KIHEI
UPCOUNTRY
MAUI
HIGHWAY

FINAL ENVIRONMENTAL IMPACT STATEMENT
VOLUME ONE: FINAL EIS AND TECHNICAL REPORTS
KIHEI-UPCOUNTRY MAUI HIGHWAY
County of Maui, Hawaii

Final
Environmental Impact Statement

Submitted Pursuant to the National Environmental Policy Act, 42 U.S.C. 4332 (2)(c)
and
Hawaii Revised Statutes Chapter 343

U.S. Department of Transportation
Federal Highway Administration
and
State of Hawaii Department of Transportation
Highways Division

Cooperating Agency
U.S. Army Corps of Engineers

DEC 21 2001
Date of Approval
Brian K. Minaai
Director of Transportation
State of Hawaii Department of Transportation

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Date of Approval
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This report documents environmental impact studies of a proposed two-lane limited-access rural highway from Kihei, an urban area on the southern coast of Maui, to Upcounty, a region on the western flank of Haleakala volcano. Eight alternative alignments and a No Build alternative are currently being considered. The eight alignments consist of all combinations of two Kihei and four Upcountry terminus options. The preferred alternative has been identified as the U1,X1 Alternative, the alignment from the Hallilmaile Road / Haleakala Highway intersection in Upcountry to the Kaonolu / Pilana Highway intersection in Kihei. The project would facilitate transportation between Kihei and Upcountry, thereby addressing growth in regional transportation demand, economic development trends, and coastal evacuation deficiencies. In addition, there is federal interest in the project because it would facilitate transportation between defense-related research activities at Science City atop Haleakala Crater and the Maui Research and Technology Park in Kihei. The project will have both adverse and beneficial impacts. Potential benefits and impacts include substantial travel time savings, loss of open space, interference with agricultural activities, changes in transportation patterns, loss of archaeological resources, and savings in energy consumption. The nature of the impact varies with the alignment alternative.
NATIONAL ENVIRONMENTAL POLICY ACT STATEMENT

The National Environmental Policy Act (NEPA), 42 U.S.C. 4321-4347, became effective January 1, 1970. This law requires that all federal agencies shall prepare a detailed Environmental Impact Statement (EIS) for every recommendation or report on proposals for legislation and other major federal actions significantly affecting the quality of the human environment. The Federal Highway Administration (FHWA) is, therefore, required to have an EIS prepared on proposals funded under its authority if the proposal is determined to be a major action significantly affecting the quality of the human environment.

EISs are required for many transportation projects as outlined in NEPA. The processing of an EIS is carried out in two stages. Draft EISs are first written and forwarded for review and comment to federal, state and local agencies with jurisdiction by law or special expertise and are made available to the public. This availability to the public must occur at least 15 days before the public hearing and not later than the time of the first public hearing notice or notice of opportunity for hearing. Normally, 45 days, plus mailing time, will be allowed for comments to be made on the Draft EIS unless a time extension is granted by the Hawaii Department of Transportation (HDOT). After this period has elapsed, preparation can begin on the Final EIS.

A Final EIS is prepared to reflect the distribution of the Draft EIS by including the following:

1. Basic Content of the Draft EIS as amended due to internal agency comments, editing, additional alternatives being considered, and changes due to the time-lag between the Draft and Final EIS.

2. Summary of public hearing comments.

3. Summary of comments received on the Draft EIS.

4. Evaluation and disposition of each substantive comment.

Administrative action cannot take place sooner than 60 days after circulation of the Draft EIS to the U.S. Environmental Protection Agency (USEPA) or 30 days after submittal of the Final EIS to the USEPA.

Both the Draft and Final EIS are full disclosure documents, which provide a full description of the proposed project, the existing environment, and analysis of the anticipated beneficial or adverse environmental effects.

General Reviewer Information

In compliance with the Metric Conversion Act of 1975 (amended in 1988) and a 1991 Presidential Executive Order, numbers throughout this Final EIS are presented in metric units with the English equivalents in parentheses.
SUMMARY

S.1 INTRODUCTION

S.1.1 APPLICANT AND PROJECT SUMMARY

The Federal Highway Administration (FHWA) and the Highways Division of the State of Hawaii Department of Transportation (SDOT) are issuing this Final Environmental Impact Statement (EIS) as the lead federal and local agencies for this project, the proposed Kihei-Upcountry Maui Highway in Maui, Hawaii.

Figure S-1 shows the general project location in the County of Maui. This proposed federal-aid limited access highway would link the Kihei-Makena and Upcountry Maui regions. In its initial phase, the highway will be constructed as a two-lane facility. The right-of-way for a future four-lane facility will be acquired, and in certain sections of the highway, earthwork for a future four-lane facility will be conducted during the initial phase of construction. This document addresses the operational impacts of a two-lane facility, the right-of-way acquisition for a four-lane facility, and in certain locations, the earthwork for a future four-lane facility.

S.1.2 PLANNING CONTEXT AND HISTORY

Study of a Kihei-Upcountry Maui Highway began over 25 years ago when, in 1970, the County of Maui studied the feasibility of a road between Upcountry Maui and Kihei. Two later studies, the County of Maui Toll Road Study (1988) and the Maui Long-Range Highway Planning Study (May 1991), also examined a roadway link between Upcountry and Kihei. Subsequently, a task force consisting of State and County officials and private citizens (the Joint State/County Task Force) was formed to recommend an alignment for this roadway. The Task Force met in 1992 and 1993, and produced a report in October 1993. Also in 1993, the SDOT, in cooperation with the FHWA, began an in-depth study of this proposed roadway link, including an evaluation of new alternatives as well as alternatives derived from past efforts. This Final EIS marks the completion of the SDOT planning efforts that began in 1993.
S.1.3 ACCEPTING AUTHORITIES

At the federal level, the FHWA Hawaii Division Administrator approved this Final EIS. At the State level, the accepting authority of this Final EIS is the Governor of the State of Hawaii. It is expected that the Governor will accept this Final EIS, completing the EIS requirements under Hawaii’s EIS Law. It is also expected that the FHWA will issue a Record of Decision (ROD) completing the project’s requirements under the National Environmental Policy Act (NEPA). After issuance of the ROD and Final EIS acceptance by the Governor, the design phase of the project may proceed.

S.1.4 PURPOSE OF THIS DOCUMENT

This Final EIS has been prepared to comply with:

- The National Environmental Policy Act (NEPA);
- Chapter 343 of the Hawaii Revised Statutes (HRS);
- FHWA and FTA Joint Regulations, 23 CFR 771;
- Regulations for Implementing the Procedural Provisions of the National Environmental Policy Act, 40 CFR 1500-1508; and
- The Hawaii Administrative Rules [Title 11, Chapter 200 (August 1996)].

This document identifies and assesses the environmental and social impacts that could result from the development of the Kihei-Upcountry Maui Highway. The highway would be designed for anticipated traffic demand in the year, 2020, which corresponds to the planning horizon of the Maui Long-Range Land Transportation Plan (February 1996). Therefore, potential impacts are assessed for that year. Construction-phase impacts are also assessed.

The EIS process is designed to enable project sponsors to develop a well-planned project that is sensitive to the physical, natural and social environment within which it would exist, and to identify and evaluate impacts associated with various alternatives under consideration. Required coordination activities with interested and affected parties are also documented in this Final EIS.
S.2 PURPOSE OF AND NEED FOR THE PROJECT

Upon completion, the Kihei-Upcountry Highway would satisfy the following six purposes and needs:

- Establish a roadway system linkage;
- Support economic development;
- Address existing intersection capacity deficiencies;
- Satisfy increased transportation demand;
- Promote the National interest as expressed though legislative directive; and
- Increase coastal evacuation capacity.

S.2.1 ROADWAY SYSTEM LINKAGE

The existing circuitous route between Kihei-Makena, a major employment center along Maui’s southern coast, and Upcountry, a popular residential area on Haleakala's western flank, is at least 25 km (16 miles) (the distance between the northern tip of Pukalani to the northern tip of Kihei). In contrast, the straight-line distance between Kihei-Makena and most Upcountry communities is 15 km to 20 km (9 to 12 miles). Travelers between the Maui Research and Technology (R&T) Park in Kihei and scientific facilities at the summit of Haleakala, called Science City, must also use the present circuitous route. The transportation route between the Upcountry communities and West Maui (Lahaina-Kaanapali-Kapalua) is also circuitous. Depending on the alternative selected, a Kihei-Upcountry Maui Highway would provide up to a 50 percent reduction in the length these journeys, substantially reducing travel time and vehicle fuel consumption.

S.2.2 ECONOMIC DEVELOPMENT

Maui’s largest industry now and for the foreseeable future is tourism. Kihei-Makena and West Maui (Lahaina-Kaanapali-Kapalua) are expected to remain the principal visitor accommodation areas on the island, as well as the island’s second and third largest employment centers. These areas will also continue to have an economic relationship with
Upcountry Maui because Upcountry has tourist attractions, such as Haleakala National Park, and is a major and popular residential area. Another increasingly important industry on Maui is high technology based at the Maui R&T Park in Kihei and Science City on the summit of Haleakala. Improved transportation efficiency would support businesses and federal government personnel at the R&T Park who provide technical assistance to Science City. In addition, road construction would infuse federal funds into the local economy.

S.2.3 EXISTING INTERSECTION CAPACITY DEFICIENCIES

Traffic volumes at nine intersections along the existing route between Kihei and Upcountry were analyzed using methodologies contained in the 1994 Highway Capacity Manual (HCM). The HCM methodologies classify traffic operations by level of service, defined by letters "A" through "F", representing best to worst conditions, respectively. In the morning peak hour, three of these intersections (including the Haleakala Highway / Hana Highway intersection and the Mokulele Highway / Pillani Highway intersection) operated at levels of service "E." In the afternoon peak hour, five intersections (including the Hana Highway / Dairy Road intersection, the Dairy Road / Kuihelani Highway / Puunene Road intersection and the Mokulele Highway / Pillani Highway intersection) operated at levels of service "E" or lower. A Kihei-Upcountry Maui Highway would divert some travel demand to an alternative route, thus relieving existing congestion at these intersections.

S.2.4 TRANSPORTATION DEMAND

Trip generation forecasts reported in the Maui Long-Range Land Transportation Plan (February 1996) indicate that the average number of daily trips on Maui would be over 386,000 in 2020, a 70 percent increase over 1990. A large portion of these trips would be generated by the tourism industry, such as home-based work trips by tourist industry employees and trips made by visitors. Because of this anticipated growth in travel demand and existing deficiencies in roadway capacity (see Section S.2.3), the following improvements are needed:
1. Additional roadway capacity between existing and future residential communities in Upcountry and employment centers in Kihei-Makena and West Maui; and
2. Additional roadway capacity between visitor accommodation regions (Kihei-Makena and West Maui) and Haleakala National Park and tourist attractions in Upcountry.

The proposed road would help satisfy both requirements above.

S.2.5 LEGISLATIVE DIRECTIVE

Federal funding for the planning of this project was appropriated because of the national interest in providing an improved transportation connection between defense-related activities at the Maui R&T Park in Kihei and Science City at the Haleakala summit. Science City receives technical support from key defense contractors in the R&T Park.

S.2.6 COASTAL EVACUATION CAPACITY

On the southern coast of Maui, the Kihei-Makena urban area is vulnerable to coastal hazards such as tsunami and tropical storms. The only routes out of Kihei-Makena are Mckulele Highway and North Kihei Road. The termini of these roadways are about 90 m (300 ft) from one another at the northern end of Kihei. The limited number of evacuation routes and their close proximity suggest there could be substantial congestion in north Kihei during an evacuation emergency. In addition, there are no alternatives should the evacuation route be blocked. A Kihei-Upcountry Maui Highway would increase evacuation capacity and provide an alternative evacuation route.
S.3 ALTERNATIVES AND ALTERNATIVE SELECTION PROCESS

S.3.1 PREFERRED ALTERNATIVE

The preferred alternative for the Kihei-Upcountry Maui Highway project has been identified as the U1.K1 Alternative, the alignment from the Halimaile Road / Haleakula Highway intersection to the Kaonoulu Street / Piilani Highway intersection (see Figure S-2). The highway will be a limited access, two-lane arterial roadway, with a length of approximately 15.8 km (9.8 miles). The posted speed limit would vary from 70 km/h (45 mph) in the urban area near Kihei to 90 km/h (55 mph) in the rural area in Upcountry. The width of the right-of-way would be at least 49 m (160 ft) in rural areas and at least 37 m (120 ft) in urban areas. These right-of-way widths are sufficient to accommodate a four-lane divided highway. The acquisition of the right-of-way for a four-lane facility is proposed to allow for the future expansion of the highway to four lanes. However, the proposed action addressed in this EIS is only the construction of a two-lane road because projections indicate that two lanes would be sufficient to accommodate the forecast travel demand in the design year, 2020.

The roadway will include one 3.7 m (12 ft) lane in each direction, and paved shoulders wide enough to accommodate bicyclists. The highway in the urban section will include bike lanes and sidewalks that are in conformance with the Americans with Disabilities Act. The highway terminus will be designed with adequate channelization (right- and left-turn lanes) to handle the projected traffic volumes. Both intersections will likely warrant traffic signals. However, this decision will be made during the design phase of the project. Several grade-separation (i.e., interchange) options for the U1 terminus were considered after the selection of the preferred alternative. However, it was determined that the additional cost of a U1 interchange could not be justified since an at-grade signalized intersection would cost substantially less, and be able to acceptably handle projected year 2020 peak hour traffic demand.
Preferred Alternative
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FIGURE S-2
S.3.2 OTHER BUILD ALTERNATIVES

In addition to the preferred alternative, seven build alternatives have been carried forward for detailed analysis in this Final EIS (see Figure S-3). The eight build alternatives, including the preferred alternative, consist of all possible combinations of two Kihei and four Upcountry terminus options. Figure S-3 shows the candidate termini and the alignments that would link them. The Kihei termini and segments are named K1 and K2, and the Upcountry termini and segments are named U1, U2-A, U2-B and U3. The names of the other build alternatives are:

1. U1,K2
2. U2-A,K1
3. U2-A,K2
4. U2-B,K1
5. U2-B,K2
6. U3,K1
7. U3,K2

The U2-A alternatives (U2-A,K1 and U2-A,K2) would require the modification of the Pukalani Bypass / Haleakala Highway / Kula Highway "Five Trees" intersection. Kihei-Upcountry Maui Highway would replace the Haleakala Highway leg (Pukalani side) and Haleakala Highway would be re-aligned to link and form a T-intersection with Pukalani Bypass at approximately 370 m (1200 ft) north of the "Five Trees" intersection. The existing segment of Haleakala Highway between the new connection to Pukalani Bypass and the "Five Trees" intersection would be converted to a cul-de-sac to maintain access to future land uses.

The design of the other build alternatives would be similar to the preferred alternative. They would provide a limited access arterial roadway with one 3.6 m (12 ft) lane in each direction, with a roadway right-of-way of at least 49 m (160 ft) wide in rural areas and at least 37 m (120 ft) wide in urban areas to allow for the widening of the facility to four lanes if appropriate in the future. The posted speed limits would vary from 70 km/h (45 mph) in urban areas to 90 km/h (55 mph) in rural areas.

S.3.3 NO BUILD ALTERNATIVE

The No Build alternative consists of those roadway improvements that are expected to be implemented by 2020 as stated in the Maui Long-Range Plan Land Transportation Plan (Final
Report, February 1997), apart from the proposed project. The No Build alternative is the
benchmark reference against which project impacts are assessed in this Final EIS.

S.3.4 ALTERNATIVES DEVELOPMENT AND SELECTION OF THE
PREFERRED ALTERNATIVE

S.3.4.1 Development of Project Alternatives

Three general steps were accomplished to develop the alternatives studied in this Final EIS:

1. A two-tiered alternatives screening analysis;
2. Refinement of Alternative U2; and
3. Additional adjustments to alignments.

A two-tiered alternatives screening analysis was performed to evaluate fourteen alternatives
that were developed from prior studies and reports, scoping activities conducted as part of
the EIS process, and public involvement activities (see Figures 2-6 and 2-7). Twelve of these
alternatives were different alignments. The other two alternatives were "enhanced widening of
existing roadways," beyond the widening proposed in the No Build Alternative, and
Transportation Systems Management (TSM).

Candidate evaluation criteria were generated and sorted into two groups: Tier One (fatal
flaws) and Tier Two. The Tier One (fatal flaw) criteria were developed to eliminate alternatives
that are impractical, unfeasible or not fundable to avoid unnecessary analysis of alternatives
that would have minimal chance of being selected as the Preferred Alternative. The Tier Two
criteria relate primarily to the nature and degree of impact. An alternative not satisfying a Tier
Two criterion could be feasible, but would not be advantageous with respect to the criterion in
question.

The Tier One screening analysis eliminated from further study six alignment alternatives, the
"enhanced widening of existing roadways" alternative, and the TSM alternative (see Section
2.2.1.3a). The Tier Two screening analysis evaluated the remaining six alternatives and
eliminated two alignment alternatives (see Section 2.2.1.3b). The remaining four alternatives
were then recast as combinations of mauka and makai segments. By combining the two
makai terminus choices (K1 and K2) with the three mauka terminus choices (U1, U2 and U3),
it became possible to generate six alternatives comprised of common roadway segments.

Following selection of these six alternatives, it was discovered that Segment U2 would cross a
site planned for a Kamehameha Schools / Bishop Estate campus. Also, archaeological
reconnaissance surveys found notable sites (potentially eligible for the National and/or State
Registers of Historic Places and important for preservation) within the U2 alignment (see
Section 3.10.2). Therefore, four modifications of the eastern (mauka) section of the U2
alignment (U2-A, U2-B, U2-C and U2-D) were developed and evaluated based on such
criteria as maximum grade, number of gulch crossings, and operational considerations.
Following this evaluation, the U2-A and U2-B modifications were selected for further
evaluation. The U2-A alignment shifts the eastern (mauka) portion of the U2 alternative
northward, creating a terminus at the Pukalani Bypass / Haleakala Highway / Kula Highway
“Five Trees” intersection. The U2-B alignment shifts the U2 alternative along the northern
boundary of the future Kamehameha Schools campus while maintaining the same terminus
(as the original U2 alternative) on Kula Highway.

Finally, the results of archaeological reconnaissance surveys (see Section 3.9) required minor
re-alignments of Segments U2-A and U3. The alternatives shown on Figure S-3 reflect all of
the changes described above.

S.3.4.2 Selection of the Preferred Alternative
The eight build alternatives described in Section S.3.1 and S.3.2 were evaluated to determine
the preferred alternative using transportation performance, cost, and agricultural impact
criteria. In addition, community plan preferences were used. The purpose of this comparison
was to determine how well each of the alternatives fared with respect to these criteria and in
comparison to one another. Other criteria that relate to environmental and social impacts
were considered for this analysis, but were not used because, while important, they did not
differentiate between the build alternatives. This analysis of build alternatives to select the
preferred alternative does not include the No Build alternative, because the No Build
alternative remains under consideration until the Record of Decision is issued.
In evaluating the transportation performance of the alternatives, all of the U3 and K2 alternatives were eliminated from further consideration because they would not serve the major travel markets as well as the U1, U2 (A or B) and K-1 alternatives. The U3 terminus is furthest away from the Upcountry population centers, and the K2 alternatives would not serve the Upcountry - West Maui travel market. Although the K2 alternatives are better in augmenting the evacuation capacity of South Maui, this advantage was not judged to override the disadvantage of not serving the Upcountry - West Maui travel market. The remaining alternatives, U1, K1, U2-A, K1 and U2-B, K1, were then evaluated using the other criteria.

Of these remaining alternatives, the U1, K1 alternative would be the least expensive to construct. However, the costs of the three alternatives are all within 7 percent of one another. Therefore, cost was only a minor factor in the decision to select the preferred alternative.

The U2-A and U2-B alternatives would cause less of an impact to agriculture than the U1, K1 alternative. However, Alexander & Baldwin, the parent company of Hawaiian Commercial and Sugar Company, indicated a willingness to work with the SDOT on appropriate mitigation to lessen the impact to their agricultural operations (see Volume Two: Draft EIS Comments and Responses). Therefore, like the cost factor, agricultural impacts were only a minor factor in the decision to select the preferred alternative.

All the remaining alternatives would be consistent with the Kihei-Makena Community Plan, and therefore, this plan does not help discriminate among the remaining alternatives. On the other hand, the Makawao-Pukalani-Kula Community Plan indicates a strong preference for a No Build alternative. However, this plan goes on to state a preference for a U1 alternative, if the highway project moves forward. This preference for a U1 alternative, among all the build alternatives, was reiterated by several Upcountry commentors throughout the EIS process. The community plan preference for a U1 alternative, if constrained to select among the three remaining alternatives, was highly influential, and was a major determining factor that led SDOT and FHWA to select the U1, K1 alternative as the preferred alternative.
S.4 IMPACTS AND MITIGATION

Table S-1 summarizes the environmental and social impacts, including construction-phase impacts, of the No Build and build alternatives, including the preferred alternative. A summary of mitigation measures for each adverse impact of the build alternatives is also provided in this table. In general, the build alternatives' impacts are similar. However, the following differences do exist:

Alternatives with a U1 alignment (U1.K1 [preferred alternative] and U1.K2)
- These alternatives would have the most severe cropland impacts.

Alternatives with either a U2-A or U2-B alignment (U2-A.K1; U2-A.K2; U2-B.K1; and U2-B.K2)
- These alternatives would have the second most severe cropland impacts.

Alternatives with either a U1, U2-A or U2-B alignment (U1.K1 [preferred alternative]; U1.K2; U2-A.K1; U2-A.K2; U2-B.K1; and U2-B.K2)
- These alternatives would increase the use of Omaopio and Pulehu Roads as a through route. These roads were not designed for such a purpose, although the County is planning to improve them.

Alternatives with a U3 alignment (U3.K1 and U3.K2)
- These alternatives would be within visual distance of a cattle corral potentially affecting ranch operations. These alternatives would also cross two pineapple fields and the Kula Agricultural Park, County land that is leased to small-scale farmers at comparatively low rates. Remnant agricultural parcels that may be difficult to work may be created at one of the pineapple fields affected by this alternative.
- These alternatives may lead to the use of local residential roads between Kula and Haleakala Highways as a route to the Haleakala summit.

Alternatives with a K1 alignment (U1.K1 [preferred alternative]; U2-A.K1; U2-B.K1 and U3.K1)
- These alternatives may affect adjacent ranching operations. Proper measures will need to be implemented to minimize the conflicts between cattle and roadway operations. For example, cattle will need to be herded across the highway right-of-way several times a year, and these crossings may take ten to fifteen minutes.
## Table S-1

### Summary of Environmental Impacts and Mitigation

<table>
<thead>
<tr>
<th>No-Build Alternative</th>
<th>Build Alternatives</th>
<th>Common</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>LAND USE</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Construction Impacts</td>
<td>Construction Impacts</td>
<td>Introduction of a roadway to agricultural areas (sugarcane, pineapple and ranching), leading to an irrevocable loss of open space and interference with existing, adjacent agricultural practices (see Farmland below). No outright residential or business displacements.</td>
</tr>
<tr>
<td>Operational Impacts</td>
<td>Operational Impacts</td>
<td>The highway would have minimal influence on long-term regional land use trends because other factors, such as water availability, health of the visitor industry, and pace of development of &quot;high-tech&quot; industry control the speed and extent of land use development.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>U1 Alternative (including the preferred alternative) Will facilitate development beyond Pukalani's urban growth boundary as defined by the community plan. Will support planned A&amp;B development in Hamakua. U2-A or U2-B Alternative. Would support the planned Kulamalu development. U2-B was the suggested alignment contained in the Kulamalu Master Plan. U3 Alternative. Not expected to influence land use development in Kula because water availability would continue to be the major constraint. K1 or K2 Alternative (including the preferred alternative). May promote in-fill development in Kihei, which would be a beneficial impact.</td>
</tr>
</tbody>
</table>

**Mitigation:** None required. **Mitigation:** Landowners affected by right-of-way acquisition will be compensated based on the guidelines of the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970.

### FARMLAND

<table>
<thead>
<tr>
<th>Construction Impacts</th>
<th>Construction Impacts</th>
<th>Common</th>
</tr>
</thead>
<tbody>
<tr>
<td>Farmland Impacts</td>
<td>Will convert agricultural lands to a transportation use, cause crop damage, disturb sugarcane and pineapple operations, and affect cattle grazing. Will damage existing U1 Alternative (including the preferred alternative). In addition to direct conversion of cropland to a transportation use, will isolate approximately 400 ha (1000 acres) of sugarcane land from a larger field.</td>
<td></td>
</tr>
</tbody>
</table>

S-15
### Table S-1
#### Summary of Environmental Impacts and Mitigation (continued)

<table>
<thead>
<tr>
<th>No Build Alternative</th>
<th>Build Alternatives</th>
<th>Alignment-Specific</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Farmland</strong> (cont.)</td>
<td>Construction impacts (cont.). See above.</td>
<td>U1 Alternative (cont.), and cross a pineapple field. In addition to direct conversion of cropland to a transportation use, will isolate approximately 400 ha (1000 acres) of sugarcane land from a larger field, and cross a pineapple field.</td>
</tr>
<tr>
<td></td>
<td>Construction impacts (cont.). Agricultural infrastructure (haul roads, and irrigation and drainage systems), adversely affecting current operating practices.</td>
<td>U2-A or U2-B Alternative. In addition to direct conversion of cropland to transportation use, would isolate approximately 25 ha (60 acres) of sugarcane land from a larger field, and cross two pineapple fields.</td>
</tr>
<tr>
<td></td>
<td>U2-A Alternative. The realigned Haleakala Highway in Pukalani would cross a pineapple field, converting some of this land to transportation use.</td>
<td>U2 Alternative. In addition to direct conversion of cropland to transportation use, would cross two pineapple fields, and a County agricultural park, which is used to lease parcels to small-scale farmers at comparatively low rates.</td>
</tr>
<tr>
<td></td>
<td>Construction impacts (cont.). Per the Farmland Protection Policy Act, Land Evaluation and Site Assessment scores for each alternative were calculated, and are shown to the right. No alternative has a score equal to or greater than 160, the threshold at which alternatives that avoid farmland impacts must be evaluated.</td>
<td>U1, K1 Alternative (preferred alternative). 151 points</td>
</tr>
<tr>
<td></td>
<td>U1-K2 Alternative. 149 points</td>
<td>U2-A K1 Alternative. 141 points</td>
</tr>
<tr>
<td></td>
<td>U2-A-K2 Alternative. 142 points</td>
<td>U2-B K1 Alternative. 139 points</td>
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<tr>
<td></td>
<td>U2-B K2 Alternative. 139 points</td>
<td>U3 K1 Alternative. 140 points</td>
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<td></td>
<td>U3-K2 Alternative. 137 points</td>
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</tbody>
</table>

S-16
### Table S-1
Summary of Environmental Impacts and Mitigation (continued)

<table>
<thead>
<tr>
<th>No Build Alternative</th>
<th>Build Alternatives</th>
<th>Alignment-Specific</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>FAIMALD (cont.)</strong></td>
<td></td>
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</tr>
<tr>
<td>Operational Impacts. Sugarcane, pineapple, ranching and small farm agriculture in the study area would remain viable. They would, however, continue to be adversely affected by external forces such as world market conditions and suburban encroachment.</td>
<td>Operational Impacts. Will interfere with sugarcane and pineapple cultivation because the highway will cross active fields, which will make working the fields more difficult. Will improve access to cattle grazing areas.</td>
<td>U3 Alternative: Would be within visual distance of a major cattle corral and water system. The corral may not operate normally if the Highway is within visual distance. K1 Alternative (including the Preferred Alternative): Without mitigation, adjacent landowner would herd cattle across the roadway several times a year. Crossing the highway would take 10 to 15 minutes.</td>
</tr>
<tr>
<td>Mitigation. None required.</td>
<td>Mitigation. A &quot;Maintenance of Agricultural and Ranching Activities Plan&quot; will be prepared during design and implemented during construction. Measures to offset adverse impacts to agricultural production include allowance for haul road crossings and grade separation of selected haul roads, and replacement and relocation of other existing agricultural infrastructure, such as irrigation and drainage systems. Farmers (owners and leaseholders) will be compensated for crop damage and lease losses, if necessary. Sections of the roadway crossing pastureland will require stock-proof fencing along both sides of the highway. Cattle crossing locations at certain bridges will be designated to avoid the need for cattle to cross the roadway.</td>
<td></td>
</tr>
<tr>
<td><strong>SOCIAL AND ECONOMIC</strong></td>
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</tr>
<tr>
<td>Construction Impacts. Socio-economic impacts associated with the various roadway widening projects contained in the Long-Range Plan.</td>
<td>Construction Impacts. The project will infuse up to $66 million of federal funds into the local economy, increasing short-term employment and the purchase of local goods and services.</td>
<td>U2-B alternative. This alignment will be adjacent to a planned shopping center in the Kulamalu development. Depending on the type of stores at this center, visitor-related establishments in Makawao, and perhaps Paia, may suffer a loss.</td>
</tr>
<tr>
<td>Operational Impacts. Implementation of community plans would affect existing communities by increasing population and traffic, and have environmental impacts, such as agricultural encroachment.</td>
<td>Operational Impacts. No alternative will cut through or isolate existing neighborhoods. Therefore, existing social activities will be unaffected. With the exception of Kahului, the new highway does not function as a bypass roadway. Therefore, adverse</td>
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### Table S-1
Summary of Environmental Impacts and Mitigation (continued)

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<tr>
<th>No Build Alternative</th>
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<td>Common</td>
<td>Alignment-Specific</td>
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<tr>
<td>SOCIAL AND ECONOMIC (cont.)</td>
<td>Operational Impacts (cont.)</td>
<td>Impact to existing business districts in Pukalani, Makawao, and Kihei are not anticipated. Adverse impacts to business districts in Kahului are also not expected because it is the island’s principal commercial center. The potential for long-term employment opportunities will depend on how well the alternatives facilitate employment-producing land uses in areas approved by the County, such as Kula, or in-fill development in Kihei. Property tax revenues to the County would decrease by about $13,000 to $46,000 per year depending on the alternative because of the conversion of taxable real estate to public right-of-way.</td>
<td>Mitigation. None required.</td>
</tr>
<tr>
<td>TRANSPORTATION</td>
<td>Construction Impacts</td>
<td>Construction delays associated with various roadway widening projects contained in the Long-Range Plan.</td>
<td>Construction Impacts</td>
</tr>
</tbody>
</table>
## Table S-1
Summary of Environmental Impacts and Mitigation (continued)

<table>
<thead>
<tr>
<th>No Build Alternative</th>
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<tr>
<td><strong>Common</strong></td>
<td><strong>Alignment-Specific</strong></td>
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<tr>
<td>TRANSPORTATION (cont.)</td>
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<tr>
<td>Operational Impacts (cont.) See above.</td>
<td>U11-12-A or U12-B Alternative (cont.) Increasing use of these roads will interfere with farm vehicle movements and local traffic, and may increase traffic related noise. This impact will be greatest under the U1 alternative, including the preferred alternative, because the Upcountry terminus is furthest away from the Omaoio and Pulehu Roads' intersections with Kula Highway.</td>
</tr>
<tr>
<td><strong>Mitigation</strong> None required</td>
<td>Mitigation. &quot;Maintenance of Traffic Plan&quot; will be prepared during the design phase to minimize impacts on traffic flows during construction.</td>
</tr>
<tr>
<td>AIR QUALITY</td>
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<tr>
<td>Construction Impacts: Dust and mobile source emissions will be generated during the construction</td>
<td>Construction Impacts: Air quality impacts during roadway construction will consist of fugitive dust and mobile source emissions from construction equipment.</td>
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### Table S-1

**Summary of Environmental Impacts and Mitigation**

(continued)

<table>
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<tr>
<th>No Build Alternative</th>
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<th>Alignment-Specific</th>
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<tbody>
<tr>
<td><strong>AIR QUALITY (cont.)</strong></td>
<td>Construction Impacts (cont.) of the various roadway widening projects contained in the Long-Range Plan.</td>
<td>Construction Impacts (cont.) See above.</td>
</tr>
<tr>
<td>Operational Impacts</td>
<td>Operational Impacts</td>
<td>Operational Impacts. None of the alternatives will cause a violation of the applicable State or federal air quality standards.</td>
</tr>
<tr>
<td>Mitigation</td>
<td>Mitigation. Dust control measures will be implemented during construction, such as minimizing land disturbance, using watering trucks and windbreaks, limiting vehicular paths, and stabilizing temporary roads. Following construction, any disturbed land not permanently in use will be revegetated.</td>
<td></td>
</tr>
<tr>
<td><strong>NOISE AND VIBRATION</strong></td>
<td>Construction Impacts. Noise will be generated during the construction of the various roadway widening projects contained in the Long-Range Plan.</td>
<td>Construction Impacts. Construction will normally occur during daylight hours when occasional loud noises are more tolerable, and construction activities will generally be in isolated areas away from noise sensitive land uses. Unacceptable noise and vibration impacts at sensitive sites are not anticipated.</td>
</tr>
<tr>
<td>Operational Impacts</td>
<td>Operational Impacts. Predicted traffic noise levels at 12 of the 13 selected noise receptor sites are predicted to increase 1 dBA to 11 dBA over existing ambient levels. These predicted increases are not considered &quot;substantial&quot; according to the SDOT Noise Analysis and Abatement Policy.</td>
<td>US Alternative. Although the predicted noise level at a site located on Kula Highway would be slightly below the predicted noise level under the No Build alternative, an impact, per the Noise Policy, would occur because the future noise level would approach the NAC. K1 Alternative (including the preferred alternative). Early morning noise impacts from vehicles traveling to the Haleakula summit were specifically mentioned as a potential concern during scoping.</td>
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## Table S-1
Summary of Environmental Impacts and Mitigation (continued)

<table>
<thead>
<tr>
<th></th>
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<td>Common</td>
<td>Alignment-Specific</td>
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<tr>
<td><strong>NOISE AND VIBRATION (cont.)</strong></td>
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<tr>
<td>Operational Impacts (cont.)</td>
<td>See above.</td>
<td>Operational Impacts (cont.)</td>
<td>See above.</td>
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<td></td>
<td>K1 Alternative (cont.)</td>
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<td>However, early morning noise levels at the most affected neighborhood would increase only by 3 dBA, which is barely perceptible and is well below a substantial increase.</td>
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<td></td>
<td>K2 Alternative. A substantial increase in noise, per the Noise Policy, is predicted to occur at a site in the future Kihei Regional Park adjacent to the highway.</td>
</tr>
<tr>
<td>Mitigation</td>
<td>None required.</td>
<td>Mitigation.</td>
<td>U3 Alternative Mitigation. A noise barrier at the site along Kula Highway was considered, but was found not to be reasonable and feasible because it would block viewpoints from the affected residence and would be inappropriate in a rural setting.</td>
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<td>Specifications for allowable noise levels during construction at nearby communities will be formulated and implemented. A noise permit will be obtained from the State Department of Health (SDOH) if stipulated noise control standards can not be met.</td>
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<td>K2 Alternative Mitigation. The SDOT and FHWA would work with the County of Maui to mitigate impacts to noise sensitive activities at the future park. Measures could include buffer zones and berms along the highway.</td>
</tr>
<tr>
<td><strong>WATER RESOURCES</strong></td>
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<tr>
<td>Construction Impacts</td>
<td>Erosion and sedimentation may occur during construction from various roadway widening projects contained in the Long Range Plan.</td>
<td>Construction Impacts. Water resource impacts could occur from erosion and sedimentation associated with the project's earthmoving and stockpiling activities, and construction of gulch crossings.</td>
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<tr>
<td>No Build Alternative</td>
<td>Build Alternatives</td>
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<tr>
<td><strong>WATER RESOURCES (cont.)</strong></td>
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<tr>
<td>Operational Impacts: Increase in regional pollutant loading of surface waters from roadway drainage because of increases in regional VMT.</td>
<td>Operational Impacts: Highway runoff containing automobile-related pollutants (petroleum, oil, rubber) would percolate into the ground. During heavy rain, runoff will drain into the gulches on the side of Haleakalā. However, since total regional VMT will decrease (see Transportation), the highway's impact on total regional pollutant loading of surface waters from roadway drainage will be reduced in comparison to the No Build alternative. Inadvertent spills of petroleum-based fuels or chemical products could infiltrate groundwater sources underlying the highway.</td>
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<tr>
<td>Mitigation: None required.</td>
<td>Mitigation: Storm water runoff and erosion during project construction will be mitigated through the use of Best Management Practices (BMPs) established before construction begins in coordination with the SDOH and Maui County. In the event of a petroleum or hazardous materials release, established incident response procedures will prevent impacts to groundwater sources. The depth of the water table from the ground will also help protect the aquifer under these conditions.</td>
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<tr>
<td><strong>FLORA</strong></td>
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<tr>
<td>Construction Impacts: Vegetational communities will be cleared in association with the construction of various roadway widening projects contained in the Long-Range Plan.</td>
<td>Construction Impacts: Vegetational communities will be cleared for the roadway (see right). None of these communities contain threatened or endangered species, consisting mostly of existing and former cultivated lands, kiawe forests, buffelgrass and gulch vegetation. Therefore, construction will not threaten the region’s botanical resources, which consists of non-native species in the areas to be directly affected by construction.</td>
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<tr>
<td>Operational Impacts: None.</td>
<td>Operational Impacts: The new highway will increase the possibility of fires in the region due to enhancing public access to dry areas.</td>
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</table>
## Table S-1
Summary of Environmental Impacts and Mitigation (continued)

<table>
<thead>
<tr>
<th>No Build Alternative</th>
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<tr>
<td><strong>FLORA (cont.)</strong></td>
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<tr>
<td>Operational Impacts</td>
<td>Operational Impacts</td>
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<tr>
<td>(cont.) See above</td>
<td>(cont.) See above</td>
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<tr>
<td><strong>Mitigation</strong></td>
<td>Mitigation</td>
<td></td>
</tr>
<tr>
<td>None required</td>
<td>Landscaping will be provided, which would include native trees and shrubs wherever practicable. The Maui Native Plant Society and the State Department of Land and Natural Resources will be consulted. Details of the landscaping plan will be developed during the design phase. Existing SDDT specifications, such as proper use of mulch and cleaning and maintenance of construction vehicles and equipment, will help control the spread of alien species. Signage will alert motorists of possible fire conditions and warn them to take measures to minimize fire risk.</td>
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<tr>
<td><strong>FAUNA</strong></td>
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<tr>
<td>Construction Impacts</td>
<td>Construction Impacts</td>
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</tr>
<tr>
<td>Animals associated with the vegetation to be removed would be displaced from the construction of various roadway widening projects contained in the Long-Range Plan.</td>
<td>Some existing faunal habitats will be converted into roadway and embankment. However, this change will not threaten the relatively common faunal communities in the region.</td>
<td></td>
</tr>
<tr>
<td>Operational Impacts</td>
<td>Use of Kihel-Upcountry Maui Highway will increase the number of vehicle collisions with axis deer. It is unlikely that the highway will increase the incidence of vehicle-cattle collisions because cattle can be prevented from entering the highway right-of-way by well-maintained stock-proof fencing.</td>
<td>U1, U2-A or U2-B Alternative (including the preferred alternative). Will be in proximity to a reservoir that may be used by migratory and resident water birds, including the endangered Hawaiian coot. However, there is sufficient horizontal and vertical buffer between the alignment and the reservoir so that the highway will not affect the waterbirds using the reservoir. U1-K1 Alternative (preferred alternative). Alternative that is furthest away from the maximum</td>
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</table>
### Table S-1
#### Summary of Environmental Impacts and Mitigation
(continued)

<table>
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<tr>
<th>No Build Alternative</th>
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<td>Common</td>
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<tr>
<td>FAUNA (cont.)</td>
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<tr>
<td>Operational Impacts (cont.) See above.</td>
<td>Operational Impacts (cont.) See above.</td>
</tr>
<tr>
<td>Mitigation None required.</td>
<td>Mitigation. Well-maintained stock-proof fencing at cattle grazing areas will prevent cattle from wandering onto the highway. However, such fencing will not prevent deer from getting onto the highway if they so wish. Frequent signage will be provided warning motorists of the danger of deer on the Highway.</td>
</tr>
<tr>
<td>SOLID AND HAZARDOUS WASTE</td>
<td></td>
</tr>
<tr>
<td>Construction Impacts Wastes would be generated in association with the construction of various roadway widening projects contained in the Long Range Plan.</td>
<td>Construction Impacts. The volumes of cut and fill will be balanced across the project so there will be no requirement for fill material to be disposed of or imported from outside the construction site. Excavated material is expected to be free of contamination. Construction activities will generate solid and hazardous waste.</td>
</tr>
<tr>
<td>Operational Impacts None.</td>
<td>Operational Impacts None.</td>
</tr>
<tr>
<td>Mitigation None required.</td>
<td>Mitigation. Solid and hazardous waste generated during construction will be properly handled and disposed of per SDH and Maui County requirements.</td>
</tr>
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</table>

**NATURAL HAZARDS**

| Construction Impacts None. | Construction Impacts None. |
### Table S-1
Summary of Environmental Impacts and Mitigation (continued)

<table>
<thead>
<tr>
<th>No Build Alternative</th>
<th>Build Alternatives</th>
<th>Operational Impacts</th>
<th>Mitigation</th>
<th>Operational Impacts</th>
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<tr>
<td></td>
<td>Common</td>
<td>Operational Impacts</td>
<td>Mitigation</td>
<td>An additional egress route and roadway capacity will be provided in the event of an evacuation from Kīhei-Ma'ili.</td>
<td>None required.</td>
</tr>
<tr>
<td></td>
<td>Alignment-Specific</td>
<td>Operational Impacts</td>
<td>Mitigation</td>
<td>None required.</td>
<td>Operational Impacts</td>
</tr>
<tr>
<td><strong>NATURAL HAZARDS (cont.)</strong></td>
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<tr>
<td>Operational Impacts: Evacuation capacity of the Kīhei-Ma'ili region would continue to be limited due to the lack of roadway capacity and alternative routes.</td>
<td>Operational Impacts: An additional egress route and roadway capacity will be provided in the event of an evacuation from Kīhei-Ma'ili. The new highway will not result in additional exposure to natural hazards.</td>
<td>Mitigation: None required.</td>
<td>Mitigation: None required.</td>
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<tr>
<td><strong>HISTORIC AND ARCHAEOLOGICAL RESOURCES</strong></td>
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<tr>
<td>Construction Impacts: Historic properties could be affected by the construction of various roadway widening projects contained in the Long-Range Plan.</td>
<td>Construction Impacts: Construction activities will eliminate archaeological sites that require data recovery, but do not require preservation. The number of these type of sites affected by each alternative is provided on the right. Only the preferred alternative (U1-K1) underwent an archaeological inventory survey. The information about the other alternatives was based on reconnaissance surveys. It is likely that the number of sites that would be affected by the other alternatives would change if they were to undergo inventory surveys.</td>
<td>Number of archaeological sites requiring data recovery by alternative: Alternative U1-K1 (preferred alternative): three (3) sites Alternative U1-K2: seven (7) sites Alternative U2-A K1: three (3) sites Alternative U2-A K2: seven (7) sites Alternative U2-B K1: three (3) sites Alternative U2-B K2: seven (7) sites Alternative US-K1: six (6) sites Alternative US-K2: ten (10) sites</td>
<td>Mitigation: None required.</td>
<td>Operational Impacts: None.</td>
<td>Mitigation: A mitigation measure that has already been implemented is the modification of alignments to avoid sites that require preservation. In accordance with Section 106 of the National Historic Preservation Act, a Memorandum of Agreement (MOA) was prepared and signed by the FHWA and the State Historic Preservation Officer (SHPO), with which the SDOT has concurred. The MOA specified that a data recovery plan be prepared and implemented, in coordination with the State Historic...</td>
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Table S-1
Summary of Environmental Impacts and Mitigation
(continued)

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<tr>
<th>HISTORIC AND ARCHAEOLOGICAL RESOURCES (cont.)</th>
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<td>No Build Alternative</td>
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<tr>
<td>Mitigation (cont.)</td>
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<td>PARKLANDS</td>
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<td>Operational Impacts</td>
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<td>Operational Impacts</td>
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<td>Mitigation</td>
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<th>VISUAL AND AESTHETIC RESOURCES</th>
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<tr>
<td>Construction Impacts</td>
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<td>Construction Impacts</td>
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<tr>
<td>Mitigation</td>
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</table>

K2 Alternative: Would enhance access to the future Kihei Regional Park to a greater degree than a K1 alternative. However, this alternative would cause a substantial increase in noise from existing levels at areas in the future park adjacent to the alignment. The future park site is currently used for pasture.
Table S-1  
Summary of Environmental Impacts and Mitigation  
(continued)

<table>
<thead>
<tr>
<th>No Build Alternative</th>
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<td>Alignment-Specific</td>
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<tr>
<td><strong>VISUAL AND AESTHETIC RESOURCES (cont.)</strong></td>
<td>Operational Impacts. Regardless of the alternative selected, the visual quality of Upcountry viewsheds will not be affected because the terrain drops away towards Central Maui and the ocean. However, the intactness of the eastern (mauka) Haleakula viewshed from Kihei will be affected by a paved roadway and associated embankments climbing the slope. Viewpoints may be created by the proposed highway, offering motorists using the Highway mauka and maikal viewsheds.</td>
</tr>
</tbody>
</table>

Mitigation. None required.

**Mitigation.** Landscaping consistent with the climatic conditions of the area will be provided to improve the appearance of the roadway. Opportunities to establish scenic overlooks will be explored.

**ENERGY**

Construction Impacts. Energy would be expended in constructing the various roadway widening projects contained in the Long-Range Plan.

Operational Impacts. Would have higher overall vehicle fuel consumption when compared to any of the build alternatives, as travelers experience increasing congestion between Upcountry and Kihei-Makena / West Maui along the existing indirect route.

Operational Impacts. Will have lower overall vehicle fuel consumption when compared to the No Build alternative because the highway will provide a more direct route between Upcountry and Kihei or West Maui. As shown to the right, the trip length between the “Five Trees” intersection and the Lipoa Street / Pillani Highway intersection will be reduced for each alternative when compared to the No Build alternative.

Trip length reductions by alternative:
- U1.K1 Alternative (preferred alternative). 13 km (36%) trip reduction
- U1.K2 Alternative. 11 km (31%) trip reduction
- U2.A.K1 Alternative. 18 km (50%) trip reduction
- U2.A.K2 Alternative. 15 km (42%) trip reduction
- U2.B.K1 Alternative. 17 km (47%) trip reduction
- U2.B.K2 Alternative. 14 km (39%) trip reduction
- U3.K1 Alternative. 14 km (35%) trip reduction
- U3.K2 Alternative. 12 km (33%) trip reduction

Mitigation. None required.

Mitigation. None required.

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Alternatives with a K2 alignment (U1,K2; U2-A,K2; U2-B,K2; and U3,K2)

- These alternatives would cause noise impacts at the future Kīhei Regional Park.

Cumulative impacts in the project area would be caused by implementation of the County's Community Plans, and other actions by governmental and private interests (see Section S.5). However, these impacts would be tempered by the large size of the project area. For example, the loss of some uncultivated lands would not affect the biological diversity of the region because the plant species affected are abundant, and are mostly not native. However, continuing encroachment on agricultural land is a concern. If not controlled, continued urban encroachment could adversely affect the sugarcane and pineapple industries on Maui, as well the small-scale farmers in Kula. The planned residential and commercial developments in Upcountry are also a concern because they would substantially increase the population of a region that is largely based on rural and agricultural lifestyles. Many Upcountry residents expressed concern that large population growth could change the "country" ambience of Upcountry.

Secondary impacts from highway projects often occur because they can induce development. These secondary impacts can include effects on open space, air quality, water quality, natural vegetation, historic sites, social environment and demands on infrastructure. However, in this case, secondary impacts from the proposed project are not anticipated because the highway would have little influence on those proposing development because other factors, such as a severely limited water supply, appear to be controlling development. The exception would be the U1 alternatives, which may facilitate a westward (makai) expansion of Pukalani and additional growth in Hallimaile, beyond what is designated in the Community Plan.

S.5 MAJOR ACTIONS PROPOSED BY GOVERNMENTAL AGENCIES IN THE PROJECT VICINITY AND COMPATIBILITY WITH LAND USE PLANS AND POLICIES

Kīhei-Upcountry Highway would be consistent with most of the governmental plans, policies and projects in the area. Specifically:
Kihei-Upcountry Maui Highway would fulfill the recommendations of the Island of Maui-Long Range Land Transportation Plan (February 1997) to construct a new highway from Upcountry to Pilani Highway.

The SDOT and the County of Maui are planning to make improvements to the highway and roadway system in the project area. Most SDOT improvements consist of widening existing highways. Most planned new roadways are in Kihei to improve local circulation. These other roadway improvements are consistent with the proposed Kihei-Upcountry Highway.

The proposed Kihei-Upcountry Maui Highway would support the goals of the Hawaii State Plan (June 1991) dealing with economic, physical and natural environment, and transportation objectives and policies.

The proposed project would be consistent with the objectives and policies of the State’s Coastal Zone Management (CZM) Program. The Department of Business, Economic Development and Tourism (DBEDT), the agency administering the State’s CZM program, is presently reviewing project consistency.

Kihei-Upcountry Maui Highway would be consistent with the County of Maui’s General Plan 1990 dealing with economic, environmental, and transportation objectives and policies.

All of the alternatives are consistent with Kihei-Makena Community Plan (1998), which included the proposed highway. However, only the No Build alternative is fully consistent with Makawan-Pukalani-Kula Community Plan (July 1996). The Makawan-Pukalani-Kula Community Plan did not support the highway, but indicated a preference for the U1 terminus if the road were to be built.

Public and private interests are developing the following projects in the general vicinity of the proposed road:

The State of Hawaii Department of Hawaiian Home Lands will be developing homesteads in Keokea.
• The County of Maui Board of Water Supply (BWS) is planning additional reservoirs and other improvements in the Upcountry water supply systems (Makawao, and Upper and Lower Kula). The purpose of these improvements is to support planned developments as specified in the Makawao-Pukalani-Kula Community Plan and to minimize the need to implement water use restrictions during drought conditions.

• A private developer will be constructing Kualamalu, an approximately 93 ha (230 acre) residential, recreational, cultural and commercial development located south of Pukalani. A Kamehameha Schools campus has already been built on this site.

• Alexander & Baldwin is planning a 27 ha (67 acre) residential housing development in Haliimaile.

• The Maui R&T Park may eventually encompass 168 ha (415 acres). Per County ordinance, fifty percent of the R&T Park must be dedicated to research and development, forty percent to support facilities and ten percent to light manufacturing and general industrial.

• The Maui Electric Company, Ltd., is planning to construct a 232-megawatt electrical generating station on Pulehu Road, approximately two miles east (mauka) of Mokulele Highway.

• Two parcels along Mokulele Highway, Mokulele Baseyard and the old Puunene Airport, are planned to be redeveloped for light industrial and other uses.

S.6 UNRESOLVED ISSUES

The major planning-level issues associated with the proposed highway have been addressed and resolved during the EIS process. There are no unresolved issues that need to be addressed at this phase of project planning. Several project mitigation measures must be tracked and implemented starting in the design phase of the project, including the preparation of detailed mitigation plans for archeological and agricultural impacts. Various design details must be investigated in the next phase of project planning, including the
provision of signals at the project termini and scenic overlooks. Various permits and approvals (see Section S.7) must be obtained before construction starts.

S.7 APPROVALS AND PERMITS

The following permits or approvals would be required prior to the construction of the highway.

Federal
- Army Corps of Engineers - Section 404 permit (Nationwide)

State
- State Department of Health (SDOH) - National Pollutant Discharge Elimination System (NPDES) permit (storm water from construction site)
- SDOH - Noise permit (if noise levels are expected to exceed allowable levels as stated in HAR 11-46-6(a), which would be determined during the design phase)
- SDOH - Water Quality Certification

County
- Department of Public Works (DPW)- Grading, Grubbing, Stockpiling and Excavation permit
- DPW - Permit for Excavation of Highway
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PUBLIC HEARING TRANSCRIPTS
  Kihei Aquatic and Community Center, September 29, 1999
  Mayor Hannibal Tavares Community Center, September 30, 1999
  Kahului School, October 13, 1999

DRAFT ENVIRONMENTAL IMPACT STATEMENT COMMENTS THAT REQUIRE RESPONSES
  Transmittal Letter from the State of Hawaii Department of Transportation
  Letters, Comment Forms, Paraphrased Oral Comments and Responses from the State of Hawaii Department of Transportation

DRAFT ENVIRONMENTAL IMPACT STATEMENT COMMENTS THAT DO NOT REQUIRE RESPONSES
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CHAPTER ONE

Purpose of and Need for Action
CHAPTER 1
PURPOSE OF AND NEED FOR ACTION

1.1 PLANNING CONTEXT
The Federal Highway Administration (FHWA) and the Highways Division of the State of Hawaii Department of Transportation (SDOT) are issuing this Final Environmental Impact Statement (EIS) as the lead federal and local agencies for the Kihei-Upcountry Maui Highway Project. This proposed federal-aid, two-lane limited access rural highway would directly link Kihei-Makena, an urban area on the southern coast of Maui, to Upcountry, a suburban and rural region on the western flank of Haleakala Volcano (see Figure 1-1). The highway would connect Piilani Highway (Kihei-Makena) with either Haleakala Highway or Kula Highway (Upcountry). This project is included in the current, federally-approved Statewide Transportation Improvement Program.

1.1.1 ACCEPTING AUTHORITIES
At the federal level, the FHWA Hawaii Division Administrator approved this Final EIS. At the State level, the accepting authority of this Final EIS is the Governor of the State of Hawaii. It is expected that the Governor will accept this Final EIS, completing the EIS requirements under Hawaii’s EIS Law. It is also expected that the FHWA will issue a Record of Decision (ROD), completing the project’s requirements under the National Environmental Policy Act (NEPA). After issuance of the ROD and Final EIS acceptance by the Governor, the design phase of the project may proceed.

1.1.2 PURPOSE OF THIS DOCUMENT
This Final EIS has been prepared to comply with:

- the National Environmental Policy Act (NEPA);
- Chapter 343 of the Hawaii Revised Statutes (HRS);
• FHWA and FTA Joint Regulations, 23 CFR 771;
• Regulations for Implementing the Procedural Provisions of the National Environmental Policy Act, 40 CFR 1500-1508; and
• the Hawaii Administrative Rules [Title 11, Chapter 200 (August 1996)].

This document identifies and assesses the environmental and social impacts that could result from the development of the proposed highway. The highway would be designed for anticipated traffic demand in the year 2020, which corresponds to the planning horizon of the Maui Long Range Land Transportation Plan (February 1997). Therefore, potential impacts are assessed for that year. Construction-phase impacts are also assessed.

The EIS process has been designed to enable project sponsors to develop a well-planned project that is sensitive to the physical, natural and social environment within which it would exist, and to evaluate and set forth the impacts associated with various alternatives under consideration. Coordination with interested and affected parties is also required and must be documented.

1.1.3 HISTORY

Study of a Kihei-Upcountry Highway began over 30 years ago when, in 1970, the County of Maui studied the feasibility of a road between Upcountry and Kihei. In 1988, the County of Maui Toll Road Study developed three possible alternative alignments. In 1991, the Maui Long-Range Highway Planning Study was completed and again identified a link between Upcountry and Kihei as a needed transportation improvement.

More recently, in 1993, the Mayor of the County of Maui created a State/County Joint Task Force for an Upcountry/Kihei Highway (Task Force). Its membership consisted of State and County officials and private citizens. The Task Force’s mission was to recommend an alignment between the coastal urban center of Kihei and the rural residential communities of Upcountry. The Task Force produced a report in October 1993, which recommended possible alignment corridors (see Figure 1-2). When SDOT and FHWA began in-depth study of this proposed roadway link, they considered the alignment corridors recommended by the Task Force as well as alternatives derived from other past efforts (see Section 2.2).
1.2 PURPOSE OF AND NEED FOR THE PROJECT

The project ("the proposed action") is being designed to satisfy the following six purposes and needs:

- establish roadway system linkage;
- support economic development;
- address existing intersection capacity deficiencies;
- satisfy increased transportation demand;
- promote the National interest as expressed through legislative directive; and
- increase coastal evacuation capacity.

1.2.1 ROADWAY SYSTEM LINKAGE

The travel distance between Kihei-Makena, a major employment center located along Maui’s southern coast, and Makawao or Pukalani, the larger Upcountry residential communities, is 30 km to 35 km (19 to 22 miles). However, the straight-line distance between the two areas is substantially less, at 15 km to 20 km (9 to 12 miles). The large difference between distance by roadway and direct distance is due to the circuitous transportation route the traveler must presently take to get from one area to the other. Starting from Upcountry, the route includes Haleakala Highway, Hana Highway, Dairy Road, Hansen Road, Puunene Avenue, Mokulele Highway and Pillani Highway. In addition to other purposes, the Kihei-Upcountry route is used for travel between the Maui Research and Technology (R&T) Park in Kihei and scientific facilities at the summit of Haleakala, called Science City. The travel distance between the two interrelated facilities is presently about 70 km (45 miles) (see Figure 1-3). The transportation route between the Upcountry communities and West Maui (Lahaina-Kaanapali-Kapalua) is also circuitous.

A Kihei-Upcountry Maui Highway would establish a direct route for these journeys, substantially reducing travel distances, thereby saving both travel time and vehicle fuel consumption.
1.2.2 ECONOMIC DEVELOPMENT

Mauli's largest industry now and for the foreseeable future is tourism. According to socioeconomic projections prepared for the county (Maui County Community Plan Update Program Socio-Economic Forecast, January 1994), the number of Maui visitors is expected to be close to four million by the year 2010, a daily average of over 66,000. In 1990, visitor arrivals numbered approximately 2.3 million, a daily average of 36,000. In other words, almost three out of ten persons, on a daily average, is a visitor. Independent projections prepared by the State of Hawaii Department of Business, Economic Development and Tourism (DBEDT) indicate that the daily average visitor count will be 64,900 by the year 2010, which is close to the County of Maui projections.

In 1990, West Maui and Kiihe-Makena contained approximately 53 percent and 42 percent of the island's hotel rooms, respectively. These two regions are expected to continue to be the primary visitor accommodation areas for the island, maintaining their 95 percent share of the island's hotel rooms in the future. In contrast to the hotel accommodation concentration in these two regions, tourist-related attractions are spread throughout the island: from the historic Lahaina town on the west side of the island, to lao Needle near Wailuku, to Hana and Ohe Gulch (Seven Pools) on the east side of the island, to the new Maui Ocean Center in Maalaea on the south side of the island, to the National Park on the summit of Haleakala.

Along with visitor growth, the number of tourism-related jobs in Kiihe-Makena and West Maui is also expected to increase. In 1990, these regions contained over 7,500 and 15,400 jobs, respectively, accounting for over 44 percent of the island's total. Socioeconomic projections contained in the Maui Long-Range Land Transportation Plan (February 1996) indicate by 2020 an increase to over 13,000 (73 percent) and 23,000 (49 percent) jobs in these two regions, respectively. Residential population is projected to grow by over 60 percent from 1990 to 2020. New housing to accommodate this growth would generally be concentrated at existing residential areas of Kahului-Wailuku, West Maui, Kiihe-Makena and Upcountry. Upcountry would continue to be a popular residential area because of its spectacular vistas and cool climate.
Kihei-Upcountry Maui Highway
Final Environmental Impact Statement

Chapter 1

Purposes of and Need for Action

Maui's high technology industry, located primarily at the Maui R&T Park in Kihei and Science City on the summit of Haleakala, is contributing to the diversification of Maui's economy. The Maui R&T Park currently houses the Maui High Performance Computing Center, Boeing-Rocketdyne, Sunsource, the U.S. Air Force, the Pacific Disaster Center, Lockheed Martin, the University of Hawaii, the University of New Mexico, and a number of small companies. Currently about eight percent built-out, the Park may eventually encompass 168 ha (415 acres) and include major new industries such as bio- and medical-technology; arts and entertainment; environmental, earth and ocean sciences; information processing and exchange; defense missions; and education and international training and technology conferencing. Science City, a federal facility, is used for space- and defense-related research and development. Science City receives technical support from defense contractors occupying space in the R&T Park.

A Kihei-Upcountry Maui Highway would support economic development initiatives by facilitating tourist travel between hotel accommodation regions and Haleakala National Park and other tourist-related attractions in Upcountry; linking the growing residential areas of Upcountry with growing labor markets in Kihei-Makena and West Maui; and providing improved transportation mobility between the R&T Park and Science City, which would support businesses and federal government personnel at the R&T Park who provide technical assistance to Science City.

1.2.3 EXISTING INTERSECTION CAPACITY DEFICIENCIES

Figures 1-4 and 1-5 present the morning and afternoon peak hour turning movement volumes at the following intersections between Kihei-Makena and Upcountry Maui.

- Pukalani Bypass and Makawao Avenue
- Haleakala Highway and Hallimaile Road
- Haleakala Highway and Hana Highway
- Hana Highway and Hansen Road
- Hana Highway and Dairy Road
- Dairy Road and Puunene Road and Kulhelani Highway
• Puunene Avenue and Hansen Road
• Puunene Avenue and Mokulele Highway
• Mokulele Highway and Piilani Highway

Operating conditions at these intersections were analyzed using the methodologies contained in the 1994 Highway Capacity Manual (HCM). The HCM methodologies classify traffic operations by “level of service” (LOS). LOS is designated “A” through “F”, representing best to worst conditions. The levels are based on user delays, which is a measure of driver discomfort, frustration, fuel consumption, and lost travel time. LOS C or D are generally considered the lowest levels that are still acceptable.

Table 1-1 summarizes the existing levels of service at the intersections identified above. In the a.m. peak hour, three intersections are experiencing levels of service “E” or lower. In the p.m. peak hour, five intersections are experiencing levels of service “E” or lower.

A Kihei-Upcountry Maui Highway would divert some travel demand from these intersections to a new, more direct route; relieving existing congestion at these intersections.

1.2.4 TRANSPORTATION DEMAND

In 1990, daily average trip generation on the island exceeded 233,000 trips. According to the Maui Long-Range Land Transportation Plan (February 1996), daily trip generation is projected to increase to over 386,000 trips in the year 2020. Kihei-Makena and West Maui presently generate a large portion of these trips as major employment centers and primary hotel accommodation regions. The concentration of trip generation is expected to remain in these regions. Since Maui’s population is expected to grow by over 60 percent from 1990 to 2020, home-based work trips are projected to exceed 69,000 in 2020; 26,000 more than in 1990. Many home-based work trips would be between residential areas and the employment centers of Kihei-Makena and West Maui. Many workers in these two regions live in other parts of the island, including Upcountry, which is one of Maui’s most popular residential regions because of its cool climate and spectacular vistas.
# Table 1-1
Existing Levels of Service at Critical Intersections

<table>
<thead>
<tr>
<th>Location</th>
<th>A.M.</th>
<th>P.M.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Haleakula Hwy./Pukalani Bypass (Signalized)</td>
<td>C</td>
<td>B</td>
</tr>
<tr>
<td>Haleakula Hwy./Haliimaile Road (Unsignalized)</td>
<td>A</td>
<td>B</td>
</tr>
<tr>
<td>Major Street Left Turn</td>
<td>D</td>
<td></td>
</tr>
<tr>
<td>Minor Street Left Turn</td>
<td>F</td>
<td>F</td>
</tr>
<tr>
<td>Haleakula Hwy./Hana Hwy. (Signalized)</td>
<td></td>
<td>C</td>
</tr>
<tr>
<td>Hana Hwy./Hansen Road (Unsignalized)</td>
<td>A</td>
<td>F</td>
</tr>
<tr>
<td>Major Street Left Turn</td>
<td>B</td>
<td>F</td>
</tr>
<tr>
<td>Minor Street Left Turn</td>
<td>F</td>
<td>F</td>
</tr>
<tr>
<td>Hana Hwy./Dairy Road (Signalized)</td>
<td>C</td>
<td>E</td>
</tr>
<tr>
<td>Dairy Rd./Kulihani Hwy./Puuene Road (Signalized)</td>
<td>D</td>
<td>E</td>
</tr>
<tr>
<td>Puunene Ave./Hansen Road (Unsignalized)</td>
<td></td>
<td>F</td>
</tr>
<tr>
<td>Major Street Left Turn</td>
<td>B</td>
<td>B</td>
</tr>
<tr>
<td>Minor Street Left Turn</td>
<td></td>
<td>F</td>
</tr>
<tr>
<td>Puunene Ave./Mokulele Highway (Unsignalized)</td>
<td>A</td>
<td>A</td>
</tr>
<tr>
<td>Major Street Left Turn</td>
<td>B</td>
<td>B</td>
</tr>
<tr>
<td>Minor Street Left Turn</td>
<td>D</td>
<td>F</td>
</tr>
<tr>
<td>Mokulele Hwy./Piliani Highway (Signalized)</td>
<td>E</td>
<td>E</td>
</tr>
</tbody>
</table>

**Notes:**
- LOS A: describes operations with very low delay, i.e., less than 5.0 seconds per vehicle, and most vehicles do not stop at all.
- LOS B: describes operations with delays in the range of 5.1 to 15.0 seconds per vehicle.
- LOS C: describes operations with delays in the range of 15.1 to 25.0 seconds per vehicle. The number of vehicles stopping become more noticeable, however, many vehicles still pass through the intersection without stopping.
- LOS D: describes operations with delays in the range of 25.1 to 40.0 seconds per vehicle. Many vehicles stop, and the proportion of vehicles not stopping declines.
- LOS E: describes operations with delays in the range of 40.1 to 60.0 seconds per vehicle. This is considered to be the limit of acceptable delay.
- LOS F: describes operations with delay in excess of 60.0 seconds per vehicle. This is considered to be unacceptable to most drivers.

**Source:** Parsons Brinckerhoff Quade & Douglas, November 1997
Maui's heavy reliance on the tourist industry also generates a high percentage (15 percent) of daily trips made by visitors. Trip generation by visitors is projected to increase from over 35,000 in 1990 to close to 60,000 (approximately a 70 percent increase) in 2020 based on projections of visitor arrivals. Many Maui tourists would visit Haleakala National Park, arriving by rental car, tour bus or shuttle, or bicycle tour. Currently, approximately one million people visit the Haleakala summit annually. A Park official indicated that the number of visitors to the summit correlates with the number of visitors to the island, including seasonal variations (telephone conversation, December 8, 1997). Therefore, a visitor count projection of four million in the year 2010 (made by the County of Maui) would increase the number of visitors to the summit to approximately 1.7 million. Since approximately 95 percent of the visitors stay at Kihei-Makena and West Maui (based on these regions' share of hotel rooms on the island), a large number of trips would be made between accommodation regions and the summit.

Based on the transportation demand projections and intersection capacity deficiencies described in Section 1.2.3, the following improvements are needed:

1. additional roadway capacity between existing and future residential communities in Upcountry and employment centers in Kihei-Makena and West Maui; and
2. additional roadway capacity between visitor accommodation regions in Kihei-Makena and West Maui, and Haleakala National Park and tourist attractions in Upcountry.

The proposed project would help satisfy both requirements.

**1.2.5 LEGISLATIVE DIRECTIVE**

Federal funding for the planning of this project was appropriated because of the national interest in improved mobility between defense-related activities at the Maui R&T Park in Kihei and Science City at the Haleakala summit (see Section 1.2.2). Science City does and will continue to receive technical support from defense contractors in the R&T Park. The construction of the proposed highway would address the national interest as expressed by this legislative directive.
1.2.6 COASTAL EVACUATION CAPACITY

Located on the southern coast of Maui, Kihei-Makena is vulnerable to coastal hazards such as tsunami or tropical storms. In the event of an evacuation, the only routes presently available are Mokulele Highway and North Kihei Road. Both roads are near sea level, making them vulnerable to flooding during a heavy storm, and may become impassable. In addition to the limited number of lanes these roads provide (two each), their north Kihei termini are approximately 90 m (300 ft) from one another. The close proximity of Mokulele Highway and North Kihei Road, their limited number of lanes, and the vulnerability of these roads to flooding could become sources of evacuation delay.

A Kihei-Upcountry Maui Highway would improve evacuation capacity by providing two additional lanes out of Kihei-Makena approximately 2.4 km (1.5 miles) or 7.6 km (4.7 miles) from the Pillani Highway / Mokulele Highway intersection (2.4 km (1.5 miles) for the preferred alternative). These two additional lanes would relieve some of the evacuation congestion at the northern end of Kihei, and provide an alignment for evacuation that would be geographically separated from the existing routes.
CHAPTER TWO

Alternatives
CHAPTER 2
ALTERNATIVES

This chapter describes the alternatives that receive detailed analysis in Chapter 4 of this Final EIS (eight build alternatives and the No Build alternative). It also describes the alternative development and screening processes that led to the selection of these alternatives.

2.1 DESCRIPTION OF ALTERNATIVES

2.1.1 NO BUILD ALTERNATIVE

The No Build alternative consists of roadway improvements that are expected to be implemented by 2020, according to the Maui Long-Range Land Transportation Plan (Final Report, February 1997), except for the Kihei-Upcountry Maui Highway Project. Proposed roadway improvements in the vicinity of the proposed project include:

- **South Kihei Road**: Widen from two to four lanes with a continuous left turn lane from Longs Drug Store to Lipoa Street, and widen from two to four lanes from Kupuna Street to Welakahao Road;
- **North-South Collector**: Construct a two lane collector road from Uwapo Road to Road F;
- **Road C**: Construct a four lane connector road from South Kihei Road (at Azeka Commercial Center) to Pilani Highway;
- **Pilani Highway**: Widen from two to four lanes from Mokulele Highway to Wallea Ike Road;
- **Mokulele Highway / Pilani Highway Intersection**: Reconfigure intersection making Mokulele Highway to Pilani Highway the through movement;
- **Mokulele Highway**: Widen from two to four lanes from Puunene Avenue to North Kihei Road;
- **Puunene Avenue**: Widen from two to four lanes from Kaahumanu Avenue to Mokulele Highway;
• Kuihelani Highway. Widen from two to four lanes from Puunene Road to Honoapiilani Highway, and construct an access road to Kahului Airport, bypassing Dairy Road;

• Hana Highway. Widen from four to six lanes from Kaahumanu Avenue to Haleakala Highway, and widen from two to four lanes from Haleakala Highway to Baldwin Avenue;

• Haleakala Highway. Widen from three to four lanes from Hana Highway to Haliimaile Road;

• Pukalani Bypass. Widen from three to four lanes from Haliimaile Road to Kula Highway; and

• Kula Highway. Widen two to four lanes from Haleakala Highway to Pulehu Road.

The Maui Long-Range Land Transportation Plan (1996) also references the construction of Ke Alii Alanui Street. This project was completed in 1997.

In summary, the No Build alternative consists primarily of widening to varying degrees the existing roads along the present route from Kihei to Upcountry. The No Build alternative (the projects listed above) serves as the reference against which project impacts are assessed in Chapter 4.

2.1.2 PREFERRED ALTERNATIVE

The preferred alternative is the alignment from the Haliimaile Road / Haleakala Highway intersection to the Kaanapali Street / Pilihi Highway intersection (see Figure 2-1). This alternative is called U1.K1. (As discussed in more detail below, the alternative Kihei termini and segments are named K1 and K2, and the alternative Upcountry termini and segments are named U1, U2-A, U2-B and U8.)

The proposed highway will be a limited access, two-lane arterial roadway, with a length of approximately 15.8 km (9.8 miles). A two-lane highway is proposed because projections indicate that two lanes would be sufficient to accommodate travel demand in the design year, 2020. A truck climbing lane is not proposed because the number of loaded trucks heading uphill is expected to be small, and cars would have opportunities to pass.
The roadway will include one 3.7 m (12 ft) lane in each direction, and paved shoulders (see Figure 2-2). The shoulders will be wide enough to accommodate bicyclists. A rural design, shown on Figure 2-2, will generally be used where the highway traverses rural areas presently used for crop production, pasture or open space. The urban design, which includes bike lanes and sidewalks that are in conformance with the Americans with Disabilities Act (see Figure 2-2), will be used for the section of highway that passes through Urban-designated land (in accordance with the State land use classification system) in the vicinity of the Kaonolu Street / Pillani Highway intersection (K1 terminus).

Under the rural design, roadway drainage structures will consist of a partially concrete-lined swale along one side of the road and a grated inlet catch basin on the other side at or near the right-of-way center line. Roadway runoff will be discharged to the nearest gulch. The urban design's drainage facilities will be storm drains or grated catch basins along the curbs. Runoff will again be discharged to the nearest gulch or drainage canal.

The width of the right-of-way needed for Kīhei-Upcountry Maui Highway would be at least 49 m (160 ft) in rural areas and at least 37 m (120 ft) in urban areas. Although only a two-lane highway is being proposed initially, the acquisition of right-of-way for a four-lane divided highway will be conducted to allow for the future expansion of the highway to four lanes (two lanes in each direction). The preferred alternative assessed in this document involves construction and operation of a two-lane road, and the necessary earthwork for a four-lane, divided highway where the highway crosses some gulches (see below), and where the urban design roadway section will be provided (see Figure 2-2). During the detailed design of the earthwork, the cut and fill volumes will be balanced so that excess fill material will not need to be disposed outside the construction area, nor will fill material need to be imported from other areas. If the road is widened in the future, additional earthwork will only be required in rural areas and those gulches not addressed in the initial phase of construction.

The precise width of the right-of-way at a given point will depend on local terrain features, which will affect the amount of earthwork required (i.e., cut and fill to achieve the desired roadway profile).
The amount of land estimated for the preferred alternative's right-of-way is approximately 97.6 ha (241 acres), which will be obtained from three property owners: Alexander & Baldwin (42.4 ha), Haleakala Ranch (47.5 ha) and Keaoulu Ranch (7.7 ha).

At the termini, Kihei-Upcountry Highway will be designed with adequate channelization (right- and left-turn lanes) to handle the projected traffic volumes. Both the mauka and makai termini will probably warrant traffic signals. However, this decision will be made during the design phase of the project based on traffic signal warrants specified in the Manual on Uniform Traffic Control Devices, published by FHWA. Lighting will be provided at the termini, but will not be provided along the length of the highway.

Four grade-separated (i.e., interchange) options were evaluated for the UI terminus in comparison to an at-grade signalized intersection. Under each of the following options, Halimaile Road / Kihei-Upcountry Maui Highway would pass underneath Haleakala Highway: 1) diamond; 2) single point urban (a signalized intersection is provided directly underneath Haleakala Highway at the point where Halimaile Road transitions to Kihei-Upcountry Maui Highway); 3) partial cloverleaf (single cloverleaf for the Haleakala Highway to Kihei-Upcountry Maui Highway makai bound movement); and 4) diamond with flyover (ramp for the Haleakala Highway to Kihei-Upcountry Maui Highway makai bound movement). An at-grade signalized intersection is estimated to cost roughly $800 thousand not including right-of-way, and an additional $250 thousand if double left-turn lanes are provided. The interchange options would cost between $20.3 million (diamond) and $29.8 million (diamond with flyover) not including right-of-way. None of the interchange options were found to warrant further consideration because the additional cost could not be justified, especially since the at-grade signalized intersection would be able to acceptably handle projected year 2020 traffic volumes.

The posted speed limit would vary from 70 km/h (45 mph) in urban areas to 90 km/h (55 mph) in rural areas.

Kihei-Upcountry Maui Highway will cross several gulches. These crossings will either be by bridge or embankment (fill) within the gulches. The decision to construct a bridge or embankment depended in part on the storm water flow in the gulch being spanned. Culverts
at the base of an embankment could handle up to 100 m³/s (3,500 cfs) of storm water flow. Flow volumes above this amount require a bridge crossing. Another factor affecting the type of gulch crossing was construction considerations, such as ease of access into the gulch and location of the gulch in relation to source of available borrow material. Based on these criteria, the preferred alternative will require five bridges (see Figure 2-3). Those bridges crossing Pualehu (#2), Kalaloa (#3), Keahuia (#4), and Waialoa (#5) Gulches will be shorter spans, approximately 30 m (100 ft) with clearances ranging from 3 m (9 ft) to 8 m (25 ft). The bridge crossing Kallalini Gulch (#1) will be approximately 100 m (340 ft) long.

All the bridges will be two lanes. If the highway is expanded to four lanes in the future, additional two-lane bridges would be constructed at the gulch crossings.

The four shorter span bridges may not require piers, whereas the Kallalini Gulch bridge may require piers (see Figure 2-4). If piers are required for the Kallalini Gulch bridge, their placement will be designed to not impede storm water flow, and scour protection will be provided where necessary in accordance with federal and State requirements. Details of the bridges will be determined during the design phase of the project.

Embarkment crossings will require placing fill material in the affected gulch and providing suitable scour protection. Excess material from grading to establish the roadway profile will be used to construct the embankments. The amount of borrow material created by establishing the roadway profile will be sufficient to construct all of the required embankments. Culverts will be placed at the base of the embankments to convey the storm water flow.

The preferred alternative also includes environmental mitigation measures to lessen the degree of unavoidable adverse impact. Major mitigation elements are listed below:

- Construction of grade-separated intersections (undercrossings) where the highway will cross two existing cane haul roads (see Figure 2-3; #14 and #15). The steepness of the terrain at these locations would make it difficult for the 136 000 kg (300,000 lb.) cane hauling trucks to stop if at-grade intersections are used, such as those along...
Longer Span Bridge (Option 1)

Longer Span Bridge (Option 2)

Shorter Span Bridge


Typical Bridge Profiles
KIHEI-UPCOUNTRY MAUI HIGHWAY
Final Environmental Impact Statement
FIGURE 2-4
Haleakala, Hana and Mokulele Highways. These undercrossings will be approximately 12 m (40 ft) long, with 10.7 m (35 ft) clearance.

- Landscaping will be provided wherever practicable, which will include native trees and shrubs adapted to the site climatic conditions. Details of the landscaping plan will be developed during the design phase.
- Signage will be provided to alert motorists to possible fire conditions, and axis deer that may be on the highway.
- Scenic overlooks may be provided. This will be explored during the design phase.
- A “Maintenance of Agricultural and Ranching Activities Plan” will be prepared during the design phase and implemented during construction to minimize the adverse impact of construction-phase activities on adjacent agricultural and ranching activities. The Plan will address such items as repair and replacement of affected agricultural infrastructure systems, provision of stock-proof fencing, and designation of cattle crossings.
- A “Maintenance of Traffic Plan” will be prepared during the design phase and implemented during construction to minimize impacts on existing traffic flows during construction.
- Appropriate archaeological mitigation will be implemented at historic sites affected by the preferred alternative.

2.1.3 OTHER BUILD ALTERNATIVES

In addition to the preferred alternative, seven build alternatives receive detailed analysis in this Final EIS (see Figure 2-5). All eight alternatives, including the preferred alternative, consist of all possible combinations of two Kihei terminus options and four Upcountry terminus options. Figure 2-5 shows the Kihei and Upcountry termini and the roadway segments that would link the termini. The Kihei termini and segments are named K1 and K2, and the Upcountry termini and segments are named U1, U2-A, U2-B and U3 (the evolution of U2-A and U2-B from U2 is explained in Section 2.2.2). All these alternatives would address the purposes and needs described in Chapter 1.
Descriptions of the alternatives excluding the preferred alternative, which was described in Section 2.1.2, follow:

1. **Alternative U1.K2.** This alternative is the same as the preferred alternative from the Upcountry terminus to where the alternative alignments cross. However, this alternative would proceed southwest to the Ke Alii Alanui Street / Pilihi Highway intersection. The length of Alternative U1,K2 is approximately 17.5 km (10.9 miles). Table 2-1 shows the land requirement for this alternative.

2. **Alternative U2-A.K1.** This alternative would extend from the existing Pukalani Bypass / Haleakala Highway / Kula Highway "Five Trees" intersection in Upcountry, and follow a generally west to southwest alignment to the Pilani Highway / Kaonolu Street intersection in Kihei. The length of this alternative is approximately 15.8 km (9.8 miles). The U2-A terminus connection to the "Five Trees" intersection would require the realignment of the Haleakala Highway leg (Pukalani side) of the intersection (see Figure 2-6). The modification of the "Five Trees" intersection would consist of the following, as shown in Figure 2-6:

- The Haleakala Highway leg (Pukalani side) would curve in an eastern direction to Pukalani Bypass, and a new Haleakala Highway / Pukalani Bypass T-intersection would be provided approximately 370 m (1200 ft) north of the "Five Trees" intersection (see Figure 2-6). At the T-intersection, only right turns would be allowed (eastbound traffic on the realigned Haleakala Highway turning southbound on Pukalani Bypass; and southbound traffic on Pukalani Bypass turning westbound on the realigned Haleakala Highway) for safety reasons. Left turns for northbound traffic on Pukalani Bypass onto the realigned Haleakala Highway would not be allowed.

- The existing segment of Haleakala Highway between the new connection to Pukalani Bypass and the "Five Trees" intersection would remain open to traffic, maintaining access to future land uses in this area. Access to this cul-de-sac would be from the Northwest. A physical barrier would be erected to prevent automobile access between this cul-de-sac and the "Five Trees" intersection. The
### Table 2-1
Estimated Right-of-Way Requirement For Each Alignment Alternative

<table>
<thead>
<tr>
<th>Land Owner</th>
<th>U1,K1</th>
<th>U1,K2</th>
<th>U2-A,K1</th>
<th>U2-A,K2</th>
<th>U2-B,K1</th>
<th>U2-B,K2</th>
<th>U3,K1</th>
<th>U3,K2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alexander &amp; Baldwin (HC&amp;S)</td>
<td>42.4 ha</td>
<td>42.4 ha</td>
<td>16.8 ha</td>
<td>16.8 ha</td>
<td>16.8 ha</td>
<td>16.8 ha</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>County of Maui</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>8.9 ha</td>
<td>8.9 ha</td>
</tr>
<tr>
<td>Dowling Company</td>
<td>--</td>
<td>--</td>
<td>6.4 ha&lt;sup&gt;2&lt;/sup&gt;</td>
<td>6.4 ha&lt;sup&gt;2&lt;/sup&gt;</td>
<td>12.4 ha</td>
<td>12.4 ha</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Haleakala Ranch</td>
<td>47.5 ha</td>
<td>58.3 ha</td>
<td>47.6 ha</td>
<td>58.4 ha</td>
<td>48.5 ha</td>
<td>59.3 ha</td>
<td>42.9 ha&lt;sup&gt;2&lt;/sup&gt;</td>
<td>52.5 ha&lt;sup&gt;2&lt;/sup&gt;</td>
</tr>
<tr>
<td>Kaonoulu Ranch</td>
<td>7.7 ha</td>
<td>11.5 ha</td>
<td>7.7 ha</td>
<td>11.5 ha</td>
<td>7.7 ha</td>
<td>11.5 ha</td>
<td>7.7 ha</td>
<td>11.5 ha</td>
</tr>
<tr>
<td>Malama Mohala Corp.</td>
<td>--</td>
<td>--</td>
<td>8.1 ha&lt;sup&gt;2&lt;/sup&gt;</td>
<td>8.1 ha&lt;sup&gt;2&lt;/sup&gt;</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Maui Land &amp; Pineapple Company</td>
<td>--</td>
<td>--</td>
<td>13.8 ha</td>
<td>13.8 ha</td>
<td>12.3 ha</td>
<td>12.3 ha</td>
<td>20.7 ha&lt;sup&gt;2&lt;/sup&gt;</td>
<td>20.7 ha&lt;sup&gt;2&lt;/sup&gt;</td>
</tr>
<tr>
<td>Von Tempsky Trust</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>10.5 ha</td>
<td>10.5 ha</td>
</tr>
<tr>
<td>Others&lt;sup&gt;2&lt;/sup&gt;</td>
<td>--</td>
<td>--</td>
<td>0.9 ha</td>
<td>0.9 ha</td>
<td>1.7 ha</td>
<td>1.7 ha</td>
<td>2.4 ha&lt;sup&gt;2&lt;/sup&gt;</td>
<td>2.4 ha&lt;sup&gt;2&lt;/sup&gt;</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>97.6 ha</strong></td>
<td><strong>112.2 ha</strong></td>
<td><strong>101.3 ha</strong></td>
<td><strong>115.9 ha</strong></td>
<td><strong>99.4 ha</strong></td>
<td><strong>114 ha</strong></td>
<td><strong>93.1 ha</strong></td>
<td><strong>106.5 ha</strong></td>
</tr>
</tbody>
</table>

**Notes:**
1. Includes right-of-way for re-aligned Haleakala Highway under the U2-A alternatives.
2. Includes the acquisition of remnant parcels.
3. Other land owners are: Robert A. and Astrid I. Watanabe, Alfred Botelho, Dwight Joan, Sr., et.al., and the State of Hawaii.

roadway between the cul-de-sac and intersection will be converted to a pedestrian walkway.

3. **Alternative U2-AK2.** This alternative would extend from the existing Pukalani Bypass / Haleakala Highway / Kula Highway "Five Trees" intersection to the Ke Alii Alanui Street / Piilani Highway intersection. The length of this alternative is approximately 17.5 km (10.9 miles). This alternative also includes the realignment of the Haleakala Highway leg (Pukalani side) of the "Five Trees" intersection as described above for U2-AK1. (see Figure 2-6). Table 2-1 shows the land requirement for this alternative.

4. **Alternative U2-BK1.** This alternative would extend west from Kula Highway at approximately 700 m (2300 ft) south of the "Five Trees" intersection. The alignment runs parallel with Segment U2-A for about 3000 m (10,000 ft), and then shares the same U2-A alignment. This alternative’s Kihei terminus is at the Piilani Highway / Kaonoulu Street intersection. The length of this alternative is approximately 15.5 km (9.6 miles).

5. **Alternative U2-BK2.** This alternative would extend west from Kula Highway at approximately 700 m (2300 ft) south of the "Five Trees" intersection. The alignment runs parallel with Segment U2-A for about 3000 m (10,000 ft), and then shares the same U2-A alignment. This alternative’s Kihei terminus is at the Piilani Highway / Ke Alii Alanui Street intersection. The length of this alternative is approximately 17.3 km (10.8 miles).

6. **Alternative U3K1.** This alternative would extend west from Kula Highway, south of Pulehu Gulch in Kula, to the Piilani Highway / Kaonoulu Street intersection in Kihei. The length of this alternative is approximately 14.5 km (9.0 miles). Table 2-1 shows the land requirement for this alternative.

7. **Alternative U3K2.** This alternative would extend west from Kula Highway, south of Pulehu Gulch in Kula, to the Ke Alii Alanui Street / Piilani Highway intersection in Kihei. The length of this alternative is approximately 16.1 km (10.0 miles). Table 2-1 shows the land requirement for this alternative.
Like the preferred alternative, the other build alternatives would provide a limited access, two-lane arterial roadway, but would reserve right-of-way for a future four-lane divided roadway (see Figure 2-2). Since most of the roadway would be in rural areas, primarily the rural design would be used. Those alternatives with U2-A, U2-B or K1 alignments would pass through State Urban-designated lands, which may require an urban design for these segments.

The other build alternatives would also be designed with adequate channelization (right- and left-turn lanes) to handle the projected traffic volumes at the Upcountry and Kīhei termini. If either a U2-A or K2 alternative were selected as the preferred alternative, the existing traffic signals at the U2-A terminus (Five Trees Intersection) and K2 terminus (Piilani Highway / Ke Alii Alanui Street intersection) would be modified. At the other termini (U1, U2-B, U3, and K1), the decision to place traffic signals would be made during the design phase, and would be based on traffic signal warrants specified in the Manual on Uniform Traffic Control Devices.

The other build alternatives would have the same posted speed limit, and similar roadway drainage structures as the preferred alternative.

The same criteria for selecting a bridge or embankment crossing of particular gulches that applied to the preferred alternative also applied to the other build alternatives. Table 2-2 displays the bridges anticipated along each build alternative other than the preferred alternative, and their locations are shown on Figure 2-3. The number of bridge crossings for each these alternatives is shown on Table 2-3. The shorter span bridges may not require piers, whereas longer span bridges (e.g., 60 m (200 ft) or more) may require at least one pier within the gulch (see Figure 2-4). The placement of any piers in the gulches would be done in a manner to not impede storm water flow, and scour protection would be provided where necessary.

The other gulch crossings would be by embankments, and excess material from grading other sections of the roadway would be used to construct the embankments. Culverts would be placed at the base of the embankments to convey storm water flow.
### Table 2-2
Potential Bridges for Build Alternatives Other Than the Preferred

<table>
<thead>
<tr>
<th>Loc.</th>
<th>Description</th>
<th>Segment</th>
<th>Approx. Length m (ft)</th>
<th>Approx. Clearance m (ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>Pulehu Gulch*</td>
<td>U2-(A or B)</td>
<td>30 (100)</td>
<td>5.5 (18)</td>
</tr>
<tr>
<td>3</td>
<td>Koloa Gulch #1*</td>
<td>U2-(A or B)</td>
<td>30 (100)</td>
<td>6 (20)</td>
</tr>
<tr>
<td>4</td>
<td>Keahuia Iwi Gulch #1*</td>
<td>U2-(A or B)</td>
<td>30 (100)</td>
<td>3 (9)</td>
</tr>
<tr>
<td>5</td>
<td>Waialoa Gulch #1*</td>
<td>U2-(A or B)</td>
<td>30 (100)</td>
<td>8 (25)</td>
</tr>
<tr>
<td>6</td>
<td>Kualihakoi Gulch</td>
<td>K2</td>
<td>30 (100)</td>
<td>5.2 (17)</td>
</tr>
<tr>
<td>7</td>
<td>Waipuilani Gulch</td>
<td>K2</td>
<td>30 (100)</td>
<td>6.4 (21)</td>
</tr>
<tr>
<td>8</td>
<td>Keokea Gulch</td>
<td>K2</td>
<td>30 (100)</td>
<td>4 (13)</td>
</tr>
<tr>
<td>9</td>
<td>Kaliulaini Gulch #2</td>
<td>U2-A</td>
<td>90 (300)</td>
<td>19.5 (64)</td>
</tr>
<tr>
<td>10</td>
<td>Kaliulaini Gulch #3</td>
<td>U2-B</td>
<td>210 (680)</td>
<td>30 (96)</td>
</tr>
<tr>
<td>11</td>
<td>Koloa Gulch #2</td>
<td>U3</td>
<td>130 (440)</td>
<td>17 (55)</td>
</tr>
<tr>
<td>12</td>
<td>Keahuia Iwi Gulch #2</td>
<td>U3</td>
<td>60 (200)</td>
<td>9.4 (31)</td>
</tr>
<tr>
<td>13</td>
<td>Waialoa Gulch #2</td>
<td>U3</td>
<td>80 (260)</td>
<td>9.8 (32)</td>
</tr>
</tbody>
</table>

**Note:** Locations of bridges are shown on Figure 2-3.  
* These bridges will be constructed under the preferred alternative.

**Source:** Warren S. Uemori Engineering, Inc., December 1997

The other build alternatives would also include environmental mitigation measures, similar to those described for the preferred alternative. If a U2-A or U2-B alternative were selected as the preferred alternative, the project would have included pedestrian facilities at or near King Kekaulike High School or Kamehameha School. For example, under a U2-A alternative, the segment of the Haleakula Highway at the Five Trees Intersection, which would have been replaced by Kihel-Upcountry Maui Highway, would be converted to a pedestrian walkway. In addition, sidewalks would be provided between the modified Five Trees Intersection and the high school. Also, an archaeological inventory survey would need to be conducted if another alignment were selected as the preferred alternative. Depending on the results, appropriate mitigation would need to be conducted.
Table 2-3
Bridge Requirements for Build Alternatives Other Than the Preferred

<table>
<thead>
<tr>
<th>Alternative</th>
<th>Number of Bridges</th>
</tr>
</thead>
<tbody>
<tr>
<td>U1,K2*</td>
<td>10</td>
</tr>
<tr>
<td>U2-A,K1</td>
<td>5</td>
</tr>
<tr>
<td>U2-A,K2</td>
<td>8</td>
</tr>
<tr>
<td>U2-B,K1</td>
<td>5</td>
</tr>
<tr>
<td>U2-B,K2</td>
<td>8</td>
</tr>
<tr>
<td>U3,K1</td>
<td>3</td>
</tr>
<tr>
<td>U3,K2</td>
<td>6</td>
</tr>
</tbody>
</table>

* U1 alignments include undercrossings where they cross two cane haul roads


2.1.4 ESTIMATED COST AND SCHEDULE

The preferred alternative, U1,K1, is currently (year 2001) estimated to cost $80.3 million, which includes approximately $4.9 million for right-of-way and $75.4 million for construction. The cost of the preferred alternative includes the cane haul undercrossings (see Section 2.1.2). Estimated right-of-way acquisition and construction costs (year 1997 dollars) for the other build alternatives are provided in Table 2-4. The lowest cost build alternative is U3,K1 because it would be the shortest, have the fewest bridges and have lower right-of-way acquisition cost. The most expensive alternative is U2-A,K2. Design normally costs approximately ten percent of the construction cost.

The present schedule of the project is shown on Table 2-5. Design is scheduled to commence in 2002, and construction could begin in 2004. Kihei-Upcountry Maui Highway could open for service in 2007.
Table 2-4
Estimated Cost by Alternative

<table>
<thead>
<tr>
<th>Alternative</th>
<th>Construction</th>
<th>Right-of-Way</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>U1,K2</td>
<td>$75,000,000</td>
<td>$3,800,000</td>
<td>$78,800,000</td>
</tr>
<tr>
<td>U2-A,K1</td>
<td>$63,500,000</td>
<td>$5,600,000</td>
<td>$69,100,000</td>
</tr>
<tr>
<td>U2-A,K2</td>
<td>$77,200,000</td>
<td>$5,600,000</td>
<td>$82,800,000</td>
</tr>
<tr>
<td>U2-B,K1</td>
<td>$61,400,000</td>
<td>$6,600,000</td>
<td>$68,000,000</td>
</tr>
<tr>
<td>U2-B,K2</td>
<td>$75,600,000</td>
<td>$5,500,000</td>
<td>$81,100,000</td>
</tr>
<tr>
<td>U3,K1</td>
<td>$49,600,000</td>
<td>$3,500,000</td>
<td>$53,100,000</td>
</tr>
<tr>
<td>U3,K2</td>
<td>$63,000,000</td>
<td>$3,400,000</td>
<td>$66,400,000</td>
</tr>
</tbody>
</table>

Notes: 1. Costs are based on acquiring right-of-way for a four-lane divided highway; conducting earthwork for a two-lane highway in rural areas and a four-lane highway in urban areas, earthwork for a four-lane highway within major gulches where bridges would not be used, and construction of a two-lane highway (see Figure 2-2) and two-lane bridges (see Tables 2-2 and 2-3).

2. Includes two undercrossings where the road crosses cane haul roads.

3. Includes the re-alignment of Haleakala Highway in Pukalani.

4. Estimates are rounded to the nearest 100 thousand.

5. Reflects reduced cost with credit for portion constructed as part of Kulamalu development.


Table 2-5
Proposed Project Schedule

<table>
<thead>
<tr>
<th>Activity</th>
<th>Period</th>
</tr>
</thead>
<tbody>
<tr>
<td>Design and Right-of-Way</td>
<td>2002 - 2004</td>
</tr>
<tr>
<td>Acquisition</td>
<td></td>
</tr>
<tr>
<td>Construction</td>
<td>2004 - 2007</td>
</tr>
<tr>
<td>Open for Service</td>
<td>2007</td>
</tr>
</tbody>
</table>

Source: State of Hawaii, Department of Transportation, January 2001
2.2 ALTERNATIVES DEVELOPMENT

Three steps were accomplished to develop the alternatives described in Section 2.1.2.1. The first step was a two-tiered screening analysis used to eliminate some of the alternatives developed during the project's scoping phase. This resulted in the selection of two Kihei terminus options and three Upcountry terminus options. The second step was an evaluation of alternatives evolving from the original U2 alignment, after it was found to impact a future private school site (the school has since been constructed) and two archaeological sites likely to require preservation in place. The third step involved minor alignment shifts of U2-A and U3 to avoid important sites identified in archaeological reconnaissance surveys.

2.2.1 SCREENING ANALYSIS

A two-tiered alternatives screening analysis was performed to evaluate a wide range of candidate alternatives and eliminate those with the fewest benefits or overriding adverse characteristics so that a manageable number of alternatives would be evaluated in detail in the Draft and Final EIS (see Chapter 4). The No Build alternative was not evaluated in this screening analysis because it is automatically included in the Draft and Final EIS as a viable option.

This section summarizes the screening analysis. The Alternatives Analysis Report that was prepared after the screening analysis appears in Appendix D.

2.2.1.1 Alternatives Considered in the Screening

Ten alignment alternatives (see Figure 2-7 and Table 2-6) were developed during the public and agency scoping process that preceded the issuance of the project's Environmental Assessment (EA) (see Chapter 5.0). The alternatives were introduced to the public through distribution in September 1995 of an EA addressing the project (see Chapter 5). After publication of the EA, public comments were received through the channels listed below, and were used to develop additional alternatives:

- written comments generated in response to the EA;
oral testimony given at two public information meetings held in October 1995;
• testimony provided during a second round of public information meetings held in May 1996 (one Upcountry and one in Kihei); and
• written comments following the May 1996 information meetings.

### Table 2.6
Original Alignment Alternatives

<table>
<thead>
<tr>
<th>Alternative</th>
<th>Upcountry Terminus</th>
<th>Kihei Terminus</th>
<th>Length</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alternative 1</td>
<td>Haleakala Highway / Hallimale Road inter.</td>
<td>Pillani Highway / Kaonoulu Street inter.</td>
<td>14.3 km (8.9 miles)</td>
</tr>
<tr>
<td>Alternative 2</td>
<td>Haleakala Highway / Hallimale Road inter.</td>
<td>Maui R&amp;T Park</td>
<td>16.3 km (10.1 miles)</td>
</tr>
<tr>
<td>Alternative 3</td>
<td>Haleakala Highway, between Hallimale Road and Pukalani</td>
<td>Pillani Highway / Kaonoulu Street inter.</td>
<td>15.5 km (9.6 miles)</td>
</tr>
<tr>
<td>Alternative 4A</td>
<td>Kula Highway, east of the Pukalani Bypass Road</td>
<td>Maui R&amp;T Park</td>
<td>16.6 km (10.3 miles)</td>
</tr>
<tr>
<td>Alternative 4B</td>
<td>Kula Highway, east of the Pukalani Bypass Road</td>
<td>Pillani Highway / Kaonoulu Street inter.</td>
<td>15.5 km (9.6 miles)</td>
</tr>
<tr>
<td>Alternative 5</td>
<td>Kula Highway, south of Pulehu Gulch in Kula</td>
<td>Pillani Highway / Kaonoulu Street inter.</td>
<td>14.0 kilometer (8.7 miles)</td>
</tr>
<tr>
<td>Alternative 6A</td>
<td>Kula Highway, near Kekaulike Highway / Kula Highway inter.</td>
<td>Maui R&amp;T Park</td>
<td>17.0 km (10.6 miles)</td>
</tr>
<tr>
<td>Alternative 6B</td>
<td>Kula Highway, near Kekaulike Highway / Kula Highway inter.</td>
<td>Pillani Highway, next to the future Kihei Regional Park</td>
<td>16.3 km (10.1 miles)</td>
</tr>
<tr>
<td>Alternative 7</td>
<td>Kula Highway south of Kula Sanitarium</td>
<td>southern section of Pillani Highway</td>
<td>14.4 km (8.9 miles)</td>
</tr>
<tr>
<td>Alternative 8</td>
<td>Haleakala Highway in Pukalani</td>
<td>Mokulele Highway</td>
<td>14.6 km (9.1 miles)</td>
</tr>
</tbody>
</table>

Sources: Warren S. Unemori Engineering, Inc. derived from State/County Joint Task Force Upcountry / Kihei Highway Final Report, October 1, 1993; County of Maui Toll Road Study, 1988; and Maui Long-Range Highway Planning Study, 1991
Based on these comments, conceptual engineering was prepared for three additional alternatives: Alternatives 2B and 2C (modifications of Alternative 2) and the "enhanced widening of existing roadways" alternative (see Figure 2-8).

- **Alternative 2B.** This alternative would extend from Haleakala Highway / Haliiimaile Road intersection in the Upcountry area, (as Alternative 2), but would then share portions of Alternative 4B's mauka alignment near the Hawaiian Commercial & Sugar Company (HC&S) land to Kihei at Kaonoulu Street. The length of this alternative is approximately 15.6 km (9.7 miles).

- **Alternative 2C.** This alternative would maintain the Haliiimaile Junction Upcountry terminus and share Alternative 4B's alignment near the HC&S land. However, its Kihei terminus would be located at the intersection of Piilani Highway and the proposed Road F. The length of Alternative 2C is approximately 17.5 km (10.9 miles).

Alternatives 2B and 2C were developed in response to comments asking that impacts to Hawaiian Commercial and Sugar (HC&S) Company land be minimized, the Maui R&T Park not be bisected, and the Kihei terminus be moved as far south as possible to create an alternative evacuation route for South Kihei and to support hotels and resorts in Wailea / Makena.

- **The "enhanced widening of existing roadways" alternative.** This alternative would provide an additional lane in each direction on the existing roads between Kihei and Upcountry beyond the widening improvements already proposed in the Maui Long-Range Land Transportation Plan (February 1996) (see Section 2.1.1). Enhanced widening of the following roadways is included in the "enhanced widening of existing roadways" alternative:
  - Haleakala Highway (12.4 km (7.7 miles));
  - Hana Highway (3.2 km (2.0 miles));
  - Dairy Road (1.3 km (0.8 miles));
  - Puunene Avenue / Mokulele Highway (10.5 km (6.5 miles)); and
  - Piilani Highway (4.8 km (3.0 miles)).
Finally, FHWA participation in this project requires that Transportation Systems Management (TSM) be considered among the alternatives. TSM is the application of construction, operational, and institutional actions to make the most efficient and cost effective use of existing transportation infrastructure. TSM actions are categorized as being either "demand-side" or "supply-side". As is explained below, TSM can be an attractive solution to many types of transportation problems. However, TSM would not satisfy a purpose such as provision of a system linkage between two localities, such as this project, that is intended to connect Kihei and Upcountry. Therefore, a TSM alternative was eliminated from further consideration.

Demand-side TSM actions, often referred as Transportation Demand Management (TDM), are intended to reduce congestion by decreasing the number of vehicles traveling at the same time by such measures as increasing vehicle occupancy, lowering the peak travel demand by shifting the time of travel, or making the use of single-occupant vehicles less attractive. Demand-side actions include high-occupancy vehicle (HOV) lanes, ride-sharing programs, parking management, and transit service improvements. Except for HOV facilities, demand-side actions tend to be more appropriate within the context of a metropolitan area.

TSM actions are intended to increase the capacity of existing infrastructure (e.g., a roadway) using relatively "low cost" and localized solutions, such as use of contraflow lanes, intersection channelization, improved pavement or signage, and synchronization of traffic signals. Supply-side actions are most effective when alleviating traffic problems at spot locations. Supply-side TSM actions would not be used when a project's intent is to provide a transportation connection between two localities.

2.2.1.2 Methodology

Criteria for evaluating the project alternatives described in Section 2.2.1.1 were developed from the following sources:

- Federal Highway (FHWA) Technical Advisory Guide (October 1987);
- State/County Joint Task Force Upcountry / Kihei Highway Final Report (October 1993);
Federal, State, County, and local comments to a project initiation letter issued by SDOT on September 1, 1994;
- An agency scoping meeting held on October 26, 1994;
- Engineering standards (Hawaii Statewide Uniform Design Manual for Streets and Highways, American Association of State Highway and Transportation Officials (AASHTO), and American Society for Testing and Materials (ASTM));
- Kihei-Upcountry Maui Highway Environmental Assessment (EA) (May 1995);
- Written comments received in response to publication of the EA; and
- Comments (oral and written) made at the public information meetings held on Maui on October 17 and 18, 1995, and on May 15 and 16, 1996.

The evaluation criteria were then sorted into two groups: Tier One (fatal flaws) and Tier Two.

2.2.1.2a Tier One Criteria

Tier One (fatal flaw) criteria identify alternatives that are impractical, unfeasible or cannot be funded given the constraints associated with federal participation in project construction. Eliminating alternatives with “fatal flaws” avoids unnecessary analysis of alternatives that are extremely unlikely to be selected as the Preferred Alternative. For this project, the Tier One criteria were:

- Satisfaction of project goals;
- Conformance with engineering design criteria;
- Benefit/cost ratio; and
- Bifurcate Maui R&T Park.

Satisfaction of Project Goals

The alternatives were evaluated with respect to whether they satisfied the project goals stated in Chapter 1, such as establishing a roadway linkage between the Kihei and Upcountry areas. An alternative received a “Y” (yes) score if it would satisfy the project goals. A “N” (no) score means the alternative would not satisfy the project goals.
Design Feasibility
The alternatives were evaluated to determine whether they met engineering design criteria for a rural, limited access arterial roadway, such as minimum curve radius and design speed. A "Y" (yes) signifies that the alternative would have a conforming design, whereas a "N" (no) would mean that its design would not conform to the criteria.

Benefit-Cost Ratio
A preliminary benefit-cost analysis to the year 2023 (completion of construction plus 20 years) was performed to eliminate alternatives that would clearly not be cost-effective in achieving the goal of linking Kihei and Upcountry Maui. Calculation of the benefit-cost ratio (BCR) for each alternative was based on a comparison of travel time between two centroids, one located at the Maui R&T Park in Kihei and the other in Pukalani, Upcountry Maui, under the future No Build Alternative. Other factors used to calculate the BCRs included:

- cost of each alternative, consisting of initial cost (construction, right-of-way acquisition, design) and annual roadway maintenance;
- user costs for vehicle operation and maintenance; and
- economic factors, such as the expected long-term inflation rate and discount rate.

The methodology conformed to procedures described in the Manual On User Benefit Analysis of Highway and Bus Transit Improvements (AASHTO, 1977). Normally, an alternative's BCR would have to be greater than one (the benefits of the project exceed its cost) for the investment to be economically justified. However, because of the preliminary nature of the analysis and the limited definition of what is considered a benefit, an alternative would have to have an extremely low BCR to have a "fatal flaw."

Bifurcate Maui R&T Park
The master plan for the Maui R&T Park was revised in 1996 to create a more campus-like atmosphere, in contrast to the light industrial park atmosphere that was originally envisioned. Its central roadway element is a large roundabout or "green" located at the core of the Park. Any alignment that divides the Maui R&T Park would be inconsistent with the Park's proposed campus-like roadway system. Because the Maui R&T Park is intended to be one of the major beneficiaries of the proposed highway, conformance with the master plan's proposed

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campus-like roadway system was elevated to a Tier One level of significance. Those alternatives that bifurcate the R&T Park were given a "Y" (yes), while those that did not were given a "N" (no). A "Y" score for this criterion indicates that the alternative has a "fatal flaw."

2.2.1.2b Tier Two Criteria

The Tier Two criteria were developed to further screen the alternatives passing the first tier criteria. These criteria relate primarily to the nature and degree of adverse impact or benefit. An alternative not satisfying these criteria could be feasible, but would not be advantageous with respect to the criterion in question. A large number of candidate Tier Two criteria were developed, but many of them were rejected. The Alternatives Analysis Report (November 1995) (see Appendix C) contains the rationale for their rejection. Many criteria were not used in the Tier Two analysis because they would not discriminate among alternatives. The omission of a criterion from the Tier Two analysis does not imply that the criterion is not important. In the final analysis, the following Tier Two criteria were used:

- Adverse agricultural impact;
- Cost;
- Conformance with community plans;
- Highway operations;
- Potential impact on endangered and threatened species;
- Enhancement of access to Hawaiian Home Lands (HHL) parcel (TMK 2-02-002:014);

and

- Visual impacts.

Adverse Agricultural Impact

The number of hectares presently used for crop production (pineapple or sugarcane cultivation or Upcountry truck farms) which each alternative would displace was calculated. Impacts on pasture lands were not considered as important because of the abundance of pasture land in the area and the substantially reduced level of investment in irrigation, drainage and other infrastructure for pasture in comparison to cropland. The following five-point scale was defined based on the acreage of encroachment for each alternative:

(1): less than 10 hectares
(2): 10 to 20 hectares
(3): 20 to 30 hectares
(4): 30 to 40 hectares
(5): over 40 hectares

Cost
This criterion compares the estimated cost of land acquisition, site work, roadway construction, and drainage for each alternative. The following four-point scale was used to score these costs:

(1): less than $45 million
(2): $45 to $55 million
(3): $55 to $65 million
(4): over $65 million

Conformance with Community Plans
There are nine planning regions in Maui County for which community plans have been prepared. The plans report current and anticipated conditions, and stipulate advance planning goals, objectives, policies and implementation considerations to guide decision making for each region. The study area overlaps planning areas addressed by the Kihei-Makena Community Plan and the Makawao-Pukalani-Kula Community Plan. Although the community plans are not official until adopted by the County Council and the Mayor, it is customary on Maui to use the most recent proposed update to the community plans to assess conformance with county planning.

The most recent proposed update for the Kihei area is the Kihei-Makena Community Plan (1996). This proposed plan recommends a roadway that would link the primary residential area of Upcountry with job centers within the Kihei region. The Plan, therefore, favors those alternatives with mauka termini near Pukalani, and makai termini at or north of the Maui R & T Park. The Kihei-Makena Community Plan was approved by the County Council and the Mayor in early 1996.
The Community Plan Update of Makawao-Pukalani-Kula (July 1996) “files” (removes from the active list) the proposed Kihei-Upcountry Maui Highway, and states that the No Build alternative is favored over any build alternative. However, the recommendations also include provisions that if the roadway is built, the preferred Upcountry terminus is in the vicinity of Halimaile Road.

The alternatives that best conform to the community plans were scored “Y” (yes). Alternatives that did not conform as well were scored “P” (poor). Alternatives that do not conform to the plans were scored “N” (No).

Highway Operations
While all of the alternatives entering the Tier Two screening can be designed to conform with applicable engineering standards (see Section 2.2.1.3), there may be operational problems with certain alternatives when connected to the existing roadway network. Those alternatives that would connect well with the existing roadway network were scored a “B” (better); those that would not were scored a “W” (worse).

Impact on Endangered and Threatened Species
A botanical reconnaissance was conducted to rank the alternatives in terms of their relative potential adverse impact on areas where endangered or threatened plant species might exist. The survey included:

- a helicopter reconnaissance of the project area;
- government agency interviews and literature search;
- a comparative ranking of the alternatives for potential botanical impacts, emphasizing impacts on rare species; and
- a general assessment of the level of potential impact of each alternative.

Based on the botanical reconnaissance, alternatives were scored numerically, from “1” (alternatives that were least likely to threaten endangered species) to “5” (alternatives with a higher possibility of displacing endangered species). Potential impact on endangered species was not considered a “fatal flaw” because at this stage of project planning, the
alignment alternatives are considered general enough to allow some latitude to bypass particularly sensitive locations, if warranted.

Enhancement of Access to Hawaiian Home Lands Parcel
The Kihei-Upcountry Maui Highway State/County Joint Task Force's Final Report (October 1, 1993) identified access to the Hawaiian Home Lands parcel (TMK 2-02-002:014) as a desirable benefit of this project. Alignment alternatives that would enhance future access to the HHL parcel received a "B" (better), while those alternatives that would not enhance access received a "W" (worse).

Visual Impact
Since all of the alternatives share a common typical design (see Figures 2-2 and 2-3) and a similar setting (agricultural lands on the western flank of Haleakala), the amount of earthmoving (cut plus fill) required for roadway construction was used as an approximate indicator of the project's long-term aesthetic impacts. It is assumed that the more material moved during construction, the greater the potential for visual disturbance of the existing landscape, even after the establishment of new plantings.

A four-point scale was developed to score the total amount of cut and fill material required for each alternative. Alternatives requiring less earthmoving received lower scores, while those requiring the most activity received a "4."

1: less than 1.5 million cubic meters
2: 1.5 to 2.0 million cubic meters
3: 2.0 to 2.5 million cubic meters
4: over 2.5 million cubic meters.

2.2.1.3 Alternatives Evaluation

2.2.1.3a Tier One Screening
Table 2-7 summarizes the outcome of the Tier One evaluation. Scores not satisfying the criteria are shaded. In summary, Alternatives 4A, 6A through 8, the enhanced widening of existing roadways alternative, and the TSM alternative were eliminated from further study.
## Table 2.7
Tier One Screening

<table>
<thead>
<tr>
<th>Criteria</th>
<th>1</th>
<th>2</th>
<th>2B</th>
<th>2G</th>
<th>3</th>
<th>4A</th>
<th>4B</th>
<th>5</th>
<th>6A</th>
<th>6B</th>
<th>7</th>
<th>8</th>
<th>EWR</th>
<th>TSM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Satisfies Project Goals</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>Design Feasibility</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>N</td>
<td>N</td>
<td>N.A.</td>
<td>N.A.</td>
</tr>
<tr>
<td>Benefit-Cost Ratio</td>
<td>1.00</td>
<td>1.00</td>
<td>1.06</td>
<td>0.67</td>
<td>1.01</td>
<td>0.94</td>
<td>1.34</td>
<td>1.53</td>
<td>0.42</td>
<td>0.26</td>
<td>-0.04</td>
<td>1.10</td>
<td>Low¹</td>
<td>N.A.²</td>
</tr>
<tr>
<td>Bifurcate Maui &amp; T Park</td>
<td>N</td>
<td>Y</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>Y</td>
<td>N</td>
<td>N</td>
<td>Y</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N.A.</td>
<td>N.A.</td>
</tr>
</tbody>
</table>

**Notes:**
- EWR: Enhanced Widening of Existing Roadways Alternative
- TSM: Transportation Systems Management Alternative
- Y: Yes
- N: No
- Does not satisfy criterion.
- N.A.: Not Applicable.

¹ The BCR for the EWR Alternative was not calculated because it failed to satisfy the project goals criterion. If the BCR for the EWR Alternative was calculated, it would be quite low because the method of calculating BCRs is based on a comparison with the future No Build Alternative of travel time between Kiteh and Upcountry Maui. When compared to the No Build Alternative, the EWR Alternative would offer a slight decrease in travel time because of marginally less congestion along the same circumferential route. This travel time savings, however, would not compare favorably to the decrease in travel time that would be achieved by substantially shortening the distance between Kiteh and Upcountry Maui through a new roadway. Therefore, along with its large capital cost ($78 million), its BCR, as calculated here, would be small.

² The BCR for the TSM Alternative was not calculated because it failed to satisfy the project goals criterion.

**Source:** Warren S. Umemori Engineering, Inc. and Parsons Brinckerhoff Quade & Douglas, Inc., January 1997
Non-satisfaction of project goals eliminated the enhanced widening of existing roadways and TSM alternatives. The enhanced widening of existing roadways alternative would not establish a roadway linkage between Kihei and the Upcountry area. The TSM alternative would also not satisfy this goal, nor other goals, such as providing additional roadway capacity and infrastructure to meet existing and future travel demand in the region.

The design feasibility criterion eliminated Alternative 8 because it is constrained to an existing government right-of-way that does not conform to modern highway design standards.

The preliminary benefit-cost analysis generated BCRs ranging from -0.04 to 1.53 (see Table 2-7). After noting the spread of the results and considering the preliminary nature of the analysis, the allowable threshold was set at 0.67, which eliminated Alternatives 6A, 6B, and 7. To affect these results (pass some alternatives eliminated by this criterion), the minimum passing BCR would have to be lowered to 0.42. However, lowering the BCR to this threshold would not affect the overall screening because Alternative 6A, with its 0.42 BCR, would have been eliminated anyway because it bifurcates the Maui R&T Park, the last Tier One criterion. This last criterion also eliminated Alternatives 2 and 4A.

2.2.1.3b Tier Two Screening

Table 2-8 summarizes the Tier Two screening analysis. An alternative did not have to satisfy every criterion to pass the screening. However, in certain instances, a particular score or group of scores disqualified an alternative from moving forward. These disqualifying scores are shaded.

Based on the Tier Two criteria, Alternatives 1 and 3 were dropped from future study in the Draft EIS for the following reasons:

- **Alternative 1.** This alternative would produce a substantially greater displacement of cultivated fields. It would displace approximately 56.2 ha (139 acres), while the alternative with the next largest impact, Alternative 3, would displace approximately 32.6 ha (81 acres), 42 percent less.

- **Alternative 3.** This alternative was eliminated because of its poorer operational aspects, particularly at its mauka terminus at the intersection of Haleakala Highway.
and Pukalani Bypass Highway where there is a seven percent grade. Because of this steep grade, a very long left turn storage lane would be required for makai-bound traffic on Haleakala Highway turning left onto Kihei-Upcountry Highway. The length of this left turn lane, plus the proximity of the two intersections, would cause a conflict in turning movements. Furthermore, this alternative scored a four (4) in terms of displacement of cultivated acreage.

### Table 2-8
**Tier Two Screening**

<table>
<thead>
<tr>
<th>Criteria</th>
<th>1</th>
<th>2B</th>
<th>2C</th>
<th>3</th>
<th>4B</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adverse Agricultural Impact</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Score</td>
<td>5</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>Encroachment (hectares)</td>
<td>56.2</td>
<td>27.1</td>
<td>27.1</td>
<td>32.6</td>
<td>21.6</td>
<td>13.3</td>
</tr>
<tr>
<td>Cost</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Score</td>
<td>3</td>
<td>2</td>
<td>3</td>
<td>2</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Estimated Cost ($ millions)</td>
<td>57</td>
<td>47</td>
<td>57</td>
<td>54</td>
<td>52</td>
<td>40</td>
</tr>
<tr>
<td>Conformance with Community Plans</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kihei-Makena</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>P</td>
</tr>
<tr>
<td>Makawao-Pukalani-Kula</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>Highway Operations</td>
<td>B</td>
<td>B</td>
<td>B</td>
<td>W</td>
<td>B</td>
<td>B</td>
</tr>
<tr>
<td>Potential Impact to Endangered &amp; Threatened Species</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>Enhancement of Access to HHL</td>
<td>W</td>
<td>W</td>
<td>B</td>
<td>W</td>
<td>W</td>
<td>W</td>
</tr>
<tr>
<td>Visual Impacts</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Score</td>
<td>3</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Est. Earthmoving (millions of cubic meters)</td>
<td>2.1</td>
<td>1.4</td>
<td>1.7</td>
<td>1.9</td>
<td>1.8</td>
<td>1.4</td>
</tr>
</tbody>
</table>

**Notes:**
- B: Better
- Y: Yes
- P: Poor
- N: No
- W: Worse

**Source:** Warren S. Unemori Engineering, Inc. and Parsons Brinckerhoff Quade & Douglas, Inc., January 1997
Alternatives 2B, 2C, 4B and 5 passed the screening evaluation for the following reasons:

- **Alternative 2B.** The advantages of Alternative 2B are its cost (the second cheapest alternative) and its relatively minimal environmental impacts in those disciplines selected for the screening analysis. Although this alternative scored a three (3) in the agricultural impact criterion, the alignment was coordinated with HC&S to minimize adverse impacts to their sugarcane operations.

- **Alternative 2C.** Since this alternative is similar to Alternatives 2B and 4B, it too passed the Tier Two screening. The major disadvantage of this alternative, in comparison to these other two alternatives, is its cost (21 percent greater than Alternative 2B and 10 percent greater than Alternative 4B). Its advantages are that it is the only remaining alternative that may facilitate access to the HHIL parcel, and it provides another Kihei terminus option (Alternatives 2B, 4B and 5 all have the same Kihei terminus at Kaonoulu Street).

- **Alternative 4B.** This alternative compares favorably against other alternatives regarding cost, impacts to cultivated fields and visual environment. It scores relatively high (3) under the "potential impact to endangered and threatened species" criterion. However, because the botanical reconnaissance was done from the air and because there is some latitude in modifying alternatives to avoid sensitive locations, this moderately high score did not warrant eliminating this alternative at this stage.

- **Alternative 5.** The primary benefits of this alternative are its cost (the least expensive alternative) and it would have the least impact on cultivated fields. The disadvantages of this alternative are its higher probability of encountering endangered species habitats, and its "P" (poor) score in regards to conformance to the Kihei-Makena Community Plan (1998). However, these factors did not warrant eliminating this alternative.

In general, the alternatives passing Tier Two would generate comparatively fewer adverse environmental impacts in the topics selected for the screening analysis, and would not
present operational difficulties interfacing with the existing roadway network. Only one of the passing alternatives would facilitate access to the HHL parcel.

2.2.1.4 Conclusion

The four alternatives that passed the screening analysis (2B, 2C, 4B and 5) were recast as combinations of mauka and makai segments. By combining their two Kihei terminus choices with their three Upcountry terminus choices, it became possible to generate six alternatives comprised of common roadway segments.

Figure 2-9 shows the Upcountry and Kihei terminus choices and the alignment segments that would be used by the six alternatives. As shown on this figure, the Kihei termini and segments were named K1 and K2, and the Upcountry termini and segments were named U1, U2 and U3.

2.2.2 MODIFICATION OF SEGMENT U2

Following selection of the six alternatives described in Section 2.2.1.4, it was discovered that the eastern (mauka) portion of Segment U2 would bisect a Kamehameha Schools / Bishop Estate campus (portions of the campus have been developed). Furthermore, the U2 alignment would potentially affect two archaeological sites that were likely to require preservation (see Section 3.10.2). Therefore, the following four variations to the U2 described in Section 2.2.1.4 were developed (see Figure 2-10):

- **U2-A.** This modification would shift the U2 terminus 685 m (2250 ft) north to the Pukalani Bypass / Haleakala Highway / Kula Highway “Five Trees” Intersection. The Haleakala Highway (Pukalani side) leg of this intersection would be modified to join Pukalani Bypass north of the “Five Trees” intersection.

- **U2-B.** This modification would maintain the original U-2 terminus on Kula Highway. It would shift the alignment to the north, running along the northern boundary of the Kamehameha School campus and a future commercial district that would be located west (makai) of Kula Highway.
• **U2-C.** This modification is similar to U2-B in maintaining the original U-2 terminus on Kula Highway. However, instead of shifting the alignment to the north, it would shift the alignment to the south, bisecting a pineapple field and two vacant agricultural lots in the Kula Estates subdivision.

• **U2-D.** This modification is similar to U2-C. However, instead of terminating at the original U-2 terminus, it would terminate at the intersection of Kula Highway and Ohana Street, one of the access roads to the Kula 200 residential subdivision, 335 m (1100 ft) south of the original U2 terminus. It would also bisect the pineapple field and two different agricultural lots in the Kula Estates subdivision.

Table 2-9 compares the four alternative modifications to U2 against ten criteria based on design and engineering considerations.

U2-A has several advantages over the other U2 options, including: termination at an established signalized intersection; a 6.8 percent maximum grade; no residential displacements with proper advance planning and coordination; minimal proximity impacts (air quality and noise) to the Kamehameha School campus, which opened in August 1999; and conformance with future widening of Pukalani Bypass. The disadvantage of this alternative is that it would have the highest right-of-way cost because of its length through urban designated land.

U2-B is the suggested alignment of the Kulamalu master plan, a future commercial, housing and institutional development just south (mauka) of Pukalani (see Section 3.1.3). Therefore, U2-B would be consistent with this development, and the private developer would not have to modify its master plan and has offered to donate the right-of-way. U2-B’s disadvantage is that it does not meet AASHTO’s recommended seven percent maximum grade for a limited access rural highway. U2-B’s maximum grade is 10 percent. All the other U2 modifications (U2-A, U2-C and U2-D), alignment alternatives (U1, U3, K1 and K2), and federal-aid highways in the project vicinity (Haleakala Highway, and Pukalani Bypass) meet this criterion.

U2-C and U2-D require little or no right-of-way acquisition in State urban designated land, minimizing their right-of-way costs. The disadvantages common to both alternatives are
### Table 2-9
Comparison of U2 Modifications

<table>
<thead>
<tr>
<th>Criterion</th>
<th>Alternative Modification</th>
<th>U2-A</th>
<th>U2-B</th>
<th>U2-C</th>
<th>U2-D</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum Grade</td>
<td></td>
<td>6.8%</td>
<td>10.0%</td>
<td>6.8%</td>
<td>6.8%</td>
</tr>
<tr>
<td>Number of Bridges</td>
<td></td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Length of Bridge Required</td>
<td></td>
<td>76 m (250 ft)</td>
<td>215 m (700 ft)</td>
<td>76 m (250 ft)</td>
<td>76 m (250 ft)</td>
</tr>
<tr>
<td>Maximum Pier Height</td>
<td></td>
<td>20 m (65 ft) ±</td>
<td>32 m (105 ft) ±</td>
<td>11 m (35 ft) ±</td>
<td>11 m (35 ft) ±</td>
</tr>
<tr>
<td>Number of Gulch Crossings</td>
<td></td>
<td>3</td>
<td>3</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>Maximum Height of Fill</td>
<td></td>
<td>17 m (55 ft)</td>
<td>15 m (50 ft)</td>
<td>21 m (70 ft)*</td>
<td>21 m (70 ft)</td>
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<tr>
<td>Maximum Height of Cut</td>
<td></td>
<td>9 m (30 ft)</td>
<td>11.5 m (38 ft)</td>
<td>12 m (40 ft)*</td>
<td>12 m (40 ft)</td>
</tr>
<tr>
<td>Length Through State Urban Land</td>
<td></td>
<td>2100 m (6900 ft)</td>
<td>1740 m (5700 ft)</td>
<td>460 m (1500 ft)</td>
<td>0</td>
</tr>
<tr>
<td>Distance from Kamehameha School Campus</td>
<td></td>
<td>120 m (400 ft)</td>
<td>Abuts Northern Boundary</td>
<td>106 m (350 ft)</td>
<td>106 m (350 ft)</td>
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<tr>
<td>Distance from Kula Highway/</td>
<td></td>
<td>0</td>
<td>685 m (2250 ft)</td>
<td>685 m (2250 ft)</td>
<td>1020 m (3350 ft)</td>
</tr>
<tr>
<td>Hāleakalā Highway Intersection</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Note:** *Includes the 900 m (3000 ft) of roadway already constructed for Kulamalu development.

**Source:** Warren S. Unemori Engineering, Inc., May 1997
adverse impact to two vacant agricultural lots in the Kula Estates subdivision and an active pineapple field, and bisection of a future commercial site that is inconsistent with site’s master plan.

In conclusion, U2-A and U2-B were selected as the preferred U2 option. U2-A’s operational advantage (termination at an established signalized intersection) outweighed its higher right-of-way cost. U2-B was selected because of its consistency with Kulamalu development.

2.2.3 ADJUSTMENTS TO PROJECT ALTERNATIVES

The results of archaeological reconnaissance surveys (see Section 3.10.2) required the realignments of Segments U2-A and U3. The U2-A and U3 alignments shown on Figure 2-5 avoid direct impacts to all significant archaeological sites found during the surveys. For more information, see Section 3.10.2.

The results of the archaeological inventory survey on the preferred alternative (see Section 3.10.3) required the realignment of the highway at Waialoa Gulch to avoid potentially affecting petroglyphs approximately 15 m (50 ft) to the west of the alignment’s centerline. The alignment was shifted 45 m (150 ft) to the east.

2.2.4 SELECTION OF THE PREFERRED ALTERNATIVE

Following public release of the Draft EIS on August 8, 1999, a public and agency review period followed, which lasted to October 14, 1999. During this period, the public and government agencies provided a great deal of information on the facts and analyses presented in the Draft EIS, as well as opinions about which alternative was preferred by the commenter. The Draft EIS public and agency review process is described in more detail in Chapter 5.

The SDOT and FHWA reviewed and considered all of the information provided during the Draft EIS review period, which helped in the selection of the preferred alternative. The No Build alternative was not included in this analysis because it remains a viable alternative until
the Record of Decision is issued by FHWA. In the selection process, the following criteria were used:

- cost;
- transportation performance;
- agricultural impact; and
- consistency with community plans.

These criteria were found to be relevant and useful in discriminating among the build alternatives. This does not mean that other criteria that were considered, which are listed below, are not important. They were not selected because they did not help in drawing distinctions among the build alternatives. Chapters Three and Four include discussions of these environmental resources and potential impacts from Kīhei-Upcountry Maui Highway.

- residential and business displacement
- traffic safety
- parks and recreational impacts
- threatened and endangered species impacts
- flora and habitat displacement
- energy impacts
- air quality and noise impacts
- changes to visual and aesthetic conditions
- geological and site contamination impacts
- employment and economic effects
- provision of bicycle and pedestrian facilities
- historic, archaeological, and traditional cultural properties/practices impacts

2.2.4.1 Cost Comparison

The estimated capital cost comparison of Build alternatives (right of way and construction) is reported in Sections 2.1.4. The ranking of the alternatives from least to most costly is provided below.
2.2.4.2 **Transportation Performance**

The transportation performance of the alternatives was determined by evaluating how well they would serve major travel markets, and their traffic impacts on the regional roadway system.

2.2.4.2a **Travel Markets**

The major travel markets that would be served by a Kihei-Upcountry Maui Highway include travel between:

- Upcountry - Kihei;
- Upcountry - West Maui;
- Maui R&T Park - Science City; and
- Emergency evacuation from South Maui.

Other travel markets, such as local circulation in Kihei or Upcountry, and commuter travel to Wailuku/Kahului, would not be directly served by a Kihei-Upcountry Maui Highway, although these travel markets could be indirectly affected by decreases in overall congestion and an increase in the capacity of the regional roadway system. Such indirect impacts were considered under traffic impacts.

Several assumptions were used to evaluate how well each alternative would serve these major travel markets. First, the evaluation considered the distance between the proposed termini and major residential centers and commuter destinations. For example, the U3 terminus is not near a major population center, and therefore, would not serve travel markets as effectively as the other three Upcountry termini. Second, travel between the Maui R&T Park and Science City would be most convenient via a U2-A or U2-B alignment, and moderately convenient via U1 and U3. The choice of a Kihei terminus for this travel market would not have much impact on the effectiveness of the route. Third, K2 would not serve the Upcountry...
West Maui travel market due to its location in South Kihei. On the other hand, K2 would provide a better evacuation route for South Maui because of its physical separation from the existing evacuation route through North Kihei.

The ranking of the alternatives in terms of effectiveness in serving the major travel markets (in decreasing order of effectiveness) is as follows:

1. U2-A.K1 and U2-B.K1 (tie);
2. U1.K1, U2-A.K2 and U2-B.K2 (tie);
3. U1.K2; and

The U2-A.K1 and U2-B.K1 alternatives were considered equal in terms of their effectiveness in serving the target travel markets because their Upcountry termini are relatively close to one another. Both alternatives would serve the Upcountry travel markets to and from Kihei, Makena and West Maui, and both would facilitate travel between the Maui R&T Park and Science City. However, these alternatives would only moderately improve evacuation capacity from Kihei.

The U2-A.K2 and U2-B.K2 alternatives were also considered equal in effectiveness in serving the target travel markets. Both alternatives would serve the Upcountry – Kihei travel market and facilitate travel between the Maui R&T Park and Science City. However, these alternatives would not serve the Upcountry – West Maui travel market.

The U1.K1 alternative was evaluated as being approximately equal in effectiveness in serving travel markets to the U2-A.K2 and U2-B.K2 alternatives. It would serve the both the Upcountry travel markets to and from Kihei and West Maui, and serve moderately well travel between the Maui R&T Park and Science City, and provide some South Maui evacuation capacity.

The U3 alternatives (K1 and K2) were evaluated as being the least effective in serving the target travel markets. They would serve the Upcountry – Kihei travel market and travel between the Maui R&T Park and Science City only moderately well. The K1 alignment would serve the Upcountry – West Maui travel market only moderately well because of its Upcountry
terminus being so far from population centers. The K2 alignment would only marginally serve this market. The K2 alignment would, however, provide the better South Maui evacuation capacity because of the proximity of K1 to the existing evacuation route.

2.2.4.2b Regional Traffic Impacts

Three primary traffic impacts may result from the Kihei-Upcountry Maui Highway:

- reduction in traffic volumes on Haleakala Highway (in comparison to the No Build);
- increase in the amount of through traffic on Omaopio and Pulehu Roads; and
- increase in the amount of through traffic on local Kula residential roads.

Although many public comments stated a perception that the U2-A alternatives would adversely affect traffic operations and safety at the Haleakala Highway / Kula Highway, or "Five Trees" intersection, all proposed alternatives would provide terminus intersections with appropriate capacity and channelization for turning and through movements, signalization, sidewalks, crosswalks and other safety and pedestrian and vehicular traffic capacity features. Therefore, an adverse impact at the Five Trees intersection is not anticipated, and was not considered in the evaluation.

Public comments on the Draft EIS also indicated the mistaken belief among Pukalani residents that there would be a direct connection between the U2 (A or B) alternatives and Pukalani Terrace. These commentors were concerned about traffic passing through their neighborhood to access Kihei-Upcountry Maui Highway if a U2 alternative were selected. Since this impact would not occur under a U2 alternative, the evaluation of regional traffic impacts did not consider this issue.

The ranking of the alternatives in terms of their potential regional traffic impacts is as follows:

1. U2-A, K1, U2-A, K2, U2-B, K1 and U2-B, K2 (tie);
2. U1, K and U1, K2 (tie); and
3. U3, K1 and U3, K2 (tie).

The U2 (A and B) alternatives were considered to have the most favorable and least adverse regional traffic impacts. First, the U2 alignments would give Pukalani, Kula, and
Makawao residents two choices for traveling between Upcountry and the coastal areas (Haleakala Highway or Kihei-Upcountry Maui Highway). Therefore, traffic volumes on Haleakala Highway would decrease, thereby improving operations on this highway. The U2 alternatives would also not affect Kula residential roads because their termini are at or near the Five Trees Intersection. However, it is anticipated that some of the motorists traveling between Kula and Kihei would use Omaopio and Pulehu Roads as an access route to the new highway instead of traveling to either the U2-A or U2-B terminus. This was seen as the only adverse regional traffic impact of the U2 alternatives.

Like the U2 alternatives, the U1 alternatives would not affect the Kula residential roads because of the large distance between the U1 terminus and Kula. Also like the U2 alternatives, some motorists would use Omaopio and Pulehu Roads as a through route to access the new highway. More motorists would use Omaopio and Pulehu Roads as shortcuts with the U1 alternatives than under the U2 alternatives because the shortcut would save more time with the U1 alignment.

In comparison to the U2 alternatives, the U1 alternatives would not reduce the traffic volume on Haleakala Highway between Makawao Avenue and Haliimaile Junction. During the morning peak period, all makai bound traffic would travel along this section of Haleakala Highway under the U1 alternatives. The U2 alternatives would remove a portion of this makai bound traffic, switching them to the less congested mauka bound direction to the U2 terminus. The opposite would occur during the afternoon peak period. Therefore, operations on Haleakala Highway would be worse with the U1 alternatives than with the U2 alternatives.

The regional traffic impacts of the U3 alternatives would include motorists using the residential roads between Haleakala Highway and Kula Highway inappropriately as a through route. Also, the U3 alternatives would only moderately reduce traffic volumes on Haleakala Highway, and not to the extent of the U2 alternatives. However, unlike the U1 and U2 alternatives, the U3 alternatives would not encourage motorists to use Omaopio and Pulehu Roads as a through route.
2.2.4.3 Agricultural Impacts

Because the potential alignments traverse agricultural areas over most of their length, and the agricultural parcels are very large, substantial adverse environmental impacts are not anticipated. None of the alternatives would bisect or pass immediately adjacent to existing residential communities or require business or residential relocations. There are no threatened or endangered floral species along the alternative alignments. None of the alignments would traverse or be near a critical habitat, valuable water body or wetland. Archaeological sites were found within the corridors, but the alignments were modified to avoid the significant sites requiring preservation. The land uses that would sustain significant adverse impacts from the proposed highway are agricultural and ranching activities. Since the level of this impact varies by alternative, these impacts were evaluated to determine the differences between alternatives.

Total land evaluation and site assessment scores from Form AD-1006, which are calculated by the U.S. Department of Agriculture and FHWA (see Section 4.2.3), were used to assess the difference in agricultural impact between the alternatives. In accordance with the Farmland Protection Policy Act, this form is used to determine whether alternatives that avoid farmland impacts need to be considered. The threshold land evaluation and site assessment score for this determination is 160 points. None of the alternatives reached 160 points, but scores ranged between 137 and 151 points. Based on the land evaluation and site assessment scores, the alternatives were ranked in the following manner (from least adverse agricultural impact to most):

2. U2-B.K1 and U2-B.K2 (tie): 139 points;
4. U2-A.K1: 141 points;
5. U2-B.K2: 142 points;
6. U1.K2: 148 points; and
As shown in these rankings, the land evaluation and site assessment scores generally decrease from U1 to U3. The Kihei terminus options were not as influential in the scores. The U1 alternatives had the highest scores (most adverse impact) because they would traverse a large parcel of sugarcane land and a pineapple field. Therefore, the agricultural impacts of the U1 alternatives would be most severe.

2.2.4.4 Community Plan Preference

The Kihei-Makena and Makawao-Pukalani-Kula Community Plans provided divergent positions regarding Kihei-Upcountry Maui Highway. The Kihei-Makena Plan supported a highway providing improved access to Upcountry. While not identifying preferred locations for an Upcountry or Kihei terminus, the Plan indicated a preference for an alignment that connects major population centers and travel destinations ("trip attractors" and "trip generators"). In its assessment of a transportation link with the Upcountry area, the Kihei-Makena Plan stated "[t]he focus should be on improving transportation services for island residents and thus the chosen route should be located to minimize travel times for the maximum number of island residents." This statement was interpreted in the following manner:

- the U3 alternatives, with a terminus relatively far from the population center of Upcountry, would not fulfill this objective statement;
- the U1 and U2 alternatives are clustered in a higher population area near Pukalani, Makawao and Haliimaile; and
- although there is not much difference between the K1 and K2 alignments in terms of proximity to the center of Kihei, the K1 alignment would be favored because it would serve the West Maui region, thereby helping to decrease travel times for the greatest number of travelers.

Unlike the Kihei-Makena Plan, the Makawao-Pukalani-Kula Community Plan clearly states that the Kihei-Upcountry Maui Highway is undesirable. However, the Plan also stated that given no other recourse, a U1 terminus is preferred. A preference for the Kihei terminus was not specified. It is therefore assumed that, if constrained to select a Build alternative, a U1 alternative would be most consistent with the Makawao-Pukalani-Kula Community Plan.
In combining the preferences inferred from the two relevant community plans, the following ranking was determined (from most favored to least):

1. U1.K1;
3. U2.A.K2 and U2.B.K2; and

The U1.K1 alternative rated the highest in terms of community preference. First, this alternative serves population, employment and visitor centers, an objective of the Kihei-Makena Community Plan. In particular, it would serve West Maui travel markets. Second, the Upcountry terminus would be at the preferred terminus stated in the Makawao-Pukalani-Kula Community Plan, U1.

The U1.K2 and U2 alternatives were all rated second and third in terms of community preference. All of these alternatives would serve population, employment and visitor centers. However, the U1.K2 alternative was marked down by having a Kihei terminus at K2, which would not serve West Maui. The U2 alternatives would have an Upcountry terminus in an area not favored in the Makawao-Pukalani-Kula Community Plan.

The U3 alternatives rated the worst in terms of community preference. Not only would these alternatives not serve population, employment and visitor centers, but the Upcountry terminus would be located in an area not favored in the Makawao-Pukalani-Kula Community Plan.

2.2.4.5 Conclusion and Selection of Preferred Alternative

The Build alternatives were compared using cost, transportation performance, agricultural impacts and community plan preference criteria. The purpose of this comparison was to help identify a preferred build alternative. The No Build alternative did not enter into this analysis because it remains a viable alternative until the Record of Decision is issued by FHWA. Other criteria were considered for the evaluation, but were not used because, while important, they did not differentiate between the alternatives.
CORRECTION

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SEE FRAME(S) IMMEDIATELY FOLLOWING
In combining the preferences inferred from the two relevant community plans, the following ranking was determined (from most favored to least):

1. U1.K1;
2. U1.K2, U2-A.K1 and U2-B.K1;
3. U2-A.K2 and U2-B.K2; and

The U1.K1 alternative rated the highest in terms of community preference. First, this alternative serves population, employment and visitor centers, an objective of the Kihei-Makena Community Plan. In particular it would serve West Maui travel markets. Second, the Upcountry terminus would be at the preferred terminus stated in the Makawao-Pukalani-Kula Community Plan, U4.

The U1.K2 and U2 alternatives were all rated second and third in terms of community preference. All of these alternatives would serve population, employment and visitor centers. However, the U1.K2 alternative was marked down by having a Kihei terminus at K2, which would not serve West Maui. The U2 alternatives would have an Upcountry terminus in an area not favored in the Makawao-Pukalani-Kula Community Plan.

The U3 alternatives rated the worst in terms of community preference. Not only would these alternatives not serve population, employment and visitor centers, but the Upcountry terminus would be located in an area not favored in the Makawao-Pukalani-Kula Community Plan.

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In evaluating the transportation performance of the alternatives, all the U3 and K2 alternatives were eliminated from further consideration. The U3 terminus is located about 6 km (4 miles) from the Upcountry population centers and would therefore serve the target travel markets poorly. The K2 alternatives would not serve the Upcountry - West Maui travel market, and is therefore, at a severe disadvantage to the K1 alternatives. The benefit of K2's superior evacuation potential for South Maui did not override the disadvantage of not serving the Upcountry - West Maui travel market. The U2-A and U2-B alternatives, with a slight edge to the U2-A alternatives because of their direct connection to the Five Trees intersection, were judged to be superior to the U1 alternatives in transportation performance. These alternatives would best serve the target travel markets and maximize connection relief on Hana Highway. The top-ranking alternatives from the perspective of transportation performance are: 1) U2-A, K1; 2) U2-B, K1; and 3) U1, K1. All the other alternatives were eliminated from further consideration.

The U1, K1 alternative would be the least expensive to construct among the three alternatives remaining. However, the costs of the three remaining alternatives are within 7 percent of one another, and therefore, unlike transportation performance, was only a minor factor in the decision to select the preferred alternative.

The U2-A and U2-B alternatives would have less of an adverse impact on agriculture than the U1, K1 alternative. However, Alexander & Baldwin (see Draft EIS Comments and Responses), the parent company of Hawaiian Commercial and Sugar Company, indicated a willingness to work with the SDOT on appropriate mitigation to lessen the impact to their agricultural operations. Therefore, agricultural impacts became less of a factor in the identification of the preferred alternative.

The U1, K1, U2-A, K1, and U2-B, K1 alternatives would all be consistent with the Kihel-Makena Community Plan. Therefore, this Plan does not help discriminate among the remaining alternatives. On the other hand, the Makawao-Pukalani-Kula Community Plan indicated a strong preference for a U1 alternative. This preference for U1 was repeated by several Upcountry commentors, each asking that the project respect the preference stated in their community plan. The Makawao-Pukalani-Kula Community Plan preference for a U1 alternative
In evaluating the transportation performance of the alternatives, all the U3 and K2 alternatives were eliminated from further consideration. The U3 terminus is located about 6 km (4 miles) from the Upcountry population centers and would therefore serve the target travel markets poorly. The K2 alternatives would not serve the Upcountry – West Maui travel market, and is therefore, at a severe disadvantage to the K1 alternatives. The benefit of K2's superior evacuation potential for South Maui did not override the disadvantage of not serving the Upcountry - West Maui travel market. The U2-A and U2-B alternatives, with a slight edge to the U2-A alternatives because of their direct connection to the Five Trees intersection, were judged to be superior to the U1 alternatives in transportation performance. These alternatives would best serve the target travel markets and maximize congestion relief on Haleakala Highway. The top-ranking alternatives from the perspective of transportation performance are: 1) U2-A, K1; 2) U2-B, K1; and 3) U1, K1. All the other alternatives were eliminated from further consideration.

The U1, K1 alternative would be the least expensive to construct among the three alternatives remaining. However, the costs of the three remaining alternatives are within 7 percent of one another, and therefore, unlike transportation performance, was only a minor factor in the decision to select the preferred alternative.

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The U1, K1, U2-A, K1, and U2-B, K1 alternatives would all be consistent with the Kihei-Makena Community Plan. Therefore, this Plan does not help discriminate among the remaining alternatives. On the other hand, the Makawao-Pukalani-Kula Community Plan indicated a strong preference for a U1 alternative. This preference for U1 was repeated by several Upcountry commentors, each asking that the project respect the preference stated in their community plan. The Makawao-Pukalani-Kula Community Plan preference for a U1 alternative...
CORRECTION

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In combining the preferences inferred from the two relevant community plans, the following ranking was determined (from most favored to least):

1. U1.K1;
2. U1.K2, U2-A, K1 and U2-B, K1;
3. U2-A, K2 and U2-B, K2; and

The U1.K1 alternative rated the highest in terms of community preference. First, this alternative serves population, employment and visitor centers, an objective of the Kihei-Makena Community Plan. In particular it would serve West Maui travel markets. Second, the Upcountry terminus would be at the preferred terminus stated in the Makawao-Pukalani-Kula Community Plan, U1.

The U1.K2 and U2 alternatives were all rated second and third in terms of community preference. All of these alternatives would serve population, employment and visitor centers. However, the U1.K2 alternative was marked down by having a Kihei terminus at K2, which would not serve West Maui. The U2 alternatives would have an Upcountry terminus in an area not favored in the Makawao-Pukalani-Kula Community Plan.

The U3 alternatives rated the worst in terms of community preference. Not only would these alternatives not serve population, employment and visitor centers, but the Upcountry terminus would be located in an area not favored in the Makawao-Pukalani-Kula Community Plan.

### 2.2.4.5 Conclusion and Selection of Preferred Alternative

The Build alternatives were compared using cost, transportation performance, agricultural impacts and community plan preference criteria. The purpose of this comparison was to help identify a preferred build alternative. The No Build alternative did not enter into this analysis because it remains a viable alternative until the Record of Decision is issued by FHWA. Other criteria were considered for the evaluation but were not used because, while important, they did not differentiate between the alternatives.
In evaluating the transportation performance of the alternatives, all the U3 and K2 alternatives were eliminated from further consideration. The U3 terminus is located about 6 km (4 miles) from the Upcountry population centers and would therefore serve the target travel markets poorly. The K2 alternatives would not serve the Upcountry – West Maui travel market, and is therefore, at a severe disadvantage to the K1 alternatives. The benefit of K2's superior evacuation potential for South Maui did not override the disadvantage of not serving the Upcountry - West Maui travel market. The U2-A and U2-B alternatives, with a slight edge to the U2-A alternatives because of their direct connection to the Five Trees intersection, were judged to be superior to the U1 alternatives in transportation performance. These alternatives would best serve the target travel markets and maximize congestion-relied on Hāleakalā Highway. The top-ranking alternatives from the perspective of transportation performance are: 1) U2-A, K1; 2) U2-B, K1; and 3) U1, K1. All the other alternatives were eliminated from further consideration.

The U1, K1 alternative would be the least expensive to construct among the three alternatives remaining. However, the costs of the three remaining alternatives are within 7 percent of one another, and therefore, unlike transportation performance, was only a minor factor in the decision to select the preferred alternative.

The U2-A and U2-B alternatives would have less of an adverse impact on agriculture than the U1, K1 alternative. However, Alexander & Baldwin (see Draft EIS Comments and Responses), the parent company of Hawaiian Commercial and Sugar Company, indicated a willingness to work with the SDOT on appropriate mitigation to lessen the impact to their agricultural operations. Therefore, agricultural impacts became less of a factor in the identification of the preferred alternative.

The U1, K1, U2-A, K1 and U2-B, K1 alternatives would all be consistent with the Kihel-Makena Community Plan. Therefore, this plan does not help discriminate among the remaining alternatives. On the other hand, the Makawao-Pukalani-Kula Community Plan indicated no strong preference for a U1 alternative. This preference for U1 was repeated by several Upcountry commentors, each asking that the project respect the preference stated in their community plan. The Makawao-Pukalani-Kula Community Plan preference for a U1 alternative...
was highly influential, and became the major determining factor that led SDOT and FHWA to select the U1 K1 alternative as the preferred alternative.
CHAPTER THREE

Affected Environment
CHAPTER 3
AFFECTED ENVIRONMENT

This chapter describes the existing environmental conditions in the project area. Impacts of the proposed Kihei-Upcountry Maui Highway project on these conditions are discussed in Chapter 4.

3.1 LAND USE

3.1.1 REGIONAL SETTING

The County of Maui consists of four major islands, Maui, Lanai, Kahoolawe, and most of Molokai (Kalawao, located on the northern side of Molokai, is officially designated a separate county). The county is the second largest in the State with a total land area on four islands of 4190 km² (1,610 square miles), and it ranks third in population (estimated 122,000 in 1999). Maui island is the second largest in the Hawaiian Archipelago, with an area of approximately 1890 km² (729 square miles).

The project would be located on Maui island between the coastal community of Kihei-Makena and an area on the western slope of Haleakala known as Upcountry Maui (see Figure 1-1). Defined neighborhoods or communities in the vicinity of the proposed project include Makena, Wailea, Kihei, Pukalani, Haalamaile, Makawao, and the Kula communities of Omaopio, Pulehu, Naalea, Waikoa and Keokea. The locations of these neighborhoods and communities are shown on Figure 3-1.

3.1.2 EXISTING LAND USES

The Kihei-Makena region is comprised of the urban mixed-use community of Kihei and the resort land uses of Wailea and Makena. Development of the Kihei-Makena region has occurred primarily because of the phenomenal growth of Maui's visitor industry since the 1960s. Coastal communities in this region are essentially linear, extending from Kealia Pond
to Makena. This region is the second largest visitor accommodation area on Maui (behind the Kapalua-Kaanapali-Lahaina region on the western side of the island). Kihei, the largest and most populous of these coastal communities, consists of a wide mix of housing types from single-family to multi-family low to medium density units, small to medium-sized commercial malls, and small to medium sized hotels along South Kihei Road. The Wailea-Makena area is a resort community, similar in size and scale to other resort communities on Maui, such as Kapalua and Kaanapali located in West Maui. In terms of urban design and socio-economic conditions, Wailea-Makena is vastly more “upscale” than Kihei, which is a working class community. Wailea-Makena contains some of Maui’s most luxurious condominiums and resort hotels, such as the Grand Wailea Resort & Spa, the Maui Inter-Continental Resort, the Four Seasons Resort, and the Maui Prince Hotel.

The Upcountry Maui communities of Makawao, Pukalani and Ha‘i‘i‘maile are a mixture of suburban and rural, with Pukalani being the most suburban of the three. Pukalani and Makawao contain most of Upcountry’s commercial land uses. Pukalani’s businesses are mostly located along Haleakala Highway and are typical of a suburban community (neighborhood shopping center, convenience stores, small offices, etc.). Businesses in Makawao, centered around the intersection of Makawao and Baldwin Avenues, are generally smaller, more pedestrian-oriented, and some preserve the town’s historic architecture. These businesses consist of restaurants, gift stores, and art galleries.

The Kula region contains a mixture of rural and agricultural land uses with human settlement most concentrated at Waiakea. Single-family residences on lots up to 0.4 ha (1 acre) are generally found between Haleakala Highway/Kekaulike Avenue and Kula Highway. This area and the area west (makai) of Kula Highway are also used for small truck farms and agricultural lots. The small two to four hectare (five to ten acre) farms produce vegetables, such as the famous Maui onions, and flowers. Large-scale sugarcane and pineapple activities extend from the west slopes of Haleakala, generally west (makai) of the small truck farms, to central Maui. Cattle ranching occurs in the area east (mauka) of Haleakala Highway/Kekaulike Avenue, and on the lower west and south slopes of Haleakala. On the summit is Haleakala National Park (see Figure 1-1). The few commercial activities in Kula are primarily along the route to Haleakala National Park and in central Kula around Waiakea.
3.1.3 PROPOSED DEVELOPMENT PROJECTS

Major proposed development projects in the study area (see Figure 3-2) include:

- Kulamalu;
- Alexander & Baldwin housing development in Hallimaile;
- Department of Hawaiian Home Lands homesteads in Keokea;
- Maui Research and Technology Park;
- Waena Generating Station;
- Mokulele Baseyard; and
- redevelopment of the old Puunene Airport.

The Kulamalu development is proposed south (mauka) of Pukalani and would consist of 32 ha (80 acres) of single-family housing, 3 ha (7 acres) of multi-family housing, 2 ha (5 acres) of elderly housing, 8 ha (19 acres) of business and commercial uses, 2 ha (5 acres) for an amphitheater, 2 ha (5 acres) for public uses, 6 ha (15 acres) for parks, and 38 ha (94 acres) for a Kamehameha Schools campus. The commercial area would be designed in compliance with Business Country Town design guidelines (Kulamalu Project Draft Environmental Assessment, April 1997). The U2-B alignment is consistent with the Kulamalu master plan (see Section 2.2.2).

Alexander & Baldwin (A&B) is planning to develop approximately 200 single-family housing units on 27 ha (67 acres) in Hallimaile about 1.6 km (1 mile) from the U1 terminus (intersection of Helekela Highway and Hallimaile Road). According to A&B, the development is consistent with the Community Plan (see Section 3.4.1.2d), but needs to obtain the proper zoning (telephone conversation on January 31, 2001).

The Department of Hawaiian Home Lands (DHHL) plans to develop homesteads for qualified individuals and families in Keokea. DHHL land holdings are approximately 2450 ha (6,100 acres). Water system and other site improvements to serve a portion of this area will be built over the next two to five years (see Appendix C).

The Maui Research and Technology (R&T) Park, in Kihei east (mauka) of Pillani Highway, is the center of Maui's efforts to develop its high technology industry. Current tenants include
the Maui High Performance Computing Center, Boeing-Rocketdyne, Sunsource, the U.S. Air Force, the Pacific Disaster Center, Lockheed Martin, the University of Hawaii, the University of New Mexico, and a number of small companies. Currently about eight percent built-out, the R&T Park may eventually occupy a total of 168 ha (415 acres). Major new industries expected to locate in the park include bio- and medical-technology; arts and entertainment; environmental, earth and ocean sciences; information processing and exchange; defense missions; and education and international training and technology conferencing.

Maui Electric Company, Limited is planning to construct and operate a 232-megawatt electric generating station on a 65 acre parcel along Puulehu Road (see Figure 3-2). The first phase of this project, 58-MW of generating capacity, is scheduled to be completed by the year 2006. The timing of future phases would be dependent on future load growth, power availability from independent power purchase agreements and unit retirements. Site preparation for future phases would be completed in the first phase.

Two parcels on Mokulele Highway, Mokulele Baseyard and the old Puunene Airport site, are being planned for redevelopment (see Figure 3-2). The existing baseyard would be expanded for light industrial use, and the old airport site would be redeveloped for various uses, such as light industrial, a raceway park, recreational facilities, a heliport or a general aviation airport.

3.1.4 GOVERNMENTAL PLANS, POLICIES AND CONTROLS FOR THE AFFECTED ENVIRONMENT

3.1.4.1 Hawaii State Plans and Controls

3.1.4.1a Hawaii State Plan

The Hawaii State Plan (June 1991) consists of comprehensive goals, objectives, policies and priorities in all areas of government functions. These functions include the protection of the physical environment, the provision of public facilities, and the promotion and assistance of socio-cultural advancement.
3.1.4.1b Hawaii State Land Use Controls

Chapter 205, Hawaii Revised Statutes (HRS), relating to the State Land Use Commission (SLUC), regulates land use through classification of State lands into four districts: Urban, Agriculture, Conservation and Rural. The intent of the land classification is to accommodate growth and development while retaining the natural resources of the area. Each district has specific land use objectives and development constraints.

Figure 3-3 shows the State land use districts in the study area. Urban-designated land in the study area is primarily in Kihei-Makena, the Upcountry communities of Pukalani and Makawao, and in relatively small areas in Kula along Kula, Haleakala and Kekaulike Highways. Much of the built-up areas (i.e., residences) in Upcountry have a Rural designation.

The Kihei-Upcountry Highway would traverse Agricultural lands along most of its length. The U2-A and U2-B alternatives would traverse vacant Urban land south of Pukalani, which is being developed as part of the Kulamalu development (see Section 3.1.3). The K1 alternative would pass through vacant Urban land at its terminus at Pililani Highway.

3.1.4.1c Coastal Zone Management Act (CZM) (Chapter 205A, HRS)

The Kihei-Upcountry Highway would be within the State’s Coastal Zone Management (CZM) area. The objectives and policies of the Hawaii CZM Program are intended to protect and manage Hawaii’s coastal resources. Federally assisted activities affecting Hawaii’s coastal zone, such as the Kihei-Upcountry Highway, must be consistent with the CZM objectives and policies.

3.1.4.1d Maui Long Range Land Transportation Plan

The Maui Long Range Land Transportation Plan (February 1997) was prepared through a cooperative effort of the State Department of Transportation and the County of Maui. The Plan serves as a guide for the development of major surface transportation facilities and programs in the County of Maui. It identifies both short-range and long-range (year 2020) strategies and actions that will lead to an integrated intermodal transportation system.

A range of alternative investments in transportation infrastructure was developed to address deficiencies in the transportation system identified during the plan’s development. A
methodology to evaluate these alternatives was developed and applied, based on the following criteria:

- congestion relief effectiveness;
- service effectiveness;
- cost effectiveness;
- planning objective effectiveness; and
- environmental impacts (land use, noise, visual, resource conservation, air quality, energy).

Following the evaluation, a list of improvements, including new highways, bypass highways (relief routes), roadway extensions, roadway widening and improvements to intersections (e.g., including signals, reconfigurations and grade separations) were recommended. Among the recommended improvements was an Upcountry-Kihei highway.

3.1.4.2 County of Maui Plans and Controls

3.1.4.2a General Plan

The County of Maui's General Plan 1992 was adopted by Ordinance No. 2039, which took effect on September 27, 1991. The General Plan consists of objectives and policies to meet Maui residents' needs and desires. The following major themes were incorporated in the General Plan: protect Maui County's agricultural land and rural identity; prepare a directed and managed growth plan; protect Maui County's shoreline and limit visitor industry growth; maintain a viable economy that offers diverse employment opportunities for residents; and provide for needed resident housing.

The General Plan's transportation objectives were the following:

1. To support an advanced and environmentally sensitive transportation system which will enable people and goods to move safely, efficiently and economically.
2. To develop a program for anticipating and enlarging the local street and highway systems in a timely response to planned growth.
3. To develop a Maui County Transportation system linked to land use planning that is less dependent on the automobile as its primary mode of moving people.
3.1.4.2b County of Maui Zoning

Zoning in the County of Maui is administered by its Planning Department. Since most of the study area is designated Agriculture by the SLUC (see Section 3.1.4.1b), the County also zones this land Agriculture. The State Urban land in Kihei-Makena is zoned for residential, business and hotel land uses. A portion of the residential land is for higher density apartment uses. In Upcountry, the State Urban lands are mostly in Pukalani and Makawao. In these areas, the County zoning is mostly residential. However, there are areas zoned “business” and “parks”, including golf courses. Also, much of the built-up areas in Upcountry have a State Rural designation.

3.1.4.2c County of Maui Special Management Area

Chapter 205A outlines special controls, policies and guidelines for development within the area along the shoreline designated by the 1975 Shoreline Protection Act as the Special Management Area (SMA). This Act gave the counties authority to issue permits for development activities proposed within the SMA. In the study area, the landward limit of the SMA is Pilani Highway (see Figure 3-4).

3.1.4.2d Community Plans

The County prepares nine Community Plans to help guide its decisions regarding development. Two of these plans are of relevance to the proposed project—the Kihei-Makena Community Plan (1998) and the Makawao-Pukalani-Kula Community Plan (July 1996). Their planning areas are displayed on Figure 3-5.

Kihei-Makena Community Plan

The Kihei-Makena Community Plan was approved by the County Council and Mayor in early 1998. The Kihei-Makena Plan addressed Kihei-Makena's physical and social infrastructure, emphasizing that community facilities are not keeping up with growth. Therefore, objectives were established to limit hotel and residential development until adequate public facilities and services, such as schools, are established to meet existing needs. The exception to this recommendation is encouragement of appropriate commercial and light industrial activities to diversify the region's economic base.

The Kihei-Makena Plan seeks the following land use patterns:
• Vacant land between Piilani Highway and South Kihei Road / Kilohana Road to be developed as an urban mix, such as single-family and multi-family residences and commercial land uses (shopping centers, hotels, etc.).
• Limited commercial/light industrial development mauka of Piilani Highway, such as the Kaonoulu parcel and the build-out of the Maui R&T Park.
• Resorts and resort-related activities (some residences, retail, commercial, etc.) to continue to be developed in the resort area of Wailea and Makena.

The Kihei-Makena Plan recommended a transportation connection to the Upcountry area. This connection would save commuter time between the residential area of Upcountry and job centers within the Kihei region. In choosing the alignment for this connection, the Kihei-Makena Plan recommended that preference be given to improving transportation service for the maximum number of residents.

Makawao-Pukalani-Kula Community Plan
The Makawao-Pukalani-Kula Community Plan (July 1996) seeks to protect and enhance the unique qualities of this region through policies and recommendations to expand the region’s agricultural base and enhance the rural qualities associated with Upcountry Maui. The Plan seeks to accomplish this by directing growth to already established urbanized centers. For example, Pukalani would be the region’s “hub” for business, commercial and housing land uses. Makawao’s and Waialea’s unique town ambiance and Kula’s rural and agricultural atmosphere would be maintained. The Community Plan seeks the following land use patterns:

• Agriculture and open space would be maintained.
• Residential growth would be directed to the established urbanized communities of Pukalani, Makawao and HaGilmaile.
  - In Makawao:
    • businesses would develop around the established central core; and
    • the country town ambiance would be maintained.
  - In Pukalani:
• residential growth would be within (in-fill) and to the north (makai) and south (mauka) of the community;
• multi-family residences (for senior housing in the Kulamalu development) would be consistent with the community’s size and character; and
• Pukalani would be developed as Upcountry’s geographic, public service and commercial hub.
  – In Haliimaile:
    • some small-scale commercial uses would serve existing and proposed residences; and
    • limited single-family residential growth would be contiguous with existing residences.
• Small-scale agriculture in Kula, particularly on the west (makai) side of Kula Highway, would be preserved.
• Waiakea would be developed as Kula’s town center:
  – some low density residential uses;
  – some small scale commercial; and
  – no urban sprawl.
• Residences in Kula would generally be allowed between Kula Highway and Haleakala Highway. Lot sizes would be no larger than 0.2 ha (1/2 acre).
• The Keokea area would be developed for homesteads by the Department of Hawaiian Home Lands (DHHL).
• No large-scale retail or heavy industrial land uses.
• Existing communities would remain separated with no in-fill development between communities.

With regards to the proposed project, the Makawao-Pukalani-Kula Community Plan stated a preference for the No Build alternative. If the road is built, however, the Plan recommended the U1 alternatives.
3.2 FARMLAND

Large-scale sugarcane and pineapple cultivation and cattle ranching are the major economic activities in Upcountry. Other agricultural activities include small-scale vegetable and flower production. Sugarcane and pineapple activities are located from the west slopes of Haleakala to central Maui. Cattle ranching generally occurs in the area east (mauka) of Haleakala Highway/Kekaulike Avenue and on the lower west and south slopes of Haleakala. In Kula, smaller scale agricultural crops include vegetables, such as head cabbage, lettuce and round onions; and flowers, such as carnations and protea. Unlike sugarcane and pineapple cultivation, agricultural activities in Kula are on much smaller farm lots of about two to four hectares (five to ten acres).

Hawaiian Commercial and Sugar Company (HC&S) cultivates approximately 14 000 ha (35,000 acres) of sugarcane (see Figure 3-6). HC&S operates a sugar mill in Puunene, which also exports electricity to the Maui electrical grid. HC&S’s Paia mill was recently closed. Other highways, such as Haleakala and Hana Highways, already cross HC&S fields (see Figure 3-6), and these highways adversely affect productivity for several reasons. For example, only some public road-haul road intersections are signalized, and these crossings delay the transport of sugarcane to the mills. In addition, suburban encroachment interferes with certain agricultural operations, such as cane burning and aerial spraying.

The other large-scale agricultural business in the study area is Maui Land & Pineapple Company (ML&P), the last pineapple processor in the State. ML&P’s pineapple fields are located around Hallimaile, Makawao and Pukalani, and in lower Kula (see Figure 3-6). ML&P selected these areas to cultivate pineapple because they have good soil conditions and access to water. Similar to HC&S, urban encroachment has adversely affected ML&P productivity.

Small farms are located in Kula around Omaopio, Pulehu, Naalea, Waiakea, and Keokea (see Figure 3-1). As described in Section 3.1.2, these two to four hectare (five to ten acre) farms cultivate vegetables and flowers. One of these farming areas is the Kula Agricultural Park, owned by the County of Maui. The Agricultural Park leases parcels to small-scale farmers at low rents. Kula farmers face problems similar to those expressed by HC&S and ML&P: urban
encroachment and periodic water use restrictions during drought conditions. Urban encroachment affects Kula farmers through speculation (increasing land values), neighbor complaints of chemical use by farmers, and increased traffic.

Cattle ranching generally occurs east (mauka) of Haleakala Highway/Kekaulike Avenue and on the lower west and south slopes of Haleakala. The ranching enterprises in the study area are the Haleakala and Kaonolu Ranches. Similar to HC&S and ML&P, urban encroachment has adversely affected these ranches because of complaints about noise and cattle crossing public roadways.

3.3 SOCIAL AND ECONOMIC ACTIVITY

As shown on Figure 3-7, U.S. census tracts (CTs) 303.01, 303.02, 304.01, 304.02, and 307 encompass the study area. CT 303.01 covers the Kula neighborhoods (see Figure 3-1); CT 303.02 includes Wailea and Makena; CT 304.01 includes Makawao and Hallimaile; CT 304.02 includes Pukalani and parts of Kula; and CT 307 includes Kihei.

3.3.1 DEMOGRAPHIC CHARACTERISTICS

Table 3-1 exhibits selected demographic characteristics of the Kihei-Upcountry Maui study area. In 1990, the population of the study area as delineated by the above CTs was 34,171, or 34 percent of the County population. Population growth in the study area was rapid during the 1980s (annual average growth of 5.6 percent). In comparison, County and State annual average population growth in the same period was 3.5 percent and 1.4 percent, respectively. The Kihei area (CT 307) experienced the greatest population increase both in absolute terms (6,863) and by percentage—an average of 7.9 percent per year. The Pukalani-Kula area (CT 304.02 -- partial) had the smallest average annual growth rate within the study area of 3.5 percent per year. Kula (CT 303.01), Wailea-Makena (CT 303.02) and Makawao-Hallimaile (CT 304.01) had annual growth rates of 3.8 percent, 7.3 percent, and 5.1 percent, respectively.

Table 3-1 also displays the number of households, families, ethnicity and age distributions for the study area in 1990. Overall whites made up 60 percent of the total population of the study
Table 3-1
Demographic Characteristics of Selected Kihei-Upcountry Areas, 1990

<table>
<thead>
<tr>
<th></th>
<th>Kula (Part)</th>
<th>Waiaku-Makono</th>
<th>Haalimali-Makawao</th>
<th>Pukalani-Kula (Part)</th>
<th>Kihei</th>
<th>Total</th>
<th>Maui County</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>CT 304.01</td>
<td>CT 304.02</td>
<td>CT 304.03</td>
<td>CT 304.04</td>
<td>CT 307</td>
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<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Sex</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Males</td>
<td>50%</td>
<td>51%</td>
<td>52%</td>
<td>51%</td>
<td>52%</td>
<td>52%</td>
<td>51%</td>
</tr>
<tr>
<td>Females</td>
<td>50%</td>
<td>49%</td>
<td>48%</td>
<td>49%</td>
<td>49%</td>
<td>49%</td>
<td>49%</td>
</tr>
<tr>
<td>Families</td>
<td>1,439</td>
<td>661</td>
<td>1,763</td>
<td>1,576</td>
<td>3,112</td>
<td>6,581</td>
<td>23,672</td>
</tr>
<tr>
<td>Ethnicity</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>White</td>
<td>64%</td>
<td>80%</td>
<td>54%</td>
<td>43%</td>
<td>65%</td>
<td>60%</td>
<td>40%</td>
</tr>
<tr>
<td>Chinese</td>
<td>3%</td>
<td>1%</td>
<td>2%</td>
<td>2%</td>
<td>2%</td>
<td>2%</td>
<td>2%</td>
</tr>
<tr>
<td>Filipino</td>
<td>3%</td>
<td>4%</td>
<td>11%</td>
<td>13%</td>
<td>14%</td>
<td>11%</td>
<td>21%</td>
</tr>
<tr>
<td>Japanese</td>
<td>18%</td>
<td>5%</td>
<td>11%</td>
<td>25%</td>
<td>5%</td>
<td>12%</td>
<td>17%</td>
</tr>
<tr>
<td>Other Asian</td>
<td>1%</td>
<td>2%</td>
<td>1%</td>
<td>1%</td>
<td>1%</td>
<td>1%</td>
<td>1%</td>
</tr>
<tr>
<td>Hawaiian</td>
<td>8%</td>
<td>3%</td>
<td>14%</td>
<td>14%</td>
<td>9%</td>
<td>10%</td>
<td>15%</td>
</tr>
<tr>
<td>Pacific Islander</td>
<td>0%</td>
<td>1%</td>
<td>2%</td>
<td>0%</td>
<td>1%</td>
<td>1%</td>
<td>1%</td>
</tr>
<tr>
<td>Black</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>1%</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>Other Race</td>
<td>2%</td>
<td>2%</td>
<td>3%</td>
<td>2%</td>
<td>2%</td>
<td>2%</td>
<td>2%</td>
</tr>
<tr>
<td>Age</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Less than 5 Years</td>
<td>10%</td>
<td>7%</td>
<td>11%</td>
<td>10%</td>
<td>9%</td>
<td>9%</td>
<td>9%</td>
</tr>
<tr>
<td>5 to 17 Years</td>
<td>17%</td>
<td>12%</td>
<td>20%</td>
<td>21%</td>
<td>14%</td>
<td>17%</td>
<td>17%</td>
</tr>
<tr>
<td>18 to 34 Years</td>
<td>20%</td>
<td>22%</td>
<td>28%</td>
<td>23%</td>
<td>31%</td>
<td>26%</td>
<td>26%</td>
</tr>
<tr>
<td>35 to 64 Years</td>
<td>41%</td>
<td>48%</td>
<td>34%</td>
<td>38%</td>
<td>39%</td>
<td>39%</td>
<td>36%</td>
</tr>
<tr>
<td>65 or More Years</td>
<td>12%</td>
<td>12%</td>
<td>7%</td>
<td>8%</td>
<td>8%</td>
<td>8%</td>
<td>11%</td>
</tr>
</tbody>
</table>

Note: CT: Census Tract
Source: U.S. Census Bureau, 1990 Census of Population and Housing, Hawaii

3-19
area, which is 20 percentage points greater than their county-wide proportion (see Table 3-1). Japanese, Filipinos and Hawaiians were the second, third and fourth next most common ethnic groups, respectively. Within the study area, the proportion of whites as compared to the total ranged from a high of 80 percent in the Wailea-Makena area to a low of 43 percent in the Pukalani-Kula area. The age distribution of residents in the study area does not appear to be substantially different from the age distribution of the entire county.

3.3.2 HOUSING CHARACTERISTICS

Table 3-2 exhibits certain housing characteristics of selected Kihei-Upcountry areas in 1990. Overall, 54 percent of the housing units were one-unit structures. However, this ratio varied by community within the study area. In the Upcountry areas, such as Kula (CT 303.01), Makawao-Pukalani (CT 304.01), and Pukalani-Kula (partial) (CT 304.02), one-unit housing types made up more than 90 percent of all housing units, consistent with Upcountry's suburban and rural characteristics. The coastal areas of Wailea-Makena (CT 303.02) and Kihei (CT 307) have a mix of housing types consistent with these areas' more urban characteristics.

The age ratios of structures (see Table 3-2) is a good indicator of the ages of the neighborhoods within the CTs. From the information presented in Table 3-2, Wailea-Makena (CT 303.02) and Kihei (CT 307) are relatively young communities in comparison to all communities combined on the island. Very few of the houses in these areas are older than 20 years. In terms of age of their communities, Kula (CT 303.01) and Pukalani-Kula (partial) (CT 304.02) are very similar to the island overall. The age ratios of Ha‘ikulimaile-Makawao indicate that they are older communities that have recently experienced surges in residential growth.

Overall the owner versus renter occupancy ratio for the study area was 58:42 in 1990, roughly the same as the owner-renter occupancy ratio for the county. Within communities of the study area, this ratio varied from 65:35 in Makawao-Pukalani to 51:49 in Kihei. According to the Maui County Data Bank (December 1994), approximately 32 percent of the housing units in the Kihei to Makena area were used for seasonal or recreational purposes in 1990. In the Upcountry areas, only two to three percent of the housing units were used for such purposes.
## Table 3-2

**Housing Characteristics of Selected Kihei-Upcountry Areas, 1990**

<table>
<thead>
<tr>
<th></th>
<th>Kula</th>
<th>Wailea-Makena</th>
<th>Haliimaile-Makawao</th>
<th>Pukalani-Kula (Part)</th>
<th>Kihei</th>
<th>Total</th>
<th>Maui County</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Housing Units</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Units in Structure</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 Unit</td>
<td>2,169</td>
<td>2,207</td>
<td>2,345</td>
<td>1,995</td>
<td></td>
<td>7,902</td>
<td>16,638</td>
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<tr>
<td>2 to 4 Units</td>
<td>98%</td>
<td>50%</td>
<td>96%</td>
<td>98%</td>
<td>41%</td>
<td>64%</td>
<td>68%</td>
</tr>
<tr>
<td>5 or More Units</td>
<td>2%</td>
<td>12%</td>
<td>2%</td>
<td>1%</td>
<td>3%</td>
<td>4%</td>
<td>4%</td>
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<tr>
<td>Mobile or Other</td>
<td>0%</td>
<td>38%</td>
<td>0%</td>
<td>0%</td>
<td>55%</td>
<td>31%</td>
<td>27%</td>
</tr>
<tr>
<td><strong>Age of Structure</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 Year</td>
<td>4%</td>
<td>11%</td>
<td>7%</td>
<td>5%</td>
<td>9%</td>
<td>8%</td>
<td>5%</td>
</tr>
<tr>
<td>2 to 10 Years</td>
<td>32%</td>
<td>41%</td>
<td>37%</td>
<td>35%</td>
<td>32%</td>
<td>34%</td>
<td>27%</td>
</tr>
<tr>
<td>11 to 20 Years</td>
<td>31%</td>
<td>43%</td>
<td>26%</td>
<td>34%</td>
<td>51%</td>
<td>42%</td>
<td>37%</td>
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<tr>
<td>21 Years or More</td>
<td>33%</td>
<td>5%</td>
<td>30%</td>
<td>27%</td>
<td>8%</td>
<td>16%</td>
<td>30%</td>
</tr>
<tr>
<td><strong>Tenure</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Owner-Occupied</td>
<td>63%</td>
<td>53%</td>
<td>64%</td>
<td>66%</td>
<td>51%</td>
<td>58%</td>
<td>55%</td>
</tr>
<tr>
<td>Renter-Occupied</td>
<td>37%</td>
<td>47%</td>
<td>36%</td>
<td>34%</td>
<td>49%</td>
<td>42%</td>
<td>42%</td>
</tr>
</tbody>
</table>

**Note:** CT: Census Tract

**Source:** U.S. Census Bureau, 1990 Census of Population and Housing, Hawaii
3.3.3 INCOME AND EMPLOYMENT CHARACTERISTICS

Table 3-3 exhibits certain income characteristics for selected Kihei-Upcountry areas in 1990. Median household incomes in the study area were higher than the median for the County, which was $38,771 in 1989. Incomes varied from a low of $40,483 in Kula (CT 303.01) to a high of $45,694 in Wailea-Makena (CT 303.02). The poverty rates of residents in Kihei-Upcountry areas were slightly higher than the rate for the County. The percentage of households with incomes below the poverty level ranged from a low of six percent in Pukalani-Kula (partial) (CT 304.02) to a high of 12 percent in Wailea-Makena (CT 303.02).

From 1980 to 1993, the unemployment rate for Maui island ranged from 2.2 percent in 1989 to 7.6 percent in 1992. The average in this period was 4.9 percent. The Kihei to Makena region is one of the island’s major employment centers (see Sections 1.2.2 and 3.3.4).

3.3.4 ECONOMIC CHARACTERISTICS

Maui’s most important industry is tourism. From 1989 to 1993, an average of over 2.3 million visitors arrived on Maui per year. The peak for this period was 1989 when there was over 2.5 million visitors. In 1988 and 1989, the island supported 2.24 and 2.28 million visitors, respectively. Most of Maui’s hotels, resorts, and visitor-related businesses are in West Maui from Lahaina to Kapalua, and in South Maui from Kihei to Makena. In the latter area, there were 84 visitor-accommodation facilities in 1993 providing a total of 7,318 visitor rental units, approximately 40 percent of all visitor-related units on Maui. In contrast, the Upcountry areas had only 63 visitor-related units. The Kihei-Makena region held about 14.6 percent of the employment on Maui, ranking third behind West Maui and Wailuku-Kahului in the number of jobs on the island.

Unlike Kihei-Makena, agriculture is Upcountry Maui’s prime economic activity. Agricultural activities in Upcountry Maui include large-scale sugarcane and pineapple cultivation, ranching and small-scale farming in Kula (see Section 3.2). Upcountry Maui also has small to medium-scale (e.g., supermarket) commercial activities, mostly in Pukalani and Makawao. The medium sized commercial land uses are exclusively within Pukalani. Makawao's
Table 3-3
Income Characteristics of Selected Kihei-Upcountry Areas, 1990

<table>
<thead>
<tr>
<th>CT 303.01</th>
<th>CT 303.02</th>
<th>CT 304.01</th>
<th>CT 304.02</th>
<th>CT 307</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kula</td>
<td>Wailea-</td>
<td>Ha'ikulie-</td>
<td>Pukalani-</td>
<td>Kihei</td>
</tr>
<tr>
<td>Makena</td>
<td>Makawao</td>
<td>Kula (Part)</td>
<td>Kula</td>
<td></td>
</tr>
<tr>
<td>Median Household Income</td>
<td>$40,463</td>
<td>$45,694</td>
<td>$41,949</td>
<td>$43,032</td>
</tr>
<tr>
<td>Selected Sources of Income</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Social Security Income</td>
<td>24%</td>
<td>24%</td>
<td>19%</td>
<td>21%</td>
</tr>
<tr>
<td>Retirement Income</td>
<td>14%</td>
<td>15%</td>
<td>16%</td>
<td>18%</td>
</tr>
<tr>
<td>Public Assistance Income</td>
<td>3%</td>
<td>3%</td>
<td>6%</td>
<td>2%</td>
</tr>
<tr>
<td>Households Below Poverty Level</td>
<td>11%</td>
<td>12%</td>
<td>10%</td>
<td>6%</td>
</tr>
</tbody>
</table>

Note: CT: Census Tract

Source: U.S. Census Bureau, 1990 Census of Population and Housing, Hawaii
business district contains pedestrian-oriented small retail stores and restaurants. Kula has very few commercial activities.

Scientific research is becoming an increasingly important industry on Maui. This industry is centered at the Maui R&T Park in Kihei and Science City on the summit of Haleakala. Science City, a federal research campus, is used for space- and defense-related research and development. Information about the Maui R&T Park can be found in Sections 1.2.2 and 3.1.3.

### 3.3.5 PUBLIC FACILITIES AND SERVICES

Community facilities and services in the Kihei-Upcountry Maui study area include community centers, schools, police and fire stations and medical facilities (see Figure 3-8).

There are three schools in the Kihei-Makena region: Kihei Elementary School, Lokelani Intermediate School, and the new Kamali Elementary School. Schools in Upcountry Maui include Makawao School, Pukalani Elementary, Kula Elementary, Kalama Intermediate, Seabury Hall (private), King Kekaulike High School, and Kamehameha School, which opened in 1999.

Police patrols for Kihei-Makena and Upcountry Maui operate out of the main police headquarters in Wailuku. The Makawao Community Police Officer maintains an office in the town. There are plans to construct a police sub-station in Kihei. Fire stations are located on South Kihei Road near Kalama Park, in Makawao, and in Kula near Waikoa.

Maui Memorial Hospital in Wailuku is the principal hospital on Maui. Smaller hospitals are in Hana and Kula (Kula Sanatorium). The Kula Sanatorium provides care for tubercular, mental and long-term patients. An ambulance stationed in Makawao provides emergency service between the Upcountry area and Maui Memorial Hospital. There is no 24-hour ambulance service in Kula. Emergency medical service in Kihei is provided by Maui Memorial Hospital.

Section 3.11 contains information about community parks and recreational facilities in the project area.
3.3.6 CRIME

Table 3-4 exhibits the crime rates of the communities in the study area for selected offenses for the years 1993 to 1996. The table indicates that the property crime rate (e.g., burglary and theft) in the Kihei to Makena communities is two to four times the rate of Upcountry communities. The crime rate differences for other offenses, such as criminal property damage, are not as great, or the Upcountry communities have higher rates than the Kihei-Makena communities.

3.4 INFRASTRUCTURE

3.4.1 ROADWAY SYSTEM

3.4.1.1 Roadway Network

Figure 3-9 displays the major transportation facilities in Kihei-Makena and Upcountry, and the roadways that connect the two regions.

The major roadways in Kihei-Makena are South Kihei Road, Pillani Highway, Wailea Alanui and Makena Alanui (see Figure 3-9). South Kihei Road, Wailea Alanui and Makena Alanui, which are two-lane arterials running along the Kihei-Makena coastline, are County facilities. They are the main roadway spine providing access to all land uses in Kihei, Wailea and Makena. Pillani Highway is a limited-access two-lane State facility that runs parallel to and east (mauka) of South Kihei Road, beginning at its intersection with Mokulele Highway and terminating at Wailea Iki Drive in Wailea. It has paved shoulders with left- and right-turn deceleration lanes at major intersections. South Kihei Road becomes North Kihei Road north of its intersection with Mokulele Highway, providing access to West Maui.
# Table 3-4
Crime Rate for Selected Offenses Per 10,000 Residents

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Burglary</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Halimaile</td>
<td>97.61</td>
<td>126.45</td>
<td>40.98</td>
<td>59.88</td>
</tr>
<tr>
<td>Makawao</td>
<td>53.90</td>
<td>162.05</td>
<td>149.25</td>
<td>97.29</td>
</tr>
<tr>
<td>Pukalani</td>
<td>88.47</td>
<td>57.85</td>
<td>93.84</td>
<td>65.54</td>
</tr>
<tr>
<td>Kula</td>
<td>100.40</td>
<td>54.37</td>
<td>43.54</td>
<td>49.94</td>
</tr>
<tr>
<td>Kihei</td>
<td>211.12</td>
<td>304.89</td>
<td>241.88</td>
<td>249.24</td>
</tr>
<tr>
<td>Wailea-Makena</td>
<td>141.69</td>
<td>144.69</td>
<td>206.49</td>
<td>132.51</td>
</tr>
<tr>
<td><strong>Theft</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Halimaile</td>
<td>86.77</td>
<td>231.82</td>
<td>174.18</td>
<td>159.62</td>
</tr>
<tr>
<td>Makawao</td>
<td>297.10</td>
<td>342.79</td>
<td>264.75</td>
<td>282.48</td>
</tr>
<tr>
<td>Pukalani</td>
<td>237.47</td>
<td>255.33</td>
<td>199.41</td>
<td>175.51</td>
</tr>
<tr>
<td>Kula</td>
<td>111.92</td>
<td>166.29</td>
<td>183.27</td>
<td>166.46</td>
</tr>
<tr>
<td>Kihei</td>
<td>730.30</td>
<td>905.90</td>
<td>909.69</td>
<td>843.86</td>
</tr>
<tr>
<td>Wailea-Makena</td>
<td>631.60</td>
<td>618.44</td>
<td>814.61</td>
<td>768.34</td>
</tr>
<tr>
<td><strong>Criminal Property Damage</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Halimaile</td>
<td>108.46</td>
<td>126.45</td>
<td>163.93</td>
<td>129.74</td>
</tr>
<tr>
<td>Makawao</td>
<td>156.68</td>
<td>180.42</td>
<td>177.03</td>
<td>161.42</td>
</tr>
<tr>
<td>Pukalani</td>
<td>85.36</td>
<td>123.64</td>
<td>77.71</td>
<td>57.08</td>
</tr>
<tr>
<td>Kula</td>
<td>64.19</td>
<td>57.56</td>
<td>65.31</td>
<td>90.80</td>
</tr>
<tr>
<td>Kihei</td>
<td>138.01</td>
<td>238.65</td>
<td>176.06</td>
<td>197.89</td>
</tr>
<tr>
<td>Wailea-Makena</td>
<td>100.86</td>
<td>105.02</td>
<td>117.99</td>
<td>154.59</td>
</tr>
<tr>
<td><strong>All Offenses</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Halimaile</td>
<td>835.14</td>
<td>1022.13</td>
<td>891.59</td>
<td>928.14</td>
</tr>
<tr>
<td>Makawao</td>
<td>1483.79</td>
<td>1676.23</td>
<td>1783.09</td>
<td>1587.77</td>
</tr>
<tr>
<td>Pukalani</td>
<td>963.84</td>
<td>1020.81</td>
<td>1036.66</td>
<td>927.51</td>
</tr>
<tr>
<td>Kula</td>
<td>515.14</td>
<td>580.43</td>
<td>738.61</td>
<td>775.33</td>
</tr>
<tr>
<td>Kihei</td>
<td>2134.23</td>
<td>2863.78</td>
<td>2784.85</td>
<td>2753.02</td>
</tr>
<tr>
<td>Wailea-Makena</td>
<td>1203.17</td>
<td>1155.19</td>
<td>1590.65</td>
<td>1462.01</td>
</tr>
</tbody>
</table>

**Note:** *Includes violent, drug, forgery, gambling, runaway, sex, terrorist threatening, truancy, and court order violation offenses.*

**Source:** Police Department, County of Maui, July 14, 1997

Upcountry Maui's major highways are Haleakala Highway, Pukalani Bypass and Kula Highway (see Figure 3-9). Haleakala Highway and Pukalani Bypass are three-lane (two lanes east (mauka) and one lane west (makai) bound) limited-access facilities with paved shoulders. At the north (makai) side of Pukalani, Haleakala Highway extends into Pukalani where it becomes...
a two-lane roadway with signalized intersections and driveway access to adjacent land uses. During the a.m. peak period, the middle south-bound (mauka) lane on Haleakala Highway/Pukalani Bypass is contra-flowed to the north-bound (makai) direction. At the “Five Trees” intersection, Haleakala Highway extends east (mauka) to the summit of Haleakala, and is the southeastern (mauka) terminus of Pukalani Bypass. The “Five Trees” intersection is the northern terminus of Kula Highway, which provides access to most of the Kula communities. This State highway terminates at Ulupalakua.

Omaopio and Pulehu Roads (see Figure 3-9) are County facilities used by Kula farmers to move equipment from field to field and transport agricultural products to Kahului Harbor. Although these roads are narrow and winding, they are used by some motorists as an alternative to Haleakala Highway to travel to Kahului or other parts of Maui.

The transportation infrastructure between the Kihei-Makena and Upcountry regions consists of Mokulele Highway, Puunene Avenue, Hansen Road, Dairy Road and Hana Highway (see Figure 3-9). Mokulele Highway and Puunene Avenue are two-lane arterials running north-south between Kahului and Kihei, and are one of the primary connections between the north and south coasts. Hana Highway begins in Kahului and runs along the north coast terminating at the southeast end of the Island. Between Kahului and Haleakala Highway, it is a four-lane divided roadway. There are two alternative routes between Puunene Avenue and Hana Highway. The first and most popular route is Dairy Road, a recently widened four-lane roadway. The second is Hansen Road, a two-lane roadway with numerous curves and a low design speed.

3.4.1.2 Roadway Accidents

Table 3-5 presents information on the number of accidents on roadways between Kihei-Makena and Upcountry Maui between September 23, 1992 and June 26, 1997.

As indicated on Table 3-5, Pulehu Road, Omaopio Road, Dairy Road, Mokulele Highway and Hansen Road have experienced a high number of vehicle accidents. Pulehu, Omaopio and Hansen Roads carry much smaller volumes of traffic in comparison to Dairy Road and Mokulele Highway. Presently, Dairy Road is probably a safer facility than indicated on Table
3-5 because it has recently been widened to four lanes. Mokulele Highway is planned to be widened to four lanes, which should improve safety on this roadway.

Table 3-5
Motor Vehicle Accidents

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Holopuni Road</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Pulehu Road</td>
<td>11</td>
<td>18</td>
<td>18</td>
<td>23</td>
<td>19</td>
<td>7</td>
</tr>
<tr>
<td>Omaopio Road</td>
<td>10</td>
<td>24</td>
<td>24</td>
<td>32</td>
<td>34</td>
<td>13</td>
</tr>
<tr>
<td>Pillwale Road</td>
<td>2</td>
<td>0</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Haleakalā Highway (Hana Highway to &quot;Five Trees&quot; intersection)</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>6</td>
<td>9</td>
<td>10</td>
</tr>
<tr>
<td>Hana Highway (Haleakalā Highway to Dairy Road)</td>
<td>11</td>
<td>21</td>
<td>17</td>
<td>14</td>
<td>15</td>
<td>9</td>
</tr>
<tr>
<td>Dairy Road</td>
<td>37</td>
<td>58</td>
<td>60</td>
<td>69</td>
<td>81</td>
<td>48</td>
</tr>
<tr>
<td>Pukanalani Bypass</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>7</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>Mokulele Highway</td>
<td>33</td>
<td>101</td>
<td>89</td>
<td>88</td>
<td>80</td>
<td>33</td>
</tr>
<tr>
<td>Hansen Road</td>
<td>38</td>
<td>56</td>
<td>40</td>
<td>67</td>
<td>74</td>
<td>32</td>
</tr>
</tbody>
</table>

Notes: (1) 1992 data collected from September 23 to December 31.
(2) 1997 data collected from January 1 to June 26.

Source: County of Maui, Police Department, July 14, 1997

3.4.2 BICYCLE AND PEDESTRIAN FACILITIES

The Bike Plan Hawaii: A State of Hawaii Master Plan (April 1994) recommended improvements to the State's bikeway systems. This plan serves as guidance to the SDOT and County transportation agencies when new roadway construction or improvements to existing roadways are contemplated. Within the study area, there is an existing bike route on Pillani Highway from Mokulele Highway to Wailea-Makena (see Figure 3-10). Recommended
bikeways are also shown on Figure 3-10. Recommended bikeways include facilities on South Kihei Road, Mokulele Highway, and Haleakala Highway.

Bicycle tours are a popular tourist activity on Maui. Tours normally start from the summit of Haleakala, run through Crater Road, Haleakala Highway and Baldwin Avenue, and end in Paia.

Pedestrian facilities within the Kihei area exist along South Kihei Road and the side streets, and at points where there is public access to the beaches and shoreline. Because of its rural environment, existing pedestrian facilities in Upcountry are limited to some of the residential neighborhoods.

3.4.3 WATER SUPPLY SYSTEM

Maui is served by five major water supply systems: Central Maui, Makawao, Kula, Hana, and Lahaina; and 15 individual sub-systems. The loa Aquifer in the West Maui Mountains is the water source for Kihei-Makena and other areas. Water is transmitted from the West Maui Mountains through transmission lines running along South Kihei Road, Pilani Highway, and Wailea Alanui Drive. The Maui Board of Water Supply (BWS) is planning to develop groundwater resources in East Maui for Kihei and other areas.

Unlike Kihei-Makena, Upcountry’s water supply is from surface sources along the north and east side of the island that feed into the Makawao and Kula systems. Makawao and Pukalani receive their water from the Makawao system. Surface water is treated at the Kamole Weir Water Treatment Plant near Hallimaile, and pumped up to the two communities. This system has no reservoir. The Maui BWS is planning to construct a 760,000 m³ (200 million gallon) reservoir to support the planned developments specified in the Makawao-Pukalani-Kula Community Plan (see Section 3.1.4.2d). The East Maui groundwater resource, once developed, would be used by the Makawao system during droughts when surface water resources are dry.

The Kula system operates as two separate systems (Upper and Lower), with each having its own separate surface water intakes, treatment plant, and distribution system (lines run along
the upper portion of Haleakala Highway for the Upper system, and along Kula Highway for the Lower system. However, water can be pumped up (lower to upper) or gravity-fed (upper to lower) between the two systems, if required. Also, during droughts, water is sometimes pumped to the Kula systems from the Makawao system, and customers are required to reduce water use. The Maui BWS has recently constructed two 190,000 m³ (50 million gallon) reservoirs in the Upper Kula System, but there are no other immediate plans for a new reservoir in this system. A reservoir similar in size to the planned Makawao system reservoir (760,000 m³ (200 million gallon)) is being planned for the Lower Kula System. The Maui BWS is also planning to convert the Upper system to a dual system, in which non-potable water would be made available to Kula farmers in the Upper area for irrigation purposes.

The Kulamalu developer (see Section 3.1.3) drilled a well in Haiku to supply water to this development (The Maui News, September 5, 1997, correspondence from the Maui BWS, May 4, 1998, and letter from Kulamalu, Inc. dated September 20, 1999). The pump installed at this well will produce 6200 m³ (1.64 million gallons) per day of which 45 percent, or 2800 m³ (7.38 million gallons) per day, will be allocated to the Kulamalu project. The remaining water will not require treatment, and will remain in Haiku. Initially, this water will provide an additional supply during drought conditions, and improve the reliability of the Upcountry systems. The Kulamalu developer will provide storage tanks and new or improved mains within the development.

3.4.4 DRAINAGE

Because it is an urban community, Kihei-Makena requires drainage collection systems. The system consists of lined and unlined channels, drain lines, pipe or box culverts, and road-side ditches.

The Upcountry area contains limited drainage collection infrastructure because of its low development density, well-draining soils and its low to moderate rainfall. When it rains enough to produce overland flow, sheet flows enter the numerous gulches on the west flank of Haleakala.
3.5 CLIMATE AND AIR QUALITY

3.5.1 LOCAL METEOROLOGY

Maui's climate varies according to altitude and leeward/windward location. Lowland areas tend to have a semi-tropical climate, while higher elevations are characterized by temperate climates. Maui is cooled by northeast trade winds approximately 70 percent of the year. These winds are constant during the spring and summer months. Trade winds are affected by local topographic conditions. The northeast trade winds become northerly as they are funneled between the West Maui Mountains and Haleakala. Areas in the "wind shadows" are shielded.

The climate of Upcountry Maui is conducive to farming, being mild with warm days and cool evenings. Pukalani and Kula are relatively dry with rainfall ranging between 50 to 100 cm (20 to 40 inches) annually. The amount of rainfall increases northeastward towards Makawao and Haiku to approximately 125 to 250 cm (50 to 100 inches) annually. Temperatures range from around 15°C (60°F) during the winter to the high 20s°C (mid 80s°F) in the summer.

Kihei-Makena is on the south side of the island, in the rain shadow of Haleakala. The region is generally sunny, warm and dry the entire year. Temperatures range from a minimum of 17 degrees°C (62 degrees°F) in February to a maximum of 32 degrees°C (90 degrees°F) in July. Average annual precipitation is less than 38 cm (15 inches) per year. Most of this precipitation occurs during the winter months when storms are usually accompanied by south winds.

3.5.2 AMBIENT AIR QUALITY STANDARDS

As required by the Clean Air Act, National Ambient Air Quality Standards (NAAQS) were established by the U.S. Environmental Protection Agency (EPA) for seven major air pollutants: carbon monoxide (CO), nitrogen oxides (NOx), ozone (O3), particulate matter smaller than 10 microns (PM10), PM2.5 (particulate matter smaller than 2.5 microns), sulfur oxides (SOx), and lead. Current standards for ozone and PM2.5 were established in September 1997. The State
of Hawaii has also established its own standards for these pollutants. Both the National and State Ambient Air Quality Standards are listed in Table 3-6. The "primary" standards have been established to protect the public health with an "adequate margin of safety." The "secondary" standards are intended to protect the nation's welfare and account for air pollutant effects on soil, water, visibility, materials, vegetation, and other aspects of the general welfare. The State of Hawaii issues its ambient air quality standards in terms of a single standard that is designed "to protect public health and welfare and to prevent the significant deterioration of air quality."

<table>
<thead>
<tr>
<th>Table 3-6</th>
<th>National and State Ambient Air Quality Standards</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Pollutant</strong></td>
<td><strong>Hawaii State</strong></td>
</tr>
<tr>
<td>Carbon Monoxide (CO)</td>
<td></td>
</tr>
<tr>
<td>1 Hour</td>
<td>10 mg/m³ (9 ppm)</td>
</tr>
<tr>
<td>8 Hour</td>
<td>5 mg/m³ (4.5 ppm)</td>
</tr>
<tr>
<td>Nitrogen Dioxide (NO₂)</td>
<td></td>
</tr>
<tr>
<td>Annual Arithmetic Mean</td>
<td>70 mg/m³</td>
</tr>
<tr>
<td>Particulate Matter ≤ 10 micrometers (PM₁₀)</td>
<td></td>
</tr>
<tr>
<td>24 Hour</td>
<td>150 ug/m³</td>
</tr>
<tr>
<td>Annual Arithmetic Mean</td>
<td>50 ug/m³</td>
</tr>
<tr>
<td>Particulate Matter ≤ 2.5 micrometers (PM₂.₅)</td>
<td></td>
</tr>
<tr>
<td>24 Hour</td>
<td>--</td>
</tr>
<tr>
<td>Annual Arithmetic Mean</td>
<td>--</td>
</tr>
<tr>
<td>Sulfur Dioxide (SO₂)</td>
<td></td>
</tr>
<tr>
<td>1 Hour</td>
<td>100 ug/m³</td>
</tr>
<tr>
<td>8 Hour</td>
<td>--</td>
</tr>
<tr>
<td>Lead (Pb)</td>
<td></td>
</tr>
<tr>
<td>Annual Arithmetic Mean</td>
<td>80 ug/m³</td>
</tr>
<tr>
<td>Lead (Pb)</td>
<td></td>
</tr>
<tr>
<td>Quarterly Average</td>
<td>1.5 ug/m³</td>
</tr>
</tbody>
</table>

Source: State of Hawaii, Department of Health, Clean Air Branch, EPA NAACIS, Updated July 1997.
3.5.3 ATTAINMENT STATUS OF STUDY AREA

Section 107 of the 1977 Clean Air Act Amendments requires the EPA to publish a list disclosing whether geographic areas are in compliance with the NAAQS. Areas not in compliance with the NAAQS are termed nonattainment areas. Areas which have insufficient data to make a determination are unclassified, and are treated as attainment areas until proven otherwise. The designation of an area is made on a pollutant-by-pollutant basis.

The State of Hawaii is designated as an attainment area for all of the applicable pollutants.

3.5.4 MONITORED AIR QUALITY

Air pollutant levels in Hawaii are monitored by a network of sampling stations under the supervision of the State of Hawaii Department of Health (SDOH). On Maui, there are only two stations. They are strategically located in Kihei and Paia to be downwind of several sugarcane fields (cane fields are burned before harvest). Established in 1996, these stations monitor sugarcane burning activities, sampling PM_{10}. Sugarcane operations also generate fugitive dust from cane haul vehicles traveling on dirt roads within the fields, and other activities. Fugitive dust can travel a few hundred meters.

Additional ambient air quality data for other pollutants was obtained from an air quality study for the proposed Kahului Airport Improvements, which obtained its data from the Maui Electric Company (MECO) (Prevention of Significant Deterioration Permit Application for Maalaea Combined Cycle Project, August 1990).

A summary of the SDOH and MECO air quality data in the study area is provided in Table 3-7. As indicated on this table, monitored levels are well below the applicable State and federal standards.
### Table 3-7
Air Quality Summary for Study Area
(SDOH and MECO Monitoring Stations)

<table>
<thead>
<tr>
<th>Pollutant</th>
<th>Location</th>
<th>Malahoa (MECO Site 223)</th>
<th>Kihei (SDOH Site)</th>
<th>Paia (SDOH Site)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Carbon Monoxide (CO)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 Hour</td>
<td>14 ug/m³ (.012 ppm)</td>
<td>NM</td>
<td>NM</td>
<td></td>
</tr>
<tr>
<td>8 Hour</td>
<td>6 ug/m³ (.005 ppm)</td>
<td>NM</td>
<td>NM</td>
<td></td>
</tr>
<tr>
<td><strong>Nitrogen Dioxide (NO₂)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Annual Arithmetic Mean</td>
<td>6 ug/m³ (.003 ppm)</td>
<td>NM</td>
<td>NM</td>
<td></td>
</tr>
<tr>
<td><strong>Particulate Matter &lt;10 micrometers (PM₁₀)</strong></td>
<td></td>
<td>24 Hour</td>
<td>66 ug/m³</td>
<td>100 ug/m³</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Annual Arithmetic Mean</td>
<td>14 ug/m³</td>
<td>24 ug/m³</td>
<td>18 ug/m³</td>
<td></td>
</tr>
<tr>
<td><strong>Particulate Matter &lt;2.5 micrometers (PM₂.⁵)</strong></td>
<td></td>
<td>24 Hour</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Annual Arithmetic Mean</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td><strong>Ozone (O₃)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 Hour</td>
<td>86 ug/m³ (.044 ppm)</td>
<td>NM</td>
<td>NM</td>
<td></td>
</tr>
<tr>
<td>8 Hour</td>
<td>--</td>
<td>NM</td>
<td>NM</td>
<td></td>
</tr>
<tr>
<td><strong>Sulfur Dioxide (SO₂)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3 Hour</td>
<td>34 ug/m³ (.013 ppm)</td>
<td>NM</td>
<td>NM</td>
<td></td>
</tr>
<tr>
<td>24 Hour</td>
<td>13 ug/m³ (.005 ppm)</td>
<td>NM</td>
<td>NM</td>
<td></td>
</tr>
<tr>
<td>Annual Arithmetic Mean</td>
<td>3 ug/m³ (.001 ppm)</td>
<td>NM</td>
<td>NM</td>
<td></td>
</tr>
<tr>
<td><strong>Lead (Pb)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Quarterly Average</td>
<td>1.5 ug/m³</td>
<td>1.5 ug/m³</td>
<td>1.5 ug/m³</td>
<td></td>
</tr>
</tbody>
</table>

Note: NM – not monitored

Sources: Hawaii Air Quality Data 1999; HDOH, Clean Air Branch.  

### 3.6 NOISE

#### 3.6.1 CHARACTERISTICS AND MEASUREMENT OF SOUND

Several characteristics of sound affect its impact. These include the sound level (loudness), the frequencies involved, the period of exposure to the noise, and changes or fluctuations in the noise levels during exposure.
Loudness is measured in decibels. Since the human ear does not perceive all pitches or frequencies equally, noise levels are adjusted, or weighted, to correspond to human hearing. This adjusted unit is known as the A-weighted decibel, or dBA.

Since dBA describes a noise level at just one moment, and very few noises are constant, ways of describing noise over extended periods are needed. One way is describing fluctuating noise heard over a period as if it were a steady, unchanging sound. This type of an average is called the equivalent sound level, $L_{eq}$. $L_{eq}$ is the constant sound level that, for a given situation and time period (e.g., 1-hour, $L_{eq}(1)$; hourly, $L_{eq}(h)$; or 24 hours, $L_{eq}(24)$), conveys the same sound energy as the actual time varying sound.

### 3.6.2 NOISE ABATEMENT CRITERIA

The FHWA has developed noise impact criteria, and the State of Hawaii has adopted these criteria as its standard. Table 3-8 lists the FHWA Noise Abatement Criteria (NAC). A noise impact occurs when predicted traffic noise levels approach or exceed the NAC, or when predicted traffic noise levels substantially exceed the existing noise level. The NACs set thresholds for determining when noise abatement has to be considered.

Most of the land in the study area is used for agriculture and ranching, and therefore falls under Activity Category D. Some land uses near the east (mauka) and west (makai) ends of the alternatives are residences, and therefore fall under Activity Category B.

### 3.6.3 MEASUREMENTS AND EXISTING CONDITIONS

Field measurements of existing noise levels were taken from June 18 to 20, 1997 at thirteen sites, as shown on Figure 3-11. These sites were considered representative of sensitive noise receptors in the area. The noise measurements were taken when traffic volumes were high, yet vehicles operated at the allowable speed limit. However, Site 1, a residential community east (mauka) of Piliwani Highway near the K1 alignment, was not measured during these traffic conditions. This site was selected because of public comments made during the environmental scoping phase that noise impacts would occur at this site from early morning
vehicles (buses, vans, cars) traveling to the Haleakala Summit (see Section 1.2.4). Noise measurements at this site were taken at 5:00 a.m.

Table 3-8
FHWA Noise Abatement Criteria (NAC)

<table>
<thead>
<tr>
<th>Activity Category</th>
<th>L_{eq}(h) for Noisiest Traffic Hour</th>
<th>Description of Activity Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>57 (Exterior)</td>
<td>Lands on which serenity and quiet are of extraordinary significance and serve an important public need and where the preservation of those qualities is essential if the area is to continue to serve its intended purpose.</td>
</tr>
<tr>
<td>B</td>
<td>67 (Exterior)</td>
<td>Picnic areas, recreation areas, playgrounds, active sports areas, parks, residences, motels, hotels, schools, churches, libraries, and hospitals.</td>
</tr>
<tr>
<td>C</td>
<td>72 (Exterior)</td>
<td>Developed lands, properties, or activities not included in Categories A or B.</td>
</tr>
<tr>
<td>D</td>
<td>---</td>
<td>Undeveloped lands</td>
</tr>
<tr>
<td>E</td>
<td>52 (Interior)</td>
<td>Residences, motels, hotels, public meeting rooms, schools, churches, libraries, hospitals, and auditoriums.</td>
</tr>
</tbody>
</table>

Notes: L_{eq}(h) is the one-hour energy equivalent sound level. Interior noise level standards apply to:
1. Indoor activities for those parcels where no exterior noise sensitive land use or activities have been identified; and
2. Situations where the exterior activities are either remote from the highway or shielded so that while the exterior activities remain undisturbed, noise nevertheless affects interior activities.


All the sites, except Site 4, are in NAC Activity Category B areas. Site 4 is considered Activity Category D.

Noise measurements and traffic counts taken during the noise measurements were used to calibrate the computer model discussed in Section 4.6. Existing counts from the traffic analysis were then utilized in the model to determine the peak noise under current conditions. Existing peak hour L_{eq}(h) levels are reported on Table 3-9. As indicated on this table, noise levels at the receptor sites are generally below the NAC. The only site that approaches the
NAC of $L_{eq}(h)$ 67 dBA is Site 7. The high noise level at this site, and the noise level at many of the other sites, is primarily caused by traffic on nearby roadways.

**Table 3-9**

**Existing Noise Levels**

<table>
<thead>
<tr>
<th>Site No.</th>
<th>Location</th>
<th>Land Use Activity</th>
<th>Noise Level ($L_{eq}(h)$, dBA)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Ohukai community (Ohukai St.)</td>
<td>Residential</td>
<td>39</td>
</tr>
<tr>
<td>2</td>
<td>Kamalu Elementary School</td>
<td>School</td>
<td>58</td>
</tr>
<tr>
<td>3</td>
<td>Omaopio Homesteads</td>
<td>Residential</td>
<td>53</td>
</tr>
<tr>
<td>4</td>
<td>Haleakala Hwy. / Halimaile Rd. Intersection</td>
<td>Agriculture</td>
<td>68</td>
</tr>
<tr>
<td>5</td>
<td>Pukalani community (Alani St.)</td>
<td>Residential</td>
<td>57</td>
</tr>
<tr>
<td>6</td>
<td>Kula 200 community</td>
<td>Residential</td>
<td>51</td>
</tr>
<tr>
<td>7</td>
<td>Kula residence along Kula Hwy.</td>
<td>Residential</td>
<td>66</td>
</tr>
<tr>
<td>8</td>
<td>Pulehu community (Holopuni Rd.)</td>
<td>Residential</td>
<td>47</td>
</tr>
<tr>
<td>9</td>
<td>Future Kamehameha School</td>
<td>School</td>
<td>53</td>
</tr>
<tr>
<td>10</td>
<td>Pilani Hwy. / Kaonolu St. Intersection</td>
<td>Residential</td>
<td>60</td>
</tr>
<tr>
<td>11</td>
<td>Future Kihei Regional Park</td>
<td>Park</td>
<td>45</td>
</tr>
<tr>
<td>12</td>
<td>King Keaaulike High School</td>
<td>School</td>
<td>49</td>
</tr>
<tr>
<td>13</td>
<td>Unnamed Road off of Haleakala Hwy. near Five Trees Intersection</td>
<td>Residential</td>
<td>49</td>
</tr>
</tbody>
</table>

Source: Parsons Brinckerhoff Quade & Douglas, Inc., June 1997

### 3.7 WATER RESOURCES

#### 3.7.1 SURFACE WATERS

Surface water resources in the study area consist primarily of intermittent streams or gulches. The more prominent gulches are:

- Kalialinui
- Kaluapulani
Pulehu
Kolala
Keahuila iwi
Waialoa
Kulanihakoi
Waipullani
Kaonoulu
Waiohuli

These gulches collect rainfall and direct flows toward the ocean. However, the gulches are usually dry, and in many places their stream beds have eroded to bedrock. The U.S. Army Corps of Engineers has regulatory jurisdiction over the gulches since intermittent streams are technically considered "waters of the U.S".

3.7.2 GROUNDWATER

Maui has four principal types of groundwater reserves: fresh basal water, brackish basal water, dike-confined water, and perched water. Most of Maui's groundwater extraction infrastructure is at lower elevations where groundwater resources are more accessible and abundant. Dike complex formations in the Upcountry area may also contain abundant groundwater. However, Upcountry groundwater resources are largely unexploited because of exploring, drilling and operating costs. There is no U.S. Environmental Protection Agency-designated principal or sole-source aquifer in the project area (under the provisions of the Safe Drinking Water Act).

3.7.3 WETLANDS

As defined by 40 CFR 230.41(a)(1), wetlands are those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted to life in saturated soil conditions. According to U.S. Fish and Wildlife Service National Wetlands Inventory Maps, wetlands near the project area occur at Kealia Pond on the south coast of the central Maui valley, and along the Kihel-Makena coast. These wetlands are not within the project area. The Inventory Map identifies wetlands within some of the gulches crossed by the proposed alignments. However, botanical surveys conducted for the project (see Section 3.8.1 and Appendix J) found no evidence (vegetation, soils or hydrology) of wetlands in any
of the gulches where they would be crossed by the alternatives. Therefore, field observations indicate that there are no wetlands within the study area, even though wetlands are identified on the Inventory Map.

3.7.4 FLOODPLAINS

According to Flood Insurance Rate Maps (FIRM), the project area is contained within Zone C, indicating that the land is prone to minimal flooding.

3.8 ECOSYSTEMS

3.8.1 FLORA

The alternatives pass through actively cultivated lands at higher elevations and uncultivated lands at lower elevations. Botanical field surveys were conducted in January, February and September, 1997 to assess the botanical resources along the alternative alignments (see Appendix J). An area 60 m (200 ft) wide (30 m (100 ft) on each side of the centerline) was surveyed along each alignment. Where the alignments cross large gulches, the survey corridor was widened to 150 m (500 ft) because remnant populations of native plants are more likely to occur on steep, inaccessible areas such as gulch walls and rocky outcroppings, away from agricultural or animal grazing disturbances.

Sugarcane fields and their associated networks of cane haul roads and irrigation systems are found along the U1 alignment.

The U2-A alignment crosses three vegetational types:

- abandoned pineapple fields characterized by scattered remnant patches of pineapple (Ananas comosus) in overgrown fields of Rhodes grass (Chloris gayana) and other weedy species;
- Christmasberry/mixed shrubland; and
- actively cultivated pineapple fields.
The U2-B alignment crosses three vegetational types: Kikuyu/mixed grass pasture land, gulch vegetation, and cultivated lands. The vegetational types found along both U2-A and U2-B alignments are dominated by introduced species.

The U3 and U1/U2-A-B alignments both cross pineapple fields and uncultivated lands. A portion of the U3 alignment crosses the Kula Agricultural Park.

The uncultivated lands are covered primarily by kiawe/buffelgrass association. Kiawe trees (Prosopis pallida), native to tropical America, and buffelgrass (Cenchrus ciliaris), native to Africa and tropical Asia, are the dominant components of this vegetational type. The kiawe/buffelgrass association occurs along the K1 and K2 alignments, most of the U3 alignment, and portions of the U1/U2-A alignment. The remaining smaller sections of uncultivated land support Kikuyu (Pennisetum clandestinum), mixed grass pasture land along the U2-A-B and U3 alignments, and gulch vegetation along all the segments crossing large, steep-walled gulches, such as Waiakea, Pulehu, and Kalialinui Gulches. Most of the uncultivated lands are used for grazing cattle and horses.

Three small clusters of the endangered Ko'oloa'ula (Abutilon menziesii), a member of the mallow or hibiscus family, were found between the 210 m and 230 m (690 foot and 750 foot) elevation within Kalialinui Gulch, nearest to the U1 alignment. The clusters are estimated to be between 820 m (2700 ft) to 1100 m (3600 ft) from the U1 alignment, which is at the 255 m (840 foot) elevation at the Kalialinui Gulch crossing.

The vegetation along the alignments is dominated by introduced or alien plant species. Very few native species were identified along the alignments, and most were found in or adjacent to the gulches.

None of the plant species found within the 60 m (200 feet) wide corridors are listed, proposed, or candidate threatened and endangered species; nor is any plant a species of concern. There are no areas on or adjacent to the termini or alignments that support sensitive native plant-dominated communities.

Appendix J contains the botanical survey reports prepared for this project.
3.8.2 FAUNA

Faunal species in the study area consists of introduced species that are common throughout the Hawaiian islands, such as rats, mice, bats, goats, mongoose, cats, and dogs (Final Environmental Impact Statement for the Site Selection for the New Kihei Public Library, Kihei, Maui, June 1991; Site Selection Study and Final Environmental Impact Statement New Kihei Elementary School, Kihei, Maui, April 1992; and Site Selection Report and Final Environmental Impact Statement for the Proposed Upcountry Maui High School, December 1991).

The project area also contains a relatively large axis deer population. Figure 3-12 illustrates the density of the deer population in the project area. The deer tend to prefer dry kauwe forest areas, such as in Ulupalakua, and are less abundant in the agricultural areas (e.g., sugarcane and pineapple fields), such as Pukaiki and Halaulu.

Birds found in the study area include the cardinal, barred dove, spotted dove, mockingbird, ricebird, white eye, myna, house sparrow, and two native species, the Hawaiian pueo and the golden plover (same sources as above).

3.8.3 ENDANGERED AND THREATENED SPECIES

Consultation with the U.S. Fish and Wildlife Service (Service) and the Department of Natural Resources (DLNR), Division of Forestry and Wildlife was initiated per requirements of the federal Endangered Species Act of 1973 (16 U.S.C. 1531-1543) and State law. Copies of the correspondence are located in Appendix C.

"Endangered" species are those that are in danger of extinction throughout all or a significant part of their ranges. A "threatened" species is one which is likely to become an endangered species in the foreseeable future. "Candidate 1" species are those for which the Service has evidence of vulnerability, but there are not enough data to support formal proposal as an endangered or threatened species.

In a letter dated January 8, 1997, the Service stated that alternatives that use the K2 segment pass within 1.5 km (1 mile) of Puu o Kali. This puu supports one of the few remaining examples of dry land forest in the State, and may contain three federally endangered plants.
(Abutilon menziesii, Hibiscus brackenridgei spp. brackenridgei, and Bonamia menziesii) and rare plant species (Acacia koaia, Achyranthes spendens var. splendens, Canavalia pubescens, and Nesoloma polynesiicum). The Service also reported that the alternatives that use the U2-A,-B segment pass near a reservoir which may be used by migratory or endangered waterbirds. The federally listed endangered Hawaiian coot (Fulica americana alai) was seen in this reservoir in 1986.

### 3.9 GEOLOGY, PHYSIOGRAPHY, SITE CONTAMINATION AND NATURAL HAZARDS

#### 3.9.1 PHYSIOGRAPHY AND GEOLOGICAL SETTING

Maui consists of two major volcanoes, the West Maui Mountains and Haleakala. The older volcano, the West Maui Mountains, may be extinct. It consists of steep valleys and peaks carved by numerous streams. The younger volcano is Haleakala. Unlike the West Maui Mountains, Haleakala is a classic rounded dome typical of a shield volcano. Kihei-Upcountry Maui Highway would be located on Haleakala's western flank. The broad gently sloping plain connecting the two volcanoes, the Maui isthmus, was formed when lava from Haleakala banked against the already existing West Maui volcano. Haleakala last erupted almost two centuries ago and is considered dormant. The potential for future eruptions exists.

Figure 3-13 displays the soil types in the project area. The alignments mostly traverse the Waiakea-Keahua-Molokai association. This soil is characterized as nearly level to moderately steep, well-drained, and moderately fine textured. Portions of Segment U3 traverse the Puu Pa-Kula-Pane and Kamaole-Oanapuka associations.

#### 3.9.2 HAZARDOUS WASTE SITES

Although the project area is largely undeveloped, a database search was conducted to investigate the potential occurrence of hazardous material sites along the proposed alignments (see Appendix K). The database search included federal and State environmental
databases, in accordance with the American Society for Testing and Materials (ASTM) standards for environmental site assessments (E1527-93). No hazardous materials sites were identified in the database search that would be likely to pose a threat to public safety.

3.9.3 NATURAL HAZARDS

Maui's last major earthquake occurred in 1938, damaging roads and buildings on Maui and Molokai and causing minor damage in Honolulu. Its epicenter was about 40 km (25 miles) north of Puawela Point on the north coast of Maui. Most major earthquakes in Hawaii occur on the island of Hawaii, where earthquake epicenters are concentrated in the southern half of the island.

Tsunamis are usually generated when the ocean floor is deformed abruptly during an earthquake. Tsunami reaching Hawaii are generated by earthquakes occurring in such places as Chile, Japan, the Aleutian Islands, Alaska and Hawaii. Based on historical records, the areas most vulnerable to tsunamis are Hilo and the North shores of all the islands. Although the project area is not susceptible to tsunami, much of Kihei-Makena is within a tsunami evacuation area (see Figure 3-14).

Hawaii's heaviest rains are brought by winter storms from October to April. These storms can bring three or more inches of rain in a single hour. Lowland leeward areas, such as Kihei-Makena, obtain their rainfall chiefly from a few winter storms, and therefore, their rainfall is strongly seasonal. Hurricanes can also bring heavy rain and wind and cause damage. However hurricanes on Maui are infrequent.

3.10 HISTORIC, ARCHAEOLOGICAL AND CULTURAL RESOURCES

This section documents activities to identify and evaluate historic and archaeological resources, and traditional cultural properties or practices (TCP) in the project area in accordance with the requirements of the Code of Federal Regulations (CFR) pertaining to the Protection of Historic Properties (36 CFR 800).
3.10.1 EARLY AGENCY COORDINATION

Coordination with the DLNR, State Historic Preservation Division (SHPD) was initiated during project scoping to achieve consensus on meeting the requirements of 36 CFR 800.4, Identifying Historic Properties. SHPD suggested that a reconnaissance-level survey be conducted on alignments considered in the Draft EIS because of the high cost of conducting an inventory-level survey of multiple alignments up to 17.5 km (10.9 miles) in length. This suggestion was followed as described below. SHPD also suggested that an inventory-level survey be conducted on the preferred alternative, which would be identified after public distribution of and comment on the Draft EIS. This suggestion was also followed as described below.

3.10.2 RECONNAISSANCE SURVEY

3.10.2.1 Methodology

Cultural Surveys Hawaii (CSH) performed an archaeological reconnaissance from February 18 through March 6, 1997 along six alternative alignments (U1,K1; U1,K2; U2,K1; U2,K2; U3,K1; and U3,K2; see Section 2.2.1.4). The reconnaissance survey extended 60 m (200 ft) from the alignment center line (120 m (400 ft) total width). In total, 36,930 linear meters (121,160 ft of roadway centerline) or 450.3 ha (1113 acres) were surveyed. The reconnaissance survey report (Cultural Surveys Hawaii, December 9, 1997) included a field survey to assess archaeological sites, archival research of historical documents and maps, and a review of previous archaeological research by others.

Following the reconnaissance survey, two new alternatives were developed to replace the eastern (mauka) portion of Segment U2 because the U2 alignment would cross a future Kamehameha School campus, and would potentially affect archaeological sites likely to be important for preservation (see Section 2.2.2, and below). A reconnaissance survey was conducted of the U2-A (two versions; see below) (Cultural Surveys Hawaii, November 14, 1997 and July 1998) and U2-B alignments (Cultural Surveys Hawaii, November 14, 1997).
Cultural Surveys Hawaii prepared a single report that includes the results of all four reconnaissance surveys (see Appendix I).

### 3.10.2.2 Survey Results

A total of twenty-five sites were identified within the 120 m (400 ft) study corridor (see Figure 3-15 and Table 3-10). Twenty of these sites are newly discovered, and five sites were previously recorded from other surveys. As indicated in Section 3.10.5, the sites listed on Table 3-10 are eligible for the National Register of Historic Places.

The sites listed on Table 3-10 fall into two general categories: (1) prehistoric (or possibly early post-contact); and (2) post contact archaeological remains. The presumed prehistoric archaeological remains include simple shelter structures and petroglyphs. The post-contact sites include wall sections, various water control features, and clearing mounds associated with sugarcane irrigation and cattle ranching. Military features in the form of enclosures were also observed. The “barren” zone between the more environmentally favorable inland (mauka) and coastal (makai) habitation and agricultural zones contained very few sites, which is consistent with previous archaeological studies and the archival research on human settlement patterns for this area.

The first reconnaissance survey (U1, U2, U3, K1 and K2) identified three sites that would likely require preservation, State Sites 50-50-10-1061, 4178 and 4764 (see Section 3.10.5). The U2 alignment was modified to the U2-A and U2-B alignments, in part because of its potential affect on Sites 1061 and 4178. In addition, the U3 alignment was shifted northeast to avoid impacts to Site 4764. It is undetermined whether this U3 shift would adversely affect other archaeological sites. However, this information would be developed for U3 should it have been identified as the preferred alternative, because an inventory survey was conducted on the Preferred Alternative (see Section 3.10.3).

Reconnaissance surveys of the original U2-A alignment (see Section 2.2.2) identified two sites, one site in Kaluapulani Gulch (Site 1062) and the other in Kalailinui Gulch (Site 4779), within the alignment (see Figure 3-15 and Table 3-10). The sites appear to be significant (see Section 3.10.5), and would require preservation. These discoveries resulted in further
Table 3-10
Sites Located During Reconnaissance Surveys

<table>
<thead>
<tr>
<th>State Site</th>
<th>Description</th>
<th>Comments</th>
<th>Affected Alignment</th>
</tr>
</thead>
<tbody>
<tr>
<td>1061,3</td>
<td>Complex (cliff overhang shelter and panels with petroglyphs)</td>
<td>2 features; 60+ petroglyph figures, including poss. boxers and canoes</td>
<td>U2 (old)</td>
</tr>
<tr>
<td>1062,3</td>
<td>Petroglyph friezes</td>
<td>Located in Kaluapulani Gulch; +/- 50 figures including overhang shelter and stone wall</td>
<td>U2-A (Original)</td>
</tr>
<tr>
<td>4178,3</td>
<td>Petroglyphs on north wall of gulch</td>
<td>Located in Kaluapulani Gulch; +/- 15 figures</td>
<td>U2 (old)</td>
</tr>
<tr>
<td>4180,3</td>
<td>Wall</td>
<td>Identified by Wulzen (1996); related to pineapple cultivation and cattle control</td>
<td>U2 (old)</td>
</tr>
<tr>
<td>41812</td>
<td>Complex of two agricultural mounds; two stone alignments</td>
<td>Historic agriculture function; site already excavated for its information</td>
<td>U2-B</td>
</tr>
<tr>
<td>4760</td>
<td>Modified outcrop</td>
<td>Cattle trail bisects site</td>
<td>U2 (old)</td>
</tr>
<tr>
<td>4761</td>
<td>Oval enclosure</td>
<td>Recurrent habitation</td>
<td>U2 (old)</td>
</tr>
<tr>
<td>4762</td>
<td>Square enclosure</td>
<td>Permanent habitation</td>
<td>U2 (old)</td>
</tr>
<tr>
<td>4763</td>
<td>Wall (enclosure segment)</td>
<td>Cattle wall</td>
<td>U3</td>
</tr>
<tr>
<td>4764</td>
<td>Cliff overhang shelter with petroglyphs</td>
<td>15 pecked and incised figures</td>
<td>U3 (old)</td>
</tr>
<tr>
<td>4765</td>
<td>Mounds, road berm and irrigation ditch</td>
<td>3 features; ditch, clearing mounds, and berm segment</td>
<td>U1;U2-A-B</td>
</tr>
<tr>
<td>4766</td>
<td>Area of sites</td>
<td>+/- 30 associated features (enclosures, alignments, and mounds)</td>
<td>K2</td>
</tr>
<tr>
<td>4767</td>
<td>Circular enclosure</td>
<td>Agriculture</td>
<td>K2</td>
</tr>
<tr>
<td>4768</td>
<td>Wall</td>
<td>Possibly a cattle wall</td>
<td>K2</td>
</tr>
<tr>
<td>4769</td>
<td>Wall and cairn</td>
<td>2 features; wall and ahu</td>
<td>K2</td>
</tr>
<tr>
<td>4770</td>
<td>Enclosure and cairn</td>
<td>2 features; enclosure and ahu</td>
<td>K2</td>
</tr>
<tr>
<td>4771</td>
<td>Mound</td>
<td>Possibly a clearing mound</td>
<td>K2</td>
</tr>
<tr>
<td>4772</td>
<td>Boundary wall</td>
<td>Site extends across entire corridor</td>
<td>K2</td>
</tr>
<tr>
<td>4773</td>
<td>Complex of 2 enclosures and 7 enclosures</td>
<td>Contain live small arms ammunition</td>
<td>U1;U2-A-B; K1,K2</td>
</tr>
<tr>
<td>4774</td>
<td>Wall</td>
<td>Cattle</td>
<td>U3</td>
</tr>
<tr>
<td>4775</td>
<td>Wall</td>
<td>Cattle</td>
<td>U3</td>
</tr>
</tbody>
</table>
Table 3-10
Sites Located During Reconnaissance Surveys
(Continued)

<table>
<thead>
<tr>
<th>State Site #</th>
<th>Description</th>
<th>Comments</th>
<th>Affected Alignment</th>
</tr>
</thead>
<tbody>
<tr>
<td>4776</td>
<td>Midden and lithic scatter, and mound</td>
<td>Previous test units observed in surrounding area (association undetermined)</td>
<td>K1</td>
</tr>
<tr>
<td>4777</td>
<td>Wall</td>
<td>Cattle, above power line at bottom of gulch</td>
<td>U1</td>
</tr>
<tr>
<td>4778</td>
<td>Enclosure</td>
<td>Undetermined</td>
<td>U1; U2-A, B</td>
</tr>
<tr>
<td>4779</td>
<td>Shelter-cave</td>
<td>Located in Kalailinui Gulch; recurrent habitation</td>
<td>U2-A (Original)</td>
</tr>
</tbody>
</table>

Notes:  
1 All numbers preceded by “50-50-10-.”  
2 Site identified from previous research.  
3 Site no longer affected because of modifications to alternatives.  
See Figure 3-15 for the locations of the sites.

Source: Cultural Surveys Hawaii, Archaeological Reconnaissance Survey of the Proposed Kihei to Kula Road Corridors, Kailua to Kama'ole Ahupua'a (TMK 2:2 and 2:3), Makawao and Wailuku Districts, Island of Maui, June 1999

refinement of the U2-A alignment to avoid the sites. The second version of U2-A would avoid Site 1062 by shifting the original alignment north at Kaluapulani Gulch. It would avoid Site 4779 by shifting the original alignment south at Kalailinui Gulch.

A reconnaissance survey of the second version of U2-A found that it would indirectly affect a heiau (State Site 50-50-10-2701). This heiau appears to be significant under Criteria D and E (see Section 3.10.5). The alignment would pass on the south (makai) side of the heiau. It would obstruct the view plane from the heiau (see Figure 3-15 and Table 3-10), even though Site 2701 is not within the 120 m (400 ft) study area. CSH noted that an alignment on the north (mauka) side of the heiau, such as the original U2-A, would not present such an effect. Potential impacts to the heiau resulted in another redefinition of the U2-A alignment, as a combination of the original and second version of U2-A. This third version of U2-A avoids Sites 1062 and 4779 (second version of U2-A), and shifts the alignment south (mauka) of the heiau (original U2-A), avoiding visual affects. Since the third version of U2-A embodies the
alignments of both the original and second version of U2-A, an additional reconnaissance survey was not necessary.

The reconnaissance survey of U2-B was prepared using an existing archaeological reconnaissance survey report (Archaeological Inventory Survey, 44-Acre Pukalani Terrace Subdivision III, Land of Aapueo, Makawao District, Island of Maui, 1996) prepared for the area surrounding the eastern (mauka) portion of U2-B. Field work was conducted on the western (makai) end of U2-B (Kallalini Gulch to Omaopio). The Pukulani Inventory Survey identified State Site 50-50-10-4181 within the U2-B alignment. However, the site was excavated for the information that attributed significance to the site, and is no longer considered significant as an historic property. The field work found no other sites.

3.10.3 INVENTORY SURVEY

Following the identification of the preferred alternative (U1.K1), an archaeological inventory survey with limited subsurface testing was conducted on this alignment (Cultural Surveys Hawaii, Archaeological Inventory Survey of the Proposed Kihei to Kula Road Corridor, Kailua to Ka'ono'u'ulu Ahupua'a (TMK 2-05-001: por. 001, 002, 003, 009 2-05-002: por. 001, 002, 005, 015, 016, and 3-09-001: por. 016), Makawao and Wailuku Districts, Island of Maui, December 2000).

3.10.3.1 Methodology

CSH performed an archaeological inventory survey of the U1.K1 alignment from August 28, 2000 to October 3, 2000. Like the reconnaissance survey, the inventory survey area extended 60 m (200 ft) on both sides of the centerline, a total width of 120 m (400 ft). However, different methods were utilized during the course of the survey. Along those sections in active sugar cane fields, the surveying was conducted by two archaeologists in a vehicle. The active cane fields were not surveyed by foot. Along those sections in active pineapple fields, the surveying was conducted by four archaeologists on foot following existing pineapple roads. All clearing mounds in the pineapple fields within the survey area were inspected. All other sections, including gulches, valleys and ravines even within active agricultural areas, were surveyed by four archaeologists spaced 1 m (3 ft) to 15 m (50 ft)
apart. Generally, the four archaeologists were spaced 1 m (3 ft) to 3 m (10 ft) apart when surveying within gullies, valleys and ravines because petroglyphs are known to exist in these types of places in the study area. The archaeologists were spaced 5 m (16 ft) to 15 (50 ft) apart when surveying open savannah with scattered kiawe.

3.10.3.2 Survey Results

A total of 128 structural and nonstructural features were identified along the 120 m (400 ft) wide study corridor of the U1K1 alignment. These features are organized into 17 distinct sites that are associated with a variety of functions, including traditional Hawaiian temporary habitation, agricultural, symbolic (petroglyph sites), animal husbandry, a marker and historic military training activities. Table 3-11 provides a listing of the sites identified along the U1 K1 alignment, and the locations of these sites are shown on Figure 3-16.

Hawaiian Temporary Habitation Sites

The seven temporary habitation sites (State Sites 3742, 3743, 3745, 5032, 5033, 5034, and 5035) identified along the U1K1 alignment are grouped at the lower portion of the alignment, roughly between the elevations of 14 m (45 ft) and 140 m (460 ft) (see Figure 3-16). Sites 3742, 3743, and 3745 were identified in a previous survey and cultural materials from these sites were collected at that time. Therefore, these sites were not re-evaluated.

Site 5032 consists of a series of boulder alignments and was determined to be a temporary habitation site based on the presence of cultural material observed on the surface that included a basalt net sinker stone, a basalt adz preform or core, and a single piece of marine shell midden. These items are typically associated with pre-contact Hawaiian culture. The construction style of the Site 5032 is similar to military sites found along the project corridor rather than the other temporary habitation sites. The size of the site is unique in that it is considerably longer.

Site 5033 is a rectangular enclosure that appears to be a traditional Hawaiian temporary habitation site that was later modified either by the military or by hunters. No cultural materials were observed on the surface, but 29.8 g (1.02 oz) of marine shell midden was encountered during excavation of the site.
### Table 3.11
Summary of Inventory Survey of the U1.K1 Alignment

<table>
<thead>
<tr>
<th>Site No</th>
<th>Site Type</th>
<th>Function</th>
<th>Distance / Orientation from Center Line</th>
<th>Age</th>
</tr>
</thead>
<tbody>
<tr>
<td>3725</td>
<td>Stone Piles</td>
<td>Agriculture</td>
<td>15 m (50 ft) South</td>
<td>Intermediate</td>
</tr>
<tr>
<td>3726</td>
<td>Stone Piles</td>
<td>Agriculture</td>
<td>45 m (150 ft) South</td>
<td>Intermediate</td>
</tr>
<tr>
<td>3727</td>
<td>Stone Cairn</td>
<td>Marker</td>
<td>60 m (185 ft) South</td>
<td>Intermediate</td>
</tr>
<tr>
<td>3742</td>
<td>Surface Scatter</td>
<td>Temporary Habitation</td>
<td>On Center Line</td>
<td>Intermediate</td>
</tr>
<tr>
<td>3743</td>
<td>Surface Scatter</td>
<td>Temporary Habitation</td>
<td>60 m (200 ft) South</td>
<td>Pre-Contact</td>
</tr>
<tr>
<td>3745</td>
<td>Surface Scatter</td>
<td>Temporary Habitation</td>
<td>40 m (130 ft) South</td>
<td>Pre-Contact</td>
</tr>
<tr>
<td>4765</td>
<td>Irrigation Ditches, and Mounds</td>
<td>Agriculture</td>
<td>Crosses Center Line</td>
<td>Historic</td>
</tr>
<tr>
<td>4775</td>
<td>Military Complex</td>
<td>Military</td>
<td>Encompasses Corridor Section</td>
<td>Historic</td>
</tr>
<tr>
<td>4776</td>
<td>Oval Enclosure</td>
<td>Military</td>
<td>15 m (50 ft) North</td>
<td>Historic</td>
</tr>
<tr>
<td>4778</td>
<td>L-Shaped Enclosure</td>
<td>Military</td>
<td>25 m (75 ft) East</td>
<td>Historic</td>
</tr>
<tr>
<td>5029</td>
<td>Petroglyphs</td>
<td>Symbolic</td>
<td>60 m (200 ft) East</td>
<td>Historic</td>
</tr>
<tr>
<td>5030</td>
<td>Walls</td>
<td>Animal Husbandry</td>
<td>On Center Line</td>
<td>Historic</td>
</tr>
<tr>
<td>5031</td>
<td>Petroglyphs</td>
<td>Symbolic</td>
<td>60 m (200 ft) West</td>
<td>Pre-Contact</td>
</tr>
<tr>
<td>5032</td>
<td>Alignments</td>
<td>Temporary Habitation</td>
<td>55 m (180 ft) North</td>
<td>Pre-Contract</td>
</tr>
<tr>
<td>5033</td>
<td>Rectangular Enclosure</td>
<td>Temporary Habitation and Military</td>
<td>45 m (150 ft) North</td>
<td>Pre-Contract and Historic</td>
</tr>
<tr>
<td>5034</td>
<td>Square Enclosure</td>
<td>Temporary Habitation</td>
<td>25 m (75 ft) South</td>
<td>Pre-Contact</td>
</tr>
<tr>
<td>5035</td>
<td>C-Shape Enclosure</td>
<td>Temporary Habitation</td>
<td>15 m (50 ft) North</td>
<td>Intermediate</td>
</tr>
</tbody>
</table>

Notes:

1. All numbers preceded by "50-50-10-1:"
2. Site identified from previous research.
See Figure 3-16 for the locations of the sites.

Source: Cultural Surveys Hawaii, Archaeological Inventory Survey of the Proposed Kihei to Kula Road Corridor, Ka'anapali to Kalaupapa (TMK 2-05-001; pps. 001, 002, 003, 005, 2-05-002; pps. 001, 002, 005, 015, 016, and 3-09-001; pps. 016), Makawao and Wallula Districts, Island of Maui, December 2000, June 1999

3-59
Site 5034 is a square enclosure that appears to have been bulldozed, damaging the west and north walls of the enclosure. A sparse amount of marine shell midden was encountered during excavation of the site.

Site 5035 is a C-shaped enclosure. No cultural materials were observed on the surface or during excavation. However, a darker stained layer similar to the cultural layers found at Sites 5033 and 5034 was encountered, which suggests that the site contains cultural material.

Petroglyph Sites

Two petroglyph sites were found in Kalieiiuni (Site 5029) and Waiakoa (Site 5031). Gulches Site 5029 consists of a panel of three historic petroglyphs pecked into the northern cliff face. Site 5031 consists of at least three traditional petroglyphs of anthropomorphic figures located on the southern side of the gulch. Both petroglyph sites are located about 60 m (200 ft) from the alignment center line. Site 5031 was originally only 15 m (50 ft) from the center line, but the alignment was adjusted 45 m (150 ft) to the east to avoid the site. Therefore, both petroglyph sites are outside of the project's Area of Potential Effect (APE) because they are 60 m (200 ft) from the centerline and because both gulches will be crossed by bridge.

Agriculture and Marker Sites

Three sites consisting of stone piles and cairns (Sites 3727, 3728, and 3729), which were identified in a previous study, are functionally associated with agriculture and a marker. All three sites were completely excavated during the previous study.

Military Sites

Site 4773 is a large historic military site consisting of 102 features that include enclosures of various shapes. The U1 K1 alignment passes directly through the site at an elevation between 150 m (500 ft) and 225 m (740 ft) (see Figure 3-16). No cultural material was observed on the surface, and none of the test probes or excavations encountered cultural material.

Site 4776 is a small oval and isolated enclosure. The site was interpreted as a military site based on its construction style, size, location and lack of traditional cultural materials. There may have been more sites or features surrounding Site 4776 because there is evidence of considerable bulldozing in the area.
Site 4778 is a small L-shaped enclosure, and is similar to Site 4776 in that it is isolated with no observable cultural materials. The site was interpreted as a military site based on its construction style, size, location and lack of traditional cultural materials.

Historic Sugar Cane Agricultural Site
Site 4765 consists of remnants of historic sugar cane cultivation infrastructure in the section of the corridor between Pulehu and Omaoopio Roads. The U1K1 alignment passes directly through this site. Recorded features include clearing mounds associated with historic sugar cane cultivation and five inactive earthen irrigation ditches with each having two to three small bridges constructed of concrete and lumber. The bridges are in poor condition.

Cattle Wall Site
Site 5030 consists of sections of cattle walls along the north side of Waiakea Gulch. The walls were used to prevent cattle from entering or exiting the gulch.

3.10.4 TRADITIONAL CULTURAL PROPERTIES / PRACTICES

According to draft Procedures for Ethnographic Surveys (SHPO, 1999), a Traditional Cultural Property (TCP) is defined as:

"Any historic property associated with the traditional practices and beliefs of an ethnic community or members of that community for more than fifty years. These traditions are founded in a community's history and contribute to maintaining the community's cultural identity. They demonstrate a continuity of practice or belief until present or documented in historical source materials, or both. These properties include, but are not limited to some types of archaeological sites." (italics added)

According to the National Register Bulletin 38, Guidelines for Evaluating and Documenting Traditional Cultural Properties (1994), a TCP is defined generally as a resource that is eligible for the NHRP because of its association with the cultural practices or beliefs of a living community that are rooted in that community's history and are important in maintaining the continuing cultural identity of the community.
TCPs differ from archaeological or historic sites in that they are sites or resources that are currently in use by a particular ethnic group. Examples of TCPs that may be in the study area include ancient fishing ko‘a, coastal zones providing edible shell fish and seaweed, land areas harvested for culturally significant plants, and structures associated with ceremonies conducted for graduates of hula halau.

3.10.4.1 Methodology

Scientific Consultant Services (SCS) conducted archival research and oral history interviews with long-time local residents of the Kihei-Upcountry region to determine whether there may be cultural resources in the project area. The oral interviews attempted to identify cultural properties in the study area, as well as defining their characteristics and associated cultural activities. These resources were evaluated in terms of their physical relationship with the alternatives. The SCS report is included as Appendix I to this FEIS.

More than 50 people were contacted and interviewed. They included several people associated ranching activities and those previously living in plantation camps. In addition, a descendant of a Land Commission Award recipient whose family had remained in the area was also interviewed.

3.10.4.2 Results of Study

No TCPs, based on definitions contained in draft Procedures for Ethnographic Surveys and National Register Bulletin 38, were identified in the project area. However, numerous culturally-significant sites and features in the general vicinity of the project area were identified through the oral histories, such as religious sites, ancient trails, petroglyphs, fishponds, and burial caves. Topographic anomalies associated with pre-contact events, individuals, or recorded in legends and stories were also noted. In addition, the reconnaissance and inventory surveys (see Sections 3.10.2 and 3.10.3) identified culturally-important archaeological sites (i.e., Criterion F for significance; see Section 3.10.5).

The following culturally-significant sites or resources in and surrounding the project area were identified through oral histories.
• Puu Pane, located outside the project area on the crest of a hill east of Haleakala Highway, which was declared sacred by the paramount chief Kihapi'ilani (c., A.D. 1500-1600s) and was used as a heiau for the high chiefs of Maui from ancient times to Kihapi'ilani;

• several old trails, including a trail near Puu o Kali, the ancient aleloku coastal trail, and Waiakea Trail, of which only portions remain or are visible;

• petroglyphs in the vicinity of Puu o Kali;

• fishponds, such as Kalepolepo, along the coast outside the project area; and

• heiau (site 2701; see Section 3.10.2) and makaheki sites near the U2-A alignment.

With the possible exception of the two heiau, one of the above potentially culturally-significant sites or resources are presently being used in a manner that would make them a TCP. The current uses of site 2701 and Puu Pane, if any, are unknown.

3.10.5 SIGNIFICANCE EVALUATION

CSH conducted significance evaluations of the sites identified during the reconnaissance surveys and the 17 sites found during the inventory survey of the preferred alternative. The evaluations were based on criteria established for the National and Hawaii Registers of Historic Places.

A resource may be considered eligible for the National Register if it has "integrity of location, design, setting, materials workmanship, feeling, and association," and meets any one of the following criteria:

A: associated with events that have made a significant contribution to the broad patterns of our history;

B: associated with the lives of persons significant in our past;

C: embodies the distinctive characteristics of a type, period, or method of construction, or represents the work of a master, or possesses high artistic values, or represents a significant and distinguishable entity whose components may lack individual distinction; or

D: yielded, or may likely yield, information important in prehistory or history.
The Hawaii Register includes another criterion:

E: site that has cultural significance, such as religious structures (shrines, heiau), or human burial locations.

The purpose of conducting a significance evaluation is to determine whether a site is a "historic property," which is defined as being on or eligible for the National Register. Federal actions that affect "historic properties" are required to comply with Section 106 of the National Historic Preservation Act.

State Sites 50-50-10-1061, 1062, 4178 and 4764 appear to be significant under Criteria C, D and E. These findings led to the modifications of Alternatives U2-A and U3 to avoid these sites. These sites are likely to yield information important to history and prehistory, are considered excellent for their site types, and are culturally significant.

Sites 4762, 4779, 5029 and 5031 appear to be significant under Criteria C and D because they are excellent examples of their type, and may yield varying types of scientific data. After refinement of the alignments, none of these sites is within the path of any alternative, including Sites 5029 and 5031, which were identified during inventory survey.

Site 2701 appears to be significant under Criteria D and E because of its information content and its cultural significance as a traditional Hawaiian religious structure.

All the other sites, including the 15 sites identified during the inventory survey within the project's APE, were evaluated by CSH as significant under Criterion D. CSH did not believe the value of these sites warranted modifications or realignments of any of the alternatives. CSH found that data recovery at each of the sites affected by the project would be appropriate. Data recovery of many of the sites, such as Sites 4181, 3727, 3728, 3729, 3742, 3743 and 3745, was completed by others. Similarly, CSH recommended that no further work is needed for Sites 4765, 4773, 4776, 4778, 5030 and 5034 because the inventory survey documented their locations, types, age and functions sufficiently that no further research on these sites appears warranted. However, CSH did recommend that data recovery be conducted on sites 5032, 5033 and 5035.
In a letter dated June 21, 1999, the Deputy State Historic Preservation Officer (SHPO) concurred that the sites identified in the reconnaissance surveys are eligible for the National Register of Historic Places (see Appendix C). Following completion of the inventory survey and cultural impact reports, they were distributed to organizations recommended by the SHPD for consultation. In a letter dated May 10, 2001, the SHPD communicated agreement with the mitigation proposals contained in the inventory survey report, but asked that significance evaluations of Sites 5029 and 5031 be changed from "D" only to "C" and "D" (see Appendix C). The survey report was revised as recommended by SHPD (see Appendix I).

3.11 PARKS AND RECREATION

Parks and recreational resources in the project area are shown on Figure 3-17.

The Kihei-Makena region contains three major beach parks (Kalama, Kamaole I, II and III and Mai Poina Oe Lau), and other smaller beach parks along the Kihei to Makena coastline. This region also features the recently completed Kihei Aquatic and Community Center, Silversword Golf Course, and two private golf courses in Wailea. The Kihei District Regional Park is being planned for the area east (mauka) of Pili/i Highway, near its intersection with Ke Alii Alanui Street. According to the County of Maui Department of Parks and Recreation, development of the park has been delayed partly because of the recent completion of the Kihei Aquatic and Community Center. The master plan for the regional park includes football, baseball, softball and soccer fields, basketball courts, nature trails and an amphitheater.

Parks and recreation facilities in Upcountry Maui include the Makawao Park/Mayor Eddie Tam Memorial Center in Makawao; the Upcountry Youth Center, Pukalani Park and Community Center, Pukalani Country Club Golf Course in Pukalani; Kula Botanical Garden, Harold F. Rice Park, Keokea Par, and a new park in Kulamalu.

At the summit of Haleakula is Haleakala National Park. The National Park extends from the higher elevations on the western flank of the volcano across the crater, to the eastern coastline at Kipahulu. According to a Park official, approximately a million people visit the summit and about one half million visit the Kipahulu side of the Park annually (telephone conversation,
December 8, 1997). In a one-year period between 1999 and 2000, about two millions people visited the national park ("Haleakala Park Visits Reach Record-High", Honolulu Advertiser, February 25, 2001). Based on Maui Visitor Bureau estimates, a little more than half the number of park visitors went to the summit, which is consistent with the park official estimate. Approximately a third of the summit visitors watch Haleakala’s famous sunrise. The summit is also used as a starting point for bike tours down the volcano (see Section 3.4.3). It was estimated that about 86,000 people bike down from the summit in 2000, up from 74,000 the year before (Honolulu Advertiser, February 25, 2001).

### 3.12 VISUAL AND AESTHETIC RESOURCES

Identifying viewsheds is an important step to assess a project’s potential visual affects. A viewshed can be described as all surface areas visible from an observer’s viewpoint. The following are general viewsheds of the study area:

**Ocean and Shoreline Views**

The ocean and shoreline views, including views of Kahoolawe, Lanai, and Molokini Islands, are spectacular scenic viewsheds from both Upcountry and Kihei.

**Haleakala**

The dry vegetated slopes of Haleakala are a backdrop to the dominant eastern (mauka) viewshed from Kihei.

**West Maui Mountains**

The West Maui Mountains, a rugged and majestic physical landmark, can be seen from both Upcountry and Kihei.

**Central Maui**

From Upcountry looking down hill, the Central Maui area is primarily open agricultural land.

These viewsheds have visual quality according to FHWA’s guidance document on visual impacts (Visual Impact Assessment For Highway Projects Publication No. FHWA-HI-88-054) because they have a high level of vividness (memorability of landscape), some intactness
(extent to which the landscape is free from visual encroachment) and some unity (the degree to which the landscape joins together to form a coherent, harmonious visual pattern).

The viewsheds from Upcountry have visual quality because of the panoramic views of Central Maui, the West Maui Mountains, and the ocean. However, Kihei, Kahului and Wailuku degrade the intactness and unity of the Upcountry viewsheds.

The makai viewshed from Kihei offers near sea level views of the ocean and coastline. However, since this viewshed has visual obstructions because of Kihei’s low elevation, its visual quality is not as high as the same viewshed from Upcountry. Kihei’s uphill views of Haleakala and distant vistas of the West Maui Mountains have high visual quality because they have few visual disruptions.
CHAPTER FOUR

Environmental Consequences
CHAPTER 4
ENVIRONMENTAL CONSEQUENCES

This chapter describes the potential environmental and social impacts of the proposed Kihei-Upcountry Maui Highway. The No Build alternative is used as the basis against which to evaluate the potential impacts of the preferred alternative (U1,K1) and the other build alternatives. Mitigation measures are also presented in this chapter. Many of the impacts and mitigation measures are attributed to a particular alternative, group of alternatives (e.g. the U3 alternatives), segment (e.g., Segment U1) or terminus (e.g., Terminus K2). In these instances, the particular section of the alternative is identified. When a particular impact or mitigation measure is attributable to the project regardless of the alternative selected, "Kihei-Upcountry Maui Highway" is often used.

4.1 LAND USE

4.1.1 LAND USE IMPACTS

Construction of the Kihei-Upcountry Maui Highway will introduce a roadway into areas presently used for agriculture and ranching. Therefore, Kihei-Upcountry Maui Highway will cause an irrevocable loss of agricultural- and pasture-related open space (see Section 4.8.1). These areas contain few manmade structures, other than those related to agricultural / ranching activities and infrastructure.

Highway projects can remove impediments to development by enhancing access to vacant land or increasing transportation capacity. To evaluate the potential land use impacts of a highway project, one compares the proposed transportation project to the planned growth within the project area. The potential growth impacts of the proposed roadway is based on an assessment of whether the transportation infrastructure will facilitate planned growth, or induce unplanned growth. The pattern of planned growth is described in the Kihei-Makena Community Plan (1998) and the Makawao-Pukalani-Kula Community Plan (July 1998) (see Section 3.1.4.2d).
All the alternatives will support planned growth because they will improve transportation between Kihei and Upcountry by reducing travel time (see Section 1.2.1). Furthermore, the proposed project is intended to meet existing and future travel demand resulting from implementation of the study area's land use plans. The issue of whether Kihei-Upcountry Maui Highway would induce unplanned growth is addressed below.

4.1.1.1 Kihei-Makena

Development in Kihei-Makena has historically correlated with the health of Maui's visitor industry. Support of growth would be beneficial in Kihei-Makena where there is ample room between Pillani Highway and South Kihei Road. Additional development would conform to Kihei's visitor-based urban environment. Factors, such as future hotel and resort development and the pace of development of Maui's "high-technology" industry (see Section 1.2.2) are expected to determine the speed and extent of growth in Kihei more than the Kihei-Upcountry Maui Highway.

As indicated in the Kihei-Makena Community Plan, only limited commercial and business development would be allowed east (mauka) of Pillani Highway, most of which consists primarily of the continued development of the Maui Research and Technology (R&T) Park. State and county zoning east (mauka) of Pillani Highway will remain in agriculture. Therefore, neither K1 or K2 segments will facilitate development in areas east (mauka) of Pillani Highway. If Kihei-Upcountry Maui Highway facilitates in-fill development between Pillani Highway and South Kihei Road, this would be considered a positive impact consistent with the Kihei-Makena Community Plan.

4.1.1.2 Upcountry

The Makawao-Pukalani-Kula Community Plan (July 1996) describes preservation of low densities, open space, and agricultural activities in Upcountry's rural communities. Because of the strong concern about potential impacts of the proposed project on the "quality of life" in Upcountry, stated repeatedly during project scoping activities (see Chapter 5), a Community Impact Assessment report was prepared for this project (see Appendix H). The findings of this report are summarized below and elsewhere in Chapter 4.
In scoping activities and interviews conducted for this EIS, many "key informants" stated a broad concern about the proposed highway facilitating urban development and increasing traffic volumes in Upcountry, elements that are inconsistent with the vision articulated for the area in the Makawao-Pukalani-Kula Community Plan. However, it is appropriate to look beyond these concerns to other factors that could affect land use trends in Upcountry, and to the relative differences among the alignment alternatives.

The project could facilitate planned residential and commercial developments in Upcountry because it will provide a transportation link between the Kihei-Makena employment center and the popular Upcountry Maui residential area. However, regardless of whether areas are available to be developed (i.e., have appropriate zoning or are identified for growth in official County land use plans), the greatest obstacle to further development in Upcountry is water availability, which has historically constrained urban growth. According to the Maui Board of Water Supply (BWS), there is currently barely enough capacity to serve current Upcountry customers. Under drought conditions, customers are required to reduce water use, and the reservoirs quickly empty.

The Maui BWS uses the Community Plan in planning new water systems and/or increasing the capacity of existing systems. As described in Section 3.4.3, the Maui BWS is planning improvements to the Makawao system in response to the Makawao-Pukalani-Kula Community Plan (see Section 3.1.4.2d), and has allowed the private drilling of a well in Haiku to free water in the Makawao system for the Kulamalu development (see Section 3.1.3). These projects in the Upper and Lower Kula systems (see Section 3.4.3) are intended to improve service to current customers. With these improvements, the Maui BWS should not have to implement water use restrictions as frequently as in the past during drought conditions (telephone conversation with Maui BWS, May 5, 1998).

Providing the additional amount of water to the Kula systems that would be sufficient to support unplanned development in Upcountry, particularly Kula, is unlikely, mainly because the system relies on surface water. Surface water resources are vulnerable to drought conditions, whereas groundwater resources are a more stable source even during a year or two of limited rainfall. According to the Maui BWS, the high cost and substantial risk of developing alternative sources of water (i.e., wells) has stopped and constrained many
development proposals in Upcountry. The Kulamalu developer was able to assume the high cost and risk of drilling a well in Halku only because of the large size and scale of the development, which is not expected to be typical for Upcountry because of land use controls (telephone conversation with Maui BWS, May 5, 1998). Therefore, water supply limitation is likely to constrain development in Upcountry in the future, despite the efforts of the Maui BWS to improve the Upcountry systems, and despite the construction of the Kihei-Upcountry Maui Highway.

Since the Maui BWS is planning to accommodate development in Pukalani, which is part of the Makawao system, the U1 alternatives could facilitate Pukalani's growth westward (makai) toward the proposed highway. This growth inducement will be partially consistent with the Makawao-Pukalani-Kula Community Plan because there are parcels on the west (makai) side of Pukalani designated for residential growth (see Figure 4-1). The U1 alternatives, including the preferred alternative, could facilitate development beyond Pukalani's urban growth boundary if the landowner, Alexander and Baldwin (A&B), chooses to develop its land north (makai) of Pukalani and Makawao. Similarly, the U1 alternatives may induce development in Haileaile beyond what is designated in the Makawao-Pukalani-Kula Community Plan (see Figure 4-1).

The U2-A and U2-B alignments may have very little influence in the area south (mauka) of Pukalani. As described in Section 3.1.3, the area south (mauka) of Pukalani is planned for development to create Kulamalu, and its developer will be making substantial improvements to the water supply infrastructure (see Section 3.4.3). Since parcels for this project already have State urban classification, the County has approved zoning and Community Plan amendments supporting the project (Maui News, December 2, 1997). With water availability not being a constraint, Kulamalu will be developed with or without Kihei-Upcountry Maui Highway. However, the U2-A and U2-B alternatives would support this development to a greater degree than the U1 or U3 alternatives by providing additional transportation infrastructure directly to the site (i.e., Kulamalu residents would not have to use Haleakala or Kula Highways to travel to Kihei). The U2-B alignment came from the Kulamalu Master Plan, and therefore, is the alignment most consistent with this development.
Legend

- Existing Roadway
- Alternative Alignments of Proposed Khei-Upcountry Maui Highway
- Proposed Terminus Alternative
- Existing Urban Areas
- Future Urban Areas

Note: Future urban areas include residences, businesses, parks and schools

Source: County of Maui, Makawao-Pukalani Community Plan, July 23, 1996, Kulamalu, Inc.

GRAPHIC SCALE:

0  .5 km  1 km  0  .25 mi.  .5 mi.

Existing and Future Urban Areas in Pukalani-Makawao
KHEI-UPCOUNTRY MAUI HIGHWAY
Final Environmental Impact Statement
FIGURE 4-1
The U2-A and U2-B alignments may facilitate in-fill development along Pukalani's southern (mauka) side. According to the Community Plan, some of Pukalani's growth is directed toward this area (see Figure 4-1).

Segment U3 is located approximately 5 km (3 miles) south (mauka) of Upcountry's "urban" areas of Pukalani and Makawao, in an area where the Community Plan designates very little additional growth. The developments that are planned include small scale commercial land uses in Waikoa and rural residences. These uses, particularly the residences, are not dependent on the highway because of Kula's attractiveness as a residential area. However, these developments will have to receive other governmental approvals (e.g., zoning, subdivision, etc.) and obtain water meters. The latter could be difficult (see above discussion on U1, U2-A and U2-B). In summary, U3 would facilitate planned growth, but not induce unplanned growth.

4.1.2 RELATIONSHIP OF THE PROPOSED ACTION TO GOVERNMENTAL PLANS, POLICIES, AND CONTROLS

4.1.2.1 Hawaii State Plans and Controls

4.1.2.1a Hawaii State Plan

The No Build alternative does not support the objectives and policies of the Hawaii State Plan (June 1991) that seek to enhance the public welfare and economic development by providing needed infrastructure. Although the No Build alternative does not support these State Plan objectives and policies, it is not necessarily inconsistent with the State Plan.

The Kihei-Upcountry Maui Highway will support those objectives and policies of the Hawaii State Plan dealing with economic, physical and natural environment, and transportation objectives and policies.

In accordance with the Plan's economic objectives and policies, Kihei-Upcountry Maui Highway will facilitate commerce through an improved transportation network. It will contribute to the economy of Maui County and the State by providing largely federally funded...
construction jobs. The State and federal government will spend roughly $80 million to construct Kihei-Upcountry Maui Highway.

The proposed highway will support both the State's established visitor industry and its growing high technology industry by providing a transportation link between Haleakala / Science City and Kihei-Makena / West Maui. Kihei is also home to the growing Maui Research and Technology (R&T) Park. Because of its 3050 m (10,000 ft) elevation, the Haleakala summit is used for science and defense-related research located in Science City.

The Plan has objectives and policies promoting the viability of sugar, pineapple and diversified agriculture. The proposed highway will serve all three of these agricultural activities (see Section 4.2.1). Although certain proposed roadway segments will cross agricultural fields, mitigation measures will be implemented to minimize adverse impacts on these fields (see Section 4.2.4). No small privately-owned farm will be directly affected by any alternative.

In accordance with the objectives and policies for the physical and natural environment, the proposed Kihei-Upcountry Maui Highway will minimize impacts to the existing environment, and where unacceptable environmental impacts might occur, mitigation measures will be implemented. Since the proposed work will be located east (mauka) of Piilani Highway, it will not adversely affect the shoreline area. The proposed highway will also not affect the spectacular panoramic views from Upcountry of the West Maui Mountains, Central Maui and the ocean. Impacts on the physical and natural environment are discussed in more detail in other sections of this chapter.

Kihei-Upcountry Maui Highway will accommodate the transportation needs of both residents and visitors. For visitors, the highway will improve transportation between Maui's hotels and resorts along the coasts, and tourist-related activities in high elevation areas of Upcountry and Haleakala. The proposed highway will contribute to residents' quality of life by improving transportation between popular residential areas in Upcountry, and employment centers and recreational attractions in Kihei-Makena and West Maui. Since the improvement in transportation will result in substantial travel time savings, the highway will provide up to 50 percent savings in vehicle fuel consumption for certain alignment alternatives and/or trips.
4.1.2.1b Coastal Zone Management (CZM)

The following describes the Kihei-Upcountry Maui Highway’s consistency with the objectives and policies of the State’s Coastal Zone Management (CZM) Program. This assessment was reviewed by the Department of Business, Economic Development and Tourism (DBEDT), the agency administering the State’s CZM program. DBEDT deferred its consistency determination pending completion of the Final EIS so that further information can be obtained about potential impacts to scenic and open space resources, public participation and historic resources (see letter dated March 30, 2001 in Appendix C).

Recreation Resources

Kihei-Upcountry Maui Highway will not adversely affect any park or recreational resource in the project area. The K2 alternatives (with the Kihei terminus at the Ke Alii Alanui Street/Pillani Highway intersection) would facilitate access to the future Kihei Regional Park for Upcountry residents.

Historic Resources

Compliance with Section 106 of the National Historic Preservation Act and Section 6E of the Hawaii Revised Statutes (the State’s historic resources law) is required for this project. Archaeological reconnaissance surveys of the alternatives identified 25 sites potentially eligible for the National and State Registers of Historic Places. The archaeological inventory survey of the preferred alternative identified 17 significant sites, an increase from five sites identified during the reconnaissance survey of this alignment. As described in Section 4.10, only three of these sites will be adversely affected by the preferred alternative because the other sites have either been avoided, or the sites have been recorded with sufficient documentation so that no further archival work is needed.

Impacts sites eligible for the National and Hawaii Registers of Historic Places and recommended for preservation in place, were avoided by modifying the alignment of the appropriate alternative. These sites include petroglyphs located in the gulches crossed by some of the alternative alignments, and one heiau in the vicinity of the U2-A alignment. Alignments were not adjusted to avoid affected sites not recommended for preservation, such
as temporary habitation sites, agricultural sites and military sites (see Section 4.10 for further details).

Scenic And Open Space Resources

Panoramic vistas of Central Maui, the West Maui Mountains, and the ocean can be seen from Upcountry Maui. Vistas from Kihei consist of near sea level views of the ocean and coastline, uphill views of Haleakala, and distant views of the West Maui Mountains. Kihei-Upcountry Maui Highway will not disrupt views from Upcountry because the terrain drops away towards Central Maui and the ocean. The proposed highway will, however, change the eastern ( mauka) view of Haleakala from Kihei by introducing a paved roadway into the present visual backdrop of agriculture and pasture land.

Coastal Ecosystems

Since Kihei-Upcountry Maui Highway will not be within the Shoreline Setback Area or Special Management Area, the alternatives will not directly affect coastal habitats, wetlands or ecosystems. Roadway drainage and runoff from construction areas will also not affect coastal areas because of natural conditions and measures to minimize off-site discharges and sedimentation.

Economic Uses

The proposed highway will support both the State's established visitor industry and its growing high technology industry by improving transportation between Kihei-Makena (and West Maui) and Upcountry Maui, including Haleakala and Science City. Kihei-Makena is Maui's second largest visitor accommodation region, the third largest employment center and home to the growing Maui R&T Park. Upcountry Maui is a popular residential area, with some tourist activities including Haleakala National Park. Science City at the Haleakala summit is the site of science and defense-related research.

Depending on the alternative, Upcountry's sugarcane and pineapple cropland will be adversely affected to varying degrees (see Section 4.2).
Coastal Hazards

Kihei-Upcountry Maui Highway will facilitate evacuation from Kihei-Makena in the event of coastal emergency, such as a tsunami. The K2 alternatives, with a more southern Kihei terminus, would facilitate evacuation better than the K1 alternatives, with a terminus in north Kihei close to the existing exit from South Maui. A more southern Kihei terminus would provide a more geographic separation between the exits from South Maui, allowing for a more orderly evacuation if needed.

Managing Development

The proposed roadway will require State and County permits. The permitting processes include provisions for public participation important for the protection of coastal resources.

Public Participation

The project included numerous scoping and coordination meetings with government agencies, elected officials, and the general public, as described in detail in Chapter 5. In addition, three public hearings were held during the public comment period on the Draft EIS. Over 400 oral and written statements about the project were received during this period.

Beach Protection

Kihei-Upcountry Maui Highway will not affect the shoreline setback area nor have an impact on coastal erosion because it will not be adjacent to or abutting the shoreline.

Marine Resources

Kihei-Upcountry Maui Highway will not directly affect marine and coastal resources. Kihei-Upcountry Maui Highway will improve access to coastal areas, especially from the Upcountry region.

Some indirect impacts are possible, such as erosion during construction, and roadway runoff during extreme storm events. However, a NPDES permit will be obtained, which will specify Best Management Practices (BMPs) to minimize erosion. As described in Section 4.7, Kihei-Upcountry Maui Highway will lead to a reduction of pollutant loading of coastal waters when compared to the future no-build condition.
4.1.2.1c Island of Maui Long Range Land Transportation Plan

The No Build alternative assumes the construction of the transportation system that is recommended in the Maui Long Range Land Transportation Plan (February 1996), except for the Kihei-Upcountry Maui Highway. Therefore, the No Build alternative is consistent with the Long Range Plan, with the exception of providing the Kihei-Upcountry highway link.

Kihei-Upcountry Maui Highway will be consistent with the Long Range Plan because it is an element of the Long Range Plan.

4.1.2.2 County of Maui Plans and Controls

4.1.2.2a Maui County General Plan

The No Build alternative would be consistent with the General Plan because of roadway improvements described in Section 2.1.1, provided that these improvements are implemented in a manner sensitive to Maui’s environmental and social conditions.

Kihei-Upcountry Maui Highway will be consistent with the County of Maui’s General Plan 1990 dealing with economic, environmental, and transportation objectives and policies. First, the proposed highway will support both Maui’s visitor and high technology industries. The highway will improve Maui’s highway network by shortening the length and duration of certain trips made by visitors, visitor industry employees and those traveling between the Maui R&T Park and Science City. Second, the project will minimize impacts to the existing environment, and will not affect vistas from Upcountry. Third, Kihei-Upcountry Maui Highway will provide a piece of transportation infrastructure that will enable people and goods to move safely, efficiently and economically between Kihei and Upcountry. In addition, the highway will be supportive of desired urban development objectives of the County of Maui (see Section 4.1.1), and therefore, will be responsive to planned growth.

The General Plan advocates land use planning that will promote a transportation system less reliant on the automobile as the primary transportation mode (see Section 3.1.2.2a). Kihei-Upcountry Maui Highway will not help achieve this objective without new transportation options becoming available. Furthermore, land use planning is not within the authority of the SPOT.
4.1.2.2b Maui County Special Management Area

There are projects under the No Build alternative that would occur in the County's Special Management Area (SMA). Construction of each of those individual projects in the SMA would require an SMA use permit.

Since no portion of Kihei-Upcountry Maui Highway will be within the SMA, the project will not require an SMA permit from Maui County.

4.1.2.2c Community Plans

Consistency of the project with the Kihei-Makena Community Plan (1996) and the Makawao-Pukalani-Kula Community Plan (July 1996) land use objectives are discussed in Section 4.1.1, Land Use Impacts. As described in Sections 3.1.2.2c, Kihei-Upcountry Maui Highway is consistent with the Kihei-Makena Community Plan because it includes a roadway between Kihei and Upcountry. However, Kihei-Upcountry Maui Highway is not consistent with the Makawao-Pukalani-Kula Community Plan because it does not include a roadway.

4.1.3 RELOCATION IMPACTS

Depending on the alternative, Kihei-Upcountry Maui Highway will require right-of-way from the land owners listed below. The existing uses on these lands are also provided:

- Alexander & Baldwin (Hawaiian Commercial and Sugar Company (HC&S)): sugarcane cultivation (U1, U2-A and U2-B alternatives);
- County of Maui (Kula Agricultural Park): leased diversified agriculture (U3 alternatives);
- Dowling Company: Kamehameha Schools campus, mostly inactive, but with planned future housing and commercial development (U2-A and U2-B alternatives);
- Haleakala Ranch: pasture land and pineapple cultivation (all alternatives);
- Keonoulu Ranch: pasture land (K1 and K2 alternatives)
- Malama Mohala Corp.: inactive, but future urban uses (U2-A alternatives)
- Maui Land & Pineapple Company: pineapple cultivation (U2-A, U2-B and U3 alternatives)
- Von Tempsky Trust: pasture land (U3 alternatives);
• Others (see Table 2-1 for a list of land owners): inactive with some planned future urban uses (U2-A alternatives); and existing pasture (U3 alternatives)

None of these land owners or uses will need to be relocated. All of the enterprises listed above could continue operation at their present locations after acquisition of roadway right-of-way. Mitigation measures to lessen the adverse impact on agricultural and ranching activities will be provided (see Section 4.2.4).

No alternative will require the displacement of any residence.

4.1.4 MITIGATION MEASURES

4.1.4.1 Land Use

Mitigation for potential land use impacts is not necessary because Kihei-Upcountry Maui Highway is intended to meet existing and projected traffic demand derived from existing land use planning objectives. The roadway is not anticipated to induce unplanned land use development in the study area. As described in Section 4.1.1, the health of the visitor industry determines the size, rate and location of development in Kihei-Makena. In Upcountry, water supply restrictions, and other factors such as State and County land use controls, determine the size, rate and location of development.

4.1.4.2 Relocation

Since no residence, tenant or business will be displaced by Kihei-Upcountry Maui Highway, relocation assistance will not be necessary. However, land owners affected by right-of-way acquisition will be compensated in accordance with the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, as amended. In addition, farmers (owners and leaseholders) will be compensated for crop damage and lease losses, if necessary (see Section 4.17.6).
4.2 FARMLAND

4.2.1 CROPLAND IMPACTS

Kihei-Upcountry Maui Highway will cross agricultural land and convert the roadway right-of-way to transportation use (see Figure 4-2). Most of the agricultural impacts will occur on existing sugarcane and pineapple fields (see below). As indicated on Table 4-1, the degree of impact will depend on the alignment selected. The U1 alternatives, including the preferred alternative, would displace the greatest amount of active farmland (approximately 48 ha (120 acres). Table 4-1 also shows the estimated amount of agriculturally-productive soil that will be permanently displaced by Kihei-Upcountry Maui Highway.

<table>
<thead>
<tr>
<th>Alternative</th>
<th>Est. Displacement</th>
<th>Land Owner</th>
</tr>
</thead>
<tbody>
<tr>
<td>U1.K1</td>
<td>48.3 ha (119.4 acres)</td>
<td>Alexander &amp; Baldwin; Haleakalā Ranch</td>
</tr>
<tr>
<td>U1.K2</td>
<td>48.3 ha (119.4 acres)</td>
<td>Alexander &amp; Baldwin; Haleakalā Ranch</td>
</tr>
<tr>
<td>U2-A.K1</td>
<td>35.3 ha (87.2 acres)</td>
<td>Maui Land &amp; Pineapple; Alexander &amp; Baldwin; Haleakalā Ranch</td>
</tr>
<tr>
<td>U2-A.K2</td>
<td>35.3 ha (87.2 acres)</td>
<td>Maui Land &amp; Pineapple; Alexander &amp; Baldwin; Haleakalā Ranch</td>
</tr>
<tr>
<td>U2-B.K1</td>
<td>31.5 ha (77.8 acres)</td>
<td>Maui Land &amp; Pineapple; Alexander &amp; Baldwin; Haleakalā Ranch</td>
</tr>
<tr>
<td>U2-B.K2</td>
<td>31.5 ha (77.8 acres)</td>
<td>Maui Land &amp; Pineapple; Alexander &amp; Baldwin; Haleakalā Ranch</td>
</tr>
<tr>
<td>U3.K1</td>
<td>21.8 ha (53.8 acres)</td>
<td>Maui Land &amp; Pineapple; County of Maui</td>
</tr>
<tr>
<td>U3.K2</td>
<td>21.8 ha (53.8 acres)</td>
<td>Maui Land &amp; Pineapple; County of Maui</td>
</tr>
</tbody>
</table>


Kihei-Upcountry Maui Highway will not directly affect any privately-owned Kula small-scale farm, although leased fields located in the Kula Agricultural Park owned by Maui County would be affected by the U3 alternatives (see below). Also, some of the alternatives could
modify travel patterns in a way that may adversely affect certain Kula farms. This issue is
discussed in Section 4.4.1.1, "Traffic Patterns."

All alternatives will adversely affect agricultural operations, such as planting, aerial spraying,
irrigation, drainage and harvesting, for several reasons. For example, the highway will cross
agricultural infrastructure, such as existing service roads and irrigation and drainage systems.
In addition, the roadway could isolate portions of fields, making them inaccessible and
unworkable for cultivation. However, in most cases, this project will not create unworkable
remnant parcels because mitigation measures to maintain the productivity and workability of
the affected fields will be implemented (see Section 4.2.4).

The impacts of alternative alignments are described below:

- Segment U1 crosses sugarcane fields owned by Hawaiian Commercial and Sugar
  Company (HC&S) west (makai) of Pukalani (see Figure 4-2). The alignment will
  separate approximately 400 ha (1000 acres) of sugarcane land from larger fields, and
  cross existing cane haul roads and irrigation and drainage systems. The isolated
  parcel will remain productive because mitigation measures, as described in Section
  4.2.4, will be implemented if a U1 alternative were constructed.

- Segment U1/U2-A crosses a Maui Land and Pineapple Company (ML&P) pineapple
  field along Pulehu Road, affecting internal roadways, water conveyance infrastructure
  and drainage patterns (see Figure 4-2). The two newly created parcels will remain
  productive because mitigation measures, as described in Section 4.2.4, will be
  implemented if either a U1 or U2-A alternative were constructed.

- Segments U2-A and U2-B separate approximately 25 ha (60 acres) of HC&S
  sugarcane land from a larger field (see Figure 4-2). It will also cross two major water
ditches, the Hamakua Ditch and the Reservoir 40 ditch. The U2-A alignment also
  crosses a ML&P pineapple field south (mauka) of Pukalani, separating two parcels
  from a larger field. These affected fields would remain productive because mitigation
  measures, as described in Section 4.2.4, would be implemented if a U2-A or U2-B
  alternative were constructed.
• The re-aligned Haleakala Highway, under the U2-A alternatives, crosses a ML&P pineapple field on the southeast (mauka) side of Pukalani. The field would remain productive because mitigation measures, as described in Section 4.2.4, would be implemented if a U2-A alternative were constructed.

• Segment U3 crosses two ML&P fields along Pulehu Road (see Figure 4-2). The western (makai) field would be divided into two field. However, both fields would remain productive because mitigation measures, as described in Section 4.2.4, would be implemented if a U3 alternative is constructed. Unworkable remnant parcels would be created at the eastern (mauka) field because of the small size of the isolated field. The U3 alignment would also cross the Kula Agricultural Park owned by Maui County (see Figure 4-2). The Agricultural Park leases low-rent parcels to small-scale farmers. Some of the parcels would be converted to the roadway. The remaining parcels and parcels modified by the roadway alignment would remain productive because mitigation measures, as described in Section 4.2.4, would be implemented if a U3 alternative were constructed.

Segments K1 and would not affect existing cropland.

4.2.2 RANCHING IMPACTS

Kihei-Upcountry Maui Highway crosses land used for cattle ranching and grazing. All proposed alternatives traverse cattle ranching and pasture land located toward the southern portion of the study area, south of the sugarcane fields and west (makai) of the small Kula farms. While reducing the acreage of pasture lands, Kihei-Upcountry Maui Highway increases accessibility to such land.

The U3 alignment would be approximately 90 m (300 ft) from a working corral and water system (tank and troughs) (see Figure 4-2). The owner of the corral, Haleakala Ranch, has indicated a preference that the highway not be within visual distance of the corral to prevent highway users from interfering with cattle operations. The U3 alignment would therefore interfere with corral operations.
Haleakala Ranch also stated that they will have to herd cattle across the K1 alignment several times a year. Herds may reach 1,500 cows, and take about 10 to 15 minutes for the animals to cross the highway. However, impacts are not anticipated because mitigation measures will be provided as described in Section 4.2.4.

4.2.3 FARMLAND PROTECTION POLICY ACT

Under the Farmland Protection Policy Act (FPPA), federal agencies must identify and consider the adverse effects of their programs on the preservation of farmland; consider alternative actions that could lessen adverse effects; and ensure that their programs, to the extent practicable, are compatible with State, local government and private programs and policies to protect farmland. Agricultural areas that will be affected by Kihei-Upcountry Maui Highway (see Section 4.2.1) are considered prime, unique, statewide or locally important according to the U.S. Department of Agriculture, Natural Resources Conservation Service (NRCS). Therefore, the proposed project is subject to FPPA.

Per 7 CFR 658.4(a), a Form AD-1006, “Farmland Conversion Impact Rating,” was submitted to the NRCS for a “relative value of farmland to be converted” score for each alternative alignment. The Federal Highway Administration (FHWA) completed the Form AD-1006 by providing site assessment scores per 7 CFR 658.5. Combined Land Evaluation and Site Assessment scores are shown on Table 4-2. The completed Form AD-1006 is provided in Appendix C.

If an alternative receives a total score equal to or greater than 160 points, alternatives that avoid farmland impacts must be evaluated. However, as indicated on Table 4-2, none of the alternatives has a score equal to or greater than 160 points.

4.2.4 MITIGATION MEASURES

Affected agricultural areas will require mitigation measures to maintain their productivity. These measures will include haul road crossings (U1 includes two undercrossings; see Figure 2-3), and the modification and reconstruction of existing irrigation and drainage systems. Access provisions for farm equipment to reach isolated fields will be made. If U2-A or U2-B
were selected, Hamakua and Reservoir 40 Ditches would be protected and remain operative during and following construction. If U3 were selected, SDOT would purchase any unworkable remnant ML&P land based on guidelines of the Uniform Relocation Assistance and Real Property Acquisition Policies Act; and would work with Maui County to modify the Kula Agricultural Park. The details of the above mitigation measures will be specified in a "Maintenance of Agricultural and Ranching Activities Plan," which will be prepared during the design phase.

Table 4-2
Land Evaluation and Site Assessment Scores from Form AD-1006

<table>
<thead>
<tr>
<th>Alternative</th>
<th>Score</th>
<th></th>
<th></th>
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<tbody>
<tr>
<td></td>
<td>Part V</td>
<td>Part VI</td>
<td>Total</td>
</tr>
<tr>
<td>U1,K1</td>
<td>66</td>
<td>85</td>
<td>151</td>
</tr>
<tr>
<td>U1,K2</td>
<td>63</td>
<td>85</td>
<td>148</td>
</tr>
<tr>
<td>U2-A,K1</td>
<td>61</td>
<td>80</td>
<td>141</td>
</tr>
<tr>
<td>U2-A,K2</td>
<td>62</td>
<td>80</td>
<td>142</td>
</tr>
<tr>
<td>U2-B,K1</td>
<td>59</td>
<td>80</td>
<td>139</td>
</tr>
<tr>
<td>U2-B,K2</td>
<td>59</td>
<td>80</td>
<td>139</td>
</tr>
<tr>
<td>U3,K1</td>
<td>60</td>
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<td>140</td>
</tr>
<tr>
<td>U3,K2</td>
<td>57</td>
<td>80</td>
<td>137</td>
</tr>
</tbody>
</table>

Notes: 1 Part V of AD-1006: "Relative value of farmland to be converted." Score calculated by NRCS.
2 Part VI of Form AD-1006: "Total site assessment points." Calculated by FHWA.
3 Land evaluation and site assessment score calculated by combining Parts V and VI of Form AD-1006.

Source: Form AD-1006, completed by U.S. Department of Agriculture, Natural Resources Conservation Service and the U.S. Department of Transportation, Federal Highway Administration, October 1997.

To minimize impacts to ranching activities, stock-proof fencing will be erected along both sides of the highway where there is cattle grazing. The details of this fencing (type and location) will be determined during the design phase. Existing stock-proof fencing in the project area consists of hog wire with barb wire along the top and bottom of the fence. Also, provisions will be made at various bridge crossings and other locations as appropriate so that
cattle may be herded between pastures without disrupting traffic. Cattle will be herded underneath the bridges at certain gulches. If U3 were selected, SDOT would work with Haleakala Ranch to find a suitable location to relocate the cattle corral based on guidelines of the Uniform Relocation Assistance and Real Property Acquisition Policies Act. The locations of the cattle crossing areas, and the relocated corral (if a U3 alternative were constructed) will be determined during the design phase.

4.3 SOCIOECONOMIC

A detailed discussion of the socioeconomic impacts of the proposed project is found in Appendix H, Kihei-Upcountry Maui Highway, Community Impact Assessment (October 1998). Most of the following information is based on that report.

4.3.1 NEIGHBORHOODS

Figure 3-1 identifies the neighborhoods and communities in the study area. None of the alternatives will split any existing neighborhood or isolate parts of neighborhoods from the greater community. Therefore, Kihei-Upcountry Maui Highway will not adversely affect community cohesion. The No Build alternative would also not affect community cohesion.

Although Kihei-Upcountry Maui Highway will not in itself change land use patterns in Upcountry in a manner different from the future development described in the community plan (see Section 4.1.1), implementation of the community plan may affect the rural country lifestyle of Upcountry by increasing the population and density, increasing traffic and associated roadway noise, and encroaching on agricultural land.

Some of the alignment alternatives have the potential to change existing travel patterns in a way that could adversely affect certain existing neighborhoods. These potential impacts are discussed in Section 4.4.1.
4.3.2 ECONOMIC ACTIVITIES

The No Build alternative would not affect property values or property tax revenues collected by Maui County. Its impact on existing agricultural activities in Upcountry would be less than any build alternative. However, the No Build alternative would not support Maui’s visitor and high technology industries to the degree of any build alternative.

Property values could increase over the long term for lands adjacent to the proposed highway, particularly at the termini. Increased values would result in increased property tax revenues for Maui County. None of the alignment alternatives would decrease property values on adjacent parcels because the market value of these properties (see Table 2.1) are based on other factors unrelated to the proposed highway, such as market demand for housing and agricultural produce.

Because of the conversion of private taxable real estate into a public right-of-way, Maui County’s property tax collections would decrease by an estimated $13,000 to $17,000 per year (1997 dollars) under the U1 or U3 alternatives. Property tax revenues would decrease by approximately $44,000 to $46,000 per year (1997 dollars) under the U2-A or U2-B alternatives. This higher impact for the U2 alternatives is attributable to the conversion of urban-designated land into roadway right-of-way. The U1 and U3 alternatives will convert almost exclusively lands designated agricultural, which have much lower property values.

The proposed project will infuse federal funds into the local economy, which will increase short-term employment and the purchase of local goods and services. However, Kihei-Upcountry Maui Highway will have little influence on long-term employment opportunities because there will be little difference in future employment-producing development (e.g. commercial) between the No Build and build conditions (see Section 4.1.1). For example, the Kulamalu development (see Section 3.1.3) includes business development that will occur with or without the project (see Section 4.1.1). However, a U2-A or U2-B alternative will better support the Kulamalu development as a business district because of improved accessibility. The U2-B alignment was derived from the Kulamalu master plan.
Existing commercial districts in Upcountry are in Pukalani and Makawao (see Section 3.3.4). Kihei also supports commercial districts along South Kihei Road and at a parcel in North Kihei, west (mauka) of Piilani Highway. Regardless of the alternative chosen, the Kihei-Upcountry Maui Highway is generally not expected to adversely affect these districts because the roadway will not function as a commercial district bypass, except for Kahului. However, a Kulamalu shopping center is planned adjacent to the U2-B alignment. Depending on the tenants at the shopping center, a U2-B alternative would shift a portion of visitor spending to this shopping center, away from the visitor-oriented shops in Makawao. This shift may occur to lesser extent with a U2-A or U3 alternative. This effect would also occur with residents commuting between Upcountry and Kihei or West Maui.

Although Kihei-Upcountry Maui Highway will enable many motorists to bypass Kahului, economic impacts to Kahului businesses are not expected because residents will continue to travel to Kahului regardless of the proposed project because of Kahului's attractiveness as the island's principal commercial center, featuring Kaahumanu Shopping Center, K-Mart, and Costco, among others.

All the build alternatives will enhance access to tourist destinations in Upcountry and Haleakala National Park, and therefore will have a positive effect on the visitor industry. However, the proposed project is not expected to facilitate visitor-related economic activities in Kihei or Upcountry (see Section 4.1.1).

Impacts on agricultural activities are discussed in Section 4.2.

The proposed project will support Maui's efforts to develop high technology industry (see Section 3.1.3). The roadway will provide increased synergism between Science City on the summit of Haleakala Crater and the R&T Park in Kihei.

### 4.3.3 PUBLIC FACILITIES AND SERVICES

None of the alternatives will directly affect (through right-of-way impacts) existing public facilities described in Section 3.3.5. However, access to these facilities and services will be
enhanced by any of the build alternatives because of the decreased travel time between
Kihei and Upcountry.

Many people who commented on the Draft EIS expressed concerns about the safety of
students driving or walking to King Keaauilak High School and the new Kamehameha Schools
campus, especially with regards to the U2 alternatives (A and B) because these alignments
would be near or adjacent to these schools. King Keaaulak High School is on Kula Highway
near the Five Trees intersection (the U2-A terminus) and the Kamehameha Schools campus is
next to the U2-B alignment within Kulamalu (see Figure 3-8).

The amount of traffic passing the school on Kula and Haleakala Highway would be the same
under the No Build, U1 or U2-A alternative, disregarding the effects of Omaopio and Pulehu
Roads in diverting traffic. These alternatives would not change the routes of travel markets so
that those routes that do not presently pass the school would not pass the school in the
future. On the other hand, a U2-B or U3 alternative would increase traffic volumes passing by
the high school. These alternatives would change the routes of some of the major travel
markets, such as the Makawao-Pukalani / Kihei-Makena and the drive to/from the summit to
routes that pass by the high school. However, the highways (Kula and Haleakala) fronting the
school are subject to lower speed limits during school hours.

The installation of signalized crosswalks and sidewalks can prevent students walking to and
from the schools being placed in danger from vehicles using the highways (see Section
4.4.4). For example, under the U2-A alternative, the Pukalani leg of Haleakala Highway would
be converted to a pedestrian walkway and sidewalks would be installed along Kula Highway
near the high school. Under the U2-B alternative, an urban design that includes sidewalks
would be used in the section of the highway adjacent to the Kamehameha Schools campus.

Scoping activities and interviews conducted for this Final EIS indicated a strong belief among
some Upcountry residents that Kihei-Upcountry Maui Highway will increase the crime rate in
Upcountry because criminals based in Kihei will have more convenient access to Upcountry.
The Makawao and Kula community police officers (see Appendix H) could not speculate on
whether the highway will increase the crime rate in Upcountry, although both officers were in
agreement that the proposed highway will facilitate better police response through additional highway infrastructure.

4.3.4 ENVIRONMENTAL JUSTICE (EXECUTIVE ORDER 12898)

Executive Order (EO) 12898, signed on February 11, 1994, requires federal agencies to take appropriate and necessary steps to identify and avoid disproportionately high and adverse effects of federal projects on the health and environment of minority and low-income populations. Because of the expected federal participation in the construction funding for this project, the project must comply with EO 12898. This section has been prepared in accordance with FHWA Actions to Address Environmental Justice in Minority Populations and Low-Income Populations (December 2, 1998).

Figure 3-1 identifies the residential areas in the study area. The Upcountry communities are clustered along Haleakala and Kula Highways. As described in Section 3.1, Pukalani, Makawao and Ha‘ili‘malie are mostly suburban. The Kula communities are of lower density, and many are typical of a rural setting (i.e., small truck farms). The Kihei-Makena communities are mostly located west (makai) of Pii‘ilani Highway. The area midway between Upcountry and Kihei, or the area that will be used for the proposed highway, is owned by a few large land owners, such as Alexander & Baldwin and Haleakala Ranch, and are used for large-scale agricultural activities. Near Haleakala, Kula and Pii‘ilani highways, where the residential communities are clustered, the alternatives have the following physical relationships with these residential areas:

- Segment U1 is located approximately 1200 to 1400 m (4000 - 4500 ft) west to northwest (makai) of Pukalani.

- At its closest point, Segment U2-A is located approximately 150 m (500 ft) south of Pukalani and approximately 300 m (1000 ft) north of a few Omaopio homesteads.

- Segment U2-B is located approximately 275 m (900 ft) south of Pukalani and approximately 240 m (800 ft) north of the Omaopio homesteads. The lower part of a
• residential subdivision, Kula 200, is directly east (mauka) of the U2-B/Kula Highway intersection. However, this subdivision is upslope from the terminus.

• Segment U3 is located approximately 240 to 700 m (800 to 2300 ft) north of residences along Pulehu Road. U3’s intersection with Kula Highway is approximately 500 m (1600 ft) southwest of the Kula Kai Subdivision, which is located east (mauka) of Lower Kula Road. However, the U3 alignment would displace portions of Kula Agricultural Park (see Section 5.2.1), which is used by minority farmers, but not as residences. Although impacts would be mitigated if a U3 alignment were selected as the preferred alternative, minority farmers would be at least temporarily affected by the project.

• Segment K1 is located approximately 500 m (1600 ft) south of a residential subdivision located east (mauka) of Piilani Highway. Kaonoulu Estate is the nearest residential subdivision, located west (makai) of the K1/Piilani Highway intersection.

• The nearest residential area to Segment K2 is approximately 500 m (1600 ft) north of the K2/Piilani Highway intersection, across Piilani Highway.

Based on the information above, no alternative will cut through a neighborhood (see Section 4.3.1) or displace any residence or business (see Section 4.1.3). In addition, proximity impacts to these communities, such as high noise levels or degraded air quality, are not anticipated. Therefore, other than minority farmers using the Kula Agricultural Park who would be temporarily affected by the U3 alternative, there are no minority or low-income populations that will be adversely affected by the proposed project, which is the finding required by EO 12898 regarding Environmental Justice.

4.3.5 MITIGATION MEASURES

Potential adverse social impacts could occur through travel pattern impacts and the location of Kihei-Upcountry Maui Highway near existing schools. Mitigation measures to minimize this impact are discussed in Section 4.4.4.
4.4 INFRASTRUCTURE

4.4.1 TRANSPORTATION

4.4.1.1 Traffic Patterns

Table 4-3 summarizes the discussion in this section.

Under the future No Build condition, major traffic pattern changes are not anticipated because no new major roadway, other than Kihei-Upcountry Maui Highway, is planned for the project area. No Build transportation improvements, as described in Section 2.1.1, consist of capacity enhancements of existing roadways. Therefore, although capacity enhancements would improve the operations of the roadways identified in Section 2.1.1, changes in traffic patterns would not occur.

Kihei-Upcountry Maui Highway, on the other hand, will cause major changes to existing traffic patterns in the project area. The proposed project will divert most trips between Kihei-Makena and Upcountry onto the new highway and off of Haleakala Highway, Hana Highway, Dairy or Hansen Roads, Puunene Avenue and Mokulele Highway, the Kihei and Upcountry, and the route that would persist under the No Build alternative. If a K1 alternative were selected, some of the travel demand between Upcountry and West Maui will also be diverted onto the new highway. Kihei-Upcountry trip lengths could be cut by half, depending on the alternative, trip origin and trip destination. Therefore, Kihei-Upcountry Maui Highway will substantially reduce total regional vehicle-miles-traveled (VMT), fuel consumption, air pollutant emissions and travel time for a large number of trips in comparison to the No Build condition. Under the No Build alternative, regional VMT would increase as population and subsequent travel demand increase on Maui. However, overall travel time may be slightly reduced under the No Build alternative in comparison to the present condition because of better roadway operations from capacity enhancements.

The diversion of trips by the proposed highway will reduce traffic volumes on the existing Kihei to Upcountry route, and therefore improve operations along this route for the remaining traffic in comparison to the No Build alternative. However, the K1 alternatives will increase
# Table 4-3
Comparison of Traffic Pattern Impacts by Alternative

<table>
<thead>
<tr>
<th>Alternative</th>
<th>Relief of Upcountry to Kihel Traffic Congestion</th>
<th>Relief of Upcountry to West Maui Traffic Congestion</th>
<th>Enhance Contra-Flow of Morning Peak Directional Traffic in Upcountry</th>
<th>Adverse Effect on Omaepio and Pulchul Roads</th>
<th>Adverse Effect on Local Roads Between Kula and Haleakala Highways</th>
</tr>
</thead>
<tbody>
<tr>
<td>No Build</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>U1,K1</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>U1,K2</td>
<td>Yes</td>
<td>Some</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>U2-A,K1</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>U2-A,K2</td>
<td>Yes</td>
<td>Some</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>U2-B,K1</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>U2-B,K2</td>
<td>Yes</td>
<td>Some</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>U3,K1</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>U3,K2</td>
<td>Yes</td>
<td>Some</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
</tr>
</tbody>
</table>

Note: Indicates an adverse impact

Source: Parsons Brinckerhoff Quade & Douglas, Inc., October 1997
CORRECTION

THE PRECEDING DOCUMENT(S) HAS BEEN REPHOTOGRAPHED TO ASSURE LEGIBILITY
SEE FRAME(S) IMMEDIATELY FOLLOWING
## Table 4-3
Comparison of Traffic Pattern Impacts by Alternative

<table>
<thead>
<tr>
<th>Alternative</th>
<th>Relief of Upcountry to Kihei Traffic Congestion</th>
<th>Relief of Upcountry to West Maui Traffic Congestion</th>
<th>Enhance Contra-Flow of Morning Peak Directional Traffic in Upcountry</th>
<th>Adverse Effect on Omaopio and Pulehu Roads</th>
<th>Adverse Effect on Local Roads Between Kula and Halaakala Highways</th>
</tr>
</thead>
<tbody>
<tr>
<td>No Build</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>U1,K1</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>U1,K2</td>
<td>Yes</td>
<td>Some</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>U2-A,K1</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>U2-A,K2</td>
<td>Yes</td>
<td>Some</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>U2-B,K1</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>U2-B,K2</td>
<td>Yes</td>
<td>Some</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>U3,K1</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>U3,K2</td>
<td>Yes</td>
<td>Some</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
</tr>
</tbody>
</table>

**Note:** ☐☐☒☒ Indicates an adverse impact

**Source:** Parsons Brinckerhoff Quade & Douglas, Inc., October 1997
traffic volumes on Piliani Highway, north of the K1 terminus, and North Kihei Road, as traffic is
diverted off the above roadways and Kuihelani Highway (Upcountry-West Maui trips). The
traffic diversion impacts on Piliani Highway and North Kihei Road will not be substantial under
the K2 alternatives (see above).

The U2-A, U2-B and U3 alternatives would create a redistribution of morning peak directional
traffic on Haleakala Highway, Pukalani Bypass and Kula Highway. As described in Section
3.4.1, the middle south (mauka) bound lane on Pukalani Bypass and Haleakala Highway is
presently contra-flowed to the northwest (makai) bound direction in the morning peak period
because most home-based work trips originating in Upcountry use these roadways to travel to
Maul's major employment centers at Kahului-Wailuku, Kihei-Makena and West Maul. This
redistribution would consist of Makawao and Pukalani commuters, and Kula commuters under
the U3 alternatives, traveling southeast / south (mauka) bound against peak directional traffic
to access either the U2-A, U2-B or U3 alignments. With the K1 terminus option, many of these
commuters would include those traveling to West Maui. By contrast, under the U1 alternatives, Upcountry morning commuters would continue to travel in the north / northwest
(makai) bound direction on Kula Highway, Pukalani Bypass and Haleakala Highway, as they
currently do, until the U1 terminus at Hallimaike Road. At that point, many of the commuters
would turn onto the proposed roadway.

The U1, U2-A and U2-B alternatives intersect both Omaopio and Pulehu Roads (see
Figure 4-3), which would cause an increase in through traffic on these agricultural roads (see
Section 3.4.1). The traffic on these roads will be higher under the preferred alternative, as well
as the U1,K2 alternative because the U1 terminus is farther from Kula than the U2-A and U2-B
termini. By increasing the use of Omaopio and Pulehu Roads as through routes, impacts from
the inappropriate use of these roads is expected (see Sections 3.4.1.1 and 3.4.1.2). These
impacts include interference with farm equipment movements, increased traffic noise and
lower traffic safety through excessive speeds on inappropriate roadways. However, the
County is planning to improve Omaopio and Pulehu Roads, which should improve safety.

In addition, the U1/U2-A,B crossings will have a slight adverse effect on farm product
transportation from Kula to Kahului because delivery trucks will cross the new highway.
However, the highway will enhance product transportation to Kihei-Makena. Safety at the at-
grade crossing of the new highway with Omaopio and Pulehu Roads will be maintained through mitigation measures (see Section 4.4.4). Farm vehicles will use the new highway.

The U3 alternatives intersect Pulehu Road (see Figure 4-3). Since the U3 terminus is a short distance away from the Pulehu Road/Kula Highway intersection, traffic diversion similar to the impacts described above on Pulehu Road would not be expected. However, U3 alternatives may encourage travelers to and from the Haleakala summit to use local residential roads between Kula Highway and Haleakala Highway because it would appear to a visitor reading a map that this is a shorter route to the summit (see Figure 4-4). The preferred route for this trip is for motorists to stay on Kula and Haleakala Highways. Increasing traffic volumes on local residential roads that are not designed for through traffic would adversely affect the adjacent neighborhoods through increased traffic noise (including travel to the summit early in the morning to watch the sunrise), and the increased potential for accidents on roadways not designed for heavy volumes. The potential use of local roads between Kula and Haleakala Highways would be mitigated as described in Section 4.4.4 if a U3 alternative were selected as the preferred alternative.

4.4.1.2 Future Traffic Operations

Year 2020 traffic volume projections were analyzed using methods described in the 1994 Highway Capacity Manual (HCM) to determine levels of service (LOS) for each alternative during the morning and afternoon peak hours. Levels of service are classified on an "A" through "F" scale, representing best to worst conditions. The LOS is based on user delays, a measure of driver discomfort, frustration, fuel consumption, and lost travel time.

Depending on the alternative, between 7,000 to 13,000 vehicles per day are predicted to use the highway. The K2 alternatives will produce lower volumes. Tables 4-4 and 4-5 provide projected levels of service for the build alternatives. For the U1, U2-A and U2-B alternatives, three roadway segments were analyzed: Haleakala Highway or the "Five Trees" intersection to Omaopio Road; Omaopio Road to Pulehu Road; and Pulehu Road to Pillani Highway. For the U3 alternatives, two roadway segments were analyzed: Kula Highway to Pulehu Road; and Pulehu Road to Pillani Highway.
Table 4-4  
Projected Levels of Service for  
the U1, U2-A and U2-B Alternatives in 2020

<table>
<thead>
<tr>
<th>Alternative/Peak Hour</th>
<th>Level of Service</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Haleskala Hwy.</td>
<td>Omaopio Rd. to Pulehu Rd.</td>
</tr>
<tr>
<td><strong>U1,K1</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A.M. Peak Hour</td>
<td>D</td>
<td>D</td>
</tr>
<tr>
<td>P.M. Peak Hour</td>
<td>D</td>
<td>D</td>
</tr>
<tr>
<td><strong>U1,K2</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A.M. Peak Hour</td>
<td>C</td>
<td>D</td>
</tr>
<tr>
<td>P.M. Peak Hour</td>
<td>C</td>
<td>D</td>
</tr>
<tr>
<td><strong>U2-A,K1</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A.M. Peak Hour</td>
<td>D</td>
<td>D</td>
</tr>
<tr>
<td>P.M. Peak Hour</td>
<td>D</td>
<td>D</td>
</tr>
<tr>
<td><strong>U2-A,K2</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A.M. Peak Hour</td>
<td>C</td>
<td>D</td>
</tr>
<tr>
<td>P.M. Peak Hour</td>
<td>C</td>
<td>D</td>
</tr>
<tr>
<td><strong>U2-B,K1</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A.M. Peak Hour</td>
<td>D</td>
<td>D</td>
</tr>
<tr>
<td>P.M. Peak Hour</td>
<td>D</td>
<td>D</td>
</tr>
<tr>
<td><strong>U2-B,K2</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A.M. Peak Hour</td>
<td>C</td>
<td>D</td>
</tr>
<tr>
<td>P.M. Peak Hour</td>
<td>C</td>
<td>D</td>
</tr>
</tbody>
</table>

Source: Traffic data used to produce analysis provided by the State of Hawaii, Department of Transportation; Parsons Brinckerhoff Quade & Douglas, Inc. prepared the analysis, October 1997

As indicated on Tables 4-4 and 4-5, most segments will operate acceptably, at LOS C or D during the a.m. and p.m. peak hours. However, there will be segments that are projected to operate at LOS E for alternatives U1,K1, U2-A,K1 and U2-B,K1. This condition will occur during the p.m. peak hour when volumes will be heaviest in the upgrade direction.
Table 4-5
Projected Levels of Service for the U3 Alternatives in 2020

<table>
<thead>
<tr>
<th>Alternative/Peak Period</th>
<th>Level of Service</th>
<th>Kula Hwy. to Pulehu Rd.</th>
<th>Pulehu Rd. to Piilani Hwy.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>U3,K1</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A.M. Peak Hour</td>
<td>D</td>
<td>D</td>
<td></td>
</tr>
<tr>
<td>P.M. Peak Hour</td>
<td>E</td>
<td>E</td>
<td></td>
</tr>
<tr>
<td><strong>U3,K2</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A.M. Peak Hour</td>
<td>C</td>
<td>C</td>
<td></td>
</tr>
<tr>
<td>P.M. Peak Hour</td>
<td>D</td>
<td>D</td>
<td></td>
</tr>
</tbody>
</table>

*Source: Traffic data used to produce analysis provided by the State of Hawaii, Department of Transportation; Parsons Brinckerhoff Quade & Douglas, Inc. prepared the analysis, October 1997*

Table 4-6 shows the LOS at the six alternative termini for each alternative. As indicated on this table, only the U1 terminus under Alternative U1,K1 is predicted to operate worse than LOS C. As indicated on Table 1-1, certain movements at this intersection are currently operating at LOS D and F.
### Table 4-6
#### Project Levels of Service at the Alternative Termini in 2020

<table>
<thead>
<tr>
<th>Location</th>
<th>Level of Service</th>
<th>A.M. Peak Hour</th>
<th>P.M. Peak Hour</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>U1,K1</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>U1 Terminus</td>
<td>D</td>
<td>D</td>
<td></td>
</tr>
<tr>
<td>K1 Terminus</td>
<td>C</td>
<td>B</td>
<td></td>
</tr>
<tr>
<td><strong>U1,K2</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>U1 Terminus</td>
<td>C</td>
<td>C</td>
<td></td>
</tr>
<tr>
<td>K2 Terminus</td>
<td>B</td>
<td>C</td>
<td></td>
</tr>
<tr>
<td><strong>U2-A,K1</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>U2-A Terminus</td>
<td>B</td>
<td>B</td>
<td></td>
</tr>
<tr>
<td>K1 Terminus</td>
<td>C</td>
<td>B</td>
<td></td>
</tr>
<tr>
<td><strong>U2-A,K2</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>U2-A Terminus</td>
<td>B</td>
<td>B</td>
<td></td>
</tr>
<tr>
<td>K2 Terminus</td>
<td>B</td>
<td>C</td>
<td></td>
</tr>
<tr>
<td><strong>U2-B,K1</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>U2-B Terminus</td>
<td>B</td>
<td>B</td>
<td></td>
</tr>
<tr>
<td>K1 Terminus</td>
<td>B</td>
<td>B</td>
<td></td>
</tr>
<tr>
<td><strong>U2-B,K2</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>U2-B Terminus</td>
<td>B</td>
<td>B</td>
<td></td>
</tr>
<tr>
<td>K2 Terminus</td>
<td>B</td>
<td>C</td>
<td></td>
</tr>
<tr>
<td><strong>U3,K1</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>U3 Terminus</td>
<td>B</td>
<td>B</td>
<td></td>
</tr>
<tr>
<td>K1 Terminus</td>
<td>B</td>
<td>B</td>
<td></td>
</tr>
<tr>
<td><strong>U3,K2</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>U3 Terminus</td>
<td>B</td>
<td>B</td>
<td></td>
</tr>
<tr>
<td>K2 Terminus</td>
<td>B</td>
<td>B</td>
<td></td>
</tr>
</tbody>
</table>

**Note:** All termini are assumed to be signalized.

**Source:** Traffic data used to produce analysis provided by the State of Hawaii, Department of Transportation; Parsons Brinckerhoff Quade & Douglas, Inc. prepared the analysis, July 1997

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4.4.1.3 Bicycle and Pedestrian Movements

Kihei-Upcountry Maui Highway will have no adverse effects on any existing and future bikeway. When completed, some bicycle tour companies may use the roadway, modifying their Haleakala bike tours. Although Kihei-Upcountry Maui Highway was not identified in Bike Plan Hawaii (April 1994) as a potential bikeway, the Kihei-Makena region will be a natural area to end some of the Haleakala bike tours if the highway were constructed. The proposed roadway will have sufficient room for bicyclists riding single file because bike lanes will be provided along urban roadway sections and adequate shoulders will be provided along rural roadway sections (see Figure 2-2). If a U2-A or U2-B alternative were selected, bike tours may interact with traffic surrounding King Kekaulike High School. If a U3 alternative were selected, bike tour operators utilizing this route would probably use Kula residential roads between Haleakala and Kula Highways. Bicycle tours moving through these neighborhoods may disturb residents and disrupt local traffic. Bike tour operators will be less likely to modify their routes if a U1 alternative were selected because of the distance between the “Five Trees” intersection and the U1 terminus.

No alternative will adversely affect an existing pedestrian facility. In some cases, some of the alternatives will improve or install walkways, sidewalks and crosswalks along existing roads (see Section 4.4.4). Kihei-Upcountry Maui Highway will include sidewalks in conformance with the Americans with Disabilities Act (ADA) where the highway is constructed in an urban area. In rural areas, pedestrian facilities will not be provided.

4.4.2 WATER SUPPLY SYSTEM

Kihei-Upcountry Maui Highway will not affect existing water supply systems or future Maui BWS plans, which are described in Section 3.4.3.

4.4.3 DRAINAGE

Kihei-Upcountry Maui Highway will not affect existing drainage systems in the project area.
4.4.4 MITIGATION MEASURES

Under a U1, U2-A or U2-B alternative, traffic conditions at the intersections of the proposed highway with Omaopio and Pulehu Roads will be monitored after completion of the project to determined whether these intersections meet traffic signal warrants specified in the Manual on Uniform Traffic Control Devices, published by FHWA.

If a U2-A alternative were selected, the modified Five Trees intersection would include crosswalks and sidewalks to the high school. In addition, the Pukalani leg of Haleakala Highway would be converted to a pedestrian walkway.

If a U2-B alternative were selected, an urban design (see Section 2.1.2) would be used next to the Kamehameha Schools campus in Kulamalu. This design includes sidewalks.

If a U3 alternative were selected, signage will be provided to direct motorists to the proper route to the Haleakala summit.

4.5 AIR QUALITY

A detailed discussion of the microscale air quality impacts of the proposed project is found in Appendix F, Air Quality Study for the Proposed Kihei-Upcountry Maui Highway (September 1998). The following information is based on that report.

4.5.1 POLLUTANTS FOR ANALYSIS

The pollutants relevant to evaluating the air quality impacts of a roadway project are those contained in motor vehicle emissions. These pollutants include carbon monoxide (CO), hydrocarbons (HC), nitrogen oxide (NOx), ozone (O₃), and lead. Vehicles account for a very small percentage of regional emissions of sulfur dioxide (SO₂) and particulate matter (PM₁₀), and therefore detailed analyses of these contaminants are typically not warranted for a proposed roadway.
Motor vehicles have historically constituted a major source of lead emissions to the atmosphere. However, lead levels have decreased substantially and will continue to do so due to the mandated decrease and elimination of lead in gasoline. Therefore, a detailed analysis of the impact of lead emissions is also not warranted.

HC and NO\textsubscript{x} emissions from automotive sources are of concern primarily because of their roles as precursors in the formation of O\textsubscript{3} in the lower atmosphere. Ozone, a major greenhouse gas, is formed through a series of reactions that take place in the atmosphere in the presence of sunlight. Since the reactions are slow and occur as the pollutants diffuse downwind, elevated ozone levels are often found many miles from sources of the precursor pollutants. HC and NO\textsubscript{x} emissions are therefore examined on a regional or "mesoscale" basis.

CO impacts are localized. Even under the worst meteorological conditions and most congested traffic conditions, high concentrations are limited to a relatively short distance (91 to 183 m (300 to 600 ft)) from heavily traveled roadways. Consequently, it is appropriate to predict concentrations of CO on a localized or "microscale" basis.

### 4.5.2 METHODOLOGY

#### 4.5.2.1 Microscale Analysis

To estimate future CO levels by year 2020, microscale air quality modeling was performed using the most recent version of the Environmental Protection Agency (EPA) mobile source emission factor model (MOBILE 5A) and the CAL3QHC version 2 air quality dispersion model. Appendix F contains a more detailed description of the methodology used to predict CO concentrations.

Adverse air quality effects of a roadway project are caused by increased vehicular activity in a particular area, such as an intersection. Impacts at these local areas, typically intersections, are often referred to as "hot spots." According to the EPA Conformity Guidelines, a hot spot analysis should be prepared if:

- the project worsens an intersection's LOS if it was previously a C or D; and
• the intersection LOS is D or worse and the project substantially increases intersection delay.

According to Section 4.4.1, the LOS at the alternative termini (U1, U2-A, U2-B, U3, K1 and K2) are predicted to remain the same as present or be no worse than LOS C, except for one terminus. Because of this predicted traffic condition, only the following two sites received detailed CO analysis because they represent the termini with the worst predicted traffic conditions:

• Site #1: Haliiimaile Road / Haleakala Highway / Kihei-Upcountry Maui Highway intersection - Alternatives U1,K1 and U1,K2; and
• Site #2: Kaonoulu Street / Piilani Highway / Kihei-Upcountry Maui Highway intersection - Alternative U1,K1

A localized (microscale) analysis of mobile sources applies mathematical models that simulate physical conditions to predict CO concentrations at specific receptor locations. Mobile source dispersion models are the basic analytical tools used to estimate CO concentrations expected under given conditions of traffic, roadway geometry and meteorology. The mathematical expressions and formulations that comprise the various models attempt to describe extremely complex physical phenomena. However, because all models contain simplifications and approximations of actual conditions, most have been designed to be conservative.

4.5.2.2 Mesoscale Analysis

The effects of a proposed project on regional hydrocarbon and nitrogen oxide emissions are an indication of the project's overall affect on areawide ozone levels. A regional emission burden (or mesoscale) analysis is often conducted to estimate these effects. This analysis utilizes vehicle miles of travel (VMT) and vehicle hours or travel (VHT) within the region (together with appropriate mobile source emission factors) to estimate changes in pollutant burden levels with and without the proposed project. The results of this analysis are then used to determine if the area will be in compliance with regulations set forth in the Final Conformity Rule.
4.5.3 POTENTIAL IMPACTS

4.5.3.1 Microscale Analysis

Maximum 1-hour and 8-hour carbon monoxide levels were predicted at two analysis sites for Alternatives U1,K1 and U1,K2. The results of this analysis are provided in Tables 4-7 and 4-8. An analysis of other sites and alternatives, including the No Build alternative, is unnecessary because the CO levels at Sites #1 and #2, under the U1 alternatives, would be the "worst-case" among all of the other termini and alternatives. Therefore, the predicted CO levels at these two analysis sites would be the highest due to microscale effects from the project. As indicated on Tables 4-7 and 4-8, no violations of State Ambient Air Quality Standards (SAAQS) for one- or eight-hour CO standards are predicted, even at these "worst-case" locations (the SAAQS are more stringent than the Federal Ambient Air Quality Standards).

Since the project is not predicted to cause a violation of the applicable air quality standards, it conforms to the goals set forth in the Clean Air Act Amendments.

Table 4-7
Predicted Worst-Case 1-Hour Carbon Monoxide Concentrations (ppm)*

<table>
<thead>
<tr>
<th>Site</th>
<th>Description</th>
<th>Alter.</th>
<th>State Std.</th>
<th>Build (Year 2020)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>AM</td>
</tr>
<tr>
<td>1</td>
<td>Hālīmaile Road / Haleakalā Highway intersection</td>
<td>U1,K1</td>
<td>9</td>
<td>0.81</td>
</tr>
<tr>
<td>2</td>
<td>Ka'ūkulu Street / Pillani Highway intersection</td>
<td>U1,K1</td>
<td>9</td>
<td>0.81</td>
</tr>
</tbody>
</table>

Note: * 1-hour CO Background = .012 ppm
Table 4-8
Predicted Worst-Case 8-Hour Carbon Monoxide Concentrations (ppm)*

<table>
<thead>
<tr>
<th>Site</th>
<th>Description</th>
<th>Alternative</th>
<th>State Standard</th>
<th>Build (Year 2020)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Hallimaile Road / Haleakala Highway intersection</td>
<td>U1,K1</td>
<td>4.5</td>
<td>0.07</td>
</tr>
<tr>
<td>1</td>
<td>Hallimaile Road / Haleakala Highway intersection</td>
<td>U1,K2</td>
<td>4.5</td>
<td>0.08</td>
</tr>
<tr>
<td>2</td>
<td>Kaonolu Street / Pillani Highway intersection</td>
<td>U1,K1</td>
<td>4.5</td>
<td>0.07</td>
</tr>
</tbody>
</table>

Note: * 8-hour CO Background = .012 ppm


4.5.3.2 Mesoscale Analysis

On a regional air quality basis, any of the build alternatives will produce an improvement over the No Build alternative because of the reduction of travel distance between Upcountry and Kihei-Makena or West Maui, which will result in decreased fuel consumption. The Kihei-Upcountry Maui Highway is included in the current State of Hawaii Statewide Transportation Improvement Program (STIP), 1997, for Fiscal Years 1998-2000. The regional effects of this project are incorporated into and satisfy the requirements of the conforming Statewide Implementation Plan (SIP). Therefore, a regional or mesoscale analysis is not necessary.

4.5.4 MITIGATION MEASURES

Mitigation measures for the air quality impacts of Kihei-Upcountry Maui Highway after its construction will not be necessary. Construction-phase air quality impacts and mitigation measures are addressed in Section 4.17.2.
4.6 NOISE

A detailed discussion of the noise impacts of the proposed project is found in Appendix G, Noise Technical Report for Kihei-Upcountry Maui Highway (January, 1998). The following information is based on that report.

The noise impact analysis for Kihei-Upcountry Maui Highway was prepared using SDOT's FHWA-approved Noise Analysis and Abatement Policy (October 1996) (hereinafter referred to as Noise Policy). This Final EIS considers two types of future traffic noise impacts:

- the traffic noise levels along Kihei-Upcountry Maui Highway under each alignment alternative; and
- the change in traffic noise levels on other roadways within the project study area due to traffic diversion caused by Kihei-Upcountry Maui Highway.

4.6.1 PREDICTION METHODOLOGY

Future noise levels with and without the project were predicted using FHWA's highway traffic noise prediction model, STAMINA 2.0 Highway Traffic Noise Modeling Program (FHWA, 1982). Input variables to the model include traffic volumes, speeds and vehicle fleet mix (auto, medium truck, and heavy truck percentages). The analysis assumes that existing and future traffic conditions have the same vehicle mix and speeds.

The noise analysis considered the following traffic scenarios:

- two-lane facility (proposed project) - sunrise hours (5:00 a.m. to 6:00 a.m.);
- two-lane facility (proposed project) - peak hour; and
- two-lane facility (proposed project) - roadway operating at level of service (LOS) C.

Roadway "level of service" (LOS) is measured on a scale from A to F (see Section 4.4.1). LOS C is a traffic condition, where vehicular volume is at the capacity of the roadway, yet vehicles operate at the allowable speed limit. This is considered to be the noisiest of the six levels of service (A through F).
4.6.2 POTENTIAL IMPACTS

Noise abatement must be considered when there is a noise impact. According to the Noise Policy, a noise impact occurs when:

- predicted traffic noise levels approach or exceed the FHWA Noise Abatement Criteria (NAC); or
- predicted traffic noise levels substantially exceed the existing noise levels.

Noise is measured by the one-hour $L_{eq}(h)$ parameter. "Approach" means to attain a noise level 1 dBA less than the NAC and "substantially exceed the existing noise levels" means to increase the one-hour $L_{eq}(h)$ by at least 15 dBA.

Computer modeling results for the Year 2020 are presented in Table 4-9.

Under the No Build alternative, predicted future traffic noise levels are expected to be no more than 1 dBA over the existing noise levels. The NAC of $L_{eq}(h)$ 67 dBA is expected to be approached at Site 7 (see Table 4-9). All other sites are predicted to remain below the NAC.

The predicted sunrise noise levels presented in Table 4-9 represent traffic using the proposed highway and other roadways during the early morning hours to model the condition of tourists traveling to the Haleakala summit for sunrise. However, these predicted noise levels do not include the cumulative effects of ambient early morning noise from other activities except at Site 1, which includes the effects of ambient early morning noise because measurements at this site were taken at 5:00 a.m. (see Section 3.6.3). The results in Table 4-9 indicate that the effects of early morning traffic will not cause future noise levels at the receptor sites to approach or exceed the NAC, including the K1 alternatives' traffic noise effects on Site 1. Site 1's sunrise noise levels are predicted to increase by 3 dBA over the existing ambient level, which is considerably less than the "substantial increase" threshold in the Noise Policy. A 3 dBA increase is barely perceptible to the human ear. Predicted noise levels at Site 1 included the effect of tour buses accelerating uphill.
### Table 4-9
Predicted Year 2020 Noise Levels

<table>
<thead>
<tr>
<th>Site</th>
<th>Location</th>
<th>Segment</th>
<th>Noise Levels (L_{eq} (dB))</th>
<th>Build Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>NAC</td>
<td>Existing</td>
</tr>
<tr>
<td>1</td>
<td>Chukai community (Chukai St.)</td>
<td>K1</td>
<td>67</td>
<td>39</td>
</tr>
<tr>
<td>2</td>
<td>Kanaulu Elementary School</td>
<td>K2</td>
<td>67</td>
<td>58</td>
</tr>
<tr>
<td>3</td>
<td>Omaopio Homesteads</td>
<td>U2-A</td>
<td>67</td>
<td>53</td>
</tr>
<tr>
<td></td>
<td></td>
<td>U2-B</td>
<td>67</td>
<td>53</td>
</tr>
<tr>
<td>4</td>
<td>Haleakala Hwy, / Halimale Rd.</td>
<td>U1</td>
<td>---</td>
<td>68</td>
</tr>
<tr>
<td></td>
<td>Intersection</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Pukalani community (Aliani St.)</td>
<td>U2-A</td>
<td>67</td>
<td>57</td>
</tr>
<tr>
<td></td>
<td></td>
<td>U2-B</td>
<td>67</td>
<td>57</td>
</tr>
<tr>
<td>6</td>
<td>Kula 200 community</td>
<td>U2-B</td>
<td>67</td>
<td>51</td>
</tr>
<tr>
<td>7</td>
<td>Kula residence along Kula Hwy.</td>
<td>U3</td>
<td>67</td>
<td>68</td>
</tr>
<tr>
<td>8</td>
<td>Pulehu community (Holopuni Rd.)</td>
<td>U3</td>
<td>67</td>
<td>47</td>
</tr>
<tr>
<td>9</td>
<td>Future Kamhehameha School</td>
<td>U2-B</td>
<td>67</td>
<td>53</td>
</tr>
<tr>
<td>10</td>
<td>Piilani Hwy, / Kaonolu St.</td>
<td>K1</td>
<td>67</td>
<td>60</td>
</tr>
<tr>
<td>11</td>
<td>Future Kilei Regional Park</td>
<td>K2</td>
<td>67</td>
<td>45</td>
</tr>
<tr>
<td>12</td>
<td>King Kekaulike High School</td>
<td>U2-A</td>
<td>67</td>
<td>49</td>
</tr>
<tr>
<td></td>
<td></td>
<td>U2-B</td>
<td>67</td>
<td>49</td>
</tr>
<tr>
<td>13</td>
<td>Unnamed Road off of Haleakala Hwy</td>
<td>U2-A</td>
<td>67</td>
<td>50</td>
</tr>
<tr>
<td></td>
<td>near Five Trees Intersection</td>
<td>U2-B</td>
<td>67</td>
<td>49</td>
</tr>
</tbody>
</table>

**Notes:**

(XX) Values that are underlined approach or exceed the applicable Noise Abatement Criteria.

* The predicted future traffic at Sites 4 and 7 results in noise levels that are lower than the predicted future No-Build noise levels. Therefore, future noise levels at these sites are assumed to be the same as the future No-Build levels.

**Source:** Persons Brinckerhoff Quade & Douglas, Inc., June 1997 and September 1998
Peak hour and LOS C traffic noise levels at 12 of the 13 receptor sites are predicted to increase from 1 dBA to 11 dBA over existing ambient noise levels (see Table 4-9). Site 11 is located at the future County Park in South Kihei. Under the K2 alternatives, Site 11’s peak hour and LOS C noise levels are predicted to increase by 18 dBA and 25 dBA over its existing ambient level, respectively. Both increases are considered “substantial,” and the LOS C condition would exceed the NAC. Therefore, a noise impact is predicted at Site 11 with the K2 alternatives, even though the site of the future park is currently being used for pasture.

Site 7, an off-site receptor, is predicted to have peak hour noise levels of $L_{eq}(h)$ 67 dBA under the U3 alternatives and the No Build alternative. Its predicted $L_{eq}(h)$ under the U3 alternatives would be slightly lower than the predicted $L_{eq}(h)$ under the No Build alternative (or under a U1 or U2-A alternative). Nevertheless, a noise impact is predicted at Site 7 because future conditions under the U3 alternatives would “approach” the NAC, as defined in the Noise Policy.

4.6.3 MITIGATION MEASURES

Noise abatement measures must be considered as part of the project if traffic noise impacts are identified. The Noise Policy is used to help determine whether noise abatement measures shall be implemented, depending on whether the measures are reasonable and feasible based on the following criteria:

- Measure would provide a minimum noise reduction of 5 dBA.
- Cost of noise abatement would not exceed $35,000 per residence benefited. The number of residences protected includes all dwelling units - owner occupied houses, rental units, mobile homes, etc. All units benefited by a 5 dBA or more noise reduction will be counted regardless of whether or not they were identified as impacted.
- Views from impacted residences are a major consideration in the reasonableness of noise abatement measures.
- Greater consideration of implementation of abatement measures is given to residential areas where high absolute traffic noise levels are expected to occur, e.g., greater than 70 dBA, or where large increases over existing noise levels are anticipated.
- Greater consideration of implementing abatement measures is given to residential areas along highways in a new location, residential areas constructed before an existing highway, and residential areas in place along an existing highway for an extended period of time.
- Consideration of adverse environmental effects and beneficial reduction of construction noise.

Noise abatement would only be considered at existing residential or planned development sites where building permit approvals have been obtained, and would only apply to outdoor ground level areas.

As stated in Section 4.6.2, a noise impact is predicted at Site 7 under the U3 alternatives, and Site 11 under the K2 alternatives.

At Site 7, a noise barrier that would provide at least a 5 dBA reduction in $L_{eq}(h)$ at the Site 7 residence was considered, but was found not to be reasonable and feasible because the barrier would block the residence’s egress/ingress on Kula Highway, block viewplanes from the residence and not be appropriate in a rural, country setting.

At Site 11, abatement measures that are reasonable and feasible include buffer zones between the roadway right-of-way and noise-sensitive areas within the park, and berms that deflect noise from the highway. If a K2 alternative had been selected as the preferred alternative, the SDOT would work with the County of Maui Department of Parks and Recreation to determine which combination of these two measures would be preferred. For example, according to the latest master plan for the park, an amphitheater would be located at the southwest corner of the park adjacent to the K2 alignment. The grade at this location would allow the highway to be constructed at a lower elevation than the amphitheater, and therefore the highway would be separated from the park by berms. At other locations along the southern perimeter of the park, activities that are not noise sensitive (e.g., ball fields) could act as buffer zones for activities that are noise sensitive (e.g., camping grounds).
4.7 WATER RESOURCES

4.7.1 SURFACE WATER

Impacts to the intermittent streams (gulches) crossed by the Kihei-Upcountry Maui Highway will be associated in part with the bridges or embankments that will cross the gulches. After construction, the bridges will have no or very minimal impacts on the intermittent streams because current flow capacities of the gulches will be maintained. Storm water will be confined within the gulch, preventing flooding of adjacent areas. Information about the size and location of the bridges is provided in Section 2.1.2, and typical bridge profiles are shown on Figure 2-4.

Decisions on whether to use a bridge or embankment for gulch crossings partially depend on the storm water flow in the affected gulches. Many of the affected gulches have small storm water flows (under 100 m³/sec (3,500 cfe) for the 100-year design storm), which culverts will be able to accommodate. Therefore, the embankment crossings (containing culverts) will not create upstream impoundments, and there will be no hydraulic impacts except perhaps during conditions exceeding the 100-year design storm.

In rural areas, the roadway will cause run-off to drain into areas previously free of automobile-related pollutants. However, these areas have already been exposed to agricultural and ranching-related pollutants, such as fertilizers, pesticides and livestock waste. Under most cases, the roadway runoff will drain into gulches and thereupon percolate into the ground. Roadway run-off could enter coastal waters during a heavy rain. However, roadway pollutant levels are related to VMT, and by reducing total regional VMT (see Sections 4.4.1 and 4.13), Kihei-Upcountry Maui Highway's impact to total pollutant loading will be to decrease pollutant emissions in comparison to the No Build alternative. Under the No Build alternative, a larger amount of pollutants would be generated because of the greater VMT compared to the build alternatives.

The U.S. Army Corps of Engineers (USACE), has stated that construction of bridges and embankments in Haleakala's gulches will require a U.S. Department of Army Nationwide permit under Section 404 of the Clean Water Act (see Appendices B and C). The Corps is
therefore a cooperating agency in the preparation of this document. A Section 401 Water Quality Certification from the State of Hawaii Department of Health (SDOH) may also be required.

4.7.2 GROUNDWATER

Kihei-Upcountry Maui Highway will overlie dike-confined groundwater sources deep below the surface. The amount of roadway run-off percolating into the ground will not be sufficient to reach the deep aquifers. In addition, according to the Maui Board of Water Supply, these sources are not utilized for potable water because of the high cost of drilling and the risk of not reaching water.

As an arterial roadway, Kihei-Upcountry Maui Highway will be used by vehicles transporting fuel and other chemicals. In the event of an inadvertent spill, fuels or chemicals could be released. Should there be an inadvertent release, State regulations require immediate containment and clean-up, and the County Department of Fire Control already has response procedures in place. The depth from the surface to the groundwater will help protect the aquifer under these conditions.

As described in Section 3.7.2, there is no U.S. Environmental Protection Agency designated principal or sole-source aquifer in the project area. Therefore, the requirements pertaining to potential impacts to such a resource under Section 1424(e) of the Safe Drinking Water Act do not apply to the proposed project.

With the No Build Alternative, roadway pollutants also would be generated and the risk of spills would exist. The location of the discharges would be different, however.

4.7.3 WETLANDS

Wetlands at Kealia Pond and along the Kihei-Makena coastline will be unaffected by Kihei-Upcountry Maui Highway. Although the U.S. Fish and Wildlife Service National Wetlands Inventory Map identifies wetlands within two of the gulches that will be crossed by some of the alternatives (Waipuilani and Waiakoe), botanical surveys conducted for this project found no
vegetational, soil or hydrological evidence that wetlands exist in any gulch to be crossed by the proposed highway. Therefore, wetlands do not exist within the path of any alternative.

4.7.4 FLOODPLAINS

As described in Section 3.7.4, the project area is not considered a floodplain because of its Zone C classification on the Flood Insurance Rate Maps. The hydrological impacts of the proposed bridges and culverts on the intermittent stream flow in the gulches are discussed in Section 4.7.1.

4.7.5 MITIGATION MEASURES

According to existing State regulations, hazardous spills require immediate containment and clean-up. Effective incident response procedures will minimize impacts to water sources. Measures to mitigate or prevent adverse impacts to the quality of State waters during construction are described in Section 4.17.4.

4.8 ECOSYSTEMS

4.8.1 FLORA

The No Build alternative consists of widening several existing roadways. The floral impact of the No-Build alternative would be removal of the vegetation in the construction zone of these widening projects.

Construction of Kihei-Upcountry Maui Highway will also remove vegetational communities. Some of these communities are commercial croplands, and cropland impacts are discussed in Section 4.2.

None of the alternatives (No-Build and Build) are expected to have an adverse impact on the region's botanical resources. The vegetational communities that will be directly affected by the proposed highway are regionally abundant (see Section 3.8.1). From a botanical
perspective, there is no alternative that is preferable because of the extensive involvement of existing agricultural areas along all alignment alternatives. However, for comparative purposes, the area of vegetational clearance for each alternative (including cropland) is shown on Table 4-10. Alternative U3,K1 requires the least clearance of vegetation.

The indirect effects of the highway include increased risk of fire and the potential introduction of alien species. Kilaeua-Upcountry Highway may increase the potential of brush fires in the region by enhancing public access to areas that are near dry land forests. The kiawe/buffelgrass association is especially fire-prone during the dry summer months. According to the National Park Service (letter dated October 25, 1994; see Appendix A), wildland fires are generally caused by humans.

The introduction of alien plant species to areas free of such species is also a concern. This concern was raised explicitly by the U.S. Department of Interior (see letter commenting on the Draft EIS, dated September 30, 1999 in Volume Two: Draft EIS Comments and Response).

One way that alien species could be introduced is through materials of construction and equipment that would be used to build the roadway. Since Maui already has all the equipment and vehicles needed to construct the road, there is little chance that off-island alien species would be introduced to the project area through equipment. In addition, much of the construction materials, such as base course and aggregate, would be obtained on Maui. Imported materials needed for the project include asphalt, cement, and rebar, but such materials are unlikely to contain alien species. Mulch may be imported for roadside landscaping, but in accordance with SDOT specifications, this material would be certified to be free of alien seed before being used.

Another way that alien species could be introduced would be through the conduit created by the roadway. This mechanism would be a greater concern if the roadway crossed areas of native vegetation. However, the agricultural areas that would be traversed by the roadway are already highly disturbed, and the increased risk of introduction of alien species is considered minimal.
In summary, Kihei-Upcountry Maui Highway will not change the current floral conditions of the project area. The area surrounding the highway will continue to be dominated by agriculture and kiawe trees/buffelgrass. The highway does not cross areas of native vegetation, and so would not increase the risk of introducing alien species into areas presently supporting native vegetation.

4.8.2 FAUNA

The impact of the No Build alternative on faunal resources would be associated with the habitat disturbance caused by the roadway widening projects contained in this alternative. This impact would not affect regional faunal conditions.

As with the No-Build alternative, the Build alternatives will convert faunal habitats into roadway and embankment. Table 4-10 shows the acreage of habitat converted for each alternative. Alternative U3,K1 would convert the smallest amount of acreage. However, regardless of the alternative, Kihei-Upcountry Maui Highway will not have a regional impact on faunal communities because they are common and widespread. As discussed in Section 3.8.2, the mammal and bird species in the project area are common throughout the Hawaiian Islands.

<table>
<thead>
<tr>
<th>Alternative</th>
<th>Approximate Vegetational Displacement</th>
</tr>
</thead>
<tbody>
<tr>
<td>U1,K1</td>
<td>97.6 ha (241.2 acres)</td>
</tr>
<tr>
<td>U1,K2</td>
<td>112.2 ha (277.3 acres)</td>
</tr>
<tr>
<td>U2-A,K1</td>
<td>98.5 ha (243.3 acres)</td>
</tr>
<tr>
<td>U2-A,K2</td>
<td>113.1 ha (279.4 acres)</td>
</tr>
<tr>
<td>U2-B,K1</td>
<td>99.4 ha (245.6 acres)</td>
</tr>
<tr>
<td>U2-B,K2</td>
<td>114 ha (281.7 acres)</td>
</tr>
<tr>
<td>U3,K1</td>
<td>89 ha (219.3 acres)</td>
</tr>
<tr>
<td>U3,K2</td>
<td>102.4 ha (252.5 acres)</td>
</tr>
</tbody>
</table>

Several commentors to the Draft EIS (see Volume Two: Draft EIS Comments and Responses) stated that Kihei-Upcountry Maui would increase the number of vehicle collisions with axis deer. The number of deer is increasing, their range is expanding, and the build alternatives cross areas where the deer have been observed (see Section 3.8.2). While the risk of vehicle-cattle collisions can generally be minimized by well-maintained stock-proof fencing (see Section 4.8.4), preventing vehicle-deer collisions is more difficult because deer can jump stock fencing. The population of axis deer in the study area is denser in Ulupalakua and less dense in Puunene. Therefore, of all the build alternatives, the U1.K1 alignment (the preferred alternative) has the least involvement with the axis deer population. The U3.K2 alignment would have the most involvement with concentrations of axis deer.

4.8.3 ENDANGERED, THREATENED AND MIGRATORY SPECIES

Consultation with the U.S. Fish and Wildlife Service (Service) (Parsons Brinckerhoff letter November 25, 1996 (see Appendix C)) and the State of Hawaii Department of Land and Natural Resources (DLNR), Division of Forestry and Wildlife (see Section 5.1.1) has occurred. The Service was consulted because of its jurisdiction under Section 7 of the Endangered Species Act of 1973 to impose requirements upon federal agencies regarding endangered or threatened species and critical habitat. The Service noted that Puu o Kali supports a rare dry land forest which may contain endangered and rare plant species. The Service also noted a reservoir that may be used by migratory or endangered waterbirds (see Section 3.8.3).

Botanical surveys which covered all alignment alternatives did not identify any listed, proposed or candidate threatened or endangered plant species, or any plant species of concern (see Section 3.8.1 and Appendix J). None of the species identified in the Service's January 8, 1997 letter were observed.

Concern about potential impacts to endangered or migratory waterbirds resulted in additional consultations with Service staff (telephone conversations on April 2 and May 9, 1997). Service staff clarified that the January 8, 1997 letter did not request faunal surveys of the alignments and the reservoir. Additional consultation with the Maui Nature Conservancy (telephone conversation on April 2, 1997) supported the Service's position that endangered or
threatened faunal species were unlikely to be found along the alignments. However, Service
staff recommended that the EIS acknowledge that the reservoir could attract migratory or
endangered waterbirds. At its nearest approach, the edge of the U2-A,B alignment right-of-
way would be approximately 70 m (230 ft) from the reservoir (horizontal distance), with an
elevational difference between the road and the reservoir of approximately 20 vertical meters
(60 ft). None of the U2-A or U2-B alternatives would modify the reservoir or its functions during
or after construction.

Based on the information above, FHWA determined that Kihei-Upcountry Maui Highway will
have no effect on the plant species identified in the Service's January 8, 1997 letter or other
listed, proposed or candidate threatened or endangered plant species known at the time the
botanical surveys were conducted. FHWA also determined that the proposed project will have
no effect on migratory or endangered waterbirds that use the reservoir near the U2-A,B
alignment. A letter was sent to the Service on December 1, 1997 requesting concurrence with
the above conclusions under Section 7. In a letter dated December 24, 1997, the Service
concurred with the FHWA determinations (see Appendix C).

4.8.4 MITIGATION MEASURES

Losses of floral communities will be partially mitigated by the implementation of a landscaping
plan, which is discussed further in Section 4.13.2. Mitigation for losses of cropland is
discussed in Sections 4.1.4 and 4.2.4.

Signage will be provided to encourage motorists to prevent brush fires. In addition, SDOT will
conduct regular maintenance to control weed growth along highway shoulders. During the
design phase, sources of water near the highway will be inventoried, and procedures to use
these sources during a brush fire will be established.

Well-maintained stock-proof fencing will be provided at cattle grazing areas (see Section 4.2.4)
to prevent cattle from wandering onto the highway. However, since such fencing will not
prevent deer from getting onto the highway, frequent signage will be provided warning
motorists of the danger of deer crossing the highway. Also, reduced speeds could help
prevent and reduce the severity of vehicle-deer collisions. Although the highway is planned for
a 90 kmh (55 mph) posted speed limit in rural sections, this limit will be re-evaluated during the design phase, and the risk of vehicle-deer collisions will be considered further in this assessment. As noted in one of the Draft EIS comment letters, the reflection of automobile headlights off of the raised pavement markers used on many of the highways on Maui mimic the headlight reflection off of axis deer eyes, which make it difficult for drivers to see the deer. Therefore, alternative pavement markers would be studied during the design phase.

Existing SDOT specifications on the use of mulch for landscaping will be followed to prevent alien plant species from invading the project area. In addition, existing SDOT specifications requiring construction vehicles and equipment to be washed after use will help prevent the spread of alien species among construction sites on Maui.

4.9 GEOLOGY, PHYSIOGRAPHY, SITE CONTAMINATION AND NATURAL HAZARDS

4.9.1 GEOLOGIC AND PHYSIOGRAPHIC SETTING

None of alternatives will affect the geologic conditions of the study area.

Kihei-Upcountry Maui Highway will alter the physiography of the study area by introducing a roadway where there is presently open space used for agriculture and ranching. The project will require cuts and fills, resulting in localized changes in topography. Table 4-11 displays the estimated amount of earthwork for each alternative. Alternative U3,K1 will require the least amount of earthwork. Regardless of the alternative, total cuts and fills will be balanced during the design phase so material will not need to be disposed of or imported from outside the project site.

4.9.2 HAZARDOUS MATERIALS

A search of federal and State environmental databases did not identify hazardous materials sites along any of the alignments. Prior land use history indicates agricultural and ranching
use. Therefore, hazardous materials are not expected to be encountered during project construction.

Table 4-11
Comparison of Earthwork (General Site Work) Among Alternatives

<table>
<thead>
<tr>
<th>Alternative</th>
<th>Excavation</th>
<th>Embankment</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>U1,K1⁵</td>
<td>856,900 m³</td>
<td>516,300 m³</td>
<td>1,373,200 m³</td>
</tr>
<tr>
<td>U1,K2⁶</td>
<td>792,800 m³</td>
<td>625,100 m³</td>
<td>1,417,900 m³</td>
</tr>
<tr>
<td>U2-A,K1⁷</td>
<td>922,700 m³</td>
<td>739,400 m³</td>
<td>1,662,100 m³</td>
</tr>
<tr>
<td>U2-A,K2⁸</td>
<td>1,058,800 m³</td>
<td>848,200 m³</td>
<td>1,907,000 m³</td>
</tr>
<tr>
<td>U2-B,K1</td>
<td>770,900 m³</td>
<td>616,700 m³</td>
<td>1,387,600 m³</td>
</tr>
<tr>
<td>U2-B,K2</td>
<td>906,800 m³</td>
<td>725,500 m³</td>
<td>1,632,300 m³</td>
</tr>
<tr>
<td>U3,K1</td>
<td>489,600 m³</td>
<td>391,800 m³</td>
<td>881,400 m³</td>
</tr>
<tr>
<td>U3,K2</td>
<td>604,800 m³</td>
<td>483,700 m³</td>
<td>1,088,300 m³</td>
</tr>
</tbody>
</table>

Notes: ⁵ Earthwork for a two-lane highway in rural areas and a four-lane highway in urban areas, and excess excavation material to be used to fill major gulches (where bridges will not be used) for a four-lane roadway. ⁶ Includes earthwork to construct two undercrossings where the road crosses cane haul roads. ⁷ Includes earthwork to re-align Haleakala Highway in Pukalani.


4.9.3 NATURAL HAZARDS

Kihei-Upcountry Maui Highway will not produce any additional exposure of communities to geologic hazards, tsunami or other natural hazards, such as tropical storms and hurricanes. The No Build alternative would also not result in additional exposure to natural hazards.

Kihei-Upcountry Maui Highway will enhance roadway evacuation capacity from Kihei-Makena in the event of a coastal emergency. In comparing the alternatives for their evacuation effectiveness, the K2 alternatives, with their more southerly terminus, would facilitate a coastal evacuation better than the K1 alternatives. With the K1 alternatives, including the preferred alternative, traffic flows will collect in North Kihei because the K1 terminus is approximately 1 km (0.6 mile) from the Pilani Highway/Mokulele Highway intersection.
4.10 HISTORIC, ARCHAEOLOGICAL AND CULTURAL RESOURCES

The purpose of this section is to summarize potential project impacts on historic and archaeological resources and traditional cultural properties (TCP), and to document compliance with Section 106 of the National Historic Preservation Act and Chapter 6E of the Hawaii Revised Statutes.

In coordination with the State Historic Preservation Division (SHPD), reconnaissance level surveys were conducted on all the alternatives considered in the EIS, and an inventory-level survey was conducted on the preferred alternative. More information about the project's historic and archaeological research activities is provided in Section 3.10.

4.10.1 SECTION 106 AND CHAPTER 6E

Section 106 of the National Historic Preservation Act of 1966 requires that federal agencies consider the effect of their projects on any resource listed on or eligible for the National Register of Historic Places, in coordination with the State Historic Preservation Officer (SHPO). The Advisory Council on Historic Preservation (ACHP) is given an opportunity to review project impacts if appropriate. Chapter 6E places similar responsibilities on State agencies to evaluate their projects. The processes of Section 106 (as described in 36 CFR 800) and Chapter 6E are very similar, with both containing two basic steps: (1) identify historic properties (sites on or eligible for the National and Hawaii Registers); and (2) assess effects, and if necessary, mitigate adverse impacts.

Section 3.10 documents the activities performed to comply with Step 1.

In assessing the effects of a project on a historic property (Step 2), there can be only one of the following three possible findings under the Section 106:

- no historic properties affected;
- no adverse effect; and
- adverse effect.
"No historic properties affected" means that either there are no historic properties present or there are historic properties present but the undertaking will have no effect upon them of any kind (that is, neither harmful nor beneficial). An "effect" means alteration to the characteristics of a historic property qualifying it for inclusion in or eligibility for the National Register.

"No adverse effect" means that there could be an effect, but the effect would not be harmful to those characteristics that qualify the property for inclusion in the National Register. In other words, it would not diminish or adversely affect the integrity of the property’s location, design, setting, materials, workmanship, feeling, or association.

An "adverse effect" means an undertaking may alter, directly or indirectly, any of the characteristics of a historic property that qualify the property for inclusion in the National Register in a manner that would diminish the integrity of the property’s location, design, setting, materials, workmanship, feeling, or association. Consideration is given to all qualifying characteristics of a historic property, including those that may have been identified subsequent to the original evaluation of the property’s eligibility for the National Register. Adverse effects may include reasonably foreseeable effects caused by the undertaking that may occur later in time, be farther removed in distance or be cumulative.

If a project has an "adverse effect", a Memorandum of Agreement (MOA) that is signed, at a minimum, by the federal sponsoring agency and the SHPO, is required. The ACHP may sign the MOA when the federal agency and the SHPO are in disagreement. Other entities may sign the MOA as concurring parties, such as the State sponsoring agency (SDOT), and agencies and organizations with an interest in the historic property(ies) affected.

Effect determinations, in accordance with Section 106 and Chapter 6E, are provided in Section 4.10.2.

Section 106 also requires consultation with those who may have knowledge about historic properties in the project area. A group of organizations and individuals recommended by the SHPO, which included the State of Hawaii Office of Hawaiian Affairs and the State Department of Hawaiian Homelands, were contacted and asked to participate in consultation at various times throughout the project. They were sent copies of the reconnaissance survey reports, the inventory survey report, and the cultural impact study, and were also asked if they had...
knowledge of other historic properties not identified in these reports (see Appendix C). One of
the consulted parties provided information about other historic properties near the U2-A
alignment during the Draft EIS review period (see letter from Charles Maxwell in Volume Two).

4.10.2 POTENTIAL IMPACTS

4.10.2.1 Historic and Archaeological Resources

None of the build alternatives completely avoid significant historic and archaeological sites.
Table 4-12 lists the historic properties (sites eligible for the National Register) that would be
adversely affected ("adverse effect") depending on the alternative. Since an inventory survey
was only conducted on the U1.K1 alignment, the preferred alternative, the level of information
obtained for this alternative is superior to the information obtained for the other alternatives. If
inventory surveys were conducted on the other alternatives, additional significant sites could
be identified. In addition, FHWA rendered official Section 106 effect determinations only for the
U1.K1 alignment (see Appendix C). Section 3.10 contains information about these sites,
including significance evaluations that indicate that they all are significant only under Criterion
D. Criterion D sites yield, or may likely yield, information important in prehistory or history.

Although the number of historic properties that would be adversely affected differs by
alternative, the overall impacts among the alternatives were judged to be equal because none
of the affected historic properties are culturally significant (i.e., eligible for listing based on
Significance Criteria E), or require preservation. Both the FHWA and SHPO agreed that none
of these sites warrant modifications or realignments of any of the alternatives, and that data
recovery would be an appropriate mitigation measure at each of the sites affected by the
project.

The FHWA determined that the U1.K1 alignment, the preferred alternative, will have an
"adverse effect" on three historic properties. State Sites 5032, 5033 and 5035. Sites 5032 and
5033 are about 57 m (190 ft) and 45 m (150) from the U1.K1 center line, respectively, which is
barely within the alignment's Area of Potential Effect (APE). Nevertheless, FHWA rendered
adverse effect determinations even though construction of Kahe-Uncountry Maui Highway may
not affect these sites. As described in Section 3.10.2, Sites 5032, 5033 and 5035 functioned
as temporary habitation as evidenced by the discovery of cultural materials. Although these sites do not require preservation, additional data recovery is needed if detailed design activities to be conducted in the next phase of project engineering confirm that these sites are displaced by the project.

Table 4-12
Historic Properties to be Adversely Affected by Alternative

<table>
<thead>
<tr>
<th>Alternative</th>
<th>Historic Properties Adversely Affected 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>U1,K1 (Preferred Alternative)</td>
<td>5032, 5033 and 5035</td>
</tr>
<tr>
<td>U1,K2</td>
<td>4766, 4767, 4768, 4769, 4770, 4771 and 4772,</td>
</tr>
<tr>
<td>U2-A,K1</td>
<td>5032, 5033 and 5035</td>
</tr>
<tr>
<td>U2-A,K2</td>
<td>4768, 4767, 4768, 4769, 4770, 4771 and 4772,</td>
</tr>
<tr>
<td>U2-B,K1</td>
<td>5032, 5033 and 5035</td>
</tr>
<tr>
<td>U2-B,K2</td>
<td>4766, 4767, 4768, 4769, 4770, 4771 and 4772</td>
</tr>
<tr>
<td>U3,K1</td>
<td>4763, 4774, 4775, 5032, 5033 and 5035</td>
</tr>
<tr>
<td>U3,K2</td>
<td>4763, 4766, 4767, 4768, 4769, 4770, 4771, 4772, 4774, 4775</td>
</tr>
</tbody>
</table>

Note: 1 Site numbers preceded by "50-50-10-".

The impacts of the U1,K1 Alternative reflect information from the inventory survey. The impacts of other U1 and K1 alternatives partially reflect information from the inventory survey. Section 106 effect determinations were made only for the U1,K1 alternative.

Federal Highway Administration, June 18, 2001 (see Appendix C).

The FHWA rendered "no adverse effect" determinations on State Sites 3727, 3728, 3729, 3742, 3743, 3745, 4765, 4773, 4776, 4778, 5030, and 5034. None of these sites warrant preservation and sufficient documentation on these sites was compiled during the inventory survey or in previous studies. The SHPD agreed in a May 10, 2001 letter (see Appendix C) that no further work is needed on these sites.

The two petroglyph sites (State sites 5029 and 5031) are located approximately 60 m (200 ft) from the alignment centerline in Kalailnui and Waikoa Gulches. Because of this distance, and since Kihei-Upcountry Maui Highway will cross both gulches via two-lane bridge, both
petroglyph sites are outside the APE. Nevertheless, mitigation measures will be implemented during construction to prevent accidental damage to the sites (see Section 4.17.7.2).

As described in Section 3.10.2, the U2-A alignment avoids State Sites 1062 and 4779 (petroglyph sites). With proper mitigation (see Sections 4.10.3 and 4.15.7.2), proximity impacts can also be avoided.

At its nearest point, the U2-A alignment's edge of pavement would be approximately 50 m (150 ft) from State Site 2701 (a heiau; see Section 3.10.2). Adverse effects on this site would not be expected because the alignment runs along the heiau’s south (mauka) side, which would not affect the heiau’s downslope (north and west) view plane (see Figure 4-5). Measures to mitigate proximity impacts to State Site 2701 would be implemented if a U2-A alternative were selected as the preferred alternative (see Sections 4.10.3 and 4.15.7.2).

State Site 4181 may be within the U2-B alignment's APE. However, this site is no longer considered a historic property (see Section 3.10.2).

The U3 alignment was shifted to avoid Site 4764 (see Section 3.10.2). Measures to mitigate proximity impacts to Site 4764 would be implemented if a U3 alternative were selected as the preferred alternative (see Sections 4.10.3 and 4.15.7.2).

4.10.2.2 Traditional Cultural Properties / Practices

As described in Section 3.10.4, Scientific Consultant Services, Inc. (SCS) prepared a report on the potential cultural resource impacts of the proposed project (Identification and Assessment of Potential Traditional Cultural Impacts Within the Kihei-Upcountry Maui Highway Project Area, Maui, Hawai‘i [IMK: 2-2 and 2-3], October 2000). The SCS report is provided in Appendix I.

According to the SCS study, the project area contains no TCPs, although there are culturally-significant sites near the project area, such as the petroglyphs (Sites 5029 and 5031) and heiau (Site 2701). None of the culturally-significant sites will be affected by Kihei-Upcountry Maui Highway (see Section 4.10.2.1). The SCS study was reviewed by the SHPD, the State
Office of Hawaiian Affairs and others who were consulted regarding the historic impacts of the project (see Appendix C).

4.10.3 MITIGATION MEASURES

In accordance with Section 106 regulations, a MOA was prepared and signed by the FHWA and SHPO because of the "adverse effects" that the project could have on three historic properties along the UI-K1 alignment (see Appendix C). The MOA specifies that a data recovery plan be prepared and implemented in coordination with the SHPD. The plan will be prepared during the design phase and will specify:

- the research questions to be addressed through the data recovery, with an explanation of their relevance and importance;
- the methods to be used, with an explanation of their relevance to the research questions;
- contents of the archaeological data recovery report;
- the report review procedures;
- a report completion date;
- proposed distribution of the results; and
- proposed methods by which native Hawaiian groups will be notified when the work is beginning and provided a summary of the report findings.

Should a previously unidentified historic or archaeological site be discovered during construction, all work will stop and the SHPD will be informed and consulted on the appropriate treatment measures.

4.11 PARKLANDS

In general, the proposed Kihei-Upcountry Maui Highway will enhance access to Haleakala National Park, the new Kihei Aquatic and Community Center and the future Kihei Regional Park. No alternative, including the No Build, will adversely affect access to or use land from any existing or future park or recreational facility described in Section 3.11.
Kihei-Upcountry Maui Highway is not anticipated to increase the approximately one million visitors traveling to the summit annually. The health of Maui’s visitor industry is the fundamental factor affecting the number of visitors to Haleakala. Roadway capacity does not act as a constraint on the number of visitors.

Kihei-Upcountry Maui Highway, regardless of the build alternative, will improve access to the future Kihei Regional Park. However, the K2 alternatives would enhance access to the Regional Park to a greater degree than the K1 alternatives. However, if a K2 alternative were selected as the preferred alternative, the SDOT would work with the County of Maui Department of Parks and Recreation to determine appropriate noise mitigation measures, such as buffer zones and berms (see Section 4.6.3).

4.12 SECTION 4(F)

Section 4(f) of the Department of Transportation Act, 49 U.S.C. 303 and 23 U.S.C. 138 (referred to hereafter as “Section 4(f)”), permits the use of land for a transportation project from a significant publicly-owned public park, recreation area, wildlife and waterfowl refuge, or a historic site only when the FHWA has determined that:

- there is no feasible and prudent alternative to such use; and
- the project includes all possible planning to minimize harm to the property resulting from such use.

The purpose of Section 4(f) is to preserve significant parkland, recreation areas, refuges, and historic/archaeological sites by limiting the circumstances under which such land can be used for transportation projects. The word "use" in this case means:

- land is permanently incorporated into a transportation facility;
- there is a temporary occupancy of land that is adverse in terms of preservation of the resource; or
- the project’s proximity to the site substantially impairs those functions that qualify the site as a Section 4(f) resource even though no land is permanently or temporarily acquired. This type of use is called "constructive use."
None of the alternatives will use lands from publicly-owned public parks or recreational facilities, or wildlife and waterfowl refuges, because there are no such resources within the path of the alignments. The Section 4(f) resource nearest to any alternative is the future Kihei Regional Park, which would be adjacent to the K2 alternatives. As described in Section 4.6.2, these alternatives are predicted to have a noise impact at the future park because there would be a "substantial" increase of noise from its present level (the area is presently vacant and is used for pasture). However, a constructive use of the park would not occur because the SDOT would work with the County to ensure that noise impacts are mitigated by buffer zones or berms (see Section 4.6.3).

An archaeological site falls within the protection afforded by Section 4(f) only if it is on or eligible for the National Register of Historic Places and the site has been determined, after consultation with the SHPO and the ACHP, to be important for preservation-in-place. Since none of the historic and archaeological sites that may be affected by the project meet these two criteria (see Section 3.10.2), the project would not involve any historic properties under the jurisdiction of Section 4(f).

### 4.13 VISUAL AND AESTHETIC RESOURCES

#### 4.13.1 POTENTIAL IMPACTS

The No Build alternative, which consists of widening existing roadways, would not affect the viewsheds described in Section 3.12. Views of roadside trees and landscaping could be affected by the removal of vegetation associated with the widening.

Regardless of the build alternative selected, views from Upcountry will not change because the terrain drops away towards Central Maui and the ocean. The visual quality of the ocean, West Maui Mountains and Central Maui from Upcountry will not be affected. In fact, the Kihei-Upcountry Maui Highway will provide additional viewpoints of these vistas for motorists. The possibility of providing a scenic overlook will be studied further in the design phase of the project.
The intactness (extent to which the landscape is free from visual encroachment) of the eastern (mauka) view of Haleakala from Kihei will be affected by a paved roadway and associated embankments climbing the slope.

Highway lights will be provided at the terminus intersections, and they will be visible from several vantage points during the evenings. Highway lights will not be provided along the entire length of Kihei-Upcountry Maui Highway.

The visual quality of the ocean, coastline and the West Maui Mountains from Kihei will be unaffected.

4.13.2 MITIGATION MEASURES

Although the proposed project's visual impact is expected to be minor, landscaping will be provided to improve the appearance of the roadway. Native trees and shrubs will be used. These plants are already adapted to local growing conditions and will require less water and soil amendments. Some of these native species include:

- williwilli--these occur naturally in some of the larger gulches in the study area;
- naio (Myoporum sandwicense)--a glossy, dark green shrub with fragrant white flowers;
- nehe--a member of the daisy family;
- ilima (Sida fallax)--a small shrub with bright orange flowers that is used in landscaping; and
- akia (Wikstroemia uva-ursi)--a low, mat-forming shrub and excellent ground cover which is used in landscaping.

The Maui Native Plant society and the DLNR will be contacted for additional suggestions for planting and planting material. A project "Landscaping Plan" will be developed and completed during the project's design phase.

Scenic overlooks will be established if appropriate location(s) are found. This will be explored during the design phase.
4.14 ENERGY

The No Build alternative would have higher regional VMT and vehicle fuel consumption when compared to any of the build alternatives because travelers would experience increased traffic delay along the existing circuitous route between Upcountry and Kihei-Makena or West Maui.

In contrast, any build alternative for the Kihei-Upcountry Maui Highway will produce lower regional VMT and vehicle fuel consumption when compared to the No Build alternative because any build alternative will provide a shorter, more direct route between Upcountry and Kihei or West Maui. As an example, Table 4-13 provides the travel distances from the "Five Trees" intersection (a point representing a centralized location in Upcountry) and the Lipoa Street/Pillani Highway intersection (a point representing a centralized location in Kihei) for the No Build and build alternatives. Trip lengths between these centroids will decrease from 50 percent to 26 percent, depending on the alternative. Alternative U2-A,K1 would decrease the length of this trip by half, and subsequently reduce vehicle fuel consumption by roughly this amount.

Electricity will be needed for roadway lighting at the termini and signalization.

4.15 CUMULATIVE IMPACTS

A cumulative impact, according to 40 CFR 1508.7, is defined as:

... an impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time.
Table 4-13  
Trip Distance Between Five Trees and the Lipoa Street by Alternative

<table>
<thead>
<tr>
<th>Alternative</th>
<th>Approx. Distance Between Centroids (km)</th>
<th>Trip Reduction</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Length (km)</td>
<td>Percentage</td>
</tr>
<tr>
<td>No Build</td>
<td>36</td>
<td>n/a</td>
</tr>
<tr>
<td>U1,K1</td>
<td>23</td>
<td>13</td>
</tr>
<tr>
<td>U1,K2</td>
<td>25</td>
<td>11</td>
</tr>
<tr>
<td>U2-A,K1</td>
<td>18</td>
<td>18</td>
</tr>
<tr>
<td>U2-A,K2</td>
<td>21</td>
<td>15</td>
</tr>
<tr>
<td>U2-B,K1</td>
<td>19</td>
<td>17</td>
</tr>
<tr>
<td>U2-B,K2</td>
<td>22</td>
<td>14</td>
</tr>
<tr>
<td>U3,K1</td>
<td>22</td>
<td>14</td>
</tr>
<tr>
<td>U3,K2</td>
<td>24</td>
<td>12</td>
</tr>
</tbody>
</table>


Sections 2.1.1, 3.1.3, and 3.1.4.2d describe proposed roadway improvements, the major land use developments in the project area, and the characteristics of the built environment in accordance with the County's Community Plans, respectively. The cumulative impacts of the proposed project and the transportation and land use projects described in these sections have the potential to be serious, if not mitigated. Under the No Build alternative, there would be a smaller level of cumulative impacts because the proposed Kihei-Upcountry Maui Highway would not be included in the mix. A discussion of the expected cumulative impacts as they relate to major environmental resources is provided below.

Land Use

Planned land use development projects, such as the Waena Generating Station, Kulamalu, DHHL homesteads and the expansion of the Maui R&T Park, would immediately and irrevocably change the land use of these areas from agriculture, open space and pasture to industrial, urban, suburban and rural uses. Roadway projects are capable of inducing regional development because they often remove
one of the impediments to growth—transportation access. Since some of the planned roadway projects, including the proposed project, are intended to improve circulation in existing urban areas, a certain amount of development can be expected from transportation and other infrastructure projects. Development in existing urban areas, such as in Kihei, would be consistent with County land use plans. Highway-induced growth in areas not approved for development, such as existing agricultural lands in Upcountry, is not expected because of land use controls (e.g., zoning) and other constraints, such as water availability. However, the major planned residential developments in Upcountry, such as the Kulamalu and DHHI projects, would substantially increase population in the region, which may encourage commercial development. For example, plans for Kulamalu include a commercial shopping center.

Farmland
The agricultural activities of the project area include large scale sugarcane and pineapple operations, and small-scale Kula farms that cultivate vegetables and flowers (see Section 3.2). The No Build alternative, comprised of several roadway widening projects, would affect sugarcane operations through the conversion of active fields to roadway infrastructure. Since these projects entail the widening of existing highways (Mokulele, Kuil HELANI, Hana and HALEAKALĀ), sugarcane operations would not be severely affected. In contrast, some of the build alternatives would cause more severe effects because they would bisect active fields. In addition, the planned Waena Generating Station would displace 66 acres of sugarcane fields. Although the residential projects in Upcountry would not directly affect agricultural land, they would substantially increase population in the region, which may exacerbate many of the concerns expressed by both the large and small scale farmers: urban encroachment, competition for water, increasing land values, and complaints from neighbors about farming activities (e.g., pesticide spraying, cane burning, etc.).

Socioeconomic Characteristics
Regardless of the alternative, planned projects would provide short-term construction employment. In addition, the expansion of the Maui R&T Park, the Waena Generating
Station and Kulamalu commercial development would provide long-term employment. The expansion of the Maui R&T Park would benefit and diversify the local economy. None of the planned roadway projects are anticipated to cause adverse social or economic impacts to any community in the study area. The Upcountry residential projects would substantially increase population in Upcountry, which may change the “country” ambiance of the region by potentially affecting the factors that create this ambience: farming (see above), open space, low population density, and rural lifestyle. Population growth in existing urban areas, such as Kihei or even Pukalani, would have less of a social impact because these two areas are physically and culturally already urban and suburban.

Transportation
Without adequate transportation improvements, planned land use developments, such as expansion of Pukalani, Kulamalu, DHHL Homesteads and Maui R&T Park, can overburden the existing roadway infrastructure. However, the planned roadway projects, including the proposed project, would alleviate the traffic impacts of these developments, and help improve regional and local circulation.

Air Quality
Other than particulate matter emissions from sugarcane burning activities, the project area has excellent ambient air quality conditions (see Section 3.5). The planned projects or developments are not anticipated to substantially change these conditions. However, some of the roadway projects may change “hot spot” or microscale conditions at certain locations. The planned Waena Generating Station would also be a major point source of Nitrogen Dioxide, Sulfur Dioxide and PM_{10} (particulate matter of less than 10 microns in diameter). However, it is not anticipated that this project would cause the SAAQS and NAAQS to be exceeded.

Noise
None of the planned land developments are anticipated to substantially affect ambient noise levels, including the Waena Generating Station. This power station would be located in a relatively isolated area surrounded by sugarcane fields. Some of the
roadway improvements, especially those near noise sensitive land uses, may cause noise impacts. These projects include the North-South Collector and Road C in Kihei, Pilani Highway widening, Kuihelani Highway widening, Haleakala Highway widening and Kula Highway widening.

Water Resources
Surface waters in the project area consist of gulches that contain intermittent streams, coastal ocean waters, and Kealia Pond (see Section 3.7.1). Groundwater in the project area is largely unexploited (see Section 3.7.2). Wetlands in the project area are at Kealia Pond and along the coastline of Kihei-Makena (Section 3.7.3). Construction that clears vegetation can cause erosion, which could increase sediment loading of surface waters during heavy rains. However, under the National Pollutant Discharge Elimination System permit process, large projects are required to incorporate Best Management Practices to minimize erosion. Once completed, many of the projects would contribute to the amount of runoff containing automobile-related (petroleum, oil, rubber) and domestic (waste water, pesticides, etc.) pollutants that could percolate into the ground or drain to surface and coastal waters. The EPA, in accordance with Section 303(d) of the Clean Water Act, has identified several surface water bodies in the project area as impaired by point and non-point pollution sources. Among these include the Kihei coastal waters.

None of the planned projects would be constructed in a wetland or floodplain, except the Mokulele Highway widening, which would be partially constructed in a floodplain at its terminus in Kihei. Wastewater from new development can pose a pollution threat to groundwater resources if sewer and treatment systems are not used. For example, the DHHL homesteads would probably utilize septic systems or seepage pits or fields for wastewater disposal.

Biological
The vegetation of the project area consists of cultivated lands (see above discussion on farmland), and uncultivated lands of various non-native and weedy species, but dominated by kiawe trees and buffelgrass. Although the projects described in Sections 2.1.1, 3.1.3 and 3.1.4.2b would clear vegetation on uncultivated lands, an
adverse impact on the botanical resources of the project area is not expected because the type of vegetation found on uncultivated lands would still be regionally abundant. Likewise, faunal habitat would remain unaffected because of the large size of the project area.

As described in Section 3.8.3, federally-protected plant species may be found in a dry land forest at Puu o Kali on the south side of the project area. Since this forest is within the DHHL property that would be used for homesteads, the DHHL project may be adversely affect the forest and the endangered species contained within it (see Section 3.8.3). There are no known federally-protected faunal species in the project area other than migratory or endangered waterbirds that may use the agricultural reservoirs.

**Historic and Archaeological**

Most of the planned projects are not expected to affect historic or archaeological sites because of the relative paucity of sites in the project area. However, archaeological reconnaissance and inventory surveys conducted for the proposed project found petroglyph sites and a heiau. These sites are considered to be significant and important for preservation. Since development is planned around some of these sites, they could be adversely affected. However, under State law private land owners are required to inform the SHPD before any construction work that would affect a historic property. The SHPD could permit the land owner to proceed if he or she demonstrates that mitigation would be implemented to protect the historic property or the necessary data recovery occurs prior to construction.

**Parklands**

None of the planned projects are anticipated to adversely affect any park or recreational resource. However, the Upcountry residential projects would substantially increase population in the region, which would place additional burdens on existing park resources. Additional parks, such as the Kihei Regional Park and Kulamalu Park, are planned to accommodate expected growth.
Visual and Aesthetic

Major visual resources of the project area are views of Haleakala and the West Maui Mountains from low-lying areas, views from Upcountry, and views of the coastline from various locations (see Section 3.12). Some of the planned projects, especially those on the slopes of Haleakala, would affect the visual quality of the Haleakala view plane.

Infrastructure and Utilities

Roadway projects would enhance Maui's transportation infrastructure, and would help improve response time for police and emergency personnel. The planned residential developments could place substantial burdens on the existing infrastructure and public services. For example, residential development in Upcountry may worsen the overburdened water supply condition of the region. As described in Section 3.4.3, Upcountry residents and farmers are presently required to reduce water use during drought conditions because surface waters are the source. The Kulamalu development has drilled a well in Haiku to free existing water capacity for the development.

In summary, cumulative impacts are tempered by the large size of the project area. For example, the loss of uncultivated lands from some of the projects would not affect the biological diversity of the region because the plant species affected are abundant, and mostly non-native. Moreover, these plant species are not federally-protected with the exception of those found at Puu o Kali. Although the impacts to uncultivated lands are not a major concern, the cumulative impacts to agricultural land, in particular HC&S sugarcane fields, are a concern. Although the cumulative take would be marginal compared to the total size of HC&S’s sugarcane land holdings (14 000 ha (35,000 acres)), throughout the century HC&S has sustained substantial losses of productive croplands due to urban encroachment. Although foreseeable cumulative impacts are not likely to shut down HC&S’s operations, continuing urban encroachment, if not controlled, may adversely affect the sugarcane-growing industry on Maui.

Planned development in Upcountry would also be a cumulative impact concern because it would substantially increase the population of a region that is largely rural and agriculturally
based. The developments may place substantial new demands on public infrastructure and services, such as water supply systems, schools, and roadways. Farming activities in Upcountry may be affected because of increasing land values, worsening traffic conditions and complaints about agricultural activities. These impacts may contribute to the change in the "country" ambience of Upcountry.

The notable difference in cumulative impacts between the build and No Build conditions would be on agricultural resources. The U1 and U2 alternatives cross sugarcane and pineapple fields, thereby adversely affecting these operations. In addition, the U1 and U2 alternatives cross Omaoio and Pulehu Roads (the U3 alternatives would only cross Pulehu Road), which will affect the existing truck transport system for produce between the Kula farms and Kahului. In other environmental resource areas, there will be little difference between the cumulative impacts of the build and No Build conditions.

4.16 SECONDARY IMPACTS

According to 40 CFR 1508.8, secondary impacts are impacts that have the potential to occur "later in time or farther removed in distance but are still reasonably foreseeable." They can be viewed as actions of others that are taken because of the presence of the proposed project. For example, the presence of a U2-A alternative may influence some bicycle tour companies to modify their Haleakala bike tours so they take advantage of the new highway to end the tours in Kihei. Secondary impacts from highway projects often occur because they can induce development. These secondary impacts can include affects to open space, air quality, water quality, natural vegetation, historic sites, social environment and demands on infrastructure systems.

Secondary impacts are not anticipated because the build alternatives will have little influence on those who could propose development. Other factors, such as water supply, appear to be controlling development to a greater degree than limited roadway capacity. Further, proposed actions, such as housing, commercial, research, light industrial and institutional developments (see Sections 3.1.3 and 3.1.4.2d), would be completed regardless of whether Kihei-Upcountry Maui Highway is approved. For example, the Department of Hawaiian Home
Lands (DHHL) homesteads in Keokea (see Section 3.1.3) would be completed regardless of the proposed project. Similarly, Kulamalu (see Section 3.1.3) would be completed despite lack of implementation of a build alternative, although the U2-A and U2-B alternatives would support this development. Therefore, for most of the build alternatives (see below), secondary impacts are not anticipated.

As described in Section 4.1.1.2, the U1 alignments may facilitate a westward (makai) expansion of Pukalani and additional growth in Halliimaile. Therefore, the U1 alternatives may cause secondary impacts, as opposed to the No Build and other build alternatives. This potential land use development would be beyond what is designated in the Makawao-Pukalani-Kula Community Plan (July 1998). The secondary impacts from land development on the northwest (makai) side of Pukalani would include the potential for erosion due to site development, loss of agricultural lands, and increased population, which can lead to more traffic, and higher demand for utility and other public services.

4.17 CONSTRUCTION

4.17.1 MAINTENANCE OF TRAFFIC

Almost all construction will take place on agricultural and pasture lands. Therefore, during construction, only slight delays to existing traffic flows, if any, are expected. Traffic impacts could occur at construction sites ingress and egress areas, and when work is being conducted at the highway termini (e.g., at the intersections with existing roadways). These impacts may include lane closures and/or detours. A "Maintenance of Traffic Plan" will be prepared during the design phase to minimize impacts on traffic flows during construction.

4.17.2 AIR QUALITY

4.17.2.1 Potential Impacts

Air quality impacts during roadway construction generally consist of fugitive dust and mobile source emissions from construction equipment.
Fugitive Dust Emissions

Fugitive dust is airborne particulate matter and is usually relatively large in particle size. Construction vehicles operating around the construction sites and material blown from uncovered haul trucks, stockpiles, and exposed areas will generate fugitive dust.

The dispersion of fugitive dust depends on particle size, emission height, and wind speed. Small particles (30 to 100 micron range) can travel several meters before settling to the ground, depending on wind speed. Most fugitive dust, however, is made up of relatively large particles (i.e., particles greater than 100 microns in diameter). Given their relatively large size, these particles tend to settle within 6 to 9 m (20 to 30 ft) of their source. Therefore, because most of the construction will occur where there are no existing homes or commercial areas, fugitive dust impacts will be minimal.

Mobile Source Emissions

Construction vehicles will emit engine exhaust while in operation. However, this is expected to cause minimal impacts because carbon monoxide (CO), the principal pollutant of construction vehicles, is most serious under localized (microscale) conditions. Most of the construction activities will occur away from sensitive receptors, such as residences.

4.17.2.2 Mitigation

The following particulate control measures related to construction activities will be followed:

1. Site Preparation
   - minimize land disturbance;
   - use watering trucks to minimize dust;
   - cover trucks when hauling dirt;
   - stabilize the surface of dirt piles if not removed immediately;
   - use windbreaks effectively;
   - limit vehicular paths and stabilize temporary roads; and
   - to the maximum degree possible, pave all unpaved construction roads and parking areas to road grade for a length no less than 15 m (50 ft) from where such roads
and parking areas exit the construction site, to prevent dirt from washing onto paved roadways.

2. Construction:
   - cover trucks when transferring materials;
   - use dust suppressants on traveled paths that are not paved;
   - minimize unnecessary vehicular and machinery activities; and
   - minimize dirt track-out by paving site exit road just before entering the public road.

3. Post-Construction:
   - restore to original conditions any disturbed land not used;
   - remove unused material and dirt piles; and
   - restore to original condition all vehicular paths created during construction and prevent future off-road vehicular activities.

4.17.3 NOISE AND VIBRATION

4.17.3.1 Potential Impacts

Construction will involve the use of heavy machinery that may cause temporary noise impacts to adjacent noise sensitive land uses. Table 4-14 presents maximum noise levels ($L_{100a}$) produced by heavy mobile construction equipment and compressors measured at a distance of 15 m (50 ft). These noise levels are estimates based on minimal site-specific data. Therefore, because of the preliminary nature of this analysis, specific impacts cannot be accurately determined without a detailed construction plan. However, because construction will normally occur during daylight hours when occasional loud noises are more tolerable, and the construction site will be in relatively isolated areas away from noise sensitive land uses, extended noise disruptions to normal activities are not anticipated.

With rubber-tired vehicles, ground borne vibration is generally low. There may be some vibration with the passing of heavy duty trucks, but this movement is usually not perceptible except within the immediate right-of-way. Construction activities will not generate
unacceptable vibration impacts at nearby land uses because no unusual activities that would generate substantial vibration are anticipated.

**Table 4-14**

**Construction Equipment Noise Levels**

<table>
<thead>
<tr>
<th>Source</th>
<th>L&lt;sub&gt;max&lt;/sub&gt; (dBA) at 15 m (50 ft)</th>
<th>Model Tested</th>
</tr>
</thead>
<tbody>
<tr>
<td>Backhoe</td>
<td>85</td>
<td>John Deere 609A</td>
</tr>
<tr>
<td>Front Loader</td>
<td>84</td>
<td>Caterpillar 980</td>
</tr>
<tr>
<td>Dozer</td>
<td>84</td>
<td>Caterpillar D7e</td>
</tr>
<tr>
<td>Grader</td>
<td>91</td>
<td>Caterpillar 16</td>
</tr>
<tr>
<td>Scraper</td>
<td>92</td>
<td>Caterpillar 660</td>
</tr>
<tr>
<td>Compressor</td>
<td>80-89</td>
<td>Various Tested</td>
</tr>
<tr>
<td>Pile Driver</td>
<td>95-100</td>
<td>Various Tested</td>
</tr>
</tbody>
</table>


**4.17.3.2 Mitigation Measures**

Specifications for allowable noise levels will be formulated and implemented to minimize adverse impacts on surrounding communities. Since the State Department of Health (SDOH) maintains community noise control standards (HAR Section 11-46) that apply to construction noise, these specifications will be submitted to SDOH for their review. The project will not deliberately exceed the stipulated noise limits unless a permit is granted by SDOH.

To minimize noise impacts from construction, the following mitigation measures will be followed:

- **Design Considerations.** During the early stages of construction plan development, natural and artificial barriers, such as ground elevation changes, will be considered for use as shielding against construction noise. Strategic placement of stationary equipment, such as compressors and generators, could reduce impacts at sensitive receptors.
• **Source Control.** Each internal combustion engine used for any purpose on the job or related to the job will be equipped with a muffler of a type recommended by the manufacturer.

• **Time and Activity Constraints.** Noisier activities will be limited to daytime hours when most people normally impacted are either not present or engaged in less noise sensitive activities.

These mitigation measures will be incorporated into the construction plan, and the contractor will comply with SDOH standard or permit specifications.

### 4.17.4 WATER RESOURCES

#### 4.17.4.1 Potential Impacts

The primary potential for construction-phase water resource impacts will be associated with erosion and sedimentation associated with the project’s clearing and earthmoving activities and alteration of existing drainage patterns.

#### 4.17.4.2 Mitigation Measures

Stormwater runoff and erosion during project construction and landscaping will be mitigated through the use of Best Management Practices (BMPs) established before construction begins. Generally accepted BMPs applicable to this project include:

- use of silt curtains and silt fences;
- minimizing areas of disturbance;
- covering stockpiles;
- immediate planting of vegetation and/or mulching on highly erodible or critical areas, such as the upper elevation portions of Kihei-Upcountry Maui Highway where the climate is generally wetter and the topography steeper; and
- construction of dikes or diversions to avoid runoff across erodible areas.

The specific erosion control measures to be implemented will be approved by the SDOH when they issue the National Pollutant Discharge Elimination System (NPDES) Stormwater
Discharge Permit for this project and the County of Maui will also require specific measures when they issue the Grading, Grubbing, Stockpiling and Excavation Permit.

4.17.5 SOLID WASTE MANAGEMENT AND HAZARDOUS WASTE

4.17.5.1 Potential Impacts

Project construction will require excavation, filling and grading activity. As discussed in Section 4.9.2, the excavated materials are expected to be free of contamination and will be used elsewhere on the project for fill. As described in Section 2.1.2 the amount of cuts and fills will be balanced so that no fill material will need to be disposed outside the construction area, nor will fill material be imported from other areas.

The construction crew will generate solid waste. The materials or substances listed below may be present on site during construction:

- detergents;
- paints;
- metal;
- tar;
- petroleum-based products; and
- cleaning solvents.

4.17.5.2 Mitigation Measures

During construction, all waste materials will be collected and stored in a securely lidded metal dumpster. The dumpster will meet all State and County solid waste management regulations. All trash and construction debris from the site will be deposited in the dumpster. The dumpster will be emptied as needed. No construction waste materials will be buried on site. The Contractor will be responsible for implementing the correct procedures for waste disposal. Notices stating these practices will be posted in the office trailer; the Contractor will be responsible for ensuring that procedures are followed.
All sanitary waste generated during the construction phase will be collected from portable units as required.

The following material management practices addressing good housekeeping and hazardous products will be used to reduce the risk of spills or other accidental exposure of materials and substances to the environment. In addition, a Spill Prevention Plan will be proposed and followed by the contractor.

1. Good Housekeeping
   - an effort will be made to store on-site only enough product required to complete the job;
   - all materials stored on site will be stored in a neat, orderly manner in their appropriate containers and, if possible, under a roof or other enclosure;
   - products will be kept in their original containers with the original manufacturers' labels affixed;
   - substances will not be mixed with one another unless recommended by the manufacturer;
   - whenever possible, all of a product will be consumed before disposing of the container;
   - manufacturer's recommendations for proper use and disposal will be strictly followed; and
   - a daily inspection will be conducted by the contractor to ensure proper use and disposal of materials on site.

2. Hazardous Products
   - products will be kept in original containers unless they are not resealable;
   - original labels and materials safety data will be retained; and
   - if disposing of surplus product, manufacturer's or local and State-recommended methods for proper disposal will be followed.

3. Petroleum Products
   All on-site vehicles and other machinery will be monitored for leaks and receive regular preventive maintenance to reduce the chance of leakage. Petroleum products will be
stored in tightly sealed, clearly labeled containers. Any asphalt substances used on site will be applied according to the manufacturer's recommendations. Vehicle servicing and maintenance activities shall not pollute the environment.

4. Paints
All containers will be tightly sealed and stored when in use. There will be the proper disposal of excess paint according to manufacturer's instructions or State and local regulations.

5. Spill-Control Practices
In addition to the good housekeeping and material management practices discussed previously, the following practices will be implemented for spill prevention and clean up:

- manufacturer's recommended methods for spill clean up will be clearly posted, and site personnel will be informed of the procedures and the location of the information and clean up supplies;
- materials and equipment necessary for spill clean up will be kept in the material storage area on site;
- all spills will be cleaned up immediately after discovery;
- the spill area will be kept well ventilated, and personnel will wear appropriate protective clothing to prevent injury from coming in contact with hazardous substances;
- regardless of their size, spills of toxic or hazardous materials will be reported to the appropriate State or local government agency;
- should they occur, the spill prevention plan will be adjusted to include measures to prevent spills from re-occurring and clean-up procedures for spills. A description of the spill, its cause, and the clean-up measures will be included; and
- the Contractor will coordinate spill prevention and clean-up efforts. In addition, the Contractor will designate at least three site personnel to receive spill prevention and clean-up training; these individuals will each be responsible for a specific
phase of prevention and clean-up. The names of responsible spill personnel will be posted in the material storage area and in the office trailer on site.

Although hazardous materials sites are unlikely to be encountered during construction, the contractor will report to SDOT and SDOH any undiscovered undocumented storage sites, hazardous materials releases or potential signs of contamination when soil is excavated. If any contaminants are encountered during construction, they will be handled according to applicable SDOH requirements.

4.17.6 AGRICULTURAL ACTIVITIES

4.17.6.1 Potential Impacts

Construction activities in agricultural areas will damage crops and remove grazing land from agricultural use. Pineapple, sugarcane and ranching activities will be adversely affected.

4.17.6.2 Mitigation Measures

A "Maintenance of Cropland and Ranching Activities Plan" will be prepared. The details of the Plan will be developed during design in coordination with affected agricultural operators, such as HC&S, ML&P, Haleakala Ranch and Kaonoulu Ranch. Some of the measures to be addressed in the Plan include the following:

- provision of temporary road crossings (existing roads will be maintained where feasible);
- provision of irrigation and drainage systems (existing systems will be maintained as much as possible);
- appropriate fencing of construction site so that agricultural and ranching workers will be kept a safe distance away from construction activities;
- provision of stock-proof fencing around construction sites to safeguard and secure livestock; and
- provision of cattle crossings where appropriate.
4.17.7 HISTORIC AND ARCHAEOLOGICAL RESOURCES

4.17.7.1 Potential Impacts

Construction has the potential to damage archaeological and historic sites, as described in Section 4.10. It also has the potential to damage sites that have not been identified.

4.17.7.2 Mitigation Measures

This Final EIS includes an MOA (see Appendix C) stipulating mitigation measures for historic and archaeological resources. The measures stipulated in the MOA will be implemented prior to construction. In addition, marked buffer zones will be placed around known archaeological preservation features at and near the construction sites. For example, buffer zones will be established around Sites 5029 and 5031, demarcated with bright colored markers, so that they will not be damaged during the construction of the bridges over Kaliakinui and Waiakoa Gulches. SDOT will consult with the SHPD to determine adequate buffer zones.

If additional historic or archaeological sites are uncovered during construction, work will stop immediately, and the SHPD will be notified without delay. Construction will resume only upon approval of the appropriate authorities.

4.18 PERMITS AND APPROVALS

The following permits or approvals will be required prior to the construction of the highway.

Federal
- USACE - Section 404 permit (Nationwide)

State
- SDOH - National Pollutant Discharge Elimination System (NPDES) permit (storm water from construction site)
- SDOH - Noise permit (if noise levels are expected to exceed allowable levels as stated in HAR 11-48-6(a), which will be known during the design phase)
- SDOH - Water Quality Certification
County
- Department of Public Works (DPW) - Grading, Grubbing, Stockpiling and Excavation permit
- DPW - Permit for Excavation of Highway

4.19 RELATIONSHIP BETWEEN SHORT-TERM USES VERSUS LONG-TERM PRODUCTIVITY

Implementation of Kihei-Upcountry Maui Highway will involve trade-offs between short-term environmental and economic losses, and long-term transportation and economic gains. Depending on the alternative, the long-term productivity of the build alternative will offset the short-term losses to varying degrees.

Adverse short-term construction-phase impacts from the construction of Kihei-Upcountry Maui Highway will disappear soon after construction is completed.

Long-term conditions include:
- reduced traffic congestion on Haleakala Highway, Hana Highway, Dairy Road and Mokulele Highway;
- reduced travel times between Upcountry and Kihei-Makena or West Maui regions; and
- improved regional State Highway System.

Considering the long-term productive uses listed above, and the fact that adverse impacts from Kihei-Upcountry Maui Highway will be minimized, the project appears beneficial to the community and to the present and future land uses in the vicinity.

4.20 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

Implementing the Kihei-Upcountry Maui Highway project will require an irreversible commitment of natural, physical, human, and fiscal resources, as follows:
• agricultural lands will be permanently lost by construction of the project (see Section 4.2.1);
• archaeological resources will be damaged, destroyed, or lost in constructing the project (see Section 4.10.3);
• considerable amounts of fossil fuels; labor required for construction, planning, engineering design, landscaping, purchasing, and services; and construction materials will be committed;
• construction will also require a substantial one-time expenditure of government funds that will not be retrievable (see Section 2.1.2). The commitment of these resources will be appropriate because the benefits from the completed Kihei-Upcountry Maui Highway include the following:
  - convenience and substantial savings in time and vehicle fuel consumption for residents, businesses, researchers and scientists, and visitors through an improved transportation system; and
  - improved accessibility and safety.

These benefits are anticipated to outweigh the commitment of resources.
CHAPTER FIVE

Comments and Coordination
CHAPTER 5
COMMENTS AND COORDINATION

This chapter presents a record of the public and agency consultation and coordination activities conducted for the project, beginning with project scoping activities. It also summarizes the comments received on the project’s Environmental Assessment (EA), Environmental Impact Statement Preparation Notice (EISPN), Notice of Intent (NOI) to prepare an EIS (see Appendix B), and the Draft EIS, which was distributed in August 1999, as well as other written and oral comments received throughout the EIS process.

5.1 PROJECT SCOPING PROCESS

5.1.1 AGENCY SCOPING AND COORDINATION

The project’s scoping process was initiated on September 1, 1994 through the issuance of letters to the agencies, organizations and individuals shown in Table 5-1. These letters requested comments on the proposed project. (The project initiation letter is provided in Appendix A). Responses from agencies and organizations (see Table 5-1) identified the following key concerns:

- alignment selection;
- directness between the Maui R&T Park and Science City;
- proposed termini;
- land use and transportation impacts;
- existing travel demand and traffic congestion;
- improved commuter and tourist accessibility;
- socio-economic impacts on existing communities;
- disruption to agricultural lands and farming activities;
- endangered species; and
- archaeological features.
<table>
<thead>
<tr>
<th>Agency</th>
<th>Sept. 1, 1994 Request For Consultation</th>
<th>Responded to Consultation Request</th>
<th>Invited to Attend Scoping Meeting</th>
<th>Attended Scoping Meeting</th>
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<td><strong>FEDERAL</strong></td>
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<td>Fish and Wildlife Service</td>
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<td>Geological Survey</td>
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<td>National Park Service</td>
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<td>Environmental Protection Agency (Pac. Islands Contact)</td>
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<td><strong>STATE</strong></td>
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<td>Department of Hawaiian Home Lands</td>
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<td>Dept. of Health (Environmental Management Division)</td>
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### Table 5-1
Public and Agency Consultation During Scoping
(Continued)

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<tr>
<th>Agency</th>
<th>Sept. 1, 1994 Request for Consultation</th>
<th>Responded to Consultation Request</th>
<th>Invited to Attend Scoping Meeting</th>
<th>Attended Scoping Meeting</th>
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<td>Historic Preservation Division</td>
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<td>Division of Forestry &amp; Wildlife</td>
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<td>State Parks</td>
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<td>Office of Hawaiian Affairs</td>
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<td>Office of State Planning (now DBEDT Office of Planning)</td>
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<td>University of Hawaii Environmental Center</td>
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<td>COUNTY OF MAUI</td>
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<td>Board of Water Supply</td>
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<td>Department of Parks and Recreation</td>
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<td>Planning Department</td>
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<td>ELECTED OFFICIALS</td>
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<td>United States Senator Daniel K. Inouye</td>
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<td>State of Hawaii Senators</td>
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<td>State of Hawaii Representatives</td>
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<tr>
<td>Mayor of Maui County</td>
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<td>Councilmembers of Maui County Council</td>
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## Table 5.1
Public and Agency Consultation During Scoping (Continued)

<table>
<thead>
<tr>
<th>Agency</th>
<th>Sept. 1, 1994 Request For Consultation</th>
<th>Responded to Consultation Request</th>
<th>Invited to Attend Scoping Meeting</th>
<th>Attended Scoping Meeting</th>
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<td>OTHER PARTIES</td>
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<tr>
<td>Haleakula Ranch Company</td>
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<td>Hawaiian Commercial &amp; Sugar Company</td>
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<td>Kaonolu Ranch Company</td>
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<td>Kihei Community Association</td>
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<tr>
<td>Kihei-Upcountry Highway Task Force Committee</td>
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<tr>
<td>Kula Community Association</td>
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<tr>
<td>Ms. Laura Tamanaha</td>
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<td>Maui Chamber of Commerce</td>
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<td>Maui Land &amp; Pineapple Company, Inc.</td>
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<td>Makawao Main Street Association</td>
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<td>Pukalani Community Association</td>
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<td>Shinwa International, Inc.</td>
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<td>Sports Shinko Company, Ltd.</td>
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A scoping meeting with government agencies was held on October 26, 1994. The agencies that were in attendance are shown in Table 5-1, and the meeting minutes can be found in Appendix A. Concerns raised at the scoping meeting included:

- congestion at the Maui R&T Park/Pillani Highway intersection;
- access to Hawaiian Home Lands;
- farmland impacts; and
- criteria to be used to select the alternatives that would receive detailed analysis in the Draft and Final EIS.

Coordination with various State and federal agencies continued throughout EIS preparation (see Appendix C), such as:

- State Historic Preservation Division (SHPD) and Officer (SHPO):
  - meeting on January 31, 1996 to discuss their comments on the EISP;
  - letter from the Federal Highway Administration (FHWA) to the SHPO, dated February 16, 1999, requesting concurrence on the results of archaeological reconnaissance surveys, and "effect" and "adverse effect" evaluations;
  - letter from the SHPO to the FHWA, dated June 21, 1999, concurring with FHWA's determination on the eligibility of sites identified along the alternative alignments;
  - Letter from the State of Hawaii Department of Transportation (SDOT) to the SHPD, dated February 8, 2001, requesting review of the archaeological inventory survey and cultural impacts study;
  - Letter from the SHPD to the Cultural Surveys Hawaii, dated May 10, 2001, providing comments on the archaeological inventory survey report;
  - Letter from the FHWA to the SHPO, dated June 18, 2001, requesting concurrence on effect determinations and submission of draft Memorandum of Agreement (MOA); and
  - Letter from the SHPO to the FHWA, dated September 28, 2001, approving the MOA.

- State Department of Business, Economic Development and Tourism, Office of Planning (OP):
  - Submission of the Hawaii Coastal Zone Management (CZM) program consistency evaluation from the FHWA to the OP on January 29, 2001; and
  - Letter from the OP to the FHWA, dated March 30, 2001, stating that the CZM consistency determination would be deferred until after the Final EIS.

- U.S. Army Corps of Engineers (USACE):
  - letter from the USACE, dated April 1, 1998, accepting cooperating agency status;
meeting on February 9, 1999 to discuss applicable Department of the Army permit;
and
letter from the USACE, dated February 26, 1999, providing information on the
applicable Department of the Army permit.

- U.S. Department of Agriculture, Natural Resources Conservation Service (NRCS):
  - NRCS on two occasions provided "relative value of farmland to be converted" scores for the alternatives (Form AD-1006).

- U.S Fish & Wildlife Service (Service):
  - letter from Parsons Brinckerhoff, dated November 25, 1996, requesting information on endangered and threatened species in the vicinity of the project;
  - letter from the Service, dated January 8, 1997, with information on possible endangered and threatened species in the project area;
  - letter from the FHWA, dated December 1, 1997, requesting concurrence on effect evaluations on endangered and threatened species; and
  - letter from the Service, dated December 24, 1997, concurring with the FHWA effect evaluations.

5.1.2 COORDINATION WITH ELECTED OFFICIALS

Following the agency scoping meeting and distribution of the EA (see below), project
briefings were held for the Mayor of Maui County and other County officials on October 17,
1995, and members of the Maui County Council on October 18, 1995.

5.1.3 ENVIRONMENTAL ASSESSMENT

5.1.3.1 Issuance of the EISPN and NOI

An "Environmental Impact Statement Preparation Notice" (EISPN) was published in the
September 23, 1995 edition of The Environmental Notice, published by the Office of
Environmental Quality Control (see Appendix B). A "Notice of Intent" (NOI) to prepare an EIS
was published in the November 9, 1995 edition of the Federal Register (see Appendix B). At
the same time, the project's EA was completed and distributed (the distribution list is provided
in Appendix B; the EA is provided in Appendix D).

With the EISPN and NOI duly published, the public had the opportunity to provide comments
on the EA. Under State EIS law, an EA, when prepared in the context that an EIS will be
prepared later, is viewed as a public and agency scoping document and a vehicle for the agency (in this case the State of Hawaii Department of Transportation (SDOT)) or applicant to establish contact with the public and agencies.

The Kihei-Upcountry Maui Highway EA was distributed a couple of weeks before the first round of public information meetings (see Section 5.2) with the intent that it would provide background information to those attending the public information meetings.

In brief, the EA:

- presented 10 alternative roadway alignments;
- summarized potential project impacts that could be significant, pending further study;
- summarized potential project impacts that did not appear to be major, pending further study;
- presented candidate alignment screening criteria for review and comment; and
- stated that an EIS would be prepared.

The public review period closed on November 10, 1995, several weeks after the first round of public information meetings (see Section 5.2).

5.1.3.2 Responses Received During the EISPN Comment Period

The following agencies, organizations and individuals submitted written comments to the SDOT during the EISPN public comment period on the EA (September 23, 1995 through November 10, 1995). No comments were received during the NOI public comment period (November 9, 1995 through December 8, 1995). All names appearing below were included in the project mailing list to ensure notification of all subsequent EIS-related activities to interested parties.

FEDERAL AGENCIES
- U.S. Department of the Army, U.S. Army Engineer District
- U.S. Department of the Interior, National Park Service, Haleakala National Park
- U.S. Department of Transportation, Federal Aviation Administration
STATE AGENCIES
- Department of Accounting and General Services
- Department of Land and Natural Resources, Historic Preservation Division
- Office of Environmental Quality Control
- Office of State Planning (currently Department of Business, Economic Development and Tourism, Office of Planning)

OTHER ORGANIZATIONS AND INDIVIDUALS
- Robert M. Butterfield
- Ann F. Crowe
- Dowling Company, Inc. (Don Fujimoto)
- Jamie Fonseca
- Hawaiian Classic Perfumes (Dennis Edward Bell)
- Hawaiian Commercial & Sugar Company (Richard F. Cameron)
- Hawaiian Estates Realty Ltd. (Suzanne Lee Freitas)
- Sam S. Hironaka
- The Incense Works (David J. Baar)
- International Longshoremen's and Warehousemen's Union, Local 142 (William Kennison)
- Kevin Johnston
- Buck Joiner
- James Judge
- Hale D. Judson III
- Nancy Kanady
- Kizmet Brokerage (Sunny Crowley)
- Kula Community Association (Steve Sutro)
- Elizabeth Marciel
- Maui Land & Pineapple Company, Inc. (Warren A. Suzuki)
- Maui Pineapple Company, Ltd. (L.D. MacCluer)
- Lenda McGehee-Simon
- William W. Monahan

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• Edwin S. Murai
• O Cole
• Christopher Perreira
• Fred Peterson
• Sally Raisbeck
• Hans Riecke
• Fredrick W. Rohlfing
• Dennis Smith
• Gordon Stellway
• Edward S. Syrjala
• Leah Wesson
• Frank W. White

These written EISPN comments were reviewed and their contents are summarized below:

• Five letters (almost 12 percent) offered no comment on the Draft EA.
• Nearly 45 percent of those responding stated that they supported at least one of the ten alternative alignments proposed in the EA for the Kihei-Upcountry Highway. The alignments garnering the most support were Alternatives 1, 4B and 6A or 6B.
• Conversely, 26 percent of the letters opposed the project for reasons including:
  – disturbance of archaeological resources;
  – increased traffic in areas where no problem currently exists;
  – project cost;
  – safety concerns;
  – loss of quality of life in Upcountry;
  – increased crime in Upcountry;
  – increased subdivision development;
  – increased tourism;
  – need to improve existing roadways;
  – loss of agricultural lands and related jobs;
  – lack of national defense justification;
  – lack of mass tourism and tourist-related jobs;
  – lack of water Upcountry; and
  – limited need to travel to Kihei because of increased jobs in the Upcountry area.

• The most frequently made comments involved:
  – project cost;

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- secondary growth or lifestyle changes in Kula;
- traffic concerns;
- need to improve existing highways;
- desire to maintain agricultural land; and
- lack of defense-related justification.

- Other comments requested clarification of information presented in the EA or studies and analyses beyond the scope of the Draft EIS document.

Some of the comments were useful in preparing this Draft EIS, while others were useful in the Screening Analysis Report, which is summarized in Chapter 2.0. The letters are reproduced in Appendix B accompanied by response letters from the SDOT.

5.2 PUBLIC INFORMATION MEETINGS

Two rounds of public information meetings (four meetings total) were conducted as part of the project’s public involvement efforts. Each round consisted of a meeting in Upcountry and a meeting in Kihei. The first set of meetings was scheduled in coordination with the issuance of the project’s EA (see Section 5.1.3). Comments were accepted for several weeks after the meetings for those choosing to comment based on the meetings. The Upcountry meeting was held in the evening of October 17, 1995, at the Upcountry Community Center in Pukalani; the Kihei meeting was held in the evening of October 18, 1995, at Kihei Elementary School. Nearly 80 participants attended the Upcountry meeting, and 35 participants attended the meeting in Kihei. Sign-in sheets and meeting minutes are provided in Appendix A. Meeting attendees were added to the project mailing list.

The Upcountry meeting produced the following comments and concerns:

- the desire to improve linkage between the Maui R&T Park and Science City is not important or could be addressed through other means;
- the project has the potential for cost overruns;
- the project should include access to Hawaiian Home Lands parcels;
- the “no build” is the preferred alternative;
- an alternative consisting of widening existing roadways should be considered; and
the project should assess potential impacts in the following areas:
- tourists using the roadway;
- Upcountry’s rural lifestyle and social environment;
- crime in Upcountry;
- access to the proposed highway by emergency medical service vehicles;
- agricultural activities, including small truck farms in Kula; and
- secondary land use impacts in Upcountry.

The Kihei meeting produced the following comments and concerns:

- the link between the Maui R&T Park and Science City is important;
- the proposed highway would provide relief to many Upcountry residents who presently have to commute long distances to their jobs in Kihei, Lahaina, and Wailea; and
- the commuting link between Upcountry and Kihei will be more crucial in the future as developers construct housing in Upcountry.

The second set of public information meetings was conducted in the evenings of May 15, 1996 at the Upcountry Community Center in Pukalani and May 16, 1996 at Kihei Elementary School. Fifty-five participants attended the May 15 meeting and 25 participants attended the May 16 meeting. Sign-in sheets and meeting minutes are provided in Appendix A. Meeting attendees were added to the project mailing list.

The following comments and concerns expressed at the second Upcountry meeting augment the comments received at the first Upcountry meeting:

- agricultural impacts (to sugar cane fields) are not that crucial because this industry is not important to the future of the island;
- the Kihei terminus should be as far south as possible because the Mokulele/Pāilani Highway intersection would be a choke-point if an evacuation from Kihei is needed;
- certain alternatives may cause unanticipated traffic problems on existing sub-standard roads; and
- certain alternatives may have potential impacts on the new high school in Pukalani.

The following comments and concerns expressed at the second Kihei meeting augment the comments received at the first Kihei meeting:
the Kihei terminus should be placed as far south as possible to accommodate projected growth in the Makena area and provide a second evacuation route from Kihei;

- some of the alternatives will produce unacceptable noise levels in existing neighborhoods;
- two Kihei termini should be considered;
- the road should not cross the Maui R&T Park;
- some of the alternatives would cause traffic problems on existing sub-standard roads;
- a spur to Hawaiian Home Lands parcels should be provided; and
- the EIS should address visual and secondary land use impacts.

Public and small group meetings have continued since the second round of public information meetings. For example, meetings have been held with:

- Hawaiian Commercial & Sugar Company on January 9, 1996 and April 10, 1997;
- Maui Land and Pineapple Company on April 25, 1997; and

5.3 WRITTEN COMMENTS RECEIVED FOLLOWING PUBLIC INFORMATION MEETINGS

Following the May 1996 information meetings, the organizations and individuals listed below provided written comments (reproduction of these letters and responses from the SDOT are located in Appendix A). All names appearing below were added to the project mailing list to ensure notification of all EIS-related activities to interested parties.

- The Amaral Company (Zandra Souza Amaral)
- Keith Dinsmore
- Isabel Gerhard-Kalahau
- Ed and Stephanie Hackenbruch
- Hawaiian Commercial & Sugar Company (Richard F. Cameron)
- Ikua Purdy Road Committee (Sam S. Hironaka)
• John Janinski
• Maui Research and Technology Park (Brett M. Klyver)
• George Schubert
• Frank W. White
• Don Williams & Company (Don Williams)

Generally, the comments focused on the need for the project and suggested alternatives or alignments. Some were valuable in the selection of the alternatives studied in the Draft and Final EIS (see Chapter 2.0). Others requested that the EIS study the following issues:

• secondary land use impacts;
• evacuation from Kihei;
• impacts to agriculture; and
• noise impacts to existing neighborhoods.

Following the selection of the alternatives to be studied in detail in the Draft EIS (see Section 2.2), the SDOT mailed notices on May 6, 1997 (see Appendix A) to interested individuals, businesses and organizations informing them of this selection. This notice also appeared in the May 7, 1997 editions of the Honolulu Advertiser and the Maui News.

Following this notice and a meeting with the Kula Community Association (see Section 5.2), the organizations and individuals listed below provided written comments (reproductions of these letters and corresponding responses from the SDOT are in Appendix A). Names appearing below were added to the project mailing list, if they were not already on the list.

• Robert M. Butterfield
• Kimo Galbraith
• Hawaiian Commercial & Sugar Company
• Kula Community Association
• Barbara L. Luke
• Kula Community Association;
• RSK Enterprise LLC;
• Azeo Park
• Heinz Rominger and Diane Clarke

Generally, the comments focused on the need for the project, suggested alternatives or alignments, provided information on potential project impacts, and presented community views of the project.

5.4 **DRAFT ENVIRONMENTAL IMPACT STATEMENT**

5.4.1 **AVAILABILITY OF DRAFT ENVIRONMENTAL IMPACT STATEMENT**

The project’s Draft EIS was announced in the August 8, 1999 edition of The Environmental Notice, and the August 20, 1999 edition of the Federal Register (see Appendix B). These announcements formally initiated the public comment period on the Draft EIS. In accordance with the stipulated review periods in State and federal law, the comment period on the Draft EIS officially ended on October 14, 1999. However, comments received after this date were considered official comments under the environmental review process.

Copies of the Draft EIS were mailed to federal, State and County agencies and elected officials who may have an interest in the project. Copies were also sent to five public libraries on Maui (Wailuku Regional, Kihei, Lahaina, Makawao and Kahului). In addition, copies of the Draft EIS were mailed to affected landowners, community organizations, and individuals who previously commented on the project or who requested copies. All organizations and individuals to whom SDOT sent copies of the Draft EIS were asked to provide comments. Appendix B lists all the parties who received copies of the Draft EIS.

5.4.2 **PUBLIC HEARINGS**

Three formal public hearings were held during the formal review period for the Draft EIS. These hearings were held during the evening, as follows:

• **September 29, 1999 at the Kihei Aquatics and Community Center:**
• September 30, 1999 at the Mayor Hannibal Tavares Community Center in Pukalani,
and
• October 13, 1999, at Kahului School.

All three hearings were advertised in the "Hawaii State & County Public Notices", a weekly publication of Statewide distribution. The hearings were also advertised in the Maui News, the only daily newspaper serving Maui County. Also, more than 200 government agencies, individuals, community and civic organizations, and businesses on the project mailing list received notice of the public hearing by mail.

Initially, only the Kihei and Upcountry public hearings were scheduled. The third public hearing was added in response to community concerns that the second hearing conflicted with the County Fair. The decision to hold the third public hearing was made before the first two hearings were held. Therefore, a sign was placed at the first two hearings informing participants of the third public hearing at Kahului School.

A record of all hearing attendees was maintained, and a handout that included project information was distributed at the sign-in table (see Appendix B).

The format of the first two public hearings was an "open house". In an open house format, no formal presentation is made, but "science fair" types of displays provide information about the project, and experts are available to answer questions. The objective of an "open house" public hearing is to create a non-threatening, relaxed environment in which participants can easily learn about the project, and then make informed comments. An open house hearing is also more convenient to the public as they may attend the hearing at any time while the hearing is occurring, and receive the same information. In comparison, at a traditional hearing, the public must arrive at the hearing by a certain time to hear the formal presentation, and those wishing to comment on the project "testify" in front of an audience. In general, most attendees tend to comment at an "open house" style hearing in comparison to a "traditional" hearing.
The "open house" format of the first two hearings was previewed by the SDOT Administrator at a Kula Community Association meeting prior to the hearings. Later, the Maui News published an article about the project and the "open house" format of the public hearings.

During the open house, the room was set up to establish the following flow through the room:

- **Sign-in:**
- **Watch project video:**
- **Visit "science fair" display section and talk with experts; and**
- **Provide written or oral comments.**

The rooms used for the hearings were large enough to accommodate this flow.

Upon entering the hearing, participants were asked to sign-in so they would be included in the project's mailing list. They were then handed a project informational packet including instructions on how to obtain project information and participate in the public hearing. They were then asked to watch a 12-minute video about the project. Many chairs were provided, and the video was set to play continuously for the full duration of the public hearing. The project video provided basic information about the project so participants would be better oriented before visiting the display section. The video provided information on the study area, purpose and need of the project, the planning process, the alternatives being considered, potential environmental impacts, and next steps.

After watching the video, the participants visited the display section where they spent most of their time. Displays were organized into the following six stations, with a member of the project planning staff positioned at each station to exchange information:

- **Purpose and need:** why the project is proposed, and what transportation problems the project is intended to address;
- **Alternatives screening:** how the planning process arrived at the alternatives addressed in detail in the Draft EIS;
- **Project description:** detailed information (schedule, cost estimates, roadway sections) on the alternatives under consideration;
• Transportation impacts: comparison of the alternatives' transportation performance and effectiveness.

• Environmental impacts: comparison of the alternatives' environmental impacts; and

• Historic and archaeological impacts: information on the historic and archeological resources found in the project area and how they would be affected by the alternatives.

Each station was staffed by a person knowledgeable about the subject addressed by the station (e.g., the historic and archaeology station was staffed by the principal of Cultural Surveys Hawaii, Inc., the subconsultant who conducted this work). Station attendants wore name tags affiliating them with their station (i.e., "Ask Me About Environmental Impacts"), and engaged public hearing attendees in dialogue about the project.

After visiting the display section, participants were encouraged to provide comments. The comment area was physically separated from the other areas so that participants would not be distracted by the video or discussions taking place in the display area. Participants had several means of providing comments:

• Use a form that was provided (the form asked only for a name and address, and the commenter could write whatever they wish);

• Provide oral comments directly to a court reporter; or

• Take forms with them for later completion and submission, or distribution to those not attending the hearings.

A drop box for completed forms was provided in the comment area. Two court reporters were also present who transcribed oral comments.

The third public hearing was held because of concerns that the second public hearing conflicted with the County Fair, which would detract from attendance. Also, some complained that the first two public hearings did not provide the public with the opportunity to hear others in the community state their opinions about the project due to the format of those public hearings. Therefore, the third public hearing was a "hybrid" of "open house" and "traditional" formats. The video, station displays and court reporter were available during the first part of
the hearing. During the second part of the hearing, a panel of SDOT and FHWA officials and project consultants sat in the front of the room and took testimony in front of an audience. The testimony was transcribed by the court reporter.

The first public hearing at the Kihei Community Complex drew 67 people; the second hearing at the Mayor Hannibal Tavares Community Center drew 129 people; and the third hearing at Kahului School drew 48 people. Total attendance was therefore 244, but some people attended more than one hearing.

Of the 244 who attended the three public hearings, a total of 163 provided comments. The most frequent mode of comment delivery was oral, with 93 persons providing oral comments to the court reporters. Written comments were the second most common mode of comment delivery, with 70 persons writing comments on the comment forms and turning them in during the hearings. The public hearings were successful in obtaining comments from 67 percent of those who attended the hearings. This high "comment productivity ratio" is attributed to the open house format of the public hearings.

Volume Two of this Final EIS, Draft EIS Comments and Responses, contains the complete transcripts of the oral comments made at the three public hearings, as well as copies of the written comments received at these hearings.

5.4.3 COMMENTS

This section provides a summary of all comments received during the Draft EIS comment period, including the comments received at the project's public hearings. Four hundred and thirteen (413) written and oral statements were received during the Draft EIS public comment period. Table 5-2 summarizes the methods in which those comments were provided, and the number of statements received through each method.

The comment letters, including completed forms, and their associated responses, are provided in Volume Two: Draft EIS Comments and Responses. They are arranged in the following order:

- Federal agencies;
State agencies;
County agencies; and
individuals and organizations

Table 5-2
Summary of How Draft EIS Comments Were Provided

<table>
<thead>
<tr>
<th>Method of Comment Delivery</th>
<th>Number of Statements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Comment Forms</td>
<td>70</td>
</tr>
<tr>
<td>During public hearings</td>
<td></td>
</tr>
<tr>
<td>Mailed In-Between or After the Public Hearings</td>
<td>131</td>
</tr>
<tr>
<td>Total Number of Comment Forms</td>
<td>201</td>
</tr>
<tr>
<td>Oral Statements at Public Hearings</td>
<td></td>
</tr>
<tr>
<td>Kihei Aquacut and Community Center</td>
<td>19</td>
</tr>
<tr>
<td>Mayor Hanaiohi Tavares Community Center</td>
<td>52</td>
</tr>
<tr>
<td>Kahului School</td>
<td>22</td>
</tr>
<tr>
<td>Total Number of Oral Statements</td>
<td>93</td>
</tr>
<tr>
<td>Written Statements Mailed to SDOT or FHWA</td>
<td></td>
</tr>
<tr>
<td>Governmental Agencies</td>
<td>17</td>
</tr>
<tr>
<td>Others</td>
<td>102</td>
</tr>
<tr>
<td>Total Written Statements</td>
<td>119</td>
</tr>
<tr>
<td>Total</td>
<td>413</td>
</tr>
</tbody>
</table>


Written comments (letters of form) requiring responses were numbered in the left margin.
The oral comments that require responses are paraphrased in the response letter from the SDOT. The paraphrasing of oral statements was done for the purpose of brevity, with no intention of modifying or obscuring the content of any comment received.

Some of the comments received led to changes in the EIS, such as clarifying information and analyses, and inserting new information that was brought to the attention of the project sponsors. The letters responding to the comments were sent in December 2001 and January 2002 (see Volume Two: Draft EIS Comments and Responses). Because of the controversial nature and high profile of this project, nearly every facet of the EIS triggered comments. However, most comments dealt with the alternative preference of the commenter.

Concern about traffic impacts also generated many comments, such as the fear that the U2 alternatives (A or B) would jeopardize the safety of King Kekaulike High School students by...
increasing traffic volumes near the school. Other comments on traffic impacts predicted that the U2 alternatives would cause increased congestion in Makawao, and that they would lead to increased through traffic in Pukalani (the latter comment based on mistaken information that the U2 alternatives include a direct access to and from Pukalani). In addition, many commenters agreed with the findings in the EIS that some of the alternatives would cause an increase in through traffic on some of the local agricultural and residential roads, such as Onaopio and Pulehu Roads.

The comments on environmental impacts ranged from concern that the Kihel-Upcountry Maui Highway would result in excess development in Upcountry, to exacerbating alien species invasion. Other environmental issues raised by the commenters included disagreement that the loss of productive agricultural land is worth the transportation benefits provided by the highway, and that the highway would generate automobile-related pollutants that could threaten previously unaffected areas. Some of the comments related to environmental concerns about particular alternatives, such as opinions that the U2-A alternatives would adversely affect a heiau (State Site 2701) and unknown burial caves, and that a U3 alternative would increase through traffic on local Kula residential roads. Other comments provided information about the population density of axis deer. This information became very useful in comparing the alternatives in terms of chances of vehicle-deer collisions. All of the comments were used in the preparation of the Final EIS.
CHAPTER SIX

List of Preparers
CHAPTER 6
LIST OF PREPARERS

Below is a listing of persons who were primarily responsible for preparing the Final Environmental Impact Statement (EIS), their titles, years of experience and educational background.

DOCUMENT PREPARATION

State of Hawaii Department of Transportation
Kenneth Au, P.E., Advance Planning Engineer
34 years experience in highway engineering and planning
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B.S., Civil Engineering, University of California at Berkeley
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Ph.D., Biology (Ecology), Princeton University
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M.P.P., Public Policy, University of Michigan, Ann Arbor
M.S., Natural Resources and Environment, University of Michigan, Ann Arbor
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Graduate Courses, University of Lowell
B.S., Civil Engineering, University of Lowell, 1980

Denetra M.G. Hutchinson, Environmental Planner
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M.S., Community and Regional Planning, University of Texas at Austin
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B.S., Mathematics, New York State University

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Graduate Work in Applied Mechanics, Polytechnic Institute of Brooklyn
B.S., Mathematics, Long Island University, 1973
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Robert L. Spear, Ph.D., Anthropologist, Scientific Consultant Services, Inc.
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M.A., Anthropology, Western Washington University
B.A., Anthropology, Western Washington University

REVIEWER

U.S. Department of Transportation, Federal Highway Administration, Honolulu

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Pat V. Phung, Transportation Engineer
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B.S., Civil Engineering, University of Washington
CHAPTER SEVEN

Final EIS Recipients
CHAPTER 7
FINAL EIS RECIPIENTS

Listed below are agencies and organizations to whom copies of this Final EIS are being sent.

**Federal Agencies**

- U.S. Department of Agriculture
- U.S. Department of Defense
  Army Corps of Engineers
- U.S. Department of Interior
  Biological Resources Division
  Office of Environmental Project Review
  U.S. Geological Survey, Water Resource Division
- Environmental Protection Agency
  Office of Federal Activities
  Region IX

**U.S. Legislators**

- The Honorable Daniel K. Inouye
- The Honorable Daniel K. Akaka
- The Honorable Patsy Mink

**State of Hawaii Agencies**

- Department of Business, Economic Development and Tourism (DBEDT)
  Office of Planning
  Library
- Department of Defense
- Department of Health
- Department of Land & Natural Resources
  Division of Forestry and Wildlife
- Office of Environmental Quality Control
- Office of Hawaiian Affairs
- University of Hawaii
  Environmental Center
State Senators

The Honorable Robert Bunda, Senate President
The Honorable Cal Kawamoto, Chair Transportation, Military Affairs and Governmental Operations Committee
The Honorable Jan Buen, District 4
The Honorable J. Kalani English, District 5

State Representatives

The Honorable Calvin Say, Speaker of the House
The Honorable Joseph M. Souki, Chair House Transportation Committee
The Honorable Ron Davis, District 7
The Honorable Bob Nakasone, District 9
The Honorable Kika Bukoski, District 10
The Honorable Chris Halford, District 11

County of Maui

The Honorable James "Kimo" Akana, Mayor
Department of Parks and Recreation
Maui Police Department

Libraries

Kihei Public Library
Lahaina Public Library
Makawao Public Library
Wailuku Regional Library
Hawaii Kai Regional Library
Hilo Regional Library
Kaimuki Regional Library
Kaneohe Regional Library
Lihue Regional Library
Pearl City Regional Library
Hawaii State Library
Legislative Reference Bureau
University of Hawaii at Manoa
    Hamilton Library
Maui Community College Library

Media
The Maui News
South Maui Times
Honolulu Advertiser
Honolulu Star Bulletin

Major Land Owners Affected by the Preferred Alternative
Alexander & Baldwin
Haleakala Ranch
Kaonolu Ranch

In addition to the above agencies and organizations who will receive a copy of this Final EIS, individuals and organizations who provided substantive comments (see Volume Two: Draft EIS Comments and Responses) will receive this Final EIS in CD-ROM. However, they will be provided with the option of receiving a hard copy of the Final EIS, or refusing the Final EIS in either format.
CHAPTER EIGHT

Bibliography
CHAPTER 8

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APPENDIX A

Early Scoping Comment Letters

Invitation to Agency Scoping Meeting

Minutes of the Agency Scoping Meeting

Minutes and Sign-In Sheets of the October 18 and 19, 1995
Public Information Meetings

Minutes and Sign-In Sheets of the May 15 and 16, 1996
Public Information Meetings

Comment Letters and Responses Following the
May 15 and 16, 1996 Public Information Meetings

Public Announcement of the Alternatives
to be Considered in the Draft EIS

Comment Letters Received After the Draft EIS
Alternatives Announcement and Responses
Subject: Kihei-Upcountry Maui Highway
Project No. HDO-9203(A)

We are undertaking planning studies for the proposed
Kihei-Upcountry Maui Highway Project and have engaged the
consultant services of Warren S. Umemori Engineering, Inc. The
project proposes to construct a new roadway connecting the Kihei
area with Upcountry Maui.

The objective of the planning study is to select an alignment for
design and construction through our public
involvement/environmental process. The process will consist of
the following major activities:

- Scoping
- Environmental Assessment and Environmental Impact
  Statement (EIS) Preparation Notice
- Public Informational Meetings
- Issuance of the Draft EIS
- Public Hearing
- Issuance of the Final EIS

I have enclosed a map (dated August 19, 1994) of the project area
showing preliminary alternative alignments which are being
investigated by our consultant. As part of our early scoping
efforts, we would appreciate any comments, concerns, or
information which your organization may have regarding these
alignments.
Mr. Rex D. Johnson, Director  
Department of Transportation  
State of Hawaii  
869 Punchbowl Street  
Honolulu, Hawaii  96813-5097  

Dear Mr. Johnson:

Thank you for the opportunity to review and comment on the Kokee-Uluanui Project. The information provided in your letter dated September 1, 1984, was not sufficient to provide an evaluation at this time. Once detailed plans have been developed, the Corps will need to review the project to determine Department of the Army permit requirements and evaluate flood hazard designations as applicable under the Federal Emergency Management Agency's National Flood Insurance Program.

Sincerely,

[Signature]
Ray H. Yoo, P.E.  
Director of Engineering

October 25, 1984  
Rex Johnson, Director of Transportation  
State of Hawaii Department of Transportation  
869 Punchbowl Street  
Honolulu, HI 96813-5097  

Dear Mr. Johnson:

Thank you for the invitation to the Kokee-Uluanui Project. Due to the temporary absence of Hawaii's National Park Superintendent Don Ruess and several other key staff, we are unable to attend the session. However, we hope to be invited as consultants on the project development evolves. Please accept the following comments in lieu of our attendance at tomorrow's meeting.

1. Alternative B and A pass through or very near areas that are generally recognized by biologists as one of the last remaining dry forest areas remaining in the Hawaiian Islands that contain a high percentage of endangered species. Increased public access to these areas may be more acceptable from a perspective of the alternatives to the east.

Sincerely,

[Signature]
Karen Arden  
Acting Superintendent

[Signature]
J. M., Jr.  
Project Manager
RECEIVED

DCC 2 1994

SHASTA S. AMEMIYA ENGINEERING, INC.

Ms. Karen Ardoin
Acting Superintendent
Department of the Interior
National Park Service
Haleakala National Park
P.O. Box 369
Hana, Maui, Hawaii 96713

Dear Ms. Ardoin:

Subject: Kiihi-Upcountry Maui Highway
Project No. HP-9303(1)

Thank you for your comments of October 25, 1994, regarding the preliminary alignments being investigated for the subject highway project.

As the project progresses, we will send to the National Park Service, notices of public informational meetings/public hearings, and environmental documents for review and comments.

Sincerely,

[Signature]

[Signature]

Director of Transportation

/c/ Warren S. Amemiya Engineering, Inc.

October 6, 1994

Mr. Rex D. Johnson, Director
Department of Transportation
State of Hawaii
869 Punchbowl Street
Honolulu, Hawaii 96813

Dear Mr. Johnson:

This is in response to your September 14, 1994 letter regarding the proposed Kiihi-Upcountry Maui Highway Project. The FAA has no facilities in the proposed project area; however, we would appreciate being kept informed during the environmental process particularly as the highway project relates to improved access to Kahului Airport.

We appreciate the opportunity to comment on this project.

Sincerely,

[Signature]

David J. Welsh
Airport Engineer/Planner

Henry A. Gudaitis
Airport District Office Manager
September 23, 1994

Honorable Rex Johnson
Director
Department of Transportation
State of Hawaii
Honolulu, Hawaii

Dear Mr. Johnson:

Subject: Kiihi-Upcountry Maui Highway
Pre-Environmental Assessment

Thank you for the opportunity to review the subject document. Our concern is that Alternative Alignments 3, 4, and 6A which connect to Lipoa Parkway/Street will funnel additional traffic adjacent to the existing Kiihi Elementary and Intermediate Schools.

Should there be any questions, please have your staff contact Mr. Ralph Yonemoto of the Public Works Division at 586-0488.

Very truly yours,

[Signature]

ROBERT P. TAKUSHI
State Comptroller

[Stamp: State of Hawaii]

[Stamp: Department of Defense]

[Stamp: Office of the Adjutant General]

[Stamp: Hawaii Air National Guard]

[Stamp: Adjutant General]
MEMO TO: Honorable Rex D. Johnson, Director
Department of Transportation

FROM: Herman H. Aisea, Ph.D., Superintendent
Department of Education

SUBJECT: Kilohana-Upcountry Maui Highway
Project No. HDM-9301

We have reviewed the preliminary alternative alignments being investigated for the subject highway and have no comment as to which is preferred. However, we believe consideration should be given to the amount of traffic generated which may affect Kilohana Elementary School on Tipa Street and Kilohana Ii Elementary School on Piilani Highway near the intersection of Alternate 6B. The new Kekaulike High School near the mauka intersection of Alternate 4 would also be affected.

Should there be any questions, please call the Facilities Branch at 733-4892.

HDA/Admin

cc: A. Sugai, OBS
R. Murakami, MDO

The Honorable Rex D. Johnson
Director of Transportation
State Department of Transportation
849 Pupukueo Street
Hilo, Hawaii 96720

Dear Mr. Johnson:

Subject: Early Scoping Efforts
Kilohana-Upcountry Maui Highway
Project No. HDM-9301 (1)

Thank you for allowing us to comment on the subject project. We have no comments to offer at this time, but we would like to receive the Environmental Assessment to review when it is completed.

Sincerely,

Peter A. Sypinski, Ph.D.
Director of Health

AN AFFIRMATIVE ACTION AND EQUAL OPPORTUNITY EMPLOYER
To: The Honorable Rex D. Johnson, Director
Department of Transportation

Subject: Historic Preservation Review of the Khului-Upcountry Maui Highway Project No. HDW-PA 2.2562

Thank you for the opportunity to comment on the schematic plan of eight alternative alignments for the proposed Khului-Upcountry Highway. The proposed route connects Kula Highway (four alternate locations), Kula Highway (six alternate locations). Distance of the Alternate routes varies from 4.6 to 6.7 miles east-west. The various routes are within a zone approximately 12 miles north-south, and they transect at least fifteen different ahupua'a.

In general, very little inventory survey work has been conducted in the undeveloped areas between Kula and Kihue. Some cultivation has occurred in Pukalani and areas transected by ALT 1 and the upper portion of ALT 4. Much of the area transected by the other routes has been ranch lands, with varying amounts of land surface alterations.

Site density in much of the relatively dry area between 400 and 1500 feet elevation is not expected to be high. However, traditional Hawaiian sites such as mea-kauai trails and associated temporary shelters, ahupua'a boundary walls, burial sites, special purpose resource gathering sites, and dry land agricultural features would be expected to occur in areas not...
disturbed by modern farming or ranching. Historic period ranching features over 50 years in age will also be present.

A number of historic sites are known to exist in the major gulches of Kula, to the west of Kula Highway. Sites such as Kamaole petroglyphs, burial caves, and habitation shelters occur in Malugani, Kalalau, Pualehu, Hanape, Waikao, and Kula Gulch. Kamaole sites occur on ridges to the west of Kula Highway in Cuo'opio, Waikao, Kamaole, Huliihi, Kamoani, and Kamaole. The known kaliu occur at elevations ranging from 1400 to 2800 ft NAD 27. Upper portions of ALT 4, 5 and 6 are in this general area of Kula.

Systematic surveys have occurred in Haiku and Kamaole (ALT 6a), where numerous historic sites associated with permanent habitation, agriculture, and ceremonial activities have been identified. Archaeological surveys conducted within relatively confined areas in Kamaole and Kamaole (ALT 7) have confirmed the presence of permanent habitation and intensive agriculture in these areas as well.

A more detailed map of the proposed alternate routes will be needed in order to describe where specific routes are located in relation to the known historic sites. This level of work would be included in the scope of an archaeological survey which would be part of the Environmental Impact Statement. Aerial reconnaissance and on-ground pedestrian survey work will also be needed, as the alternate route selection proceeds.

The location of known sites with preservation value in relation to proposed routes should be done in early planning stages so that these sites can be safely avoided. Likewise, it is preferable to identify areas with high site densities and/or significant cultural resources in early stages of planning.

Please contact Mr. Theresa X. Donham at 244-5169 if you have any questions.

Kenji
Mr. Rex D. Johnson  
October 8, 1994

Page 2

Our reviewers suggest that another heretofore undescibed alternative would be the construction of several feeder roads to the main road going up from Kihai. Currently, the Kipona Street intersection is very heavily used. Compressing all of the traffic from upcountry through this junction is problematic. Since much of the traffic originates in Wailua, the alternative of providing a feeder to the Wailua resort should be considered. This, both Kihai and Wailua would be served and both would be impacted to a lesser extent (for example, alternative # and the Kipona Street connection would merge near Kihai). Consideration of a similar operation should be undertaken for the junctions near Wailua, Kula, Puukulani, and Makaha.

Thank you for the opportunity to comment.

Sincerely,

John T. Harrison  
Environmental Coordinator

CC: GEQC  
Warren S. Umemori Engineering, Inc./  
Roger Fujikawa  
Richard Moyer  
Chris Welch

Mr. Rex D. Johnson, Director  
Department of Transportation  
State of Hawaii  
659 Punchbowl Street  
Honolulu, Hawaii  808-587-5207

Dear Mr. Johnson,

In your letter to me dated September 1, 1994, you identified the major activities which were to be accomplished in the planning study and asked for our comments and concerns. My Planning Director had responded earlier on September 10, 1994, identifying those items which were of particular interest to his Department. I thought, however, that I would stress some issues of more general impact or concern.

In the scoping portion of the project, I believe we need to ensure an understanding of the socioeconomic effects of the road. In particular:

- The ability to live and work in the Upcountry environment will be enhanced. The shorter commute to both Kihai and Lahaina will provide better access to markets and jobs for farmers, craftsmen and employees.

- The selected route should be one to benefit both the present residents, as well as future residents. The development of the Hawaiian Homelands which extend from Keakea to Kihai must be considered. We need to ensure that the route chosen either connects to the Keakea Homelands or provides for a relatively inexpensive access to these homelands.
The preservation of the lifestyle is also very important in selecting the route. A minimum of disruption to agricultural lands, especially cane lands is very important.

When considering the environmental impact of the project, we felt that the effects could be very large and wish that several issues be reviewed in detail.

This is a major interconnecting highway and will profoundly impact the character and timing of development at both ends of the highway. The statement must adequately address the change in the direction of community growth implied by construction of this highway.

The road will allow people to transit easily between the Upcountry rural home environment and the coastal urban work environment. The environmental statement should address the long-term effects of such a transportation system and identify or implement measures to improve energy efficiency and reduce environmental effects. We feel that bikeways and Park & Ride facilities need to be addressed.

I appreciate the work of your staff in this process, and I am hopeful that we can continue to progress on this very important project.

Please call me if you would like to discuss my comments in more detail.

Sincerely,

LINDA CROCKETT LINGLE
Mayor, County of Maui

Mr. Rex D. Johnson
Director of Transportation
State of Hawaii
869 Punchbowl Street
Honolulu, Hawaii 96815-5097

Dear Mr. Johnson:

SUBJECT: KIHEI-UPCOUNTRY MAUI HIGHWAY
Project No. HPDS-9203 (1)

Thank you for your letter dated September 1, 1994, soliciting comments regarding the Kihei-Upcountry Maui Highway.

I have sent copies of your letter to the chairs of the Council’s Planning Committee and Public Works Committee, for their comments.

Again, thank you for the opportunity to comment on this project.

Yours truly,

Goro Hokama
Council Chair
Mr. Rex Johnson, Director  
Department of Transportation  
State of Hawaii  
869 Punchbowl Street  
Honolulu, HI 96813-3597

Dear Mr. Johnson:

SUBJECT: KEHEI-UPCOUNTRY MAUI HIGHWAY  
PROJECT NO. HDPS-9203 (1)

Thank you for your letter requesting comments, concerns or information  
related to the aforementioned subject matter.

For your information, your letter has been transmitted to the Council for  
referral to the appropriate standing committee.

Thank you very much for giving us the opportunity to state our concerns.  
Should you have any questions, please feel free to contact me at 243-7822.

Very truly yours,

ALICE L. LEE  
Councilwoman

November 21, 1994

Mr. Rex D. Johnson, Director  
Department of Transportation  
State of Hawaii  
869 Punchbowl Street  
Honolulu, Hawaii 96813-3597

Dear Mr. Johnson,

Re: Comments on upcoming planning studies for the Proposed Kehei-  
Upcountry Maui Highway Project

Thank you for your request for information and our comments on  
the upcoming planning studies for the proposed Kehei-Upcountry  
Highway Project. We are aware of the areas of concern which affect  
water and deserve inclusion in the analysis for this project such  
as the following:

1. Water Transmission:

   Water concentrates in and on the north slopes of Hualalai, while  
   the majority of the new land-use approvals occur on the south  
   slopes. Therefore, land-use approvals in those areas require and  
   generate water transmission lines which cross the island from  
   the north to the south. Requirements to pump water up to water-  
   transmission areas also grow.

   The proposed highway would directly require no new transmis-  
   sion lines. However, the road would be a likely alignment for  
   the future linear which are required to serve land-use approval.

   New transmission lines which run to newly-approved projects  
   can have adverse effects on land-use pressures and growth under  
   certain conditions. These effects are best reviewed by the  
   Planning Department.

   We would be willing to assist with technical support in any  
   master-planning efforts which are needed to anticipate the adverse  
   effects of land-use approval and our subsequent facilities.

   Please be advised that there may be a cost effect also. If a  
   new road or other factors, including existing ones, induces  
   growth at elevations above the existing water sources, the Board  
   must be required to pass the unique, high cost of pumping onto  
   high-elevation consumers. We are researching elevation-related cost  
   and pricing issues now.

“By Water All Things Flow.”
November 31, 1994
Mr. Ray D. Johnson, Director, Department of Transportation
Proposed Kilohi-Opono Maui Highway Project, page 2

3. Water Conservation:

With the involvement of state funds and pursuant to state Act 73, erosion-control and revegetation plantings would be native Hawaiian species. We suggest species which are climate-adapted to the intense, arid coastal vegetation zone. Such plantings can prevent the overspill of the EPA-standard drinking water of the area’s Central water system. Examples are as follows:

Trees –
- 'Ohe na'ue
- 'Ohe kohai
- La'ila'iloa
- Ho'o nui
- Koa
- Hau

Shrubs –
- 'Ohe na'ue
- Koa
- 'Ohe kohai
- Hau
- Ho'o nui
- La'ila'iloa

Groundcovers –
- 'Ohe na'ue
- Hau
- Hau
- Koa
- 'Ohe na'ue
- La'ila'iloa
- Hau
- Hau
- Koa
- 'Ohe na'ue
- Hau
- Hau
- Koa
- 'Ohe na'ue
- Hau

November 31, 1994
Mr. Ray D. Johnson, Director, Department of Transportation
Proposed Kilohi-Opono Maui Highway Project, page 3

3. Water Conservation (concluded)

Plants with those or similar species, as site conditions and commercial-availability permit, saves drinking water. The plants' rainfall supplemented with low amounts of survival on the sites' rainfall. Irrigation during the first year(s) and succor is further guidance in water conservation in landscaping may be found in the attached document or in the Maui County Planting Plan.
Mr. Rex Johnson, Director  
State of Hawaii  
Department of Transportation  
459 Punchbowl Street  
Honolulu, Hawaii 96813-5097

Dear Mr. Johnson:

Re: Kaili-Upcountry Maui Highway, Project No. HDP-203(2)  
(Hoy-PA 1.2525)

This is in response to your letter of September 1, 1994,  
regarding the above subject. We have the following comments:

1. The EIS must have a goal and needs assessment which states why this project is necessary and what function it will serve. Analysis should show the benefit of the county would realize from this road and the criteria used for route selection. Would there be energy savings, a reduction of congestion, or jobs for people? Would it be more efficient for travelers from the airport to take this route to the elevation areas of Kaili-Upcountry? What is the cost/benefit per route? Which route would carry the most number of people? Would it be more efficient for people from Lahaina to travel this route to get to the elevation areas? The EIS should address the "growth impact" potential along the alignment and at the terminus. Related to growth impact would be the potential loss of farmland due to increased demand for development and impacts on agriculture.

2. The route selected should connect existing population centers. Alternatives 6b, 6c, and 7 would result in little or no savings of time/distance between Kaili and existing population centers "upcountry" over existing routes. Alternative 6 is likely to impact a significant number of archaeological sites; mitigation would prove expensive, avoid/reduce/compensation is preferable to mitigation.

3. Alternative Route 6 provides advantages of convenience to the KP Park and connecting central Kaili to Kula, Pukalani, and Nahakuli. However, increased traffic on Lipoa Street would need to be considered, and Lipoa Street, its intersections, and entries/exists from Milliani Highway upgraded accordingly.

4. The proposed Hana-Pukalani-Kula Community Plan, Part II, policy recommendations on transportation objectives and policies states: "Support the planning of the proposed Upcountry-Kaili connector highway with the least negative impact to the Upcountry lifestyle and character by locating the upcountry terminus in the vicinity of the intersection at Halawai Road and Malolani Highway." Alternative 3 and 4 terminate in the "upcountry area," with access from the bypass will allow the major population centers of Makawao, Haliimaile, Pukalani and parts of Kamaole-Nalani easier access to the proposed Upcountry-Kaili road.

5. The proposed Kaili-Upcountry Community Plan (K-U CP), Part II, policy recommendations on transportation policies and objectives states: "Support a new bypass highway matrix of Milliani Highway, coordinated with a Hana-Kihei Pond bypass and an Upcountry-Kaili connector road, to be constructed as growth in the region warrants." The K-U CP also seems to be consistent with alignment alternative 3 and 4 which terminates in Kaili at Lipoa Street and Milliani Highway intersection which is the future intersection of Road "U". The K-U CP under goals, objectives, and policies on "Land Use" states: "A central business and commercial center for Kaili clustered around the North Kaili Road/Milliani Highway intersection would seem a logical point to coordinate the upcountry road.

6. One route that is not examined on the alternative alignments is the old county route which still shows in the tax map sheet book. The route may be more cost effective because it would be a shorter route, avoid larger gulches, one overpass may resolve the agricultural traffic conflict, and since the kaali terminus is near the intersection of Haliimaile and North Kaili road, it would be more easily service people going to or coming from either Kaili or Lahaina.

If you have any further questions, please call myself or Julie Higa at 343-7735.

Very truly yours,

[Signature]

Plan-Makaka  
Director of Planning

[Co-signatures]
RE: Kihel-Upcountry Maul Highway, MDPS-9203

Mr. Rex Johnson
Department of Transportation
869 Punchbowl St.
Honolulu, HI 96815-5097

Dear Mr. Johnson,

I am very interested in the planning process for this proposed road. To me it seems that the best thing would be to have several routes down from Upcountry not just one connecting in to lower Pukalani, see attached. To have just one connection to Upcountry seems short sighted. By having just one connection you are just adding to the bottle neck that already exists below Pukalani.

I would like to be kept informed of any public meetings. Will you be able to add me to your mailing list for this project? Thank you.

Sincerely,

[Signature]

Robert N. Butterfield
October 19, 1994

Ron Tazuki
Department of Transportation
Planning Branch
600 Kapiolani Blvd
Honolulu, Hawaii 96813

Re: KWEI-UPCOUNTRY ROAD

Dear Mr. Tazuki:

Haleakala Ranch Company prefers that the Naiku connection be somewhere near Hula 200 and the Hokai connection through R & T to Lipa/Pillani intersection.

Sincerely,

Peter D. Baldwin
President

Mr. Rex Johnson
Director of Transportation
State Department of Transportation
889 Punchbowl Street
Honolulu, HI 96813

Re: Kihel-Upcountry Maui Highway Project No. HDPS-9203 (1)

Thank you for your letter dated September 1, 1994 informing Hawaiian Commercial & Sugar Company (HC&S) of the planning studies being done for the proposed Kihel-Upcountry Maui Highway Project and requesting our input on the preliminary alternative alignments.

My comments are based on the map that was provided with your letter of August 19, 1994. HC&S has specifically focused on the various alignment that have a detrimental effect on HC&S' viability.

Alternatives 1, 2, A, 3

All three alternative routes traverse through HC&S' lands; lands that are currently in cultivation, therefore, severely disrupting field operations. The physical splitting of the plantation, intersecting canehauler road systems, drip irrigation systems, potential disruption of the major water distribution systems, and adverse effects on current agricultural practices will seriously affect HC&S' operating efficiency. This is a major threat to the future viability of HC&S and ultimately the Island of Maui.

Along with the cost to the plantation, significant project costs can also be associated with these alternatives. Costs such as the purchase cost of land right-of-ways, relocating existing drip irrigation supply lines, realigning water transportation systems, canehaul roadways, and highway hauler crossings will significantly add to the cost of this project.

October 5, 1994
Mr. Rex Johnson  
Director  
State Dept. of Transportation  
869 Punchbowl Street  
Honolulu, HI  96813-5097  

October 10, 1994

Mr. Rex Johnson, Director  
State Dept. of Transportation  
869 Punchbowl Street  
Honolulu, HI  96813-5097  

Subject: Kula-Upcountry Maui Highway  
Project # HDPS-9203 (1)  
HWY-PA 2.2352  

Dear Mr. Johnson,  

Thank you once again for inviting the public into this important process. Our Association appreciates the opportunity to further study this project along with the DOT and all those who might benefit. We know this place will never fly without widespread community acceptance. To achieve this acceptance it must be shown to benefit the many residents who travel down to work daily in a safe, efficient direction. Military purposes, visitor traffic, and definitely Hawaiian Home Lands are all important concerns, but leasing our small farms, awakening our rural communities of Omooplo, Kekeha, and Waikoa with the screams of development and transient traffic flows will be unacceptable to either. A few who live on this mountainside.

CONDITIONS OF OUR SUPPORT  
We stand ready to support a final alignment only if:  

1. The highway benefits the many upcountry resident commuter population base (Puakea, Maalaea, Hauku)  
2. The route is safe; and efficient (overpasses and underpasses where needed)  
3. The route is safe and efficient (overpasses and underpasses, where needed)  
4. Small farms and residents will not be displaced or disadvantaged  
5. The route connects directly with Hana Highway (to eliminate the potential use of many narrow, steep, neighborhood roads as shortcuts)  
6. The Kula terminus should be located to aid Westside commuters and a future spur road access to the Hawaiian Homes Development if possible.
General Comments, Concerns, and Information On Schematic Plan of Alternative Alignments (W. Unrastor Map Revised Aug. 19 94)

ALT 1, 2, 3
These routes would satisfy most of our conditions if all intersections were made to be safe. The Kula C.A. would favor them in numerical order.
ALT 1 only intersects Pulehu Rd. and intersects directly into Haliimaile Rd. routing traffic from Makawao and Haiku straight to Kula.
ALT 2 crosses both Pulehu and Omao but intersects with Haliimaile Rd.
ALT 3 this route would not benefit as many lacking the efficiency of 1 & 2, crossing both Pulehu and Omao, also not connecting with Haliimaile Rd. but meeting most of our conditions

ALT 4, 5, 6, 7
These suggested alignments would fall to meet most or all of the Kula C.A.'s conditions of support for the Kihel / Upcountry Highway.

With much thought and debate the Kula C.A. concurs with the:
- Distinguished members of the Makawao / Pukalani / Kula Citizens Advisory Committee (K.C.A. Kihel / Upcountry Highway)

That:

Kihel-Upcountry Highway: The proposed highway between Kihel and the Upcountry region is significant in terms of its land use and transportation impacts. The CAC recognized that the selection of an alignment must consider the growth inducing impacts to the region's agriculture, rural character and open spaces.
The need to maintain the unique Upcountry ambiance is an essential parameter in analyzing alternative routing schemes. Recognizing that the evaluation of alternatives should weigh transportation costs and benefits as well as community and land use impacts, the CAC recommends that the Upcountry terminus intersect Haliimaile Highway in the vicinity of Kula. The CAC further recommends that a spur off of the proposed Kihel-Upcountry Highway be provided to facilitate access to the Department of Hawaiian Homes Lands development area.
The Kula C.A. also agrees with both the Upcountry CAC and the Meaui Planning Dept. that the Makawao-Ulupalakua Connector road be dropped as a capital improvement project thus, all planning, design, and funding be suspended. (ALT 7)

We also believe this route (ALT 7) would benefit very few, worsen traffic safety, disrupt quiet communities, and only benefit visitor traffic and private landowners.

Some citizens in our association do believe the losses outweigh the gains connecting these small and rural communities, and funds should be used to improve existing roads and highways to aid the traffic flow between Upcountry and the South / West Side. The Kula C.A. also believes this is a realistic alternative and should be studied.

The Kula Community Association has followed the Upcountry Highway discussions through the Toll Road concept of former Mayor Taveres (Dec. 1990) and the hard work of the Upcountry / Kihel Highway Task Force. We are fully aware of the importance of choosing a workable alignment versus one plagued with problems or weighted by special interests.

Thanks again for listening, and could you please forward the origin / destination studies and any reports filed to you on this project to help us stay current.

Maua Ahoa
Sincerely,

Steve Sutro
President,
Kula Community Association
Of course when the travel benefit/cost comparisons are made, "Alternatives" 7 and 9/8 should drop out of serious contention, but why muddy the waters in the first place?

Sincerely,

[Signature]

Joel W. McDonald

[Address]

copy: Mayor Lingle
September 22, 1994

Mr. Rex D. Johnson, Director
Department of Transportation
State of Hawaii
859 Punchbowl Street
Honolulu, HI 96813-5097

Attention: Mr. Ronald Tsubaki

Dear Mr. Johnson:

Subject: Kihel-Upcountry (Maoi) Highway
Project No. HDN-9003 (C)

We are taking this opportunity to respond to your letter dated September 1, 1994, with regards to the planning studies for the proposed Kihel-Upcountry Highway on the Island of Maui.

Our review of the proposed alternative alignments, in particular alternatives 3 and 4, leads us to believe that these routes may impact two parcels owned by Shinwa International, Inc. Perhaps, the Schematic Plan of Alternative Alignments prepared by Wacks & Associates, Engineering, Inc., revised August 19, 1994, can be supplemented with a map identifying the parcels affected by these proposed alignments.

Due to the proximity of these proposed alignments, we would appreciate your consideration to be included in any subsequent review processes.

Thank you for this opportunity to comment. Should you have any questions, please do not hesitate to contact us.

Very truly yours,

[Signature]

Ging Wong
Vice President

SHINWA GOLF HAWAII CO., LTD. • SHINWA GOLF RESORT SERVICE HAWAII, INC.
2255 Kapiolani Boulevard, Suite 1900 • Honolulu, Hawaii 96815 • Telephone (808) 945-3500 • Facsimile (808) 945-6058
Subject: Environmental Scoping Meeting
Khel-Upcountry Maui Highway
Project No. HNPS-9203(1)

We will be conducting an environmental scoping meeting with the environmental agencies and other interested parties that are expected to participate in the consultation and coordination of the Khel-Upcountry Maui Highway Environmental Impact Statement (EIS). The purpose of the scoping meeting is to provide a forum to discuss the scope of the environmental studies and EIS that will be prepared for the project.

The meeting will be held on Wednesday, October 26, 1994, at 1:30 p.m. in the office of Parsons Brinckerhoff Quade and Douglas, Inc., Pacific Tower, Suite 1000 at 1001 Bishop Street.

If you have any questions, please call Mr. Ronald Tsuizuki, our Head Highway Planning Engineer, at (808) 587-1830.

Sincerely,

[Signature]
Director of Transportation

Enclosure
received some responses to the initiation letter. Subsequent letters were then sent to invite appropriate agencies to this meeting.

The EA is expected to be issued in December 1994. Concurrent with its publication, an Environmental Impact Statement Preparation Notice (EISP/N) will be published in the Office of Environmental Quality Control (OEQC) Bulletin and a Notice of Intent (NOI) will be published in the Federal Register. This will trigger both the National Environmental Protection Act (NEPA) and Chapter 243, Hawaii Revised Statutes (HRS) processes.

The EA is expected to include the eight build alternatives previously described, the No-Build alternative, a public transit/ISM alternative, and an alternative which explores the widening of existing roadways. It will identify those areas where impacts could be significant or where the level of impact is unknown. The EA is expected to recommend the preparation of an EIS. Two public information meetings, one in Kihie and one in the Upcountry area, are expected to follow the completion of the EA.

Screening criteria are presently being developed and input on the criteria was requested. Following the completion of the EA, the criteria will be applied to the alternatives to narrow them to three.

After completing the screening analysis, the draft EIS will be prepared. The following topics among others, will be emphasized:
- farmland conversion;
- archaeology;
- endangered and threatened species;
- traffic impact;
- cost/benefit analysis; and
- social impacts.

The draft EIS is expected to be completed in January 1995. The draft EIS:
- will disclose the results of the screening analysis;
- will analyze the No-Build alternative;
- will analyze the three build alternatives in detail; and
- will not disclose the preferred alternative.

Public hearings will follow the issuance of the draft EIS. After publication in the OEQC Bulletin and the Federal Register, a 45-day comment period will ensue.

The final EIS will disclose the preferred alternative and respond to the comments received on the draft EIS. The Record of Decision will be approved after allowance of a minimum 30-day review period from the publication date of the final EIS (in the Federal Register).

Parties on the mailing list will receive notices of meetings and the draft and final EISs. Today’s meeting attendees are automatically included on the list. Suggestions of additional names for inclusion on the list should be made in writing to the Chief (SDOT) or by phone to Ron Tsukushi (SDOT).

A comment sheet provided an avenue for the participants to express relevant concerns.

Finally, the scoping meeting concluded with general discussions, summarized below:

Comment: Since “directness to Haleakala” is one of the listed screening criteria, “access to the Maui R&T Park” should be included as a criteria.

Question: The State/County Task Force recommended that a spur be constructed to provide access to the Hawaiian Home Lands. Will this be included in the project?

Response: No. The spur does not satisfy the project’s objectives.

Question: Does the Hawaiian Home Lands have plans for their area?

Response: Yes.

Comment: Alternative 6 would provide access to Hawaiian Home Lands from Upcountry.

Comment: Maui County Public Works Department has received calls concerning impacts to small family-owned farms.

Response: WSU explained that Alternative 4 would be the only alignment to traverse a small, family-owned farm parcel. Presently, the land is not being farmed but is being used for limited grazing.

Comment: The Kula Community Association wants the Upcountry terminus located below Puahinani.

Response: Engineering and traffic limitations may not make this alignment as feasible as others.

Question: When will the screening analysis be completed?

Response: The screening process will be completed in February or March, 1995.

Question: Will there be another public opinion survey, similar to the one that the Task Force administered?

Response: No. However, the public input process is ongoing. There will be opportunities for the public to comment, including the meetings to be held after issuance of the EA and the public hearings on the draft EIS.

Comment: A recommendation was made to change the Kihie terminus of Alternative 4 from the Maui R&T Park at Lipoa Street to Kamaolu Street. This revision would better serve commuters from Lahaina.

Response: Comment to be considered.

DISTRIBUTION:

Meeting Participants
Herb Tateshi
Werner Beuggert
TO: FILE
FROM: DENEITRA M.G. HUTCHINSON
DATE: OCTOBER 31, 1995
RE: KHEI-UPCOUNTRY MAUI HIGHWAY PROJECT
     OCTOBER 18, 1995 7:00 P.M. PUBLIC INFORMATION MEETING
     KHEI SCHOOL CAFETERIAM
IN ATTENDANCE: SDOT HIGHWAY PLANNING - RON TSUZUKI
                SDOT MAUI DISTRICT - BOB SAROT
                WSU - WARREN UNEMORI
                WSU - HARREN UNEMORI
                WSU - CLIFFORD N. MUKAI
                PB - DAVID ATYON
                PB - DENEITRA M.G. HUTCHINSON

Approximately 35 meeting attendees (see sign in sheets attached)

MEETING SUMMARY:

The following summarizes oral comments presented during the public information meeting
held at the Khei School Cafeterium on October 18, 1995.

Commenter - Carla Flood, Khei Community Association
Enthusiastic about the project and supports the link between the Maui R&T Park and Science
City at Haikaula.

Commenter - Greg Valentine
1. Estimated that about 1,500 Upcountry residents presently commute to work daily, traveling
   42 miles one-way.
2. People would need the proposed highway as growth and expansion of the Upcountry area
   continues into year 2020. As homes are built Upcountry, residents will need to travel to
   Khei for tourist-related jobs.
3. Favors Alternative 5.

DISTRIBUTION:
K. Au - SDOT
S. Chang - SDOT
B. Sarot - SDOT
W. Unemori - WSU
D. Hutchison - PB
D. Atyon - PB
W. Bruggen - PB
W. Yoshida - PB
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Memorandum

TO:       FILE
FROM:     DENEITRA M.G. HUTCHINSON
DATE:     OCTOBER 31, 1995
RE:       KIHEI UPCODENT MAUI HIGHWAY PROJECT
          OCTOBER 17, 1995, 7:00 P.M. UPCODENT PUBLIC MEETING
          UPCODENT COMMUNITY CENTER

IN ATTENDANCE:
SDOT HIGHWAY PLANNING - RON TSUZUKI
SDOT MAUI DISTRICT - BOB SIAROT
WSU - WARREN LINEMORI
WSU - DARREN LINEMORI
WSU - CLIFFORD N. MUKAI
PB - DAVID ATKIN
PB - DENEITRA M.G. HUTCHINSON

Approximately 50 meeting attendees (see sign-in sheets--attached)

MEETING SUMMARY:
The following summarizes oral testimony presented during the public information meeting
conducted by the State Department of Transportation.

Commenter - Richard Cameron, Hawaiian Commercial & Sugar Co., Phoenix Gen. Manager
Please see attached written comments.

Commenter - Charles Manuell, Waikului Community Association
1. Alternative 6 was never part of the task force report.
2. Preference for a route that would touch the bottom of the Hawaiian Home Land property
   without taking Hawaiian Homes land.
3. Considers the "No Build," with widening improvements to existing roadways, a viable and
   possibly less expensive alternative than the build alternatives.

Commenter - Dan Eckel
1. Concerned about the No Build not passing the screening analysis.
2. Suggested using telecommunications and high-tech communication improvements to reduce the need to travel between Maui R&T Park and Science City.
3. An update to the Makawao-Pukalani-Kula Community Plan has just recommended maintaining the rural characteristics of the Upcountry area. The roadway would disrupt this way of life.

**Commenter - Mary Emerson, Maui Conservation Council**
Requested better maps in the draft EIS than were provided in the EA.

**Commenter - Dick Meyer, Upcountry Citizens Advisory Committee (CAC) Vice-Chair**
1. The presentation did not reference the alignment alternative for the roadway which is contained in the recently released CAC version of the update to the Makawao-Pukalani-Kula Community Plan. The CAC recommended an alignment similar to Alternative 2, with its Upcountry terminus near Hala Saddle Road and the Kula terminus near the Maui R&T Park.
2. Strongly supported the No Build alternative and wanted it considered a viable alternative throughout the development of the EIS.
3. Would like the project to consider the possibility of relocating defense operations from the Maui R&T Park to a site closer to Science City, or use telecommunications to reduce need for travel.
4. Is this an official scoping meeting? If not, you must have an official scoping meeting in case of a legal challenge.
6. Clarify whether project is a four-lane or two-lane highway, and whether the construction costs being provided correspond to the four-lane or two-lane concept. The EIS will need to address cost of the four-lane highway. The cost estimate needed to include right-of-way costs and looks low.
7. The real reason for the road is tourist travel. Hopes that the EIS addresses impact of tourist travel through rural area.
8. Concerned about increased accessibility that the roadway will bring to the area. Crime is three to four times higher in Kula than Upcountry and therefore road will increase crime rate Upcountry.

**Commenter - Nancy Gillingham**
1. On a scale of 1-10, what is the likelihood of the roadway being built?
2. If the project is not built within the next four years, will the project disappear?

**Commenter - Richard Pobee**
1. Disagrees that there is a linkage need between Maui R&T Park and Science City.
2. Thinks that the true reason for the proposed roadway is to get Upcountry residents into Kula.
3. While he supports the project, he believes that voters should determine whether the project should proceed via referendum.

**Commenter - Sally Eibesfeldt**
1. Believes that there is not enough traffic between Science City and Maui R&T Park to justify building a highway. The EIS should be very specific about the levels of the Maui R&T Park and Science City traffic; the number of people who would use the roadway, and time savings as compared to the No Build alternative. Sensed that there would only be a small travel time savings that would benefit only a few people.
2. Thought it might be less expensive to shuttle people between the two locations via helicopter.
3. Future expansion of the Upcountry area is limited because of Haleakalā National Park.

**Commenter - Cahn Kepupa, Puuolani Community Association**
Questioned whether federal funds would be contributed if the No Build alternative were selected, and whether payment would be an 80% (federal) / 20% (State) split.

**Commenter - John McDonald, Kula Community Association**
Requested greater analysis of the benefit/cost ratio. Wanted benefit/cost analysis included in the future studies. Recommends that the selected alternative be the most cost effective.

**Commenter - Sydney James**
Is it true that if Kula-Upcountry Highway is built, Puaene Bypass will not be built?

**Commenter - Phil Mulligan**
3. How many residents live Upcountry and work in Kula? Is there a need for the project? How many people travel between the Maui R&T Park and Science City? What are the future travel projections? Have there been travel studies? Will the State calculate the cost per commuter or scientist?
1. Challenged survey that showed only 3 percent of population opposing the road. In general, Kula residents don’t want the roadway. Therefore, the percentage of residents opposing the project must be greater than 3 percent.

2. Objects to roadway because of resultant adverse impacts.

Commenter - Steve Suter, Kula Community Association
1. Which highway improvements will be included in the No Build alternative?
2. Is Alternative 7 part of the No Build alternative?
3. The Kula Community Association voted in favor of building a new roadway two years ago. At the time, they favored an alignment with an Upcountry terminus near Hānalike Road, similar to either Alternative 1 or 2. Now a roadway might be favored that has its lower terminus facilitating travel to Lahaina. However, since new members now sit on the board, they will need to re-vote on whether they favor the road or the No Build alternative.

Commenter - Mapani Hingona
1. Project could resemble H-3 project on Oahu and experience cost overruns. Link between Maui R&T Park and Science City is not the true justification for constructing the road since very few commuters would actually use the road, just as the defense-related reason was not the true reason for building the H-3 project. The real reason for the proposed highway is to help get tourists and residents around.
2. Senator Inouye has secured federal funds. If Maui residents don’t want the road, federal funding may be lost, and the island may not get a new roadway later when it is really needed.

Commenter - Luana Perena, registered nurse
Quite concerned about access and response time for emergency medical service vehicles reaching accidents that might occur along the alignment.

Commenter - unknown
1. What is the actual cost of each alternative as a four-lane highway?
2. The project does not have to be constructed simply because funding is available. The Senator will not support a project the community does not support.
3. Level of social impact on Kula would be severe for the residents who live there. An urban environment would be introduced into an existing rural one.
4. The Omaopio area, in particular, would be most severely impacted. Since there could be an intersection between Omaopio Road and Kula-Upcountry Highway, Omaopio Road would have to handle increased traffic if the proposed highway is constructed, and since Omaopio Road is only 14 feet wide, there are safety concerns with respect to increased traffic volumes.

5. How much use would the proposed highway actually get?
6. How much travel time would the proposed highway save?

Commenter - Kenneth Okamura
1. Concerned about the impacts to agricultural activity Upcountry, the State’s premier area for flowers and vegetables.
2. Disputes statement in EA, Section 3.1, which states that the project “might enhance farming.” Sees proposed road as having only adverse impacts on farming. Predicts that the road would increase housing supply and water demand; accelerate the loss of agricultural lands; cause more tourists to become nuisances to farmers; disturb rural lifestyles; adversely affect access to the harbor for trucks carrying agricultural products from Upcountry via Omaopio Road, and create safety concerns at the intersection of Omaopio Road and Kula-Upcountry Highway.

Commenter - Steve Burston, Casanova, Inc.
1. As a restaurateur, supports the proposed highway and notes that tourism benefits the entire Upcountry community, either directly or indirectly. For example, he stocks his restaurant with produce and flowers from several local vendors. Increased tourism would expand the Kula economy.
2. Is concerned about the pace of the project. Wants the road to open before he retires.
3. Kula is already a bedroom community, and Kula residents already need to commute to non-farm related employment centers. The opportunity for Kula residents to take non-farm related employment would grow with the proposed roadway because Kula residents would have increased access to employment opportunities and roadway congestion would be less.
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KIHEI-UPCOUNTRY MAUI HIGHWAY PROJECT
PUBLIC INFORMATION MEETING
OCTOBER 17, 1995 • 7:00 P.M.
UPCOUNTRY COMMUNITY CENTER
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**KIHEI-UPCOUNTRY MAUI HIGHWAY PROJECT**  
**PUBLIC INFORMATION MEETING**  
**OCTOBER 17, 1995 • 7:00 P.M.**  
UPCOUNTRY COMMUNITY CENTER
NOTICE

KIHEI-UPOCOUNTRY HIGHWAY
PUBLIC INFORMATION MEETINGS

The Department of Transportation (DOT), Highways Division announces that it will hold two public information meetings on the proposed Kihel-Upcountry Highway project. The first meeting will be conducted on May 15, 1998, at 7:00 p.m. at the Upcountry Community Center in Pa'auilo. A second meeting will be held the following night, May 16, 1998, at 7:00 p.m. at the Kineo School Cafeteria, (250 Lioua Street). The meetings will follow-up the October 1997 meetings which presented the conclusions of the Environmental Assessment and ten alternative alignments for the proposed roadway. The purpose of the May meetings is to inform the public of the screening analysis that has been conducted since October, and to present the three alternative alignments proposed for detailed study in the draft Environmental Impact Statement.

The proposed Kihel-Upcountry Highway would be a 15.4 kilometer (9.6-mile) highway that would link the coastal area of Kihel (Kihei Highway) to Upcountry Maui at either Ha`elukula Highway or Kula Highway. The highway would be generally aligned in an east-west (mauka-makai) direction.

For additional information, please contact Ron Tsubuki of DOT at 808-587-1830.

Kazu Hayashida, Director
Department of Transportation
Kihei-Upcountry Highway Project
Maui, Hawaii
State of Hawaii • Department of Transportation • Highways Division
U.S. Department of Transportation • Federal Highway Administration

Project Description
The Hawaii Department of Transportation and the Federal Highway Administration (FHWA) are sponsoring the construction of a road, limited access arterial roadway that would connect the coastal area of Kihei to the Upcountry area of Maui. The proposed highway would range between 14.1 kilometers (8.8 miles) and 16.9 kilometers (10.5 miles). It would link the coastal area of Kihei (Pilimai Highway) to Upcountry Maui at either Makalapa Highway or Kula Highway.

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<td>Access to Hawaiian Home Lands</td>
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Legend: 1-5 = Best to Worst  Y = Yes  N = No  B = Better  W = Worse  -CA = Cause for Elimination

Project Alternative Alignments

ALTERNATIVES PROPOSED FOR DETAILED STUDY APPEAR IN BOX

Comments
If you wish to comment, please mail or deliver comments by May 31, 1996 to the following address:
Mr. Kurt Hayashida, Director
State of Hawaii Department of Transportation
889 Punchbowl Street
Honolulu, Hawaii 96813
Memorandum

DRAFT

TO: FILE
FROM: DENEIRA M.G. HUTCHINSON
DATE: JUNE 10, 1996
SUBJECT: KHEI-UPCOUNTRY HIGHWAY
PUBLIC INFORMATIONAL MEETING
DATE & TIME: WEDNESDAY, MAY 15, 1996
LOCATION: PUKALANI UPCOUNTRY COMMUNITY CENTER

IN ATTENDANCE: SDOT: BOB SIENOT
SDOT: RON TSUIKI
WSU: WARREN S. UMEMORI
WSU: CLIFFORD MUKAI
PSOD: DENEIRA M.G. HUTCHINSON
PSOD: DAVID ATIKI
PUBLIC: SEE ATTACHED SIGN-IN SHEET

MEETING SUMMARY
SDOT conducted a public informational meeting on the status of the proposed Kheii-Upcountry Highway project. This meeting was a follow-up to the October 1995 meeting in which ten alternatives were introduced to the public. Approximately 57 individuals were in attendance.

Bob Sirot presided over the meeting that began with introductions of the project team members. Next, Warren Umemori summarized the project's progress and findings to date. David Atkin described the screening analysis and how ten alternatives were screened down to three recommended for study in the draft Environmental Impact Statement (EIS).

COMMENT SESSIONS
A brief intermission followed the presentation to allow the participants to view the exhibit boards. After 15 minutes, the meeting was opened for comments. Whenever possible, the commentator is identified in parentheses preceding the question or comment.

(Gage Schubert, Kula Glen)
C: Where is the growth in population densely projected to occur? Concerned about how the through traffic along Alternative 5 will affect the Kula Glen area.

(Dave Pio, Haleakala
C: Concerned about the lack of access for emergency vehicles.

(Peter Sisco)
C: What is the purpose of the proposed road? Who will site serve?

(Brett M. Klyver, Maui Research & Technology Park)
C: Read written testimony (see attached).

(Richard Kelian)
C: Suggested that Alternative 1 be reconsidered since agricultural impact may not be that important to the future of the Island. Considering the cost, Alternative 1 is only $2 million more costly than Alternative 2. But, Alternative 1 would intersect only one existing roadway (Puulele Road), while Alternative 2 would intersect two roadways (Puulele Road and Ohepio Road).

(Steve Stutrow)
C: Ultimately favored the No Build Alternative. However, also felt that Alternative 1 needed to be reconsidered since agricultural impacts should not be so heavily considered. Compared Alternative 1 to Alternative 2 which would intersect two existing roads, to the one road that Alternative 1 would affect.

(Unidentified)
C: Agreed with screening conclusion that Alternative 1 should not be considered. Favors Alternatives 2 and 4B. These two alignments would provide commuters a choice of routes.

(Buck Joiner, Kilah Community Association)
C: Prefers Kheii terminus as far south as possible since existing access to Kheii is via North Kheii only. The Mokuleia/Maui highway intersection is presently a choke-point. The proposed Kheii terminus could be a second evacuation route. In the UPCountry area, a preference was made for a terminus above Pukalani, not Haleakula Junction, which is presently too congested.

(Sam Clark, President of Hale Community Association)
C: Concerned about future traffic volumes on Kauaula Road. This is an older sub-standard road that would not be able to handle additional traffic if Alternative 2 is selected.

(Nancy Hoelmen)
C: Favors Alternative 5 because lots of congestion currently exists in Pukalani. Is especially concerned because of the new high school in Pukalani near the mauka terminus of 4B and the students having accidents because they are not experienced drivers.

(Sam Hirozuna)
C: Favors Alternative 7 because of low cost, donation of ranch land for roadway, no gulches to cross, the extension of existing Pilani Highway (which has been long-
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<tr>
<td>Paul L.</td>
<td>28-307 2nd Ave.</td>
<td>930-6181</td>
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<td>L.</td>
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STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

KIHEI - UCCOUNTRY
PUBLIC INFORMATIONAL MEETING
UCCOUNTRY, HAWAI'I

PLEASE PRINT

NAME
Paul L.
L.
John
L.
Robert
L.
Terry
L.
Paul
L.

ADDRESS
28-307 2nd Ave.

ORGANIZATION
930-6181

PHONE NO.
930-6181

PAGE 1 OF 2

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

KIHEI - UCCOUNTRY
PUBLIC INFORMATIONAL MEETING
UCCOUNTRY, HAWAI'I

PLEASE PRINT

NAME
David
Jack
Bob
Mike
Bill
Clint
Glen
Jim

ADDRESS
28-307 2nd Ave.

ORGANIZATION
930-6181

PHONE NO.
930-6181

PAGE 1 OF 2
# STATE OF HAWAII
## DEPARTMENT OF TRANSPORTATION
### HIGHWAYS DIVISION

**KINUE - UPCOUNTRY**  
**PUBLIC INFORMATIONAL MEETING**

### UPCOUNTRY - KINU

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<tr>
<td>Joe Yama</td>
<td>123 Kamehameha Rd, Kula</td>
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<tr>
<td>John Smith</td>
<td>456 Main St, Kula</td>
<td></td>
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<tr>
<td>Alice Brown</td>
<td>789 Front Ave, Kula</td>
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<tr>
<td>David Lee</td>
<td>101 Back Rd, Kula</td>
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<td>Sarah Johnson</td>
<td>222 Side St, Kula</td>
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<tr>
<td>Mike Garcia</td>
<td>333 Rear Rd, Kula</td>
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**PAGE 2 OF 2**

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**STATE OF HAWAII**  
**DEPARTMENT OF TRANSPORTATION**  
**HIGHWAYS DIVISION**  

**KINUE - UPCOUNTRY**  
**PUBLIC INFORMATIONAL MEETING**

### UPCOUNTRY - KINU

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<td>Doug Sheehan</td>
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**PAGE 3 OF 3**
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<tr>
<td>William Smith</td>
<td>357-5 Opio Street, Honolulu</td>
<td>Maui Planning Dep</td>
<td>808-733-1532</td>
</tr>
<tr>
<td>Lily Brown</td>
<td>160-2 Yoke Place</td>
<td></td>
<td>808-779-1242</td>
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<tr>
<td>Charles Wilson</td>
<td>730 6th Avenue</td>
<td></td>
<td>808-771-3462</td>
</tr>
<tr>
<td>Elizabeth Park</td>
<td>7235 Kamehui Rd, Kailua</td>
<td></td>
<td>808-596-3370</td>
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<tr>
<td>Janice Thompson</td>
<td>220 M.H. Mililani St, Kailua</td>
<td></td>
<td>808-486-2189</td>
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<tr>
<td>James Green</td>
<td>P.O. Box 451, Hilo, Maui</td>
<td></td>
<td>808-961-2119</td>
</tr>
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Memorandum

DRAFT

TO: FILE
FROM: DENEITRA M.G. HUTCHINSON
DATE: JUNE 10, 1996
SUBJECT: KHEI UPLAND HIGHWAY
PUBLIC INFORMATIONAL MEETING
DATE & TIME: WEDNESDAY, MAY 16, 1996
LOCATION: KHEI ELEMENTARY SCHOOL

IN ATTENDANCE: SDOT: BOB SARIOT
SDOT: RON TSUZUKI
WSJ: WARREN S. UNEMORI
WSJ: DAIREN UNEMORI
WSJ: CLIFFORD MUKAI
PBOD: DENEITRA M.G. HUTCHINSON
PROD: DAVID ATKIN
PUBLIC: SEE ATTACHED SIGN IN SHEET

MEETING SUMMARY

SDOT conducted a public informational meeting on the status of the proposed Khei Upland Highway project. This meeting was a follow-up to the October 1995 meeting in which ten alternatives were introduced to the public. Approximately 24 people were in attendance.

Bob Sariat presided over the meeting that began with introductions of the project team members. Next, Warren Unemori summarized the project's progress and findings to date. David Atkin described the screening analyses and how the alternatives were screened down to three recommended for study in the draft Environmental Impact Statement (EIS).

COMMENT SESSION

As David concluded his portion of the presentation, participants began asking questions. Since this portion of the meeting was unstructured, most comments have not been attributed to individual speakers, but whenever possible, a name is provided.

C. Why is the cost benefit for Alternative 5 so high?

Draft Memorandum to file
June 10, 1996
Page 2

C. The Khei terminus be placed as far south as possible because of projected growth in the Makaha area (similar to Alternative 6B). An alignment near the regional park is preferred.
C. The increased noise levels created by the highway would affect the subdivision mauka and north of Kaunale Street. Favors Alternatives 6A, 6B, and 7 because noise impacts on this subdivision would be farther away.
C. Two Khei connections should be considered, one north and the other south. Perhaps the alignment should extend in the direction of Waianae.
(Brett M. Klyver, Maui Research & Technology Park)
C. Questioned the State legislative appropriation to study Alternative 7.

(Buck Joiner, Kheia Community Association)
C. Appreciates that Alternative 5 is the least expensive, but is concerned about constructing Alternative 5 because it would deposit large volumes of traffic onto Kona Drive in the Upland area. Believes that Kona Drive is unable to handle large volumes of traffic.
C. Also opposes alignment that would intersect at Helimoa Road because this already congested intersection would worsen.
C. Would like to see Kheia terminus as far south as possible.
C. Supports Alternative 4B as a way to encourage the counter flow of traffic. Is aware that some oppose because of potential impact to high school, but believes that issues with high school would only occur at the open and close of the school day.

(Gene Thompson, Maui Sun Times)
C. Agrees that an alternative which terminates at the Maui R&T Park is not a good idea.
C. Supports Alternative 5.
C. Concerned about cost differential of Alternative 4A vs. Alternative 4B. Does not think the cost is reasonable.
C. Kheia terminus should be as far south as possible to provide a back door out of Kheia in the event of disaster (i.e., lava). The road is currently impassable or closed during flood storms.
C. Supports alignment that would use Lipoa Street.
C. Requested spur to Hawaiian Home Lands.
Because of the many commuters between Haiku and Makawao, there needs to be a way to reduce travel time. Favors a hybrid Alternative 1/Alternative 2, but not at the expense of traversing the Maui R & T Park.

(William Spence, Maui Planning Department)
C: Planning Department offered the latest versions of community plans for analysis. Upcountry community favors alternative in the vicinity of Halima Road.

C: Recognized A&B planned development along Olowalu Road.
C: EIS should address visual and secondary impacts since the highway would be more than a connector. It would open up growth in the corridor.
C: Supports Alternative 4B because it would provide an escape route from Kilaeu.
C: Recommended hybrid of Alternatives 3 and 8 (mauka portion of Alternative 8 and makai portion of Alternative 3). It would reduce agricultural impacts.
C: If the road is moved too far south, would contradict legislative mandate of connecting to the Maui R & T Park.

MEETING ADJOURNED
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<tr>
<td>Marc Eisenson</td>
<td>20 S. Kii 30</td>
<td>K.C.</td>
<td>832-3821</td>
</tr>
<tr>
<td>Ann Hiraoka</td>
<td>121-31 Pali Hw. Kaimuki</td>
<td>K.C.</td>
<td>836-3815</td>
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<td>Volva Hiraoka</td>
<td>958 Kii St.</td>
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<td>Lillie Kikita</td>
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<td>829-5724</td>
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<td>CLEARANCE</td>
<td>467 Kalihi Pl. Kalihi</td>
<td>M.CO.</td>
<td>838-3692</td>
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<td>DARRELL SALTZ</td>
<td>15 Kii St. Kaimuki, Honolulu</td>
<td>K.CO.</td>
<td>873-4356</td>
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<td>GEORGE FUMIO</td>
<td>1924 N. Kii Pl. K.K. Kalihi</td>
<td>K.C.</td>
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<td>DAUGHTER</td>
<td>343 Kalihi Pl. K.K. Kalihi</td>
<td>K.C.</td>
<td>872-3301</td>
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<tr>
<td>NORMAN HIRAM</td>
<td>1651 Nu’uanu Pani St. Kalihi</td>
<td>K.C.</td>
<td>875-1700</td>
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<tr>
<td>REESE KIYUKI</td>
<td>1785 Kii St. Kalihi</td>
<td>M.CO.</td>
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<tr>
<td>Kilua (Kalei)</td>
<td>P.O. Box 1739, Kīhei</td>
<td>None</td>
<td>878-3881</td>
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<tr>
<td>Gloria Allgood</td>
<td>340 Kawaikapu St., Kīhei</td>
<td>LHA</td>
<td>871-8246</td>
</tr>
<tr>
<td>Charles Allgood</td>
<td>2531 Kīhei Rd., Kīhei</td>
<td>D.N. Transport</td>
<td>871-3751</td>
</tr>
<tr>
<td>Bert Davis</td>
<td>860 Kōmalani St., Kīhei</td>
<td>Kea Companies</td>
<td></td>
</tr>
<tr>
<td>Serena Minkus</td>
<td>766 Wiliwili Pl., Kīhei</td>
<td></td>
<td>877-2784</td>
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May 21, 1996

Mr. Kazu Hayashida, Director
State of Hawaii Department of Transportation
859 Punchbowl Street
Honolulu, HI 96813

RE: Alternate 2 for the proposed Kualii-Uplountry Highway above Olasala Road.

Dear Mr. Hayashida:

The above mentioned route for the Kualii-Uplountry Highway, is strongly opposed by the Olasala residents. I, Zandra Souza Amaral represented on behalf of some of our community members to make clear our objections to this intended route. Our concerns are, but not limited to:

A. The noise impact on our community,
B. The history of spending care endangering the safety of our children.
C. The overall safety of our community and our children.

As I stated at the public hearing on May 16, 1996, noise from above the ranch is amplified and heard clearly in our residential community. At this time, noise is limited to cows and sheep from barking. However, if the new road goes through this area, the noise would cause severe impact on our community caused by cars racing up and down the highway at all hours of the day and night. Not to mention our having to deal with the issue of shuttling traffic at 3:00 or 5:00 in the morning up to Kualii to view the area. I doubt sincerely that anyone in OHA state government would appreciate being woken up by traffic noise at 4:00 in the morning and we certainly would not appreciate it either.

As a residential community we feel that placing such a highway on Alt. 2 would cause undue hardship and strain as well as cause a problem with safety, on our already strained community. We have had problems with speeding traffic in the past. We felt we addressed this problem by working with the Department of Public Works. With the support of our community and Our County's Public Works Committee we were successful in putting "Speed Bumps" in place on June 2, 1992.

Again in 1993, we were faced with similar conditions. Our homes were burglarized because of security and safety problems being cause by foltering parked cars at the mask and end of Olasala Road which did not have adequate lighting and street signs. On September 14, 1992 our County Department of Public Works installed two "No Parking Bylaw" signs along with a street light. Our community firmly believes that:

"WORKING TOGETHER WITH OUR GOVERNMENT, WE CAN MAKE A DIFFERENCE."

We ask the community to ask, why does OHA state need to place a highway in an area that would affect existing residential communities when they have more viable solutions? Such as routing the highway further into the Makaha/Walua area. Placing the route in the Makaha/Walua area would have much less impact on existing residential communities. It would also fulfill the goal of our Federal Government in conserving the potential area of OHA state in the event of endangagement and the UAE or LACK OF USE of prudence in planning by our state, thereby causing all of us a lot more money in the long run. Let us not plan for today with no regard for the future, we've done it in the past and we all paid very dearly for those mistakes.

We ask that the Department of Transportation work with us and utilize "Alternate 2" for the proposed Kualii-Uplountry Highway. Should you have any questions, please don't hesitate to contact me at 879-7445.

We look forward to your expedient response in assisting us in maintaining harmony and security in our communities.

Sincerely,

Zandra Souza Amaral

cc: Mr. Reed Ariyo / Counsel Engineering
Mr. Bob Grow / State Department of Transportation, Kahului
Counsel Members: Mr. Wayne K. Nishiki (Kula District) and
Mr. Robert M. Morden (Up-Country District)
Request: **NOT using Alternate 2 as a route for the Kibei-Upscountry Highway.**

**REASONS:**
A. The noise impact on our community.
B. The danger of speeding cars endangering safety of our children.
C. The overall safety of our residential community and children.

**Signatures of persons affected by “Alternate 2” for the Kibei-Upscountry Highway:**

<table>
<thead>
<tr>
<th>Approve</th>
<th>Object</th>
<th>Signature</th>
<th>Street Address</th>
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</table>
| X       |        |           | 5756 3rd Ave  
8000 Kibei St.  
1234 Main St.  
5678 Elm St.  
2468 Oak St.  
3456 Pine St.  
123 Elm St.  
567 2nd Ave.  
8901 Main St.  
456 Oak St.  
2345 Pine St.  |

Submitted by: Zandra Amaza & Kibei Residents

Street Address: 565 Kibei St., Kibei, WI 50713

Date: 5/15/16, Phone: 429-3463
Ms. Lendia Sousa Amaral
The Amaral Company
365 Holokai Street
Kiholo, Hawaii 96753

Dear Ms. Amaral:

Subject: Kiholo-Upcountry Maui Highway
Project No. HPD-5920(1)

Thank you for your input in our planning process. The comments expressed in your May 21, 1994 letter made us aware of the concerns of yourself and your neighbors on the Kiholo-Upcountry Maui Highway project and its proposed alternatives. The purpose of an informational meeting is to inform the public of our progress/discretion and to solicit opinions that have not been made clear by the public. Your concerns and recommendations will be considered in the development of this project.

Very truly yours,

WAZU HAYASHIDA
Director of Transportation
Dear Mr. Dinsmore,

I live in Kīhei and want a Kīhei-Upcountry Highway very much as I travel frequently to Kāpāwai and Kīpahulu.

I read the South Maui Times (May 24 & May 31) about the meeting on May 15 and 16. I would like to attend future meetings.

I am voting for Route 5 from Kāneʻohe to middle of Kula Highway.

Thank you for giving me this New Highway Dream.

Sincerely,

Isabel Gerhard-Kalbou
879-2762
MR. KAZU HAYASHIDA, DIRECTOR
DEPT. OF TRANSPORTATION
889 PUNCHBOWL STREET
HONOLULU, HI 96813

DEAR MR. HAYASHIDA,

WE RECENTLY ATTENDED THE MAY 15TH INFORMATIONAL MEETING AT PUKALANI.

OF THE ROUTES DISCUSSED FOR THE NEW UPCOUNTRY HIGHWAY, WE FAVOR ALT. 2 WITH MODIFICATIONS. WE WOULD LIKE TO SEE THE HIGHWAY WITH TWO TERMINUSES UPCOUNTRY, ONE AT BALTIMAILE ROAD, AND ONE WHERE ALT. 4B ENDS. THIS WOULD GREATLY RELIEVE CONGESTION AT THE END OF THE HIGHWAY WHICH WE FEEL WILL BE A MAJOR PROBLEM IF THERE IS ONLY ONE EXIT/ENTRANCE TO THE HIGHWAY.

ON THE NISEI END, WE WOULD LIKE TO SEE THE TERMINUS AS FAR SOUTH AS POSSIBLE. INSTEAD OF CARRYING THROUGH THE MIDDLE OF ONE MAUI RAIN FOREST, MOVE IT TO CONNECT WITH THE KIHEI REGIONAL PARK UPTON ALT. 4B WAS PROPOSED.

WE HAVE HEARD AT VARIOUS TIMES THAT THIS ROAD WILL BE ONLY 2 - OR POSSIBLY 3 - LANES WIDE. PLEASE, PLEASE, PLEASE: MAKE THIS ROAD 4 LANES!! 2 OR 3 LANES WILL BE A WASTE OF TAXPAYER MONEY. 2 OR 3 YEARS FROM NOW AND BE TOLD THAT TO Widen THE HIGHWAY TO 4 LANES IS GOING TO COST ANOTHER $50 TO $80 MILLION DOLLARS. EVEN THOUGH BUILDING 4 LANES NOW WILL COST MORE, IT WILL BE MUCH CHEAPER IN THE LONG RUN.

DO IT ONCE! DO IT RIGHT!

WE HOPE YOU WILL TAKE THESE SUGGESTIONS TO HEART, AND THAT WE ARE UP WITH A HIGHWAY WE CAN ALL VIEW WITH PRIDE AND NOT ONE THAT WE VIEW WITH SCORN AND SHAME.

THANK YOU.

ED AND STEPHANIE HAYASHIDA
BALTIMAILE, HI 96706
Ed and Stephanie Hackenbruch
972 Akaka Street
Haili, Hawaii 96760

Dear Ed and Stephanie Hackenbruch:

Subject: Kihel-Upcountry Maui Highway
Project No. HDFS-9202(1)

Thank you for your letter received on May 20, 1996, regarding the proposed alignments.

While having more lanes and turning out into multiple termini may be desirable, additional considerations or cost constraints may affect the feasibility of these proposals. In addition, the alignment ultimately selected is expected to be able to handle the projected traffic demand between Upcountry Maui and South and West Maui through the year 2022. Although the projected traffic demand only warrants a two (2) lane highway to year 2022, an adequate right-of-way will be acquired in conjunction with this project to accommodate a four (4) lane highway in the future.

Nonetheless, please be assured that your comments are appreciated and will be taken into consideration.

Very truly yours,

Kazu Hayashida
Director of Transportation

Cc: Warren S. Umemori Engineering, Inc.

May 31, 1996

Mr. Kazu Hayashida, Director
Department of Transportation
State of Hawaii
883 Punchbowl Street
Honolulu, Hawaii 96813

RE: Proposed Kihel-Upcountry Maui Highway Project
Three Alternative Alignments

Thank you for this opportunity to provide comments on the three Alternative Alignments for the Kihel-Upcountry Maui Highway that were presented at the public meeting on May 15, 1996. Since HC&S cultivates 36,000 acres of sugarcane here in the central valley of Maui, the location of this project is very important to our farming operations.

Alternative 2, dissects several HC&S' fields, roadways, irrigation systems, and drainage systems, in addition to taking cane land out of production. This route would require HC&S to change its operational practices making it extremely costly and inefficient. Keeping HC&S 'whole' will require far more extensive mitigating measures which go beyond the cost of acquiring the right-of-way itself. Due to the significant effect on agricultural operations associated with this route, HC&S cannot support this alternative.

With proper mitigation, HC&S could support Alternative 4B since it would affect our operations to a lesser degree by closing a much smaller section of the farm. Therefore, the cost of mitigative measures would be far less than Alternative 2.

HC&S supports Alternative 5 since it does not cross through any of our fields and therefore would have minimal effects on our operations.

We request that the potential impacts on HC&S' existing operations be addressed in the Environmental Impact Statement for this project and that HC&S be consulted and recognized in the preparation of the EIS. Mitigating measures
Mr. Kazu Hayashida, Director
May 31, 1996
Page two

should be identified in the EIS, as these will be bona fide costs of the respective alignments. Attachment 1 shows a summary of the impacts to HCAS of two of the identified alignments.

We look forward to future discussions with the DOT and its consultants on this proposed highway project. We believe that by working together, we can identify an appropriate roadway alignment which will benefit all parties — farmers, residents and businesses on Maui. This over 1,000 farmers at HCAS have an important stake in the chosen alignment.

Thank you for this opportunity to provide comments.

Sincerely,

Richard F. Cameron
Plantation General Manager

Attachment

ATTACHMENT 1
Kihel-Upcountry Maui Highway
Three Alternative Alignments

The Public Meeting on May 15, 1996 showed three alternate roadway alignments for the proposed highway. Alternative 2 would have a serious effect on HCAS operations.

Alternative 2 — From Haleakala Highway at Halliman Road to Maui R&T Park at Kihel.

a. Land area for right-of-way is 78 acres; transverses 4 miles through HCAS property.
b. This route crosses one primary (paved) hauler road and two secondary hauler roads.
c. This route crosses three small ditches and numerous drip irrigation pipelines.
d. This route isolates approximately 1,200 acres of cane land. HCAS would need underpasses or traffic lights to cross the new highway.
e. Drainage — This route will cross at least three major gullies, Waikōa, Pulēhu and Kalaiulu Gullies, and several smaller ones which will require the State to build bridges to traverse these gullies adding additional cost to these projects.
f. Endangered species — This route crosses three gullies that contain the endangered plant species Abutilon maniculatum. The largest concentration of these plants is at the Kalaiulu Gully.

Alternative 4B — From Kula Highway, near Kula 200, to Pilihi Highway at Kaanapali Street.

a. Land area for right-of-way is 19 acres; transverses 1 mile through HCAS property. This route isolates approximately 60 acres of cane land since it is near the top edge of the farm land.
b. This alternative route crosses two major ditches, the Hamakua Ditch and the Reservoir 40 Ditch.
c. Drainage — This route will cross at least three major gullies, Waikōa, Pulēhu and Kalaiulu Gullies, and several smaller ones which will require the State to build bridges to traverse these gullies adding additional cost to these projects.
d. Endangered species — This route crosses three gullies that contain the endangered plant species *Abutilon menziesii*, but this route is farther away from the endangered species than Alternative 2.

In the above mentioned alternatives, the disruption would require mitigative measures such as:

- Land for right of way — HCES' lands needed for the highway would be 'prime' agriculture land that will need to be purchased.
- Splitting of fields — Compensate for the increased cost of field operations due to the additional hauling time mileage, concrete crossings for haulers and treated equipment. Field isolation and possible abandonment may also have to be compensated for.
- Hauler roads intersects — There will be a need for underpasses or traffic lights at these hauler roads to minimize hauling delays and provide a measure of traffic safety. Additional cane hauler roads that are parallel to the new road may be necessary.
- Proximity to highway — Compensation for the additional costs of operation to control dust and cane smoke and the potential to restrict the use of chemicals currently being used would reduce operating efficiencies.
- Irrigation system intersects — Several pipelines, ditches, supply lines and mainlines would need to be relocated and cross the new road.

Mr. Richard F. Cameron
Plantation General Manager
Hawaiian Commercial & Sugar Company
P. O. Box 266
Puuolane, Hilo 96784

Dear Mr. Cameron:

Subject: Kihel-Upcountry Maui Highway Project No. HPSE-9201(1)

Thank you for your May 31, 1986 letter regarding the effects of our proposed alternatives for the Kihel-Upcountry Maui Highway project on the Hawaiian Commercial & Sugar Company's operations. We have met previously with you and have found these discussions to be very helpful in developing our project.

We will keep you informed of major developments in the project and look forward to any assistance you can provide.

Very truly yours,

RATIF HAYASHIDA
Director of Transportation

cc: Warren H. Umemori Engineering, Inc.
May 28, 1986
Page 2

Link to Ulupalakua.

Yes, many of us who have homes or farms in the Kokee-Ulupalakua-Kaanilo-Kapaa-Malaho area will benefit. Please remember, though, that when the highway to Kapaa was built, the Casemore family benefited a great deal.

It is important to note that Waikiki has 5 roads leading in and out of the area. Waikiki also has the convenience of the City Bus. Kiholo, THE FASTEST GROWING COMMUNITY ON MAUI, has only one way in and out of the area.

The extension of Pilani makes a lot of common sense because the highway was designed and approved more than 20 years ago. There are no questions about the right of way—engineering and construction will be relatively simple.

The closing of the old road became an issue in the mid 1980s. The Kiholo and Kula Community Associations, The Maui County Council including now Mayor Linda Lingle were 100% behind the reconstruction of the road. Unfortunately, tourists don't vote on Maui and we don't have enough votes in our area to help our cause.

We would also appreciate your consideration and study of using the existing and farms on this road. One of these farms is highly successful with an investment exceeding $1 Million and more than 2,000 acres of citrus trees. Currently, there is no reasonable public access to the Kauai-Kalani Park Road since the closure in 1994. Water is adequate.

Thank you for your consideration of your request.

Sincerely,

Sam S. Hirooka, Coordinator
Members: Hiroshi Arisumi, George Purdy, Dr. Ralph Hart, William A. Dixon, Sue Heeiro Haan, and Harold Nakamoto

Enclosures:
1. Advertisement, Maui News 3/10/88
5. Letter dated 5/14/87 from Ulupalakua Ranch to Dr. Fujio Hatae
7. Letter dated 6/8/84 from Mr. Hamamoto, ILU
LEASE
SIGN THIS PETITION

ROAD BUILT IN 1860'S
CLOSED MARCH 1994
LOCAL RESIDENTS USED
ROAD EXTENSIVELY FOR
RECREATION TO SOUTH MAUI
MAINTENANCE COST
FOR UNIMPROVED ROAD
BECAUSE TOO MUCH FOR
COUNTY BUDGET WHEN
TOURISTS AND EMPLOYEES
BEGIN USING THIS
CONVENIENT ROAD.

BENEFITS:
1. SAFE IMPROVED ROAD (NOT A SUPER HIGHWAY) WOULD...

RELIEVE TRAFFIC — PUKALANI TO HANA HIGHWAY
KULA HOSPITAL — MINUTES FROM KIHEI IN CASE OF DISASTER
EVACUATION — FROM SOUTH MAUI IN CASE OF NATURAL DISASTER

FOR PUKALANI AND ALLOCCITY EMPLOYEES
A SAFER, FASTER, HASSLE FREE
PLEASANT DRIVE TO SOUTH MAUI AND EVEN TO HANA

POSSIBLE SOLUTIONS:
COUNTY OF MAUI — SEEK FINANCIAL HELP FROM STATE
LEGISLATURE — EARMARK SPECIAL FUNDING FOR NEW ROAD
STATE AND MAUI — WORK TOGETHER TO BUILD LEAST COSTLY ROAD

ADVANTAGE:

CC: GOVERNOR BEN CABANAG
HOUSE SPEAKER JOSEPH SUKI
SENATOR JOE TANAKA, CHAIRMAN, SENATE COMMITTEE ON TOURISM
MR. RICH ODO, CHIEF, HIGHWAY DIVISION, STATE OF HAWAII
MR. ROBERT SIROCY, MANAGER, MAUI DISTRICT OFFICE, STATE HIGHWAYS DIVISION

Additional Enclosures:
SUPPORTERS OF THE IKUA PURDY ROAD COMMITTEE

Mr. Sam S. Hironaka
Coordinator
Ikua Purdy Road Committee
99 Hanilua Place
Wailuku, Hawaii 96793

Dear Mr. Hironaka:

Subject: Kihei-Upcountry Maui Highway
Project No. HOPS-9201(1)

Thank you for your input in our planning process and the comments expressed in your May 25, 1996 letter making us aware of the concerns of yourself and your committee on the Kihei-Upcountry Maui Highway project and its proposed alternatives. Your concerns and recommendations will be considered in the development of this project.

Very truly yours,

Suzu Hayaishi
Director of Transportation
May 17, 1996.

Mr. Kaku Hayashida
Director
State Department of Transportation
889 Punchbowl St.
Honolulu, HI 96813

Dear Mr. Hayashida,

I'm a resident of upper Kula on Maui, and would like to offer some opinions on the proposed highway alignment between Kibei and Upcountry Maui.

First, I would choose the least expensive plan. Because of budgetary constraints is tight, the $7.5 million route from Kaeoaulu, Kibei to Waikaia, Kula would take my vote.

Next, any of where the road starts in Kibei should consider the congestion already resulting from the quick-paced construction of homes in Kibei district. I think the new road should intersect Kibei as far south as possible so as not to add to the troubles of gridlock now resulting in north Kibei. My choice again would be the Kaeoaulu Street (or anywhere further south) alternative.

And last, where the alignment road joins Upcountry should again be as far away from present or potentially new overcrowded areas of our highways. I disagree with any elective below Pukalani because of traffic jams that already occur during rush hour. How will this be in a few years when more houses are built in Upcountry Maui? The best options then would be to send the Upcountry commuter traffic away from these spots by diverting the flow of traffic away from where it's already overcrowded. People instead of going down the hill into a traffic jam would detour uphill shortly before heading to their business or beach in Kibei. Therefore, either intersections of the alignment road upcountry at King Kekaulike High School or anywhere south would be preferable. I suggest joining the road at the intersection of Hwy. 37 and Hwy. 377 near Rice Park. This would allow easier access for tourist traffic to bypass the central Kibei traffic messes and get to Haleakula National Park in an expeditious way from the South Maui resorts.

Thank you for your time in considering my views.

Aloha kakou.

[Signature]
May 20, 1999

Mr. Kazu Hayashida, Director
State of Hawaii Department of Transportation
855 Punchbowl Street,
Honolulu, HI 96813

Dear Mr. Hayashida,

Last Wednesday and Thursday, I testified at the informational hearings held by the state to discuss the different alternatives for Maui's Upcountry-Kihei link. As the Maui Research & Technology Park developer and the representative for the park's owners, I spoke against having the Upcountry Road run through the park to the intersection at Lipoa and Pilani Hwys. I repeat our position to you now that, while we are not opposed to the Upcountry-Kihei road, we do not want it running through the park.

During the early 1980's, with the park's first Master Plan, our initial thought was that an Upcountry road running through the park would be appropriate. This thinking continued because our initial development plan was, in reality, a light industrial park similar to the Waihu Business Park. As the true nature and character of the park took shape and as the first buildings were occupied with specific user types, it became clear that the original master plan was too limited in scope and unable to take advantage of the many opportunities high technology represented. The result has been that we have now re-oriented our master plan to represent a true research park campus (see attached). As you can see, a major road such as is planned for the Upcountry-Kihei link would split our campus in half and drastically weaken the special appeal high technology users are seeking in their moves to Maui.

With the opening of the Maui High Performance Computing Center, one of the world's largest "supercomputers" as our anchor tenant and with other tenants moving into the park to take advantage of this facility and the park's telecommunication infrastructure, it is imperative to Hawai'i's and Maui's future technology growth that the State take no action that would adversely impact the success of this project. An Upcountry road running through the park would be just such an action. As the new Master Plan clearly shows, the park is redesigned around a large roundabout, or "Green" with key facilities such as the International Teleconferencing center, three new premier office buildings, a support services core and an educational facilities, all lending to this new campus environment. Your proposed road would split the campus in two.

Mr. Kazu Hayashida
May 20, 1999
Page 2

destroying the roundabout and representing a major obstacle for the interaction of many new tenants in the park, including the pedestrian walkways and bike paths.

We, therefore, ask that you NOT include the alignment of the Upcountry Road through the park as an alternative for your consideration. It represents the most expensive and longest of all of the options. It has a direct and immediate negative impact on all further development in the park. It destroys the nature and character of the technology campus environment we are attempting to create.

And it will cause a number of users, desiring to relocate to the park with valuable jobs and investment capital for our community, to re-think their commitment of bringing high-tech industries here.

The Maui Research & Technology Park's mission is to be the information center of the Pacific Rim nations and one of the state's most valuable economic assets. The Governor's State of the State address and his Economic Recovery Report both stressed the park's importance to Hawai'i's future economic recovery. We would all hate to see the State's department of Transportation take actions that could destroy that mission.

Sincerely,

MARTIN M. HAYWARD, P.E.
Director of Development
BMK/CPG

Warren S. Umemori
Mr. Brett K. Klyver  
Director of Development  
Maui Research and Technology Park  
535 Lipoma Parkway, Suite 111  
Kihei, Hawaii 96753

Dear Mr. Klyver:

Subject: Kukui-Ukumiana Maui Highway  
Project No. HDPS-9204(1)

Thank you for your input in both May informational meetings and your letter of May 20, 1996, on the Kukui-Ukumiana Maui Highway, Project No. HDPS-9204(1). We are now aware of your wish not to include the alignment of our project through the Maui Research and Technology Park and will take your concerns into consideration.

Changes and adjustments are part of the environmental process and we appreciate your comments.

Very truly yours,

KAZU HAYASHIDA  
Director of Transportation

Cc: Warren S. Umemori Engineering, Inc.
As a resident of Kula, living in an agriculturally zoned subdivision that is directly connected to the Pulehu Rd./Oneloa Rd. corridor that connects “Up-Country” Maui to the district of Pahului and the airport, I am much concerned with the highway alignments being considered. During my many years residency in southern California I took an active role in community planning and its interface with the roadways. I have seen the havoc created by well-intentioned studies that failed to anticipate the rampant growth that seems to inevitably follow the introduction of new highways in to previously undeveloped lands.

The public response to the two meetings held during the last few days in Pukalani and in Kula was remarkably small. As an "old hand" regarding such public-impact issues, I can only guess that the newspaper reports of the scheduled meetings were not read by a widespread audience or that those that did learn of the meetings had too little time to rally their forces; or, of course, the possibility that there is apathy.

Clear and concise data was presented to the public attending these meetings. I found it easy to understand and compliment the engineers on their patience and care during their presentation.

I was not surprised to learn that the criteria followed in determining the "best" alignments was motivated to a large extent by ease. It was daunting, however, to perceive so easily how much political power was clearly being applied via the interests of the big land owners.

Most of those attending the meetings saw clearly that an alignment that would begin at the south end of Pukalani, near the new Meadows subdivision, and continue directly to a point northwest i.e. down hill of the Kula-Kahekili Highway would meet the needs of most of the electorate, with the least impact on "human needs."
Kahaluu-Upcountry Highway Project, Cont'd

Within two to three years a full compliment of several thousand students will be attending that high school. Parents will be driving their students to this school at seven am. Commuters from much of southern Kula will be lined-up at the existing traffic light seeking an easy flow of traffic towards the Pukalani By-pass and down into Pukalani. And to this already critically dense flow tourists in private car and bus and one begins to perceive the flaw in positioning the terminus of AL 5B in that location.

And that is just focused on current development at the 5-tree intersection. Already county approvals are in the works for development of the so-called Pukalani Triangle, a pineapple field bounded by Malaeke Avenue on the west, Pukalani By-Passes on the north, and Old Makena Road on the south. And then there are the developments that sports planners envision for lands directly west of the high school.

All in all, this location promises far worse traffic snarl than ever AL 5.

Upcountry critics will probably not focus on the issue of 400-low income housing as it affects the employment of families living in Haiku and surrounding areas. There is little doubt however that many residents of northeast Kula, Upcountry as well as those communities that abut Hana Highway have sought employment at the resorts in Wailea and Makena.

Aligning the new highway, so that its terminus with Makena Rd, is near Hailei Road will enable many residents of the area to avoid the one terminal traffic congestion that now exists at the intersection of Hailei Road and Makena Rd., without factoring-in the impact of traffic as future Hailei Road development comes on-line.

A cursory glance at any map of the Hailei area, Kaua, Haiku districts yields the information that there are now many rural roads that connect these communities with one another. Though none of these roads would meet current federal standards, most of them carry traffic throughout the day for residents and visitors alike.

It is a logical and fair assumption that no one locale would be seriously impacted by a focused flow of traffic, excepting perhaps the small community of Hailei, but since it already is a near totally company-oriented community I believe that this particular "company" would undertake cooperation with the County in order to widen Hailei Rd., at least the financial impact would be feasible.

Kahaluu-Upcountry Highway Project, Cont'd

In conclusion, may I summarize my views:

Though cost will undoubtedly determine the future augmentation of this highway project, I urge the County O.C.T. to factor-in as much focus on the future impact of traffic and development as is possible to do.

Haiku may be tilting away from agriculture, tourism-interests are even more important for the future of the state, and jobs will be necessary to bring that about.

An increasing job market pre-supposes increased residential development, and that undoubtedly mandates more and better roadways.

Haiku needs carefully planned roadways, perhaps not more roadways as such. Your Project Description says that the Federal Highway Administration is joining the State O.C.T. in sponsoring the construction of a rural, limited access arterial roadway.

If the arterial roadway does indeed maintain its rural character and limited access, all would be perfect for Haiku and its future interests.

But we all understand just how big an "if", that really is.

Thank you for considering my views.

Sincerely,

[Signature]

cc: Linda Crockett Lingle
    Mayor, County of Maui
    David V. Blaisdell
    Director of Planning
May 23, 1996

Mr. Gage Schubert
108 Holopuni Road
Kula, Hawaii 96790

Dear Mr. Schubert:

RE: Proposed Kīhei to Upcountry Highway

Thank you for your letters dated May 17 and 19, 1996, expressing your concerns and encouraging this Department’s involvement with this project. We share many of your concerns and have been involved since the project’s inception.

The State Department of Transportation (DOT) recently held two informational meetings, May 15 at the Puunene Community Center, and May 16 at the Kīhei School Cafeteria. A Planning Department representative attended both meetings with the purpose of monitoring project status and assessing public sentiment.

Your letters express a concern with the possibility of unwanted and uncontrolled growth along the project’s right of way. In a letter written during the scoping phase of the EIS process, this Department pointed out the potential impact and asked that it be analyzed in the document. The letter brings out other issues as well. A copy is enclosed.

Again, thank you for expressing your opinions, and I assure you that this Department will continue to be involved in this project. If you need any additional information, please contact William Spence or my staff at 243-7735.

Very truly yours,

David W. Blaise
Director of Planning

Enclosures
cc: Julie Higa
Ron Suzuki, DOT
Central File
CADD/CORRESPONDENCE/AGELTR

FAX: 808-243-7735

Project No. HPDS-9203(1)

June 1, 1996

Dear Mr. Schubert:

Subject: Kīhei-Upcountry Maui Highway

Thank you for your letter dated May 17, 1996, regarding the proposed alignment. We feel that the detailed alternatives screening process, as well as a continuing process for public input, will assist us in developing “carefully planned roadways.” Please be assured that your comments are appreciated and will be taken into consideration.

Very truly yours,

Razu Hayashida
Director of Transportation

cc: Warren S. Unomori Engineering, Inc.
May 28, 1994

Mr. Kayee Hayashi, Director
State of Hawaii, Department of Transportation
869 Punchbowl Street
Honolulu, HI 96813

Dear Mr. Hayashi:

With reference to the Alternative alignments for the Kibe—Upcountry Highway, the best choice would be Alternative 1 with on—off ramps at the Hali‘imaile/Haleakala Highway intersection.

Yours truly,

Frank W. White
Director of Transportation

Mr. Frank W. White
Poa Kea Farm
206 Cooke Road
Kula, Hawaii 96790

Dear Mr. White:

Subject: Kibe—Upcountry Maui Highway
Project No. HDPB-9203(1)

Thank you for your comments concerning Alternative #1 and an overpass with on/off ramps at the Hali‘imaile/Haleakala Highway intersection.

The traffic volume projected for the foreseeable future in Upcountry Maui at the location mentioned cannot justify a grade-separated structure. Nevertheless, your comments and interest in this project are appreciated.

Very truly yours,

Kazuo Uyemura
Director of Transportation

cc: Warren S. Umemori Engineering, Inc.
Mr. Kazu Hayashida, Director
State of Hawaii DOT
869 Punchbowl Street
Honolulu, HI 96813

Re: Kīhei-Uponcountry Highway Project - Maui, Hawaii

Dear Mr. Hayashida:

Thank you for this opportunity to provide the following comments.

It appears by the comments made at the May 16, 1996 Kīhei meeting that the Piilani Highway terminus would be better located at one end or the other of the Maui R & T Park, not through the middle on Lipoa Street. Actually, I suggested two terminuses on north and south of the park but was informed that only one terminus is allowed within the funding guidelines. Perhaps the private sector would be more likely to add half of the two road intersection "Y" above the R & T Park.

For the Uponcountry terminus, perhaps consider Maui Land and Pine to sell, trade, dedicate or otherwise transfer enough property in Pukalani to provide an acceptable buffer zone to existing residential subdivisions. This would allow an Uponcountry terminus in the Pukalani area without negative impacts to neighborhoods while providing positive economic impacts. This concept uses the most viable portions of Alternative #8 (the portion above Alternative #2) and then continues down Alternative #2 and then to a terminus at Piilani Highway near the sewer treatment plant and the Kīhei regional park. The north portion of the "Y" theory mentioned above could then be completed by the private sector.

With the valid concerns on all sides of this issue, the above combination of alternatives may provide a balance of satisfaction to all concerned.

Thank you for your continuing dedication to resolving this very difficult situation.

You are welcome to contact me with your questions and comments.

Aloha,

Don Williams, CGIM

If you wish to comment, please mail or deliver comments by May 31, 1996, to the following address:
Mr. Kazu Hayashida, Director
State of Hawaii Department of Transportation
869 Punchbowl Street
Honolulu, Hawaii 96813
NOTICE

The latest information regarding the Kīhei-Upcountry Maui Highway project follows below:

Due to comments received from our last public meetings, we have made adjustments to our then-recommended alignments No. 2A, 3B, 4B and 5. The new alignments are illustrated in the above map and are named by the Upcountry (U) termini in combination with a K (Kīhei) termini:

- U-1 - Holokūka Highway at Kalama Road intersection
- U-2 - Kīhei Highway east of Pukalani Bypass Road
- U-3 - Kīhei Highway south of Pāhoa Gulch
- K-1 - Pāhoa Highway at Kāne'oo Street intersection
- K-2 - Pāhoa Highway at proposed Road "F" intersection (south of Kīhei Regional Park)

These alignments are currently being investigated in the Draft Environmental Impact Statement (EIS) now being prepared.

We wish to thank you for your input into this environmental process and look forward to your continued support and interest as this project develops.

Please contact the Highways Division, Planning Branch, at (808) 384-2142 if additional information is desired.

Glenn M. Okimoto for
KAZU HAYASHIDA
Director of Transportation

(Hon. Adm.: May 7, 1987) (A-44229)
NOTICE

The latest information regarding the Kīhei-Upcountry Maui Highway project follows:

Due to comments received from our last public meetings, we have made adjustments to our then-recommended alignments No. 2A, 2B, 4B and 5. The new alignments are illustrated in the above map and are named by the U-(Upcountry) termini in combination with a K-(Kīhei) termini.

U1 - Hāna Highway at Hallimaile Road intersection
U2 - Kula Highway east of Pukalani Bypass Road
U3 - Kula Highway south of Pulehu Gulch
K1 - Pālini Road at Kaunoa Street intersection
K2 - Pālini Road at proposed Road "F" intersection (south of Kīhei Regional Park)

These alignments are currently being investigated in the Draft Environmental Impact Statement (EIS) now being prepared.

We wish to thank you for your input into this environmental process and look forward to your continued support and interest as this project develops.

Please contact the Highways Division, Planning Branch, at (808) 587-1843 if additional information is desired.

KAZU HAYASHIDA
Director of Transportation
Mr. Kau Hayashida, Director of Transportation
Dept. of Transportation
860 Punchbowl St
Honolulu, HI 96813

Dear Mr. Hayashida:

Please keep me on the mailing list for information related to the Kula-Ukumamai Maui Highway.

I sincerely hope that you don't build the U-1 or U-2 upcountry connections. There is too much congestion in these areas. Please spread out the traffic.

I STRONGLY urge you to look seriously at the U-3 - K-2 option.

You have a tough job. No matter what is decided there will be a lot of people who don't agree with you. I wish you luck.

Sincerely,

Robert M. Butterfield

Mr. Robert M. Butterfield
P.O. Box 122
Pukalani, Maui 96788

Dear Mr. Butterfield:

Subject: Kula-Ukumamai Maui Highway
Project No. HDPS-92001

Thank you for informing us of your position on the alternative alignments for the Kula-Ukumamai Maui Highway project. We will maintain your name on our mailing list and will consider your input during the ongoing environmental process.

Very truly yours,

[Signature]

KAZU HAYASHIDA
Director of Transportation

cc: Warren S. Unemori Engineering, Inc.
Kikei, Maui

Dear Kagw Hayashi,

I am against all your proposed upcountry roads as they don't make sense. Future growth will be focused on Makaha and Hanalei. Your main tourist areas in those areas all want to go to Haleakala and the 'Windy Country'.

Why put the road in Kokei where traffic is already congested and close to Pukalani? (just to please the upcountry people?)

A road up at the end of Pukalani highway would be the shortest, easiest and most convenient route.

Why did the town of Kokei fail to build it out 5 years ago but its the best way for...

The State can acquire the needed land without that much environmental protest. We need some action now on roads on this island as ours are the worst! Its way past time someone starting repairing and adding new roads to ease the traffic problems which are getting worse every year. It has been way too long since roads last even been repaired and expanded...

We're the 1 island in the world to visit last but not even drive on decent roads.
I can name dozens of main roads in and out of every city that are terrible to drive on and killing our cars!
I don't even remember seeing a road repaired in the last 4 weeks unless it was a new sub-division. Please acquire and use all the funds possible to relieve this dangerous situation.

We lived in Hawaii over 40 years and am watching everything I love slowly disappear with "progress" but new roads are vital. It's been way too long so how about some action from there?

Mahalo & Aloha
Kimo Hall
Box 1728
Kihei 808-879-6611

Kihei 95753

This would be very easy and practical.
Mr. Kazu Hayashida, Director
Department of Transportation
State of Hawaii
859 Punchbowl Street
Honolulu, Hawaii 96813

RE: Proposed Kīhei-Upcountry Maui Highway Project

August 04, 1997

Dear Mr. Hayashida:

In June 1997, as a result of comments received from public hearings held in 1996, we were informed of new alignments being proposed by DOT for the Kīhei-Upcountry Highway project.

We are aware that these alignments will be included in the Draft Environmental Impact Statement for this project, which is currently being prepared. Accordingly, we would like to provide you with our preliminary comments for your consideration in the preparation of this document:

1) The points of origin in Kīhei currently have no impact on HC&S’ operations and therefore we have no concerns or preferences;

2) Hālekōa Highway at Halliwell Road intersection (U1): As we have commented upon in the past, this routing alternative would bisect HC&S’ property. As a result, this route would serve to isolate 1,000 acres of cane land under the cultivation and would require the installation of underground or traffic lights to enable HC&S to continue to cultivate these areas. This alignment also intersects cane haul roads, which are primary thoroughfares for our haulers and crosses essential irrigation ditches and pipelines. Our ability to move equipment and to irrigate our crops must be preserved. As a side note, this alignment would also require the construction of bridges to cross the several gullies, which will increase the cost of the highway. Unless satisfactory mitigative measures are implemented, HC&S strongly opposes this route.

3) Kula Highway, East of Pukalani Bypass Road (U2): This highway alternative also traverses through HC&S’ property, although to a somewhat lesser degree than the above mentioned alignment (U1). This...
alignment, which runs along the top edge of our farm land, would isolate approximately 60 acres of cane land, and again, would require mitigative measures to maintain HC&S access to those lands. The route also crosses two major water ditches, the Hanakaa Ditch and the Reservoir 40 Ditch, which will need to be protected and remain operative, even during construction. This alignment also crosses at least three major gullies and several smaller gullies, which again will require bridges and will add to the cost of the projects. Again, unless satisfactory mitigative measures are implemented, HC&S strongly opposes this route.

4) Kula Highway South of Puuolu Gulch (U3): Of the three alternatives being presented, this alternative (U3) has the least impact to HC&S. The route does not cross through any of our fields and therefore would have minimal effects on our operations.

We have attached a map to help illustrate the impacts of the roadway alignments on the plantation.

The alternatives U1 and U2 will cause significant impacts to HC&S and, this will require significant mitigative measures, which have been previously outlined to the department, to ensure minimal disruption to HC&S' current operations. We trust that these impacts and mitigations will be addressed in the upcoming draft EIS. If you need further clarification of these measures, please feel free to call me for the information.

We continue to welcome open and early discussions with the DOT and its consultants on this highway project. Though our working together, early on in the process, we believe an alignment which will benefit all parties—farmers, residents and businesses on Maui—can be identified. Over 1,000 employees at HC&S have a lot at stake on your choice of alignments.

Sincerely,

G. Stephen Holaday

Enclosure

cc: M. J. Ching
Mr. G. Stephen Holaday  
Plantation General Manager  
Hawaiian Commercial & Sugar Company  
P.O. Box 256  
Puuumea, Hawaii 96784  

Dear Mr. Holaday:  

Subject: Kula-Upcountry Maui Highway, Project No. HDPS-9203(1)  

Thank you for your August 4, 1997 letter summarizing Hawaiian Commercial & Sugar Company's (HC&S) position on the proposed alternatives for the Kula-Upcountry Maui Highway project.  

We are confident that, through our previous meetings and correspondence, we have been made aware of HC&S operations and position on the alternatives and will strongly consider them in our analysis of this project.  

As stated previously, we will keep you informed of major developments in the project and look forward to any assistance you can provide.  

Very truly yours,  

HUGH F. O'NO  
Administrator  
Highways Division  

cc: Warren S. Immeku Engineering, Inc.

---

To: Maui County Council  
From: Alan Kaufman, KCA president  
Date: 2 May 1997  

The Board of Directors of the Kula Community Association has asked that I inform you about results of a justcompleted community survey. The survey was mailed to every household in the Kula area. A total of 318 surveys were returned, for a response rate of 41%.  

It has been the position of the KCA Board of Directors to support water rate increases provided that the proceeds are used to expeditiously initiate and complete needed system improvements. Of those responding, 71% disagreed with this position, 9.9% disagreed, 6.7% were undecided, and 3.4% did not respond.  

The community was also polled on the preferred location of the Upcountry terminus of the Kula-Upcountry Road. Haalulau was favored by 30.8%, the "No Build" option by 27.2%, Paliho/Omaoapio area by 9%, Five Trees/Kula 200 by 15%, Undecided by 5.7%, and 2.3% did not respond to the question. The position of the KCA Board of Directors has been to favor the "No Build" option, or if the road is to be built, to put it at Haalulau. It appears that position accurately reflects the opinion of the Kula Community.  

As these issues are addressed, the KCA Board of Directors hopes the opinions of our community will receive due consideration.  

Sincerely,  

Alan Kaufman  

Copy: Mayor Linda Lingle  
Bob Slayton, Division of Highways  
Senator Don Iseman  
Kazu Hayashida -  

---
Mr. Alan Kaufman, President
Kula Community Association
P. O. Box 417
Kula, Hawaii 96790

Dear Mr. Kaufman:

Subject: Kīhei-Uplcountry Maui Highway Project No. HPDS-9201(1)

Re: Kīhei-Uplcountry Highway Project

September 10, 1997

Mr. Kenneth Au
DOT Highways Division
869 Punchbowl St.
Honolulu, Hawaii 96813

Dear Mr. Au,

This letter is long overdue. I spoke with you by phone several months ago about the above project. I still, as I conveyed to you, feel that the best route for the highway is from K-2 to the upper end of Kēkāulike Highway. This is the most direct way to the crater, which over 2,000,000 people a year visit. This is also the most direct route for those working in the crater. Four hundred lots will be subdivided in the Hawaiian Homelands area in upper Kula in the very near future. This will necessitate the improvement of the roads in this area. Since a number of these people may be employed or seek employment in the Wailea area the upper Kula connection makes a lot of sense.

Recently we were informed a developer in our neighborhood is planning a town with a twenty acre shopping center. It appears on his maps what looks like the U-2 alternative on your map. Since we have a not yet completed high school, King Kēkāulike, only a few hundred feet below this proposed development, I question why the State would support such a situation. This man and his fellow investors have rubbed elbows with several State and County people, leading many of us to think a back room deal was struck. Although only a few weeks ago in a meeting with residents he stated he would be building 324 homes, he jumped to 400 and is now at 450. I'm enclosing a master plan of his project obtained from the County Planning Department here on Maui.

I hope you will look it over and understand as I have that the scope of this project is detrimental to the safe environment the students in Kēkāulike deserve. I did a traffic study Monday, Sept. 8, 1997 from 2:00 pm to 4:00 pm. The numbers I came up with were astounding. The vehicles going in numbered 188, going out
262, students walking alongside (there is no sidewalk) the Kula Highway numbered 41, vehicles going up or down, 1,720, and industrial vehicles, 22, for a total count of 2,194 vehicles during the two hour period. I intend to do more traffic studies as I realize one is not sufficient to be a true study of traffic. The developer of the above project I mentioned, did a traffic study, however it was done in 1995 when two classes attended Kekaulike High. Since then a number of those students have obtained a drivers license. The high school at present contains freshmen through juniors, with it becoming a four year high school for the 98/99 school year. In speaking with the principal I was told the school is full with each class that comes in. The freshmen class this year consists of 400 students. There are a total of 1,040 students in the school at present. Since the school is bordered by Haleakala Highway on one side and Kula Highway on the other I believe adding another highway in the same area would be like sentencing a few students every year to certain death. While observing the traffic, a tourist made a U-turn on the highway while another went in the school turning lane, and realizing he made a mistake, quickly cut out almost hitting a town-bound vehicle.

Some parents are upset and feel they can do nothing to stop this since this man seems to have everyone in his back pocket. They feel if anything happens to them or their children as a result of the tremendous amount of traffic coming into the neighborhood of the school, they will sue the developers of Kukuiula, the County of Maui and the State. I believe good planning is important and with good planning we can avoid the above.

Since the Kihel to Upcountry Highway is a plan for the future the U-2 and U-3 areas are the least efficient at allowing for traffic flow. The U-2 site would be a good recipe for traffic gridlock.

If you would like to go over the area in detail I would be happy to meet with you. We have had several accidents in the area since the school opened. The most recent resulted in a death. My home phone is 572-0729.

Sincerely,

Barbara J. Luke
Ms. Barbara Luke
171 Auili Drive
Pukalani, Hawaii 96761-3097

Dear Ms. Luke:

Subject: Kula-Upscountry Maui Highway Project,
Project No. HDFS-9201(1)

Thank you for your input on the Kula-Upscountry Maui Highway Project. Through letters like yours, we hope to get an idea of the public's feelings during this environmental process.

In regards to the Kula-Upscountry development, the Department does not favor one alignment over another at this time. A minimum of six alignment combinations are possible and viable. However, while an amino businessman will take advantage of area opening up due to a new highway, the Department does not select an alignment specifically to encourage development.

Very truly yours,

KAZUO YAMASHITA
Director of Transportation

[Signature]

Harren S. Utsumi Engineering, Inc.
<table>
<thead>
<tr>
<th></th>
<th>Kilauea Uplountry Road</th>
<th>Kilauea Vision</th>
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<tr>
<td></td>
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<td>5 Towns</td>
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<tr>
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<td></td>
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<td></td>
<td></td>
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<tr>
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<td></td>
<td></td>
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<tr>
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<tr>
<td>N Total</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Locality</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Kula Community Association P.O.B. 417 Kula, HI 96790

Survey results as of 27 April 1997 (FINAL)

8. # of Kula residents [96790 zip code]: 1200

Survey returned: 314

% response compared to total of Kula residents: 15%

Questions asked:

1. I believe the Uplountry Terminus of the Kilauea Uplountry Road should be: (circle one)

2. "The views for the Kula Community are to preserve open space, support agriculture, maintain a rural ambience in residential areas and ensure that, as changes occur in the region, information and services will support the rights and needs of all residents."

3. The position of the KCA Board of Directors has been in support water rate increases PROVIDED that the Department of Water Supply use the proceeds to expeditiously initiate and complete needed system repairs.

Kula Community Association P.O.B. 417 Kula, HI 96790
Mr. Alan Kaufman, President  
Kula Community Association  
P. O. Box 417  
Kula, Hawaii 96790

Dear Mr. Kaufman:

Subject: Kīhei-Uplcountry Maui Highway  
Project No. HDP-9205/1

Thank you for your November 8, 1997 letter informing us of the results of the Kula Community Association's survey. We appreciate the input on your community's opposition to U-2 and U-3 and will consider it in our project evaluation.

Very truly yours,

[Signature]  
Director of Transportation  

/re: Warren S. Ueno

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

Dear Mr. Hayashida:

As one of the General Partners of the Kulamalu Limited Partnership, I was dismayed to learn that your department has replaced alternative U2 (Kulamalu) with a new alternative, U2A. I feel that alternative U2 is a better route and should remain as the primary alternative for the following reasons:

1. Should alternative U2 be selected, the owners of the Kulamalu property have offered to dedicate the appropriate right-of-way land area and provide the design, to federal standards, for the section through the Kulamalu project area. Assuming a constant right-of-way width of 160 feet, we estimate that approximately 21.4 acres of land will be needed. Please note that in November of 1997 a 5 acre Kulamalu parcel was sold at a price of over $200,000 per acre. As such the dedication of a 21.4 acres right-of-way required for an alternative U2 will result in a significant savings to both federal and state taxpayers.

2. We are aware that your department is concerned about the approximately 1100 linear feet (3% of the entire highway length) of alternative U2 which has a 10% roadway grade. The Kulamalu property has been classified as "urban" by the State Land Use Commission since October of 1969. Based upon the design criteria of the AASHO Green Book ("A Policy on Geometric Design of Highways and Streets, 1990"), it would be appropriate to characterize the area as mountainous urban and to utilize a design speed of 40 mph (posted 35 mph) and a maximum grade of 10% (Table 7.1-1, page 53). A more detailed explanation from Austin, Tsutsumi & Associates is attached for your review.

3. Kulamalu will be proceeding with construction of a two lane roadway from Kula Highway to the Karmamaka School campus in early 1998 at a cost of approximately $6,200,000. This substantial amount represents additional project savings should alternative U2 be selected.

4. Although alternative U2A provides for a more direct approach to Huleia-Kula Highway, there are several major issues relating to this route.
A. Alternative U2A bisects an established residential community between Kaskakai Gulch and the terminus. This would require the condemnation of a number of parcels with various owners. Additionally, parallel roadways adjacent to the highway would need to be constructed to service the existing loss since the highway will be classified as a limited access highway.

B. Alternative U2A requires an additional new crossing over Kaskakai Gulch, adding substantial cost and time to this route. Additionally, Kaskakai Gulch is known to be rich in Hawaiian cultural artifacts.

C. Kulanalu has developed their master plan accommodating alternative U2. Should alternative U2A be selected, the section of this alignment traversing the Kulanalu property results in several remote parcels that would be unsuitable to the developer and therefore should be included in the right-of-way acquisition. Due to the additional project reconfigurations and redesign efforts, as well as the overall impact to the master plan, Kulanalu will not negotiate the right-of-way and design funds for the U2A alternative. Furthermore, Kulanalu will expect to receive condemnation proceeds based upon the fair market value of this urbanized and fully zoned property.

We feel that alternative U2 provides the Federal Highways Administration and the Department of Transportation with a far more economical route than alternative U2A and respectfully request that you reconsider designated alternative U2 as the primary route in the Final EIS for the Honolulu Upland Highway project. Based on the above reasons we feel that this alignment is the only viable route through this area.

In closing we want to make it clear that Kulanalu will not support alternative U2A, but on the other hand is willing to be supportive of U2 due to it’s minimal impact to the development. Thank you for your time and consideration. Please feel free to contact me should you have any questions or if you or your staff wish to further discuss this matter.

Sincerely,

RSK Enterprises LLC

Ronald Kobayashi
Its Principal
Table VI-B. Relation of maximum grades to design speed for
rural arterials.

<table>
<thead>
<tr>
<th>Design Speed (mph)</th>
<th>40</th>
<th>50</th>
<th>60</th>
<th>70</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type of Terrain</td>
<td>Grade (%)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Level</td>
<td>5</td>
<td>4</td>
<td>3</td>
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<td>5</td>
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<td>2</td>
</tr>
<tr>
<td>Mountain</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
</tbody>
</table>

The number of basis inputs is limited by volume, load of service, and spacing conditions. A divided arterial, as illustrated in this chapter, requires less or none more than.

When the use of curves is required on a rural arterial alignment, a superelevation rate compatible with the design speed must be used. Superelevation rate should not exceed 0.12; however, where far and near approach areas are long, the maximum superelevation should not exceed 0.01. Superelevation would amount to the length of roadway needed in accordance with the change in cross slope from a surface with adverse curves versus a level surface with adverse curves. Adjacent curves for stopping sight distance are considered, there are adverse advantages to using the maximum grade when cross-slopes are minimal.

Horizontal Curves

Permanent Curves

Permanent curves are constructed to provide cross-slope drainage for a period. Two-lane rural permanent are normally designed with a cosine curve and cross slopes varying from 1:1 to 1:3. Percent with the higher end being most provided. Mildly permanent are removed as the pavement deteriorates or is closed to traffic. Where drainage is carried across adjacent lanes, cross slope may be increased from one lane to another.

Vertical Clearance

Now or manmade structures should provide 16 ft clearances over cross roadways with existing structures that provide 14 ft, if allowed hand access may be reduced. In highly urbanized areas, a minimum clearance of 16 ft may be provided if there is no contact with 16 ft clearance. So we should provide additional clearance for future construction of the resembling road.

Structures

The left side for the approach roadway should initially be paved across all new bridges. Long bridges, defined as bridges having an arc length in excess of 300 ft may have a lower width. On long bridges, all or a portion, rail or barrier shall be installed at least 8 ft measured from the edge of center traffic lane on both the left and right. See Chapter 6 for more information on bridge widths.

Bridges to travel in plan should have approach slopes and at least width of the traveled way plus 10 ft clearance on each side. The roadway should be provided for an inside and outside shoulder. If they do not provide at least 10 ft clearance on each side, we are not capable of 16 ft clearances. To minimize approach, narrow bridges should be considered for special use; bridge terminations such as stopping and pavement marking.
Design Speed

The design speed for urban arterial generally range from 40 to 60 mph, and additionally may be as low as 30 mph. The lower (40 mph and below) speeds apply in the central business district and intermediate areas. The higher speeds are more applicable to the outlying business and developing areas.

Design Traffic Volume

The design of urban arterials should be based on traffic data developed for the design year, usually 30 years. The design heavily volume (DHV) is the most reliable method to determine design requirements. Sometimes, capacity is used as a design tool. The limitations and variations that are often encountered are recognized in capacity design, and a practical level of service for design conditions is provided. Refer to Chapter 8 for information on traffic and capacity.

Levels of Service

For acceptable degrees of congestion, travel and selection arterials and their auxiliary facilities, i.e., turning lanes, median separations, intersections, and traffic control systems (traffic signals, etc.), should generally be designed for level of service. M. High density volume of heavy traffic volume in urban arterials. The levels of service are provided in Table VII.2 for information on traffic and capacity.

Table VII.2 - Maximum grades for urban arterials.

<table>
<thead>
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<th>Type of Terrain</th>
<th>Maximum Grade (%)</th>
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</thead>
<tbody>
<tr>
<td>Level</td>
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Design (speed limit)

<table>
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<tr>
<td>Mountain</td>
<td>6</td>
<td>10</td>
<td>9</td>
<td>8</td>
</tr>
</tbody>
</table>

Table VII.3 - Maximum grades for urban arterials.

Alignment

Alignment of the urban arterial is ideally developed around the design speed (also called particularly when a principal arterial is located on a new location and is not replaced by a new right-of-way requirement. There are many cases, however, where this is not possible and alignment must be made in intersections. It is desirable to use the highest alignment design possible because urban arterials are often not encountered in the low-speed range.

Cross Slope

Adaptive cross slopes for proper drainage is important in urban arterials. The cross grades related to 30% drainage and hydrologic are composed in heavy traffic volumes in intermediate to high speeds. Cross slopes should range from 1.5 to 3 percent, the lower values being in the outer lanes with the cross slope increasing about 1 percent for each additional lane over which water must drain until the maximum 3 percent is reached. This
Mr. Don S. Fujimoto
Vice President
Kulaheia Limited Partnership
P.O. Box 1417
Wailuku, Hawaii 96793

Dear Mr. Fujimoto:

Subject: Kīhei-Upcountry Maui Highway, Project No. HDPS-9204(1)

We are still considering your proposed alignment for the U-2 terminus (Pukahilani end) as part of our investigation into viable alternatives. However, as mentioned in our numerous meetings we still have several reservations. These include the following:

1. Safety: The problem of braking of vehicles especially a fully loaded truck on a downgrade of 10% and the proximity of an elementary school (Kamahameha feeder school) will create a potentially hazardous mix of pedestrians and motorists.

2. Your proposed alignment would be more acceptable with a curvilinear alignment to prevent excessive speeding on a downhill 10% grade.

3. If the right-of-way is limited to a 160' width exclusive of cut and fill for 4 lanes of through traffic plus turning and acceleration/deceleration lanes, costly retaining walls may be required.

4. The steep uphill grade will more than likely require a truck climbing lane.

5. Our investigation of your alignment indicates that the Kalaiakau Gulch crossing will require piers in excess of 100 feet and a bridge span of 650 to 700 feet. This is far higher and longer than other alignments under consideration.

6. While the design speed can be lowered, this is applied in the Central Business District and immediate areas only for urban arteries.

Thank you for your interest in our project. We will be continuing our analysis of various alternatives as part of our draft environmental impact statement process.

Very truly yours,

KAZU HAYASHIDA
Director of Transportation
Dear Mr. Hayashi,

I've written you to persuade you to reconsider building the roads U-1, U-2, U-3, K-4, K-2, from Kihei to the Upcountry area to prevent serious damage to the quality of life in Kula.

U-1 will cause more traffic in the Malawana and Pakalani areas. This will eventually force you to upgrade Malawana Avenue, which is now ready to receive more traffic. If you haven't been in Malawana lately, you may not know it is also usually very crowded.

Ending Highway U-2 near the King Kamehameha High School is a bad idea. After school, this area is full of kids walking home, school buses and traffic. Students crossing the road may get hurt with the added traffic.

Tourists coming up Highway U-3 from the hotel and beach area will flood Kula. They will cause tourist stands to pop up everywhere and tourist bus stops. The result will be destroying one of the only areas with real rural life on the island.

Also, adding these roads will result in a population increase. This will directly affect our water supply. Sometimes, during the summer we receive notices to not use the water carelessly, and to not wash the cars until the semi-drought is over and even worse for the farmers not to water. More houses means more people will need water. We do not have the water for another subdivision.

The traffic increase will cause a buildup in traffic which during school hours will be dangerous and unpleasant on the Lower Kula Highway #37. Traffic moves slowly on that road near schools. Two schools are located in Kula, and both are right next to Haleakala Highway where the posted speed limit is 25 MPH. Every morning my brother and I bike to school. We travel north along the Upper Kula Highway. I don't want to see the road crowded since there is no bike lane.

Going in the downhill direction, people traveling from the Upcountry area traveling down to Kihei will result in Kihei being even more crowded. Kihei is already so crowded; I once saw this Lady in her car trying to turn right from the beach, and it took her twenty minutes. So, I assure you that the traffic and the bad air from it is unnecessary from the point of view of many.

Some people want the road so they don't have to drive as much. This is not good reason to ruin a beautiful land.

In short, this is not the time to add a major new road into Upcountry. It would be good to put the time, money and resources into building up the upcountry so it can handle the highways in the future.

Please answer back with your input, Sincerely

Azeo Park
Mr. Azeo Park
214 Kawadi Place
Kula, Hawaii 96790

Dear Mr. Park:

Subject: Kīhei-Ucountry Maui Highway
Project No. HDP-9203(1)

Thank you for your interest in our Kīhei-Ucountry Maui Highway project. We are in our environmental evaluation process and encourage public comments and recommendations on the alternative alignments.

We are preparing a Draft Environmental Impact Statement (EIS) for circulation later this year that will address your concerns. Copies will be available for review at your local libraries. A public hearing will also be held at locations in Kīhei and Ucountry Maui where the public can again make known their comments on the EIS.

I believe the high school you mentioned at the U-2 terminus is the Kīheiki High School not the King Kamehameha High School.

If you have further questions, you can write to me at the following address: 869 Punchbowl Street, Honolulu, Hawaii 96813.

Again, thank you for your comments.

Very truly yours,

Kazu Hayashida
Director of Transportation

Cc: Warren S. Uenori Engineering, Inc.
Dear Sir,

On February 15, 1998 my wife and I attended a meeting of the Kula Community Association. One of the topics of discussion was the Kula-Upcountry road. We were informed that the Association has taken the following position:

1. There should be no road.
2. If a road is to be built, it should be as far from Kula as possible.

There is a very vocal minority in favor of the 1st alternative, so much so that it really was not possible to voice a dissenting opinion. This is quite surprising in light of the fact that the Association itself undertook a survey of residents with the following results:

- 27% did not want a road at all
- 67% wanted a road, but were split between the different routes
- 6% had no opinion

While it is true that the single largest group did not want a road, one cannot help but be impressed by the overwhelming majority in favor of the project. However, this group was split among the various routes.

Having established that the vast majority of the respondents would like a road, it is probably wiser to leave the actual routing to the professionals working in and for the Department.

The Kula Community Association is not speaking for us in this matter and we do not believe that the democratic process was helped by their stance. On our part we are going to speak to our friends and neighbors to make sure our views are also heard and to this end we would appreciate to be placed on the project mailing list.

Sincerely,

Heinz Ronninger
Diane Clarke
Ms. Helga Folkes
150 Holopuni Rd.
Kula, Hawaii 96790

April 1, 1998

Department of Transportation
To Whom it May Concern:

I find the new highway that you are considering of constructing from Kibei to Kula is needed, however, I hope you consider bringing it up from Kibei, Lopes street east coming in at Highway 37 where 277 corners in South of Pakiku Gulch near Kalawao Gulch. It would make a quick way up to Haikahakaka for Kibei & Waihau residents and tourists. At the same time those from upcountry commuting to Kibei/Waihau to work would be traveling south on Kula Highway (37) where the ones commuting to Kahului, Lahaina would be traveling in the opposite direction. It would ease up some of the congestion in the mornings.

Sincerely,

Helga Folkes

Ms. Helga Folkes
150 Holopuni Rd.
Kula, Hawaii 96790

Dear Ms. Folkes:

Subject: Kibei-Upcountry Maui Highway
Project No. HPDS-92021

Thank you for your interest in our Kibei-Upcountry Maui Highway project. We appreciate your comments and recommendations regarding the project's alternative alignments. Your April 1, 1998 letter will help us better gauge the public's feelings on our proposals.

We are preparing a Draft Environmental Impact Statement that is scheduled for distribution later this year. Copies will be available for review at your local libraries. A series of public hearings will then be held at locations in Kibei and Upcountry where the public can provide us with their comments on this project.

Should you have any questions, please contact Kenneth Au at 984-2400 (ext. 71843).

Very truly yours,

Kazu Hayashida
Director of Transportation

cc: Warren S. Unoesseri Engineering, Inc.
APPENDIX B

Environmental Impact Statement (EIS) Preparation Notice

Federal Register Notice of Intent

Environmental Assessment Distribution List

Agency and Public Comment Letters Responding to the EISPN and Responses

State Draft EIS Notice

Federal Register Notice of Availability of Draft EIS

Draft EIS Transmittal Letter and Recipients

Public Hearing Materials and Sign-In Sheets
(15) Central Maui Expansion of Sanitary Landfill Project

District: Wailuku
TNR: 3-6-034
Applicant: County of Maui, Department of Public Works & Waste Management
200 South High Street
Wailuku, Hawaii 96793
Contact: Charles Jeczka (243-7845)

Accepting Authority: County of Maui, Department of Public Works & Waste Management
200 South High Street
Wailuku, Hawaii 96793
Contact: Charles Jeczka (243-7845)

Consultant: Main Pujjlo & Associates
99-1200 Hualoa Valley Street, Suite 201
Aiea, Hawaii 96701-3281
Contact: Jennifer Elveno (481-5336)

Public Comment Deadline: October 23, 1995
Status: First Notice, pending public comment.

The County of Maui has determined that the existing Central Maui Sanitary Landfill is reaching its capacity and that an additional solid waste disposal site is needed. Instead of searching for a new landfill location, the County proposes to expand the existing Central Maui Sanitary Landfill. The proposed project includes Plans IV, V, and VI. Plans IV and V are currently being used by a quarry operator and Plans V and VI are currently occupied by quarry owners but are scheduled for quarry operations in the future. Expanding the landfill into areas where the quarry operations are completed eliminates the need for large-scale excavations, and is a good use of unwanted areas.

This site is centrally located with respect to the major populated areas of Maui, yet it is also a rural, agricultural district. This combination of a central yet rural location and geographically physical characteristics makes the site environmentally well-suited for the expansion of the landfill.

(16) Kiiheki-Upcountry Highway Project

From Piiholo Highway to Haleakala Highway

District: Maui
TNR: Various
Applicant: Department of Transportation Highways Division
689 Pauwahi Street
Honolulu, Hawaii 96813
Contact: Kenneth As (887-2150)

Accepting Authority: Governor, State of Hawaii
Office of Environmental Quality Control
220 South King Street, Suite 400
Honolulu, Hawaii 96813
Contact: Warren Umemoto Engineering, Inc. (843-4405)
2145 Waihe Street, Suite 403
Wailuku, Hawaii 96793

Public Comment Deadline: October 23, 1995
Status: First Notice, pending public comment.

The Highway Division of the State of Hawaii Department of Transportation (DOT) and the Federal Highway Administration (FHWA) are preparing an environmental impact statement (EIS) addressing the construction of a new five-lane divided rural arterial with limited access. The length of the roadway would be approximately 13.4 kilometers (8.3 miles), and would link the coastal area of Kiiheki (Piiholo Highway) to Upcountry Maui (near Haleakala Highway or Kula Highway); reducing the existing journey by approximately 15.3 kilometers (9.5 miles). The roadway, referred to as Kiiheki-Upcountry Maui Highway, would be generally aligned in an east-west (ढोके-ढोके) direction. Two alternative roadway alignments have been developed.

The roadway would satisfy several goals:
- Enhance access between the Kiiheki Research and Technology Park and existing scientific facilities in the area of Haleakala, called Science City;
- Provide a more efficient route for commuters traveling between Upcountry and Kiiheki;
- Help alleviate traffic congestion on existing roadways by providing more roadway capacity; and
- Facilitate travel between Kiiheki and the summit of Haleakala.

Potential impacts of the proposed highway are expected to be relatively minor in the areas of water quality, air and noise emissions, and visual impact. However, the level of impact could be more severe in the following areas:

- Social and Economic Activity - due to possible changes in the recreational character of the Upcountry area, increased land values; and increased tourist activities.
- Traffic - due to the creation of new intersections and roadway crossings, and the culmination of traffic volumes.
- Environmental - due to possible disturbance of important cultural and historical sites and remains.
- Navigation and Fish HAB - due to possible impacts on endangered plant species.
- Biological and Archaeological Resources - due to possible impacts on native Hawaiian archaeological resources.

An EIS is deemed appropriate because the project's potential level of impact in several areas is presently unknown, and could be significant. The EIS will evaluate the alternative alignments and, on the basis of selection criteria, determine which to address in detail. The draft EIS will not select a preferred alternative from those analyzed in detail. Selection of the preferred alternative will occur after issuance of an Advanced Notice on the draft EIS.

To ensure that the full range of issues related to the proposed project are addressed and all significant issues identified, comments and suggestions are invited from all interested parties.

(17) Haiku Well Pump Station

The Final Environmental Assessment/Negative Declaration for the project action has been withdrawn. The Notice of Availability of the Negative Declaration was published in the August 8, 1993 CEQ Bulletin.

The Maui Board of Water Supply has precipitated the negative declaration. For further information, contact the County of Maui, Board of Water Supply, David Coaldick (243-7116).

The Environmental Notice Office of Environmental Quality Control.

Page 13
Environmental Impact Statement: Kiheki-Upcountry, Maui, Hawaii

[Federal Register: November 9, 1995 (Volume 60, Number 217) [Notices] [Page 56625-56633]
From the Federal Register Online via GPO Access [www.access.gpo.gov]

DEPARTMENT OF TRANSPORTATION
Federal Highway Administration

Environmental Impact Statement: Kiheki-Upcountry, Maui, Hawaii

AGENCY: Federal Highway Administration (FHWA), DOT.

ACTION: Notice of Intent.

SUMMARY: The FHWA is issuing this notice to advise the public that an environmental impact statement (EIS) will be prepared for a proposed highway project to constructs the Kiheki and Upcountry areas of Maui, Hawaii.

FOR FURTHER INFORMATION CONTACT: Mr. Abraham Wong, Division Administrator, Federal Highway Administration, Office Address: 200 Ala Moana Boulevard, Room #2002, Honolulu, Hawaii 96815; Mailing Address: P.O. Box 50206, Honolulu, Hawaii 96850; Telephone: (808) 541-2700.

SUPPLEMENTARY INFORMATION: The FHWA, in cooperation with the Hawaii Department of Transportation (HIDOT), will prepare an EIS addressing a proposed new, four-lane divided rural arterial with limited access. The roadway would be approximately 15.4 kilometers (9.6 miles) long, and would link the central area of Kiheki (Puaulu Highway) to Upcountry Maui (either Huleiake Highway or Kula Highway), reducing the existing journey by approximately 15.3 kilometers (9.5 miles). This roadway, referred to as Kiheki-Upcountry Maui Highway, would be generally aligned in an east-west (mauka-makai) direction. The roadway would satisfy several goals: enhance access between the Maui Research and Technology Park in Kiheki and the related scientific facilities at the summit of Haleakala, called Science City; provide a more efficient route for commuters traveling between Upcountry and Kiheki; help alleviate traffic congestion on existing roadways by providing more roadway capacity; and facilitate tourist travel between Kiheki and the summit of Haleakala.

Alternatives under consideration include taking no action, ten alternative roadway alignments, and a Transportation System Management alternative.

Letters describing the proposed action and soliciting comments have been sent to federal, State and local agencies, and to private land owners, organizations, and citizens who have previously expressed or are known to have an interest in this project. A meeting to discuss the scope of the EIS was held October 26, 1994, in Honolulu, Hawaii. In addition, a public hearing will be held after publication of the draft EIS. Public notice will be given of the time and place of the hearing. The draft EIS will be available for public and agency review and comment prior to the public hearing.

To ensure that the full range of issues related to this proposed action are addressed and all significant issues identified, comments and suggestions are invited from all interested parties. Comments or questions concerning this proposed action and the EIS should be directed to the FHWA at the above address.

(Catalog of Federal Domestic Assistance Program Number 20.255, Highway Planning and Construction. The regulations implementing Executive Order 12272 regarding intergovernmental consultation on Federal programs and activities apply to this program.)


R.J. McCormick,
Field Operations Engineer.
[FR Doc. 95-27638 Filed 11-8-95; 8:45 am] BILLING CODE 4910-22-M
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<td>Historic Preservation Administrator</td>
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<td>Kula Community Association</td>
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<tr>
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<tr>
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<td>Mary Jo Parker, Exec. Director</td>
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<td>American Lung Association of Hawaii</td>
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<td>245 North Kuau Street</td>
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<td>Maui Land &amp; Firestone Company, Inc.</td>
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<td>P.O. Box 187</td>
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<td>Maui Regional Library</td>
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<tr>
<td>434 Kamehameha Highway</td>
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<tr>
<td>Kaunakakai, Hi 96748</td>
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<tr>
<td>The Honorable David Morabito</td>
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<tr>
<td>Representative, House</td>
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<tr>
<td>325 S. Beretania Street</td>
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<tr>
<td>Honolulu, Hi 96813</td>
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<tr>
<td>Gregory P. Kaluhiwai</td>
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<tr>
<td>Director</td>
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<tr>
<td>Office of State Planning</td>
</tr>
<tr>
<td>2550 Kamehameha Highway</td>
</tr>
<tr>
<td>Kihei, Hi 96753</td>
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</table>
Subject: Kibi-Upcountry Maui Highway, Maui, Hawaii Draft Environmental Impact Statement

In accordance with the requirements of the State Environmental Impact Statement (EIS) rules (Title 11, Chapter 206 of the Hawaii Administrative Rules) and Chapter 343 of the Hawaiian Revised Statutes, we are providing you a copy of your letter submitted during the Kibi-Upcountry Maui Highway project’s EIS Preparation Notice comment period, along with a response to your letter, if necessary. Comments have been numbered to identify the points made in each letter, and the associated response.

Your letter and our responses are included in the upcoming Draft EIS for this project. As some of our responses may reference sections in this Draft EIS, we will send you a copy upon its publication.

Thank you for your participation in this project. If you have any questions, you may contact Kevin At (808) 587-1843 or you can reach him by calling Maui’s toll-free voice access number 984-2400 extension 71843.

Very truly yours,

Kazu Hayashida
Director of Transportation

Enclosure

CC:
Abraham Y. Wong (FHWA), OEQC
Warren S. Uanmoa Engineering, Inc.

Various

Planning and Operations Division
U. S. Army Corps of Engineers
Building 230
Fort Shafter, Hawaii 96852-5449

Mr. Donald W. Reeser, Superintendent
United States Department of the Interior
National Park Service
P. O. Box 169
Maui, Hawaii 96720

Mr. Don Hibbard, Deputy State Historic Preservation Officer
Department of Land and Natural Resources
601 Kamehameha Boulevard, Room 555
Kapolei, Hawaii 96707

Mr. Robert M. Butterfield
P. O. Box 122
Pukalani, Hawaii 96788

Ann and R. Douglas Crowe
R. R. 2, Box 96-A
Kihei, Hawaii 96790

Mr. Don Fujimoto
Vice President
Browning Company, Inc.
P. O. Box 1417
Wailuku, Hawaii 96793

Mr. Jamie Ferreira
109 Kauhina Drive
Kihei, Hawaii 96790

Mr. Stephen Holaday
President General Manager
Hawaiian Commercial & Sugar Company
P. O. Box 266
Puna, Hawaii 96784
Mr. Sam S. Hiramatsu  
99 Naunela Place  
Wailuku, Hawaii 96793

Mr. David J. Baer  
The Inocente Works  
P.O. Box 427  
Kula, Hawaii 96790

Mr. William Kentzien  
International Longshoremen's & 
Warehousemen's Union  
896 Lower Main Street  
Wailuku, Hawaii 96793

Mr. Kevin Johnston  
2720 Gulani Street  
Pukalani, Hawaii 96768

Mr. Buck Jordan  
Kīhei Community Association  
3443 Malison Place  
Kīhei, Hawaii 96753

Mr. James R. Judge  
2233 Vineyard Street, Suite B  
Wailuku, Hawaii 96793

Ms. Hale D. Jutson III  
P.O. Box 115  
Makawao, Hawaii 96768-0115

Ms. Nancy Kenedy  
2774 South Kihei Road  
Kīhei, Hawaii 96753

Susan Crowly, President  
Kaluana Brokerage  
P.O. Box 1038  
Kula, Hawaii 96790

Various  
President  
Kīhei Community Association  
P.O. Box 197  
Kīhei, Hawaii 96753

Ms. Elizabeth Macler  
168 Alaka Place  
Pukalani, Hawaii 96768

Mr. Warren A. Suzuki  
Vice President  
Maul Land and Pineapple Company, Inc.  
P.O. Box 187  
Kīhei, Hawaii 96732-0187

Mr. L. Douglas MacCherr  
Plantation Manager  
Maul Pineapple Company, Ltd.  
870 Hāliliwai Highway  
Hāliliwai, Hawaii 96768

Mr. William W. Monahan  
R. R. 7, Box 250A  
Kīhei, Hawaii 96739

Mr. Christopher Pennera  
P.O. Box 23241  
Hono, Kīhei, Hawaii 96823

Mr. Frederick W. Rothling  
Executive Director  
Maul Open Space Trust  
Kīhei, Box 198  
Kīhei, Hawaii 96790

Mr. Dennis Smith  
Box 1039  
Kīhei, Hawaii 96790

Mr. Gordon Stellway  
P.O. Box 206  
Pukalani, Hawaii 96768
EISPN Commentors Who Do Not Require Responses

Dane B. N. Young
Realty Contracting Officer
Federal Aviation Administration
U.S. Dept. of Transportation
P.O. Box 50109
Honolulu, HI 96850-0109

Sam Calajo, Computer
Department of Accounting and General Services
1151 Punchbowl St.,
Honolulu, HI 96813

David Bace, Director
Office of Planning
Department of Business, Economic Development &
Tourism
205 South Beretania St., 8th Flr.
Honolulu, HI 96813

Dennis Edward Bell, President
Hawaiian Classic Perfumes, Inc.
P.O. Box 2184
Kula, HI 96730

Zuane Lee Freitas
221 Labl St.
Punalu, HI 96722

Leila McCalhan Simon
(provided substantive comments but-address could not be located)

Edwin S. Murak
2731 Oluali St.
Puako, HI 96788

O'Cole
3200 Atlan Waiai Drive 136
Kula, HI 96733

Frank F. White
Punrea Farm
288 Cooke Road
Kula, HI 96790

Various

Mr. Edward S. Syjala
P. O. Box 149
Cumberland, Massachusetts 02052

Ms. Lehi Wesson
84 Kihikihi Place
Pukalani, Hawaii 96788

Ms. Sally Rahfield
427 Liholiho Street
Waialua, Hawaii 96791

Mr. Hans Reiche
77 Apailani Lane
Haiku, Hawaii 96708

Mr. Fred Buehner
377 Ohia Place
Kibali, Hawaii 96753

Ms. Giovicine Solomon, Director
Office of Environmental Quality Control
225 South Beretania Street, Suite 702
Honolulu, Hawaii 96813-2419
Planning and Operations Division

Mr. Kazu Hayashida, Director  
Department of Transportation  
Highways Division  
State of Hawaii  
600 Kepelani Boulevard  
Honolulu, Hawaii 96813

Dear Mr. Hayashida:

Thank you for the opportunity to review and comment on the Final Environmental Assessment and Environmental Impact Statement  
Preparation Notice for the Kīhei Upcountry Road Project, Kīhei, Maui.  
The following comments are provided pursuant to Corps of Engineers authorities to disseminate flood hazard information under the Flood Control Act of 1950 and to issue Department of the Army (DA) permits under the Clean Water Act, the Rivers and Harbors Act of 1899, and the Marine Protection, Research and Sanctuaries Act.

1. Based on the information provided, a DA permit will be required as there are intermittent streams located within the project area. Please contact our Regulatory Section at 438-9250 for further information and refer to file number PO96-016.

2. The flood hazard information provided on page 13 of the environmental assessment is correct.

Sincerely,

H. Paul Mizue, P.E.  
Acting Chief, Planning and Operations Division
November 3, 1995

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

Dear Mr. Hayashida:

Thank you for asking the National Park Service to comment on the KAAWAKAAKALULUA HIGHWAY ENVIRONMENTAL ASSESSMENT.

Enclosed are our initial comments of 10/25/95 and additional information, including that submitted by the National Biological Service, concerning resources that could be impacted by the alternative 5, 6a, 7a, or possibly 6b) through or near Pu'u Kali. The Pu'u Kali area is being considered by State of Hawaii, Natural Area Reserve Commission as a potential Natural Area Reserve. Regarding the other proposed highway routes, we have no comment.

Sincerely,

Donald W. Reeder
Superintendent

cc: Natural Area Reserve Commission

October 25, 1994

Rex Johnson, Director of Transportation
State of Hawaii's Department of Transportation
869 Punchbowl Street
Honolulu, HI 96813

Dear Mr. Johnson:

Thank you for the invitation to the October 25, 1994 meeting session for the proposed Kaaawa-Kualoa Highway. Due to the temporary absence of Kualoa National Park Superintendent Don Reeder and several other key staff, we are unable to attend this session. However, we hope to be involved as consultants as the proposed development evolves. Please accept the following comments in lieu of our attendance at tomorrow's meeting.

Alternative 6 and 6a pass through or very near what is generally recognized by biologists as one of the most intact and diverse 'windward' dry forest remaining in the Hawaiian Islands; it contains a number of listed or proposed Endangered Species Act species recognized by the US Fish and Wildlife Service, i.e., the Pu'u o Laka 'ahu'a tree. The other alternative to the west appear to pass through areas of relatively little known biological value and hence may be more acceptable from that perspective versus the alternatives to the east.

Direct displacement of dryland forests in this area by highway assessments are not the only threats posed by the proposed developments; however, non-native plants and animals and the effects of wildfire fires are other severe causes of loss. It is well known the predominance of wildfire fires are human caused in general the native shrublands that persist in this region are nearly invariably found in areas of rough 'a'a lava. However, the fire history of the past 50 years has shown that even in these discontinuous fuels, fire fed by surrounding or laminated forest fuels (primarily alien grasses and kaneku bushes) produces more than 60 feet wide, e.g., Oahu's Koolau Highway. Increased public access to areas that are peripheral to dryland forests may affect them by increasing fire frequencies in the region - a severe perturbation.

Our assessment that the more western alternative routes may be 'generally more acceptable' from a biological perspective is somewhat subjective, because these are private ranchlands without easy legal access. The private lands are largely unaltered and resilient populations of endangered species may be found among any of the proposed routes. Hence these areas occupy both the basic habitat of biological survey which would allow approval or disapproval of particular routes on that basis. Scientists of the National Park Service and the National Biological Survey have a strong interest in assessing the impacts of the proposed alternatives so that values at risk can be identified and appropriate mitigation efforts made in the planning and route selection process.

Road planners recognize that without stringent limited-access rules road developments in the purview of A sequence of growth. We recommend considering the proposed roadway carefully as to centralize development, thereby providing some protection to Maui's rural and wild areas.

Sincerely,

Karen Anghin
Acting Superintendent
U.S. Department of the Interior, National Park Service, Haleakala National Park

1. The information about the lowland dry forest, a resource containing a number of endangered plant species, is included in the Draft EIS. Alternatives 6A and 6B would have passed through or near this forest. However, both of these alternatives were eliminated from further study in the alternatives screening analysis (see Section 2.2.1 and Appendix E). The bold alternatives addressed in detail in this Draft EIS would not affect individuals of endangered plant species in this forest. A botanical survey conducted for this project (see Sections 3.6.1 and Appendix J), found no other endangered or threatened plant species along the alternative alignments. Under Section 7 of the Endangered Species Act, the FHWA has determined that the proposed project will have no effect on listed endangered or threatened plant and animal species in the project area. The U.S. Fish and Wildlife Service has concurred with this determination.

October 18, 1993

Mr. Kazu Hayashida, Director
State of Hawaii
Department of Transportation
Highways Division
600 Kapilolani Boulevard
Honolulu, Hawaii 96813

Dear Mr. Hayashida:

Your "Notice of Public Informational Meetings and Availability of Environmental Assessment (EA)" for the proposed Kula-Upono county Maui Highway project also forwarded a copy of the EA of May 1993 for our review.

The Federal Aviation Administration has no objections or comments regarding your proposed project.

We appreciate this opportunity to review your proposal. Please contact me at 541-1256, if there are ways we may be of assistance.

Sincerely,

Darice B. N. Young
Realty Contracting Officer, ASNL-56
TO: Governor, State of Hawaii
Office of the Governor

SUBJECT: Kīhei-Upcountry Maui Highway Project
Piilani Highway to Haleakala Highway/Kula Highway
EIS Preparation Notice

Thank you for the opportunity to review the subject document. We have no comments to offer at this time.

Should there be any questions, please have your staff contact Mr. Ralph Yukumoto of the Public Works Division at 586-0488.

Sincerely,
SAM CALLISON
State Comptroller

cc: State Department of Transportation, Highways Division
Warren S. Umemori Engineering, Inc.
Roger Evans
Page 2

The overview study would basically (1) review archival records and review prior archaeological survey work in the corridor and in adjacent and similar environmental areas, (2) and then predict likely land use and historic site patterns for prehistoric/earliest historic times and later 1800s times, so types of sites and densities of sites can be predicted for each corridor, (3) determine if the corridor areas have had their land surface extensively altered, making the survival of sites unlikely, and (4) determine through prior archaeological studies and through new aerial reconnaissance and/or brief field reconnaissance if the archaeological sites of the corridor areas are secure. This would provide a basis for evaluating likely site patterns and densities in each corridor and for selecting the final corridor. Some interviews with knowledgeable Hawaiians who are familiar with past land use of the region would also help in this overview, as traditional cultural places and/or archaeological sites that might have considerable significance could be identified. Final corridor selection can take this into consideration.

Thus, we urge the Department of Transportation to conduct an overview study as part of the corridor selection and feasibility process. The overview study should be included among the documents available for public and agency review prior to the final corridor selection. An archaeological inventory survey would then be conducted for the selected corridor area.

As a state funded undertaking, the project must comply with Chapter 6E, HRS. Also, as a federally funded project, the Kāhāl-Ua'ūcyno Roadway project must comply with Section 106 of the National Historic Preservation Act. We recommend that DOT and FHWA coordinate with our office as soon as possible, so state and federal compliance concerns can be met in a timely and cost-efficient manner.

KD jn

c: Kauai Hayakawa, Director of Transportation-Federal Highways Administration
October 21, 1995

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

Dear Mr. Hayashida,

Subject: Environmental Impact Statement Preparation Notice for the Kilaeua-Upcountry Maui Highway

Thank you for the opportunity to review the subject document. We have the following comments:

1. The proposed highway is expected to increase visitor traffic to the Haleakula National Park. The Draft Environmental Impact Statement (EIS) must analyze the impacts of this project on Haleakula National Park.

2. The proposed highway would facilitate access to Upcountry Maui and affect the character of the existing residential areas. The Draft EIS must examine the impacts of the roadway on the existing communities in Upcountry Maui.

3. The proposed highway would provide potential access to new areas and increase the use of lands adjacent to the roadway. The draft EIS must analyze the extent of development with and without this new roadway. Please also determine the significance of these impacts in relationship to the existing community plan.

If you have any questions, please call Jeyan Thiruchin, 866-4189. Mahalo.

Sincerely,

Gary Gill
Director

c: Warren Unemori

State of Hawaii, Office of Environmental Quality Control

Kilaeua-Upcountry Maui Highway Draft Environmental Impact Statement Responses to EISN Comments

1. As described in Section 4.11, the proposed project would improve access to Haleakula National Park. According to a Park official, approximately one million people visit the summit annually, an already substantial number in spite of the circumscribed route many visitors must travel. However, the direct influence of the proposed project on the number of visitors who visit the summit would be less than the overall health of Maui's visitor industry.

2. The impacts to existing communities and neighborhoods in Upcountry are discussed in Section 4.3.1.

3. Land use development impacts are discussed in Section 4.1.1. The project's consistency with the existing community plan is discussed in Section 4.1.2.2c.
MEMORANDUM

TO: The Honorable Kazu Hayashida, Director
Department of Transportation

FROM: Gregory G.Y. Pai, Ph.D.
Director

SUBJECT: Environmental Assessment (EA) – Kula-Uponcountry Maui Highway

We have reviewed the subject project and do not have substantive comments at this time. The EA satisfactorily addresses our concerns.

We appreciate the opportunity to review and comment on the document. If there are any questions, please contact the CZM Program at 587-2876.

DOT Highways Division
869 Punchbowl St
Honolulu, HI 96813

Dear Sir:

Please send me information on the Kula-Uponcountry Highway project. I would like to become a consulting party to the project. I want to make comments regarding the project but need your background information.

Must all comments be postmarked or received by the newspaper was not clear – by October 23?

Thanks.

Sincerely,

Robert M. Butterfield
Robert M. Butterfield

1. Thank you for your interest in this project. Your name has been placed on the project mailing list. You will receive the Draft EIS and information on the scheduling of the project’s public hearings.

RE: Kīhei - Upcountry Road

Mr. Kazu Hayashida
Director, State Dept. of Transportation
869 Punchbowl St
Honolulu, HI 96813

Dear Mr. Hayashida:

My personal preference is that a Kīhei-Upcountry road not be built. The money should be used to improve the existing roads. Maui needs this road about as much as a whale needs a bathing suit. I could not attend the meetings. I wrote for a map showing the proposed routes but I have not received it yet. I wanted to get in my comments before the deadline, so...

1. Roads from the Airport to Kaanapali and Kīhei need to be 4 lanes.
2. Something needs to be done about the terrible design of the Hana/Dairy Road area. Every try to make a left out of K-Mart? There needs to be a left turn lane from K-Mart all the way to Hana Highway.
3. And my personal pet peeve: to get to Kanaha Beach Park via the shortest least congested route from east Maui, I have to travel around the airport loop. Why can’t Alanui Street cross Kealia Place and connect directly to Alanui Place?

If a road must be built, Please, Please, Please, Please, Don’t have it connect anywhere near lower Pukalani or “5 trees” (Haileakala Hwy - Kula Hwy). There is much too much congestion in that area already. The connection should be south of 577 - 37 (south of Hailea Road). Over a million visitors a year visit the summit of Haleakalā. Most coming from Kīhei-Lahaina. This will give them an alternate route and spread out traffic so no one road is totally impacted. Mile 14.5 on Hwy 37 looks good to me for a connection point if it must be done.

Thanks for listening. Good luck.

Sincerely,

Robert M. Butterfield
Robert M. Butterfield

1. The improvements suggested are included in the Maui Long-Range Land Transportation Plan (February 1990) and are therefore included in this project's No Build condition.

2. The alternative suggested is similar to Alternatives 6a and 6b (see Section 2.2.1). These two alternatives were eliminated from further study in the alternatives screening analysis (see Section 2.2.1 and Appendix E) because they had inadequate benefit-cost ratios.

November 9, 1995

Mr. Taku Hayashida, Director
State of Hawaii Department of Transportation
849 Punchbowl Street
Honolulu, Hawaii 96813

Dear Mr. Hayashida:

We wish to add our voices to the many in our community who strongly object to the proposed Kibei-Upona Highway Project on Maui. Taking the list of "purposes of the project" in your order, following are our opinions:

1. The defense-related activities in Kibei and sciences city on Maalaea will never involve the number of personnel to justify the expenditure of $25.7 million to $32.6 million. When speed of transport is necessary helicopters can and will be used. The legislative mandate, if such has been passed, is in error and should be repealed.

2. A roadway linkage to Kibei will encourage the growth of a suburban bedroom community to Kibei while destroying the last agricultural area for small farmers left on Maui. Our farmers and their produce are important to Hawaii. There is no question that many small farmers will not be able to survive the economic impact of the growth that would ensue.

3. The existing transportation demand and capacity for Upona is just fine. There are no traffic delays on Kula Highway since the Pukalani bypass opened. Putting in a Kibei link will create a capacity problem.

4. Economic development is addressed in #. Upona needs to be protected from regional growth of population and tourist activities to protect the agricultural jobs!

5. With funds for human services, education, control of crime, etc. being severely cut or removed, this is not the time to build new highways. There is great need for improvement of highway service from Kahului to Lahaina. Should a severe storm, a tsunami or an airplane crash occur, those arteries would be paralyzed...as they have been from single traffic congestion in the past.

It is clear that the "purposes of the Project" are diametrically opposed to the life of Upona Maui as a rural-farm community. It is equally clear that the work of your department is needed elsewhere. Our plea is for reason to prevail in the protection of Upona and that sound planning and work be done to correct existing problems.

Sincerely,

R. Douglas Grove

cc: Sen. Daniel K. Inouye

John F. Craven
R. Dougal and Ann F. Crowe

1. The Draft EIS does not contain information on the number of workers traveling between the Maui RST Park and Science City. However, this number is probably very small in comparison to the one million visitors who travel to the summit annually, and residents who travel between their Upcountry residences and employment/recreation areas in Kīhei-Mauna and West Maui. These latter two travel markets would benefit from a Kīhei-Upcountry Maui Highway, with improved transportation for workers traveling between the Maui RST Park and Science City being a byproduct of the new road.

2. Potential land use development impacts are discussed in Section 4.1.1. Potential impacts to large agricultural businesses and the small Kula farms are discussed in Section 4.2.1.

3. Section 4.2.3 describes the existing traffic conditions at major intersections and roadway segments along the route between Kīhei and Upcountry. As described in Section 4.4.1, the proposed project would improve overall regional traffic conditions because the new highway would divert a large portion of the travel demand that would have used the Hana Highway-Kula Highway-Ma'alaea Highway route between the Kīhei and Upcountry regions.

4. As described in Section 4.2.2, economic development activities are expected to occur in the Kīhei-Mauna and West Maui regions, as part of efforts to expand Maui's visitor industry and to diversify its economy by developing high technology industries. None of these economic development activities are being proposed in the Upcountry region where agriculture is expected to remain the primary source of employment. However, the Upcountry region, particularly the Pukalani, Makawao and Ha`ikū areas, is expected to accommodate more residences. Therefore, the link between Upcountry's residential communities and the employment centers of Kīhei-Mauna and West Maui will become more important in the future.

5. Highway projects are funded by federal and State fuel taxes. By law, these funds can only be used for highway projects and operation. Highway funds cannot be used for non-highway purposes, and therefore highway projects do not compete against other government services, programs and projects, such as education, crime control, etc.

6. The Maui Long Range Land Transportation Plan includes widening sections of Honoapiilani Highway and construction of a Lahaina Bypass. Both projects are considered part of the proposed project's No Build Alternative.

7. The project's purposes and needs, as described in Chapter 1, are based on existing and future travel demand, land use and socioeconomic development patterns, defense-related needs and the need to increase evacuation capacity of the Kīhei-Mauna region. However, it is understood that in achieving or satisfying these purposes and needs, the highway could have adverse effects on the "suitable community" of Upcountry. It is, therefore, the purpose of the Draft EIS to disclose all potential impacts as best as possible so that full information is available prior to identification of the project's Preferred Alternative.
November 9, 1995

Mr. Kazu Hayashida, Director
Department of Transportation
State of Hawai‘i
869 Punchbowl Street
Honolulu, Hawai‘i  96813

Dear Mr. Hayashida

Re: Kihel-Upcountry Highway

We support the Department’s proposal to link the Upcountry area with Kihel, however, we have some reservations regarding alignments 4A and 4B. Based upon the map provided in the Environmental Assessment, it appears that these alignments pass through TMIC 2-3-8/55. We are currently under contract to purchase this property. This parcel has been urbanized and zoned (R-2, PD, and MF) since the late 1970’s. It would be more beneficial to the State to route the highway through non-urbanized lands, thus, lowering the cost of right-of-way acquisition.

Thank you for allowing us to comment on this project. Please call me if you have any questions regarding our position.

Sincerely,

Don Fujimoto
Vice President

Kihel-Upcountry Hwy
Draft Environmental Impact Statement
Responses to RISP On Comments

Dowling Company, Inc.

1. The concern expressed by the commenter is noted. However, land acquisition cost is only one factor among many in the identification of the project’s Preferred Alternative.
Dear Sir,

As a resident of Kula for twenty-eight years, my comment is we have no new highway. My choice is I was to make our choice it would be to connect closer to Hana. It seems the most central and cost effective.

Please don't ruin Kula like the rest of the island has been!

Please keep me posted on all news of this project.

Thank you,

Sincerely,

Jamie Feneos
OCTOBER 20, 1995
LADIES AND GENTLEMEN:

I WISH TO EXPRESS MY STRONG SUPPORT FOR ANY KHEI TO UPCOUNTRY HIGHWAY.

I DO WANT TO ADD THAT I HOPE THAT ANY SUCH ROAD WILL CONNECT KHEI WITH THE KULA HIGHWAY, TO MAKE THE MOST DIRECT ROUTE POSSIBLE FROM KHEI TO THE SUMMIT OF HALEAKALA, AS WELL AS AFFORDING EASY ACCESS TO UPPER KULA AND ULUPALAKUA.

IT IS TIME FOR US TO FACE THE FACT THAT THIS IS 1995, AND THAT WE DO OURSELVES AND OUR CHILDREN A GREAT DISSERVICE TO IMPEDER PROGRESS.

THE POPULATION OF MAUI MUST CONTINUE TO GROW AT LEAST AS FAST RELATIVELY AS THAT OF THE REST OF THE USA. HOUSING WILL BE NEEDED AND IT IS LOGICAL THAT MORE AND MORE PEOPLE WILL NEED TO LIVE UPCOUNTRY.

A KHEI TO KULA DIRECT ROAD WILL EASE TRAFFIC PRESSURE ON HANSEN ROAD, DAIRY ROAD, THE NOKULELE HIGHWAY, AND THE HALEAKALA HIGHWAY.

LET US FACE THE FUTURE AND MOVE INTO THE TWENTY FIRST CENTURY.

YOURS TRULY,

DENNIS EDWARD BELT
PRESIDENT
HAWAIIAN CLASSIC PERFUMES, INC.
PO BOX 2184
KHEI, MAUI 96753
TEL/FAX 808 874 5500

HAWAIIAN COMMERCIAL & SUGAR COMPANY
P.O. BOX 355, PUNAHELE, MAUI, HAWAI'I 96764

October 17, 1995

Mr. Katsu Hayashida
Director
Department of Transportation
State of Hawaii
869 Punchbowl Street
Honolulu, Hawaii 96813

Dear Mr. Hayashida:

Re: Proposed Kheia-Upcountry Maui Highway Project
Environmental Assessment

Thank you for this opportunity to provide comments on the Kheia-Upcountry Maui Highway Environmental Assessment. My name is Richard Cameron, Executive Vice President and General Manager of Hawaiian Commercial & Sugar Company (HC&S). HC&S cultivates 39,000 acres of sugar cane here in the central valley of Maui.

We find that the Environmental Assessment fails to adequately address the impacts of the several of the proposed alignments will have on HC&S' farming activities. In particular, alternatives 1,2,3, and 8, which dissect HC&S' fields, roadways, irrigation systems and drainage systems, in addition to taking cane land out of production, will significantly disrupt our operations. The result will be the need for operational changes by HC&S which will be extremely costly and will decrease our efficiency. Accordingly, mitigating measures will be needed to keep HC&S whole. The Environmental Assessment fails to identify and address these costs, which should be considered as costs of the highway project, in addition to the cost of acquiring the right-of-way itself.
For example, throughout Section 3.0, impacts, HC&S sugar operations appear to be ignored as an existing "agricultural activity" in the subject (impacted) areas. Section 3.3.3, Farmlands, makes no mention of sugar as a major crop in the area. Just as the alignments which traverse grazing lands are identified, it should be pointed out that alignments which 1, 2, 3, and 4 traverse lands currently being cultivated in sugar. Additionally, the conclusion stated in Section 3.1, that "agricultural, social and economic activity may be enhanced by providing a more direct route between agricultural areas and the Kihel Urban Center" is completely untrue for HC&S. In fact, just the opposite is true - HC&S prefers a highway route that does not divide our agricultural operations.

Accordingly, we request that the potential impacts on HC&S existing operations be addressed in the Environmental Impact Statement for this project and that HC&S be consulted and represented in the preparation of the EIS. Mitigating measures should be identified in the EIS, as these will be bona fide costs of the respective alignments. We offer Attachment 1 to this testimony as a summary of the impacts to HC&S of four of the identified alignments.

We look forward to future discussions with the DOT and its consultants on this proposed highway project. We believe that by working together, we can identify an appropriate roadway alignment which will benefit all parties — farmers, residents and businesses on Maui. The over 1,000 farmers at HC&S have an important stake in the chosen alignment.

Thank you for this opportunity to express our concerns.

Sincerely,

Richard F. Cameron
Plantation General Manager

Attachment

ATTACHMENT 1

Kihel-Uponcountry Maui Highway
Environmental Assessment

The Environmental Assessment illustrates ten alternate roadway alignments for the proposed highway. Alternatives 1, 2, 3 and 4 would have a serious effect on HC&S operations.

Alternative 1 — From Haleakula Highway at Hallimale Road to Pilani Highway at Kaunolu Street.

a. Land area for right-of-way is 116 acres; traverses 6 miles through HC&S property.
b. This route crosses six primary (paved) hauler roads and two secondary hauler roads.
c. This route crosses the Kaunolu Ditch, six small ditches and numerous drip irrigation pipelines.

Alternative 2 — From Haleakula Highway at Hallimale Road to Maui R&T Park at Kihel.

a. Land area for right-of-way is 78 acres; traverses 4 miles through HC&S property.
b. This route crosses one primary (paved) hauler road and two secondary hauler roads.
c. This route crosses three small ditches and numerous drip irrigation pipelines.

Alternative 3 — From Haleakula Highway, between Hallimale Road and Pukalani to Pilani Highway at Kaunolu Street.

a. Land area for right-of-way is 78 acres; traverses 4 miles through HC&S property.
b. Hanakea Ditch — This alternative passes close to the Hanakea Ditch. Serious costs associated with its relocation or replacement by a pipeline. Large siphon pipes cross two deep gulches and some long tunnels pass under pineapple fields. Several existing drip irrigation systems would be adversely affected if the ditch was relocated at a lower elevation. If the highway is located directly below the ditch, several existing drip irrigation pipelines, filter stations and pump stations would be affected.
Alternative B -- Route is along “old government right-of-way” from Hālekaloa Highway to Mākāleha Highway.

- Land area for right-of-way is 165 acres, transverses 8.5 miles through HC&S property.
- This route crosses four primary (paved) hauler roads and one secondary hauler road.
- This route crosses the Hamakua Ditch, the Keahalu Ditch, the Kowai Ditch, five small ditches and numerous drip irrigation pipelines.

In each of the above mentioned alternatives, the disruption would require mitigative measures such as:

- Land for right of way -- HC&S’ lands needed for the highway would be “prime” agriculture land that will need to be purchased.
- Splitting of fields -- Compensation for the increased cost of field operations due to the additional hauling time mileage, concrete crossings for haulers and tracked equipment. Field isolation and possible abandonment may also have to be compensated for.
- Cane hauler roads intersect -- There will be a need for underpasses or traffic lights at these hauler roads to minimize hauling delays and provide a measure of traffic safety. Additional cane hauler roads that are parallel to the new road may be necessary.
- Proximity to highway -- Compensation for the additional costs of operation to control dust and cane smoke and the potential to restrict the use of chemicals currently being used would reduce operating efficiencies.
- Irrigation system intersects -- Several pipelines, ditches, supply lines and mainlines would need to be relocated and cross the new road.
- Drainage -- These highways will cross at least three major gulches, Waikaoa, Pulehu and Kaliatuli Gulches, and several smaller ones which will require the State to build bridges to traverse these gulches adding additional cost to these projects.

Hawaiian Commercial & Sugar Company (HC&S)

1. Alternatives 1, 2, 3 and 6 were eliminated from further study in the alternatives screening analysis (see Section 2.2.1 and Appendix E). Alternative 1 was eliminated because this alternative would produce a substantially greater displacement of cultivated fields than any other alternative. Alternative 2 was eliminated because it would bisect the Maui Research & Technology Park. However, modifications to this alternative (Alternatives B and 2C) were developed in response to this and other letters from HC&S. These two alternatives are still under consideration (Alternatives U1.K1 and U1.K2). Alternative 3 was eliminated because of its poor operational aspects and because it would displace a substantial amount of cultivated fields. Alternative 6 was eliminated because it is constrained to an existing government right-of-way that does not conform to modern highway design standards.

2. The impacts to HC&S sugarcane land are discussed in Section 4.2.1 and measures to minimize or mitigate impacts to sugarcane operations are discussed in Section 4.2.4. The costs of these measures are included in the cost estimates presented in Section 2.1.2.3.

3. Additional consultation with HC&S was conducted during the preparation of the Draft EIS. Information provided by HC&S in this and other letters, and through consultation, was valuable in preparing the Draft EIS. While Alternative U1 still adversely impacts HC&S, it has been refined to reduce somewhat the level of impact.
Hawaiian Estates Realty Ltd.

Kihei-Upcountry Highway Project
Maui, Hawaii
State of Hawaii • Department of Transportation • Highways Division
U.S. Department of Transportation • Federal Highway Administration

About the Project
The Hawaii Department of Transportation and the Federal Highway Administration (FHWA) are sponsoring the construction of a rural, limited access, arterial roadway that would connect the central area of Kihei to the Upcountry area of Maui. The proposed 15.4 kilometer (9.6 mile) highway would link the coastal area of Kihei (Pāili Highway) to Upcountry Maui at either Hālekūlā Highway or Kula Highway. The highway would be generally aligned in an east-west (maka-ō-kai) direction (see map). Two lanes of an ultimate four-lane highway is being proposed for initial construction.

PURPOSES OF THE PROJECT

- legislative mandate: provide improved connection between defense-related activities at the Maui Research and Technology Park and Science City at Hālekūlā.
- roadway system linkage: provide more efficient travel between the employment centers of Kihei and residential areas upcountry.
- existing transportation demand and capacity: ease congestion and traffic delays.
- economic development: support regional growth of population, jobs, and tourist activities.

WHAT IS PROPOSED

- an ultimate four-lane rural arterial that would connect Pāili Highway with either Hālekūlā Highway or Kula Highway within an area bounded on the east by Hālekūlā and Kula Highways, starting at the Hālekūlā/Ohiaime Road intersection, continuing south past the Kula Sanitarium, toward Ulupalakua, and turning northeast to join Pāili Highway, the western boundary.

Ten alternative alignments are presently being analyzed. Based on potential impacts on social and economic activity, traffic, farmland, air emissions, visual environment, endangered and threatened species, and historic and archaeological resources, DOT has determined that preparation of an environmental impact statement (EIS) is appropriate.

MAJOR PROJECT MILESTONES

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<th>Activity</th>
<th>Completion</th>
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<tr>
<td>Planning</td>
<td>September 1996</td>
</tr>
<tr>
<td>Design</td>
<td>1997 - 1999</td>
</tr>
<tr>
<td>Construction</td>
<td>1999 - 2003</td>
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</tbody>
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COMMENTS

An Environmental Assessment has been issued, and the public comment period ends November 10, 1993. If you wish to comment, please mail or deliver comments to the following address:

Mr. Katsu Hayashi, Director
State of Hawaii Department of Transportation
869 Punchbowl Street
Honolulu, Hawaii 96813
Mr. Kenneth Au, Advance Planning Engineer  
State of Hawaii Department of Transportation, Highways Division  
889 Punchbowl Street  
Honolulu, HI 96813  
Phone: 808-244-5136  
October 4, 1995

Dear Mr. Au:

Re: Your Invitation for Written Comments
Highway for the Up-Country-Kihei Link

Thank you for your willingness to review comments for the above. We believe very strongly that the most important road to encourage and benefit tourism, ease growing traffic problems and help local residents and farmers is the COMPLETION OF THE PILLANI HIGHWAY AT WALEA. The very short and relatively inexpensive road to complete the circle around Haleakala from Hana to Wailuku will do more to satisfy our tourists than any other project. On the other hand, each day of delay means a growing number of disgruntled visitors, particularly after a long day of driving to Hana, Kipahulu and Waiopu. Estimates are that there are about 12,000 guests at the Tideswell Winery a month. Many people could save an hour of driving time back to Wailuku or Kea;apali with the Pillani extension.

The local people who work or play at Waiwai from the Kula-Waiwai area will also benefit with less traffic problems, shorter driving time, etc. Residents from Kula and Lahaina will also benefit in going to see friends or relatives at Kula Hospital, visit Haleakala or game fishing on the other side. Farmers will benefit, too.

It may be of interest to you to learn that the 86 year old road which connected Kahanuma to Wai'apalaua was closed in March 1984 because "too many tourists began using the road to have a taste of wine, and the county could not maintain the road in a proper manner. Liability was a major problem."

In the meanwhile, the Environmental Impact Study completed on February 15, 1977 by the Department and the U.S. Dept. of Transportation known as PIILLANI HIGHWAY PROJECT NUMBERS F-033-1 [4], F-033-1 [1] and F-033-1 [10] (Hana-Makena Road) Kana Highway, Maui, Hawaii, provides all the answers. The study made sense in 1977, and today it is much stronger because of ever growing traffic problems with the greatly increased number of hotels, condos, tourists and residents of Maui. If you are unable to find a copy of this somewhat ancient study in your files, I shall be glad to make of this copy of this 152 page report to you.

Thank you for your consideration of this very important matter.

Very truly yours,

Sam S. Hirooka

cc: Mr. Robert Stent, District Director  
Reo. Joseph M. Sotol, Speaker of the House

Encl.: Copy of Letter dated June 3, 1994 from William Keninson, Business Agent  
ILWU Local 142, Maui Division

Editor, Maui News

It is the goal of the ILUW to improve the life of its members, and at the same time, help our employers as well as the community in General.

According to the State Highway Dept., the road from Kana to Waiopu was greatly improved recently -- the first time in nearly 100 years, after the road was transferred from the County to the State last year. All that remains now is only a short 4 miles to complete the Up Country Area to the growing employment center of hotels in Wailuku.

We learned from the State DOT that the Pillani Highway was scheduled to be completed to Waiopu in March 1989 after the first section in Kihei was completed. The State Legislature appropriated more than $7 million in 1977 to complete Pillani to the Kula Highway.

The Benefits are many:

1. Up Country employees of Wailuku will save as much as 68 miles each day from Waiopu to Hana: 40 miles from Kula and 15 miles from Kipahulu.

2. Our Tourists, whose goodwill and business we need to provide to our members will have the short cut when they go to Hana and Hana. They will save 34 miles just one way, when they go around the island to Hana and return to Wailuku.

3. Even the Maui Hi Tech Park staff will save 25 miles round trip to Hana and Kihei. Tourists from Kea'apali will also save mileage and time when going to Hana and Hana.

Every car taking Pillani Highway will mean one less car to alleviate the traffic jams now on the Kula and Kapalua highways.

We're for the Kihei to Up Country Road too. But it may be many years before we see the road. In the meantime, Pillani is easy, short and cheap by comparison. It goes through upcountry land. The right of way is all set. Basic engineering was done in 1977 when the EIS was completed and approved by both the Federal and State Highway Departments. The terrain is relatively smooth with no guches.

The uphill climb is good -- it goes to only 1,800 ft elevation at Waiopu. We, of the ILUW wish to preserve our sugar and pineapple lands for our workers and companies, and also to support our employees who work in the Waiopu area. Preservation of farm lands for our farmers is a must.

The 4 Mile Pillani Extension is a Win, Win situation for everyone, including our construction workers who need jobs on Maui. We need the support of everyone on Maui!

William Keninson, Business Agent, PAC Chairman  
ILWU Local 142, Maui Division

June 3, 1994
Sam S. Hironaka

1. The alternative suggested is similar to Alternative 7 for this project. This alternative was eliminated in the alternatives screening analysis (see Section 2.3.1 and Appendix E) because it had an inadequate benefit-cost ratio.

Kiihi-Uapcountry Highway Draft Environmental Impact Statement Responses to EISPM Comments

DIRECTOR OF TRANSPORTATION
Nov 13 10:12 AM '95

2 November 1995

Hana Hayashida, Director
State of Hawaii Dept. of Transportation
809 Raymond Street
Honolulu, HI 96813

Dear Mr. Hayashida,

I am writing with reference to the proposed Kiihi-Uapcountry highway project now under study. As a longtime resident of Kiihi in Uapcountry Heiau, I have had ample opportunity to observe the obvious: that a more direct link between the Uapcountry area and Kiihi/Molokai would have a very considerable impact on the nature of the entire rural and agricultural community which I call home.

I view the building of such a link as potentially awesome, and I also think that there is much to the argument that the highway would put an end to the rural/agricultural nature of Kiihi, Kauai, and Koolau. There are very few residents or farmers in the area who want the road to bring to their community the urbanization that might otherwise occur. On the other hand, there are many residents of Kauai and Koolau who now commute daily to Kiihi. And who would very much benefit from a more direct link to their places of employment.

I therefore think very strongly that if the road must be built, it should be along the corridors set forth currently as Alternatives 1, 2, or 3. There is hardly any useful purpose in spending $200,000,000 to produce a route which will divert traffic up into the Kiihi area and force the great majority of those who will use the highway to have to drive further up Koolau in order to then go down to Kiihi. Keeping the eastern terminus of the road close to where most Kiihi-blend traffic now actually originates will best serve both those who use the road and those who wish to preserve the country character of the greater Uapcountry community.

Thank you for reading and taking note of my views.

Sincerely,

David J. Bank
Managing Director

cc: Warren Iwamoto

THE INCENSE WORKS
POST OFFICE BOX 421, HUAI, HAWAII 96762
PHONE (808) 673-3520 FAX (808) 974-5112
The Incense Works

1. Potential impacts to Upcountry's communities and agricultural activities are discussed in Sections 4.3.1 and 4.2.1, respectively.

2. The proposed project would not cause urbanization in Kula because development in Kula is constrained by water availability (see Section 4.1.1.2).

3. Alternatives 1, 2, and 3 were eliminated from further study in the alternatives screening analysis (see Section 2.2.1 and Appendix E). Alternative 1 was eliminated because the alternative would produce a substantially greater displacement of cultivated fields than any other alternative. Alternative 2 was eliminated because it would bifurcate the Maui Research & Technology Park. However, Alternative 2 was modified to Alternatives 2B and 2C, and these two alternatives are still currently under consideration and are now called Alternatives U1,R1 and U1,R2. Alternative 3 was eliminated because of its poor operational aspects and because it would displace a substantial amount of cultivated fields.

---

November 6, 1995

Kazu Hayashida, Director
State of Hawaii Department of Transportation
869 Punchbowl Street
Honolulu, HI 96813

Re: Kula-Upcountry Highway Project on Maui, Hawaii

Dear Mr. Hayashida:

The ILWU Local 142, Maui Division enthusiastically endorses the Alternative 4-B to the Kihel-Upcountry Highway Project. We have many members who live in the upcountry area who work in Kihel. This highway will be very beneficial to these members as well as for the economy of Maui.

We have looked at other alternatives but find that this Alternative 4-B will have the least amount of impact on our sugar cane lands.

Therefore, we would appreciate your support on the Alternative 4-B project.

Sincerely,

ILWU Local 142
Maui Division

William Hennison
Business Agent
International Longshoremen's and Warehousemen's Union, Local 142

1. Alternative 4B was modified to Alternatives U2-A.K1 and U2-B.K1. The major change to this alternative is that its Upcountry terminus was shifted north to the "Five Trees" intersection.

2760 Olulani St.
Pukalani, HI 96768
November 1, 1995

Mr. Kazu Hayashida
869 Punchbowl St.
Honolulu, HI 96813

Dear Mr. Hayashida:

I think that the road from Wailea to Kihei should be tied in around Keokea. It seems the most direct from Kihei and ties in closely for those going to Haleakala Crater. It spreads the use out and gets congestion away from the new Pukalani High School area.

Sincerely,

Kevin Johnston
Kevin Johnston

1. Alternatives 6A and 6B both had an Upcountry terminus in Keawakapu. Both alternatives were eliminated from further study in the alternatives screening analysis (see Section 2.2.1 and Appendix E) because they had inadequate benefit-cost ratios.

2445 Pehila Pl., Kihei, HI 96753, Phone (808) 879-1764, Nov. 13, 1995

OPINION — Brief Report

While I was in the Caribbean and Florida during hurricane relief, I missed the two meetings on the Upcountry/Kihei Highway. However, there seems to have been a few unfavorable letters in the Maui News regarding this project and some people have a grand new idea. Having been involved in road and traffic issues more or less for the past decade, I'd like to refresh those memories.

First of all, we recognize some names in the commentaries (sic), would allow nothing anywhere near anything. It is truly difficult to grant much credulity to such statements. For example, Roger I. Knox of Kihei suggested that the Kihei Community Association ... report by the Upcountry/Kihei Task Force which covered a period of sixteen months, involved more than 100 people from the task force, and included meetings. We did surveys in the area. We surveyed all major businesses, put out a survey in the Maui News. We had about 100 responses. There was, and I believe, continues to be (sic), a well-organized support for this project. The same people who would like to see the road, easily outweigh the few who say that the road would bring... application for the highway and it is absolutely necessary to consider all possibilities, even those that are distinctly ridiculous.

To recognize the need for this road, it is necessary to be a bit of a visionary. Maui is growing and it will continue to grow, hopefully in an intelligent, planned, managed manner. Someday we hope to have a four-year college or university. Someday South Maui will need a High School. Someday we will need a second hospital. All of these projects could easily go above the Haliakalau and South Maui will soon have a 1200 acre recreational park. It would seem reasonable that the people Upcountry would want, and should have, access to all of these facilities. The Upcountry/Kihei Highway would do that.

In a more pressing matter, please consider the safety aspect of this highway. For years I have preached about the extreme vulnerability of South Maui to catastrophe. If a large fire started in North Kihei, fanned by trade winds blowing South, it could easily block both S. Kihei Rd. and Pi'ilani Highway. There is a critical need to build a second road. A fire of this magnitude is possible, and we do not have the resources available to control it. Moreover, the Upcountry/Kihei Highway would allow access to thousands of homes and apartments and it can happen anywhere. A highway to Upcountry listening to the Kihei at the Haliakalau of South of the point, would provide an additional road that residents have lived as well as access for fire fighters to get in front of the fire. Also, if Maui is a direct hit by a major hurricane, large sections of South Kihei Road would cease to exist. Pi'ilani Highway will be in constant gridlock and recovery efforts will be severely impacted. Upcountry/Kihei Highway would be invaluable in this situation. Similarly, the highway would provide an additional evacuation route for Upcountry residents. It is easy to be a nay sayers and throw verbal rocks. It is much more difficult to recognize the need for managed growth and appropriate disaster preparation, and to make it happen. Recognize also that the political and financial climate is changing drastically. If the Upcountry/Kihei Highway is not built now, in the future, the cost will be higher and the availability of funds will be considerably less. The Upcountry/Kihei Highway will be a long range benefit to Maui. Expensive, but worth it.

Sincerely,

John T. Johnston

Chairman of the Maui Power, Water, Sewer Council, Counties Kihei Traffic Safety Committee, a member of the Maui Traffic Safety Council, and participates in all County and State Road and Highway Planning Groups for many years.

C.C. KA'AHUPA, P.E.

CC:

M. K. KAHAUPA, P. E.
Buck Joiner

1. Increasing the coastal evacuation capacity of the Kihei-Makena region is one of the purposes of the project.

JAMES R. JUDGE
2223 VINEYARD SQUARE, SUITE D
WAILUKU, MAUI, HAWAII 96793
TELEPHONE: (808) 243-8955
FAX: (808) 242-3568

October 23, 1995

Department of Transportation
Highways Division
Attention: Mr. Kenneth Xu
Aliamanu Hale, 5th Floor
869 Punchbowl Street
Honolulu, Hawaii 96813

Re: Kihei/Mauna proposed highway

Gentlemen:

I would like to become a consulting party and go on record with the following comments about the environmental effects of the proposed highway:

1. The routing of any proposed highway that would cross both Pulehu and Oaoao Roads would destroy the rural character of the area.

2. The topography of the Pulehu and Oaoao areas is such that all of the road and traffic noise would be clearly broadcast to the higher areas.

3. At the present time, when any of the sugar cane fields are burned and harvested, you can distinctly hear the cracking of the flames and the squeaking of the heavy equipment operating over three miles away. All traffic noise would be similarly amplified.

In addition, having a proposed highway bisect both Pulehu and Oaoao Roads would create a traffic hazard. You must understand that both Pulehu and Oaoao Roads are used by many farmers, either taking their products to market or moving heavy equipment from field to field. Farming requires heavy, slow moving equipment, which would make crossing a higher speed limit highway extremely difficult, if not extremely dangerous.

The most important thing to understand about the proposed highway is that both Pulehu and Oaoao Roads are very narrow, winding roads that simply were not engineered or built to take the increased traffic that would feed into any new highway.
It is obvious that all Pukalani and Kula residents who live or work south of the Kula 200 subdivision would utilize either Omaopio or Pukahau Roads to gain access to any new highway, as it would be closer for them.

Traffic presently backs up at the bottom of Pukahau Road, at Hansen Road, and we could expect the same to occur at any intersection with the proposed new highway. Attempting to cross a 55-mile an hour highway would create a worse backup than the present crossing of a 35-mile an hour Hansen Road.

Please contact me if you have any questions regarding the above.

Very truly yours,

James R. Judge

JMJ:jfoa675
pc: Mr. Mass Udono
To whom it may concern:

I am writing concerning the proposed project along the road, and a lot of upcountry folks East this way.

I like the idea of people from out in Haiku and the town using the project benefitting, from this road. Furthermore, a project that stops in Kula, to Kula, and has a road. A road, will intersect this highway, a curved road, or whatever it may be, and that road, will benefit too.

As far as the amount of people,

I see many people on both sides.

I think there will need to have a

for the road towards it would be easy. Is this, coastal, or not.

Just know that it will be well

upcountry and down.

Thank you for your consideration.

Mr. Hale D. Judson III
P.O. Box 315
Kula, HI 96730-0315

Ph # 572-0539
November 3, 1995

State Department of Transportation
Highways Division
859 Punchbowl St.
Honolulu, HI 96813

RE: New road between Kīhei and Upcountry

Dear Dept. of Transportation:

I am strongly in favor of having this road completed as soon as possible. The newspaper coverage of the hearings made no mention of what I perceive as the most serious reason for having this road. Should Kīhei ever be subjected to tsunami flooding, we would have no way of reaching other parts of the island. All of our grocery stores are in the flood plain, and could be wiped out. We need another road to provide us a way of exiting to higher ground in case of disaster.

Why are we looking a gift horse in the face. Let's take advantage of this wonderful opportunity to expand our road system with the help of federal funding and reap the fringe benefits of opening a new part of the island for sightseers, visitors and residents. Kīhei deserves this. We are the last community on the island to get a public swimming pool and a decent community center and decent school buildings. Please don't deprive us of this chance to bring increased infrastructure to our area with the help of the federal government funds.

Aloha from Maui,

Nancy Kanady
2274 So. Kīhei Rd.
Kīhei, HI 96753

808-579-5595
Department of Transportation  
Highways Division  
569 Punchbowl St.  
Honolulu, HI 96813

November 10, 1995  

Ladies and Gentlemen,

I strongly support a Kihei to Upcountry, Maui Highway.

There are so many reasons why I feel this is urgently necessary. The population on Maui is only going to increase. Over the past 20 years I have seen amazing growth, and unfortunately a tremendous lack of planning for this growth.

We rely on tourism as our major source of economy. With the rise in tour buses come huge numbers of automobiles on the road, and accidents due to sightseeing. To be able to bypass the lead roads for Kamauma's, so they can drive to the crater and beyond, quickly from their hotels in Kihei, would significantly reduce highway deadlocks, and I believe road fatalities and insurance claims (thereby lowering rates—hopefully).

Now with the Hawaiian land claims on the planned new extension bypassing Dairy Road by the new shopping center, the traffic lights on Dairy Road and Hana Highway should be unpassable during AM & PM commutes times, as well as the lunch hour... Which basically means only a few hours per day will traffic flow normally through that section. By opening the Upcountry road—we could re-route a significant number of vehicles... The road debate could continue for years, but not be intolerable. (Plus better negotiating for the state on land swaps—if it is urgent).

I will be joining many Upcountry residents soon, and hope to one day soon solve the 45 to 60 minutes I will be forced to drive by dining so far around.

Please guide us into the 21st Century safely and efficiently, by extending Uipa Road up from the Research and Tech park in Kihei to Kula in the most direct and cost efficient manner. If you have a better plan—I will support the one that goes in the fastest.

I encourage you to do this now—not in ten years. It will create much needed jobs and lessen the impact on our environment (via reduced gas purchasing, shipping and pollution). Please plan for planting of trees and bike pathways. (Link to Kihei 2000 and the Kalawao (Student benchmark project)).

With Regards,

Sunny Crowley  
President  
Kilicame Brokerage  
P.O. Box 1029  
Kula, Maui, HI 96790

Sunny Crowley, Kilicame Brokerage

1. The roadway would include landscaping and paved shoulders that are 1.8 m (6 ft) and 2.4 m (8 ft) wide, sufficient for use by bicyclists.
November 10, 1995

Mr. Kano Hayashida, Director
State Dept. of Transportation
809 Punchbowl Street
Honolulu, Hawaii 96813

Dear Mr. Hayashida,

Thank you for this opportunity to allow our Association to offer input on the proposed Kilihi-Upland Highway. Our board of directors has been canvassing our community for opinions on the different alignments and options. Our current conclusions are very similar to the recommendations we submitted to the SDOT on 10/10/94 (copy enclosed). We found support for a single alignment, the "No Build" option, along with a (PSM) and Public Transit Alternative. We also came up with verified comments on the Environmental Assessment of this project.

Please allow us to continue with our observations and suggestions.

We understand the reasoning behind the "Legislative Mandate," and agree the defense-related activities at Science City and Kilihi's MRT Park should have an bearing on preference on which alignment is studied. Even the "no build" option should qualify for the funds by getting the workers to and from the summit in a safer and more efficient manner.

We believe that a new highway between Kilihi and Upland would greatly improve the traffic flow up and down the mountain. We also agree that the "No Build" would improve the public transportation system would do the same, and move the logical first step to take. Public transportation might only help a small percentage of the commuters, but it would guarantee to eliminate thousands of rented cars, adding road room for years to come.

Our board had trouble with the high estimates of growth stated in the E.A. from 1997 to 2020, jobs on north side up 43%, population Upland up 41%, and the visitors count up 122%.

In the past 8 years unemployment has doubled, hotels and many other businesses have streamlined operations, laying off many workers. Along with a fairly flat tourism market, on new hotels are being planned for the future for the Kilihi-Waller-Makaha area.

Growth Upland in the Kilihi Upland region will be restricted because of the lack of water. Hawaiian Homelands, farmers, and drought protection for the current residents are the priorities for any future water source development.

Maui's real attraction is its open space. Our parks will hopefully be protected and increase in size and number, but our Agricultural areas, ranches, and truck farms are the most important assets of our unique community for the resident and visitor alike. We all must consider the trade-off if this highway is plotted through those areas.

In our current Upland Community Plans Recommendations, commercial and light industrial lands are being designated to supply jobs and services to limit the need to travel down the hillside. We also expect a major increase in home run businesses. This concept of Upland becoming a more complete community is a realistic one.

Our Board of Directors has concluded that we would support only the alignment connecting Hekili Street to a northern connection in Kilihi, with conditions. We are concerned as many residents and farmers are that this alignment will cause undue and undesirable traffic to Kilihi off the new highway onto Manoa and Pali Roads. This potential impact would have to be resolved with those concerned to gain our full support.

Our Board of Directors has also concluded that we support a "No Build" Alternative as stated in the Maul Long-Range Plan. We believe all of these road improvements should be studied and funded except for one, Alternative 7 (Pali Road to Upland). The State should in no way consider this connection with the No Build plan, or otherwise. Our Association and community have voiced strong opposition to this roadway, knowing full well the major social impacts it would cause. Our serene low density agriculture areas would experience a change in character threatening our country communities across the mountainside. Those few that support this road alignment can never justify the harm it would do.

We hope these concerns and recommendations help clarify some areas that we believe to be important, and possibly overlooked in the assessment of the Kilihi-Upland Highway Project.

Sincerely,

Steve Sorensen, President
Kula Community Association
KULA COMMUNITY ASSOCIATION

Mr. Rex Johnson, Director
State Dept. of Transportation
880 Puupöbowl Street
Hanaeleo, HI 96713-5997

Subject: Kula-Upcountry Maui Highway
Project #: HDPS-9203 (1) HWY-PA 2.2552

October 10, 1994

Dear Mr. Johnson,

Thank you once again for inviting the public into this important process. Our Association appreciates the opportunity to further study this project along with the DOT and all those who might benefit. We know this plan will never fly without widespread community acceptance. To achieve this acceptance it must be shown to benefit the many residents who travel down to work daily in a safe, efficient direction. Military purposes, visitor traffic, and definitely Hawaiian Home Lands are all important concerns, but losing our small farms, awakening our rural communities of Omaopio, Kekaha, and Waikoloa with the screams of development and transient traffic flows will not be acceptable to all but a few who live on this mountainside.

CONDITIONS OF OUR SUPPORT

We stand ready to support a final alignment only if:

1. The highway benefits the main upcountry resident commuter population base (Pukalani, Makawao, Hali'imaile)
2. Impacts to the future Socio-Economic environment of Kula is minimal
3. The route is safe and efficient (overpasses and underpasses, where needed)
4. Small farms and residents will not be displaced or disadvantaged
5. The route connects directly with Hanaalaka Highway (to eliminate the potential use of many narrow, steep, neighborhood roads as shortcuts).
6. The Kula terminal should be located to aid Westside commuters and a future spur road access to the Hawaiian Homes Development if possible.

General Comments, Concerns, and Information On Schematic Plan of Alternative Alignments (W. Umeo, Map Revised Aug. 19, 96)

ALT 1, 2, 3

These routes would satisfy most of our conditions if all intersections were made to be safe. The Kula C.A. would favor them in numerical order,

Alt. 1 only intersects Pualehu Rd. and intersects directly into Hali'imaile Rd, routing traffic from Makawao and Hali'imaile straight to Kula.
Alt. 2 crosses both Pualehu and Omaopio but intersects with Hali'imaile Rd.
Alt. 3 would not benefit as many people, lacking the efficiency of 1 & 2, crossing both Pualehu and Omaopio, also not connecting with Hali'imaile Rd. but again meeting most of our conditions.

ALT 4, 5, 6, 7

These suggested alignments would fail to meet most or all of the Kula C.A.'s conditions of support for the Kula / Upcountry Highway.

With much thought and debate the Kula C.A. concurs with the:

Distinguished members of the Makawao / Pukalani / Kula Citizens Advisory Committee (Re-Kihei / Upcountry Highway)

And

The Maui County Planning Department's recommendations of the revisions of the M.P.K. Community Plan Update (Re-Kihei / Upcountry Highway).

That:

Kula-Upcountry Highway: The proposed highway between Kula and the Upcountry region is significant in terms of its land use and transportation impacts. The CAC recognized that the selection of an alignment must consider the growth inducing impacts to the region's agriculture, rural character and open spaces. The need to maintain the unique Upcountry ambiance is an essential parameter in analyzing alternative routing schemes. Recognizing that the evaluation of alternatives should weigh transportation costs and benefits as well as community and land use impacts, the CAC recommends that the Upcountry terminal intersect Hanaalaka Highway in the vicinity of Hali'imaile Road. The CAC further recommends that a spur off of the proposed Kula-Upcountry Highway be provided to facilitate access to the Department of Hawaiian Home Lands development area.

The Kula C.A. also agrees with both the Upcountry CAC and the Maui Planning Dept. that the Makana-Ulupalakua Connector road be dropped as a capital improvement project thus, all planning, design, and funding be suspended. (ALT 7)
We also believe this route (ALT 7) would benefit very few, worsen traffic safety, disrupt quiet communities, and only benefit visitor traffic and private landowners.

Some citizens in our association do believe the losses outweigh the gains connecting these maunau and maeki communities, and funds should be used to improve existing roads and highways to aid the traffic flow between Upcountry and the South / West Side. The Kula C.A. also believes this is a realistic alternative and should be studied.

The Kula Community Association has followed the Upcountry Highway discussion through the Toll Road concept of former Mayor Tavares (Dec. 1990) and the hard work of the Upcountry / Kilei Highway Task Force. We are fully aware of the importance of choosing a workable alignment versus one plagued with problems or weighted by special interests.

Thanks again for listening, and could you please forward the origin / destination studies and any reports filed to you on this project to help us stay current.

Much Aloha
Sincerely,

Steve Sutro
President,
Kula Community Association
Kula Community Association

1. The transportation systems management (TSM) alternative, which includes improvements to Maui's para-public transit system, was eliminated from further study in the alternatives screening analysis (see Section 2.2.1 and Appendix E) because it would not satisfy the project's goals.

2. The projections in the environmental assessment were taken from socioeconomic forecasts prepared for the County of Maui in 1994. Since that time, State of Hawaii Department of Business, Economic Development and Tourism (DBEDT) completed their year 2020 projections, which are an update of previous projections for the year 2010. In comparing both projections for the year 2010, the County population and daily vehicle census projections are 3.5 percent, 5 percent, and 14 percent higher than the DBEDT projections, respectively. Therefore, the comment is justified in questioning the County of Maui projections. However, more recent DBEDT projections indicate that the county's population, employment and daily visitor counts would still increase substantially, by 22 percent, 25 percent and 32 percent from 1990 to 2010, respectively.

3. We agree that water availability has historically and still continue to be the major constraint to development in Kula (see Section 4.1.1.2)

4. One of the impacts of the proposed project is the conversion of open space, currently used for sugarcane and pineapple cultivation and cattle grazing, to a paved roadway (see Section 4.1.1)

5. Travel demand between Upcountry and the rest of Maui for employment, shopping, or other two purposes is still expected to remain relatively high for the foreseeable future because no new major employment centers or commercial facilities are being planned for Upcountry, except those within the proposed Kulamalu development.

6. Both an Upcountry terminus at the Kula Road/Kahului intersection and a Kula terminus at the Pauanui Highway/cane Mill intersection are still under consideration.

7. Potential impacts to travel patterns on Maui and Maui Intersystem are discussed in Section 4.1.1. Possible mitigation measures to address these impacts are described in Section 4.4.4.

8. Alternative 7 was eliminated from further study in the alternatives screening analysis (see Section 2.2.1 and Appendix E) because it has an inadequate benefit-cost ratio.

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October 19, 1995

Mr. Kazu Hayashida
State Department of Transportation
Highways Division
859 Punchbowl Street
Honolulu, Hawaii 96813

Dear Mr. Hayashida,

The October 18, 1995 article in THE MAUI NEWS, "Upcountry-to-Kihei road has its ups and downs," gave some shocking figures. The cost of this highway between Kihei and Upcountry was quoted as $50 million. The time saved for individuals traveling this route was quoted as (a whopping) 25 minutes. The cost for agricultural companies involved was described as "extremely costly.

Why can we not look at the situation more creatively? The travel time to Kihei is prolonged by the lack of the fourth lane of Hana Highway, the intersection of Hana Highway/Dairy Road, and the need to improve Pali Highway by four lanes beginning at Dairy Road. Surely the addition of the fourth lane to the Hana Highway, an imaginative and ingenious improvement of the Dairy Road intersection, perhaps an overpass, and adding the two lanes to Pali Highway would alleviate the traffic congestion that is a headache for everyone, both those in Kula and Upcountry residents.

I am sure the Maui County Planning Commission would be relieved to know that a large construction project and highway was not crossing their land.

Maui has the basis of a very successful public transportation system ran by Maun Economic Opportunity. It would be a simple matter of upgrading their funding and expanding their facilities to have a full-scale public system. In view of our shaky economy, would it be not more economical and sensible to use our highway funds in a wise and responsible manner? Do we really need an "H-3" on Maui?

Very truly yours,

Elsiebeth Hardesty (Mrs. David Hardesty)

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THE MAUI NEWS, THE KROMALU ADVERTISER/ STAR BULLETIN, State Department of Transportation, Senator Daniel Inouye
Elizabeth Marcel

1. Many of the improvements suggested are recommended in the Maui Long Range Land Transportation Plan and therefore are considered part of the proposed project's No Build Alternative. The impacts of the No Build Alternative are evaluated in the Draft EIS.

2. Improvements to Maui's para-public transit system were considered under the Transportation Management System (TSM) Alternative. The TSM Alternative was eliminated in the alternatives screening analysis (see Section 2.5.1 and Appendix E) because it would not satisfy the project's goals.

November 6, 1995

Mr. Kazu Hayashida, Director
State of Hawaii
Department of Transportation
689 Punchbowl Street
Honolulu, HI 96813

Dear Mr. Hayashida:

Subject: Kihei-Upcountry Maui Highway Environmental Assessment

Pursuant to our review of the Environmental Assessment (EA) for the proposed highway project and our attendance of the public informational meeting held at the Upcountry Community Center on October 17, 1995, we offer the following comments:

1. Alternatives 2, 3, 4, 6, 7, 8 and 9 will adversely impact the operations of Maui Pineapple Company, Ltd. HPPOs in varying degrees. For each of the alternatives the EA should address the adverse impacts on existing farming operations and efficiency, existing irrigation systems, existing planting layouts, existing farm roadway systems, existing pineapple harvesting operations, etc. In addition, for those alternatives that will bisect existing pineapple fields, the question on whether or not it would be economically feasible to continue to farm the smaller remnant parcels created by the proposed highway should be answered.

2. The EA should analyze the negative cost impacts on the existing pineapple farming operations for each alternative.

3. The EA should address the mitigating measures that will be necessary due to the adverse impacts on the existing pineapple farming operations.

4. The economic state of pineapple operations has been marginal. There is a current shortage of viable pineapple farming lands and the loss of any lands caused by the proposed highway will have further negative impacts.
Mr. Kazu Hayashida  
November 6, 1995  
Page 2

We appreciate the opportunity to provide our comments. If you have any questions or wish to discuss any of our comments, please feel free to contact me.

Sincerely,

Macren A. Suzuki 
Vice President/Land Management

/c/  
Gary Clifford  
Doug McCluer  
Mas Nohara  
Doug Schenk
October 3, 1995

DOT Highways Division
866 Punchbowl St.
Honolulu, HI 96813

Attention: Kenneth Au

Dear Mr. Au:

SUBJECT: COMMENTS ON UPCOUNTRY-FINEST HIGHWAY LINK

It is my opinion that the link between Upcountry and Kihei is unnecessary and will have a negative effect on the Upcountry area still has the lowest crime rate on the island of Maui.

The road between Kihei and Upcountry will lead to the expansion of development in the area which is now the buffer between the tourist and commercial areas of Kihei and the quiet bedroom communities of Hali and Pahalani. To create this corridor will be to the detriment of the Upcountry and is, in my opinion, unnecessary.

The present traffic is manageable and growth in the future will be dependent upon additional water which does not now, or in the very near future, seem to be available.

Thank you for your consideration.

Sincerely,

[Signature]

L. D. Hefcluser

Maui Pineapple Company, Ltd.

DRAFT ENVIRONMENTAL IMPACT STATEMENT Responses to ESPU Comments

Maui Pineapple Company, Ltd.

1. Section 33.6 provides information about current crime rates for both the Kihei, Makana and Upcountry communities. In comparison to Kihei-Makana, Upcountry has lower overall crime rates. The effect of the road on crime rate is discussed in Section 4.3.3.

2. Potential land use development impacts are discussed in Section 4.11.

3. Section 1.2.3 describes existing traffic conditions. Consultation with the Maui Board of Water Supply supports the comment that future development in Upcountry depends on the water supply.
CORRECTION

THE PRECEDING DOCUMENT(S) HAS BEEN REPHOTOGRAPHED TO ASSURE LEGIBILITY
SEE FRAME(S) IMMEDIATELY FOLLOWING
October 3, 1995

DOT Highways Division
869 Punchbowl St.
Honolulu, HI 96813

Attention: Kenneth Au

Dear Mr. Au:

SUBJECT: COMMENTS ON UP COUNTRY-KHIEI HIGHWAY LINK

It is my opinion that the link between Upcountry and Kihei is unnecessary and will have a negative effect on the Upcountry area. Crime reports indicate that the Upcountry area still has the lowest crime rate on the island of Maui.

The road between Kihei and Upcountry will lead to the expansion of development in the area which is now the buffer between the tourist and commercial areas of Kihei and the quiet bedroom communities of Hula and Pukalani. To create this corridor will be to the detriment of the Upcountry and is, in my opinion, unnecessary.

The present traffic is manageable and growth in the future will be dependent upon additional water which does not now, or in the very near future, seem to be available.

Thank you for your consideration.

Sincerely,

L. D. Hahlwer

Maui Pineapple Company, Ltd.

1. Section 3.3.6 provides information about current crime rates for both the Kihei-Makena and Upcountry communities. In comparison to Kihei-Makena, Upcountry has lower overall crime rates. The effect of the road on crime rate is discussed in Section 4.3.3.

2. Potential land use development impacts are discussed in Section 4.1.1.

3. Section 1.2.3 describes existing traffic conditions. Consultation with the Maui Board of Water Supply supports the comment that future development in Upcountry depends on the water supply.
Linda McGahen-Simon

1. Potential impacts to Upcountry's communities and agricultural activities are discussed in Sections 4.3.1 and 4.2.1, respectively.

2. The proposed project would not cause urbanization in Kula because development in Kula is constrained by water availability (see Section 4.1.1.2).

3. Alternatives 1, 2, and 3 were eliminated from further study in the alternatives screening analysis (see Section 2.2.1 and Appendix E). Alternative 1 was eliminated because it would produce a substantially greater displacement of cultivated fields than any other alternative. Alternative 2 was eliminated because it would bifurcate the Maui Research & Technology Park. However, Alternative 2 was modified to Alternatives 2B and 2C, and these two alternatives are still currently under consideration and are now called Alternatives U1,K1 and U1,K2. Alternative 3 was eliminated because of its poor operational aspects and because it would displace a substantial amount of cultivated fields.
To gain a perspective on the proposed highway link from Kula to Up-Country, Maui, one must go back to the creation of the Kula Research & Technology Park. For five years I lobbied for the Maui Economic Development Board (MEDB) where my chief responsibility was the development of the Park. From its very inception, we knew that it was critical to site the Park on the site of the former rail line that traversed Kula and Hana. During the negotiations, it became evident that the contractor and the rail line would be constructively opposed to placing the administrative center in the Park. They wanted the location to be near to Hana in the east and close to the rail line in the west, which was more in their best long-term interest.

The infrastructure of the Park was completed, an office building was constructed, and the rail line contractor and rail line officials were educated. Now after all this came the opportunity to get funds through the defense budget in the form of the high-speed rail line to link the Park to Hana in Hana. The military significance of the road was always recognized as negligible to non-existent. The money to build it was what you would call "loophole." MEDB was then required to coordinate efforts to determine the best route.

The issue really came before the public during the planning sessions of the Up-Country Community Advisory Council (CAC). I was a member of that CAC. The entire report of the CAC, which met over twenty times, is replete with the message that Up-Country needs a primary environmental resource that should be protected for the benefit of all who live in or visit Hawaii. A highway that would create a loop from Kula to Hana and back would destroy the Hana highway. We were told by rail line officials that the route would be far more attractive to rail line officials than the rail line is to the rail line officials.

The Department of Transportation would have a much better chance of obtaining the necessary funds to build a high-speed rail line to the rail line than to the rail line.

I fully concur with this conclusion by the CAC. One need only look as far as Oahu to see what happens to rural areas when they are accessed by highways. Development is not very far behind and the rural nature of the area is gone forever. Kula should be viewed as a city, not just for the pleasure of those who live there, but for everyone. I have been a life resident of Hawaii, first on Oahu and now on Maui. I have watched beautiful Oahu turn into a congested nightmare. Please, resist the pressure of developers and land owners and do something right for these islands. Don't allow a Kula-Kula loop to happen.
October 20, 1975

STATE DEPARTMENT OF TRANSPORTATION
Highways Division
600 Punchbowl Street
Honolulu, HI 96813

Ref: The Upcountry-to-Kihei Road

Dear Sir:

My name is Edwin S. Murai. I am a resident of Pukalani, Maui. I am in favor of an Upcountry-to-Kihei road.

This road would be the link between Upcountry-to-Lahaina and a means of bypassing the Kahului/Ma'alaea hub.

Yours truly,

Edwin S. Murai
2711 Olialani Street
Pukalani, HI 96788

P.S. The choice of the best route, I leave up to professionals like yourself. Keeping in mind that it is a link between Upcountry and Lahaina.
Christopher Perreira

1. Alternative 3 was eliminated from further study in the alternatives screening analysis (see Section 2.2.1 and Appendix E) because of its poor operational aspects and because it would displace a substantial amount of cultivated fields. Alternative 5 is still under consideration, and is now called Alternative U3.K1.

2. As described in Section 2.1.2, right-of-way would be reserved for a four-lane divided highway, even though the proposed project would only construct a two-lane highway. It is not anticipated that a four-lane divided highway will be needed by the design year 2020. The design of the two-lane highway would be such that the future expansion to a four-lane divided highway would have minimal impacts to traffic conditions.
Conference Memo 10-1-95

Dear Kenneth

I'd like to comment on the road from Kula to Kīhei. Just do it!

I think you should put the road through the Ulupalakua
Ranch (the old road) to come out near kapalua. I think a lot
of the people that would use this road are workers and tourists. That would
put all these people in the same area and not in Kīhei. Kīhei is very crowded
already.

Aloha

Fred Peterson

Kapalua Bay Hotel
October 1, 1995

Kennerth Au
State DOT Highway Division
869 Punchbowl Street
Honolulu HI 96813

Dear Mr. Au:

I would like to be a consulted party for the Environmental Impact Statement for the Kihei to Kula highway link. Please send me a copy of the Draft EIS, if it exists, or of the Environmental Assessment.

Thank you for your assistance.

Sincerely yours,

Sally Raisbeck

Sally Raisbeck
Given the fact that people living on Maui do work by computer in London, i.e. doing currency trading on the London market, and also given the fact that modern telescopes can be remotely controlled from laboratories all over the world, it would seem that the need for people to travel from the base facilities to Science City is considerably less now than when the base facilities were in Puna. In ten years that need will be considerably less than it is now.

4. What time saving would be made in the entire trip from Science City to Kīhei by any of the new proposed highways?

Section 1.2 of the EA says that a 45 mile journey would be reduced by 9.5 miles. The time consuming part of the journey is the twisting switchbacks of Crater Road, which must still be traversed regardless of the new road. The roads eliminated are mostly high speed roads, Piiholo Highway, Volakia Highway, Hana Highway, and Hāna Highway. Only the stretch of Hānaua Road is two-lane and slow.

If we estimate an average speed of 55 mph for 7.5 miles and 30 mph for 2 miles, the saving of 9.5 miles in distance would mean a time saving of about 12 minutes.

5. If the federal defense benefit of this highway consists of saving 12 minutes on a journey for only a handful of people, is it worth the $80 million federal funds for this highway? Is the highway needed for the stated reason, or is it a purely pork barrel project?

As a federal taxpayer, I would much rather have my federal taxes go for health care than for this highway. As a state taxpayer, I would much rather have my state taxes go for schools and libraries than for this highway.

The true driving force for this highway is to open Upcountry to the kind of real estate development that has taken place in Kīhei. Most people Upcountry do not want that to happen.

6. If only a few people need to travel between the two sites for work-related purposes, is a new highway the best way to facilitate their travel?

At the Information Hearing, I suggested half-jokingly that helicopter trips between Kīhei and the edge of the National Park, plus a van shuttle to the top, would be faster and more cost-efficient than a new highway, for the federal defense linkage requirement. The National Park begins at about 7000 feet elevation, and this alternative would eliminate a portion of the time-consuming Crater Road, as well as the portion of the route the new highway is expected to cover.

7. The EA does not specify elevations for the various alignments, but most seem to end between 2000 feet elevation and 3000 feet elevation. The difficulty of travelling between Kīhei and Science City lies primarily higher than that, from 4000 feet up to the summit at 10,000 feet.

The helicopter or equivalent alternatives should be explored, especially since the data link may cause the need for such transportation to decline even further.

At present data communication facilities are out to bid for a link between Science City and the base facilities at Maui R&T Park.
Another "No-Build" Alternative would be to improve Hana Road and possibly improve various intersections on the current route. This also should be explored.

As suggested by someone at the Information Hearing, another quick and cheap way to reduce travel time between Science City and the base facilities would be to relocate the base facilities to their old home near Pauuone, or even to Paalani.

8. OTHER QUESTIONS

What are the criteria that will be used to decide on the alternatives to be considered in the Draft EIS?

At the Information Hearing, the slide showing these criteria was very difficult to read. Could the criteria be mailed to all those who attended the Information Hearings or who requested the EIS?

Will those charged with preparing the EIS include conclusions of the relevant Community Plans now being considered by the Maui County Council?

A number of very public spirited citizens spent large amounts of time preparing the General Plan, the Upcountry Community Plan, and the Kihei-Makena Community Plan, as part of the official planning process of Maui County. They have been reviewed by the Planning Department, the Planning Commission, and are now being reviewed by the County Council. Public hearings were held at each stage of the process.

The principles enunciated in those documents represent the consensus among the citizens of Maui for the future of their area and should be considered in the EIS.

As noted by Dick Mayer as the Information Hearing, will the Draft EIS consider the entire four-lane proposal, as required by law, not merely the interim two-lane proposal?

The EIS on the airport expansion attempted to break the project into 22 discrete pieces, in order to avoid considering the impacts of the whole project. This was improper, and care should be taken to assess the entire impacts of this project.

Will the Draft EIS include detailed information about the sources of funding for the proposed highway? Also detailed information about the proposed costs?

I hope these questions and comments will be of assistance in the Draft EIS.

Sincerely yours,

Sally Rainbeck
7. The use of helicopters to transport personnel between Science City and the Maui Nā Pali Park is beyond the scope of this study. Currently, there are no plans to develop helipad facilities that would make this suggestion possible.

8. While improvements to Molokini Highway are included in the No Build Alternative, improvements to Hansen Road are not.

9. Relocating the base facilities to Pauinii or Pukalani is beyond the scope of this study. We know of no plans for such a relocation.

10. The criteria that were used to select the alternatives under consideration in the Draft EIS are described in Sections 2.1.1 and 2.1.2.

11. Information on County plans is provided in Section 3.1.4.4. Project consistency with these plans is discussed in Section 4.1.2.2.

12. The proposed project would only construct a two-lane highway because traffic projections indicate that two lanes should be sufficient by the design year 2000. However, we are planning at this time to reserve right-of-way for a four-lane divided highway so that we can lessen the impacts when two additional lanes are needed beyond 2000. The impact analyses of the EIS are based on this proposed action.

13. To ensure that a highway project is not broken into smaller discrete pieces, the proposed action must (1) connect logical termini and be of sufficient length to address environmental matters in a broad scope; (2) have independent utility or independently significant, i.e., be usable and be a reasonable expenditure even if no additional transportation improvements in the area are made; and (3) not restrict consideration of alternatives for other reasonably foreseeable transportation improvements. The Build alternatives under consideration meet these criteria.

14. Section 2.1.2.2 provides information on the estimated costs of the Build alternatives. The expected sources of funding would be the federal highway fund (80%) and the State highway fund (20%).

October 30, 1995
State Department of Transportation
Highways Division
869 Punchbowl Street
Honolulu, Hawaii 96813

RE: Kīhei-Upcountry Maui Highway

Gentlemen:

I support the planning and construction of the Kīhei - Upcountry Highway and urge you to consider the following:

1. Place the Upcountry terminus in such a way that residents living in Makawao and beyond will also benefit from this new highway. I found it significant that Makawao Avenue which terminates just above Pukalani was not even shown on the map (Figure 1-1) in your Environmental Assessment. This is a major road serving thousands of people and should be considered in your assessment.

2. Make the present Lipsan Street intersection the Kīhei terminus of the new highway. It is centrally located in Kīhei and has already some of the necessary infrastructure in place.

3. Rout the new highway to make the Hawaiian Homeland area accessible from it without going through it.

4. Design the shoulders as bikeways.

5. Take advantage of the scenic and aesthetic opportunities the location of this highway has to offer. Provide lookouts and rest stops in as many places as possible. In the design of this highway the aesthetic quality should be considered as important as the customary engineering aspects. Top designers should be engaged to design the landscaping, signage, bridges, embankments, etc. Excavative cuts and fills should be avoided so that the road blends into the existing countryside rather than dominate it.

Very truly yours,

Hans Riecke, FAIA
Member of the State/County Joint Task Force

cc: Mayor Linda Crockett-Lingle

Hans Riecke, FAIA
Hans Riecke

1. Residents of Makawao would benefit from the proposed project because it would improve their transportation to and from Kula-Maile and West Maui. The figure has been corrected.

2. Lono Street will not be a Khelili term because Maui Route 30 officials requested that the highway not come through the park.

3. None of the alternatives considered in the Draft EIS were located on or near Department of Hawaiian Home Land (DHHL) homesteads in Kula. DHHL would have to construct their own access road to the new highway if they desire a connection and SDOT would have to provide permission for the connection.

4. The roadway would have 1.8 m (6 ft) and 2.4 m (8 ft) paved shoulders (see Section 2.1.2.21) sufficient for bicyclists. Whether the roadway would be designated as a bikeway has not been determined.

5. Opportunities would be explored to develop scenic lookouts. Landscaping would also be provided to improve the aesthetics of the highway (see Section 4.8.4) both for travelers and those viewing the highway from downstream areas. The roadway would be designed to minimize and balance cuts and fills.

Frederick W. Rohlfing

RECEIVED
Nov 7, 1995
State Dept. of Transportation Highway Division
800 Punchbowl St.
Honolulu, HI 96823

COMMENTS ON PROPOSED KIBEI-UPCOUNTRY MAUI HIGHWAY

Having been a property owner on Maui since 1976, a resident of Kula since 1984, Prezident and/or member of the Board of the Kula Community Association since 1991, and a member of the Joint Task Force of the State and County of Maui that has studied the project, I have major concerns with this multi-million dollar proposal. The initial estimate for a new road grew out of an alleged defense requirement to erect the Air Force defense contractor office building in the Kibei R & T Park with the satellite tracking facility on the summit of Haleakula. The location of the defense contractor was itself a "boondoggle" operation to assist in sharing up the R & T Park rather than the choice of the contractor or the USAF. Hence from the outset the "defense" case for the road has rested on a foundation of sensational "pork". (Indeed, some have characterized the project as Maui's H-3 boondoggle.)

There has never been any significant demonstration of support for such proposed road by people living in Upcountry Maui. In fact, in prior discussions at public meetings of a possible road connecting the areas during the administration of Mayor Hansen I have seen overwhelming majority of the people of Kula strongly opposed any connecting route with small minorities favoring a Makau-Ubupalaka connection along the route of the dirt road that formerly was utilized by local people or the like, it is clear that the people of Kula, Keanakoi, Olowalu, and Upepolau are even more concerned today that their rural/farm area life style would be negatively impacted by thousands of Maui's visitors traipsing through the area in their non-a-car not only on the new highway but also on existing narrow and, in some cases dangerous, small roads. One has only to look to the traffic to and from Ha'ena - estimated at slightly less than one million vehicles a year - to realize even more would drive the circle route through Upcountry if it was made easier for them.

The task force report and EIR pose a dilemma to the people of Upcountry. The various alternatives that provide a routing straight up the hill, from selected points in Kibei to several Kauai points would clearly cause the area's desirable influx of tourists and
the inevitable "Gahau-ization" (urbanization) of Upcountry Maui. If, on the other hand the road were built across Haleakalā from Kīhei to the Hawaiʻi-Haleakalā Hwy intersection it would blot out numerous large and small farms and existing back roads such as Onopio and Pulsehu and require construction of overpasses to avoid the kind of poor transportation planning that was demonstrated in connection with the Pukalani Bypass project. (That performance led to a number of accidents and severe injuries before traffic signals were installed at Makawao Rd.) Farmers on the lower slopes of Haleakalā would at the least be inconvenienced and at worst put out of business. Despite this latter possibility, the Upcountry Citizens Advisory Committee in its comprehensive Community Plan Review took the view, with which I concur that "If there HAS TO BE a new Kīhei-Upcountry road" (e.g. despite opposition from the people directly affected), its Upcountry terminus should be at the junction of Makawao Rd and Haleakalā Hwy. It would then at least service the people living in the largest Upcountry Maui population centers of Makawao and Pukalani.

The BOTTOM LINE, however, is that the best alternative in the EIA is # 2.1. e.g. the NO-BUILD ALTERNATIVE.

In this day of "budget shortfalls" and cuts in Federal and State funding across the gamut of social programs and the lack of funding to alleviate the impacts from overcrowded prison it is both ironic and sad that an unnecessary, largely unwanted and wasteful highway project has gotten as far as it has.

Without admitting to the rationality of the political reality driving the expenditure of taxpayer funds for construction work, if the money contemplated for this project were devoted to improving Makawao Hwy, Hansen Road and Haleakalā Hwy it would make travel between Upcountry and Kīhei, and also Kahului and Kīhei much safer and less time consuming without the extremely disruptive socio-economic impacts that would inevitably result from the major disruptive new route. I urge that the E.I.S. examine the benefits from applying the Federal and State funds sought for this project for improvement of existing routes in Maui County as for other more necessary public construction projects in our State.

As with the "Field of Dreams" - if you build it, they will come! Please don't let that happen to our Upcountry home.

Sincerely,

[Signature]
October 30, 1995

Letters to the Editor
Hawaii News
100 Mahalanis
Wailuku, W, 96793

Dear Editor:

The Upcountry Road info meeting recently held in Pukalani was
hopelessly a wake-up call to the Department of Transportation
from numerous Upcountry residents who clearly oppose this
misguided project. The DOT hasn’t exactly distanced itself
from the Upcountry and a lot of us suspect its home alive and well
somewhere inside the Department’s office.

How can we possibly justify spending $70 million dollars to enable
a handful of Upcountry boys to more quickly reach their big toys on
the summit of Haleakula? The $70 million is just for starters.
And, yes, this does not include the cost of land acquisition
and/or right of ways. As indicated in a letter to the editor
last week this whole thing smells like a Maui version of Oahu’s
Kamehameha Highway disaster.

Your voice can make the difference. Public input is being
sought through November 10th so it’s important you quickly
share your outrage with Senator Inouye (the road’s prime sponsor)
and with Kuhi Hayashida (DOT chief) in the form of a letter
or phone call demanding the abandonment of this expensive folly.
If we have any kind of money to throw around let’s throw it
at something infinitely more important like education and human
services, both of which continue to suffer from crippling
budget cuts.

Dennis Smith
October 2, 1985

DOT Highways Division
869 Punchbowl St.
Honolulu, HI 96813

ATTENTION: KENNETH AU

Dear Kenneth,

I noticed that the EIS for the ten alternate bypass routes for the new Kihel to Upcountry highway have been recently published. I AM OPPOSED TO ALL TEN ROUTES FOR ARCHEOLOGICAL, TRAFFIC, COST, SAFETY, AND LOSS OF QUALITY OF LIFE REASONS.

It is incredible to learn that the ONE AND ONLY reasonable routing for this highway has not even been considered! Here is the route that is cost effective, sensible, and capable of delivering the least impact to traffic on Maui:

The route should start at the intersection of Highway 350 and the new Pilani Highway in Kihel. Thereafter, two new lanes should be built on a sugar land, parallel to Highway 350, with a dividing median. This would create a safe four lane highway. Proceeding north to Puunene, the new highway would fork prior to Puunene, and maintain four lanes through a sugar lands to the bottom of Highway 37. This would avoid more impact on Hansen Road. At the bottom of Highway 37, a new fourth lane would be added, turning Highway 37 from a three lane debacle into a safer four lane highway. Thereafter, the four lanes would narrow at the new Pukalani Bypass above Halimarne and proceed from there AS IS into the greater Upcountry area.

Cheaper, because the highway goes through sugar land, and the route is level. Most of the roadbed is already down, and widening would be so easy to do.

Safer, because highway 350 would become a divided highway, while now it is very unsafe. Safer and cheaper, because now Highway 37 IS a three lane death trap, and the cost of daily skiing is exorbitant.

Environmentally safe, since the existing roads and new roads would not create any disturbances to helius and other significant archeological structures.

TAKE ADVANTAGE OF WHAT WE ALREADY HAVE! CORRECT THE TRAINEY YOU HAVE CREATED WITH THREE LANEING HIGHWAY 37! KEEP OUR EXPENSIVE

Sincerely,

Gordon Stellway
572-1377

BYPASSES AS BYPASSES FOR THEIR INTENDED USE! GET RID OF THESE AwFUL PROPOSED ROUTED!
Gordon Stellway

1. The alternative suggested is similar to the No Build Alternative (see Section 2.2.1.1), except for the connection between Malaekahatu Highway and Hahala Highway. A similar alternative that would improve the No Build condition was developed called the "Widening of Existing Roadways Alternative" (see Section 2.2.1.1). This alternative was eliminated in the alternatives screening analysis (see Section 2.2.1 and Appendix E) because it would not satisfy the project's goals.

Edward L. Sydilla
P.O. Box 709
Canonsville, MA.
21022
November 24, 1995

Mr. Abraham Wong
Federal Highway Administration
P.O. Box 30526
Honolulu, Hawaii 96823

Dear Mr. Wong:

I have only recently become aware of the proposal for a new limited access highway to the upper area of Maui. I am requesting that my name be added to the Service and Distribution List for this project through the Record of Decision. I would also be interested to know if copies

2. Documents were prepared for the public hearing in Kahului. If so are they available? My specific comments will be reviewed pending a review of the draft Environmental Impact Statement.

I appreciate any assurance that you may be able to render to me with this request.

Sincerely,

Edward L. Sydilla
Edward S. Syjala

1. Your name has been placed on the project mailing list. You will receive the Draft EIS, and information on the scheduling of the project's public hearings.

2. Chapter 5 and Appendices A and C of the Draft EIS contain information about the project's scoping activities.

November 3, 1995

State Department of Transportation
Highways Division
869 Punchbowl St.
Honolulu, HI 96813

RE: New road between Kihei and Upcountry

Dear Dept. of Transportation:

I am strongly in favor of having this road completed as soon as possible.

For Maui to continue to support its population we must have safe roads. It is ridiculous to drive 20 miles and over crowd other roads to get to a place 6 miles away. Living upcountry and working in Kihei, I have driven coned highways for years. We must continue to improve our out-dated highway system.

Please take advantage of any opportunity to expand our road system with help of federal funding and reap the benefits for our residents. Please don't deprive us of this chance to bring increased infrastructure to our area. It is so outdated and we need this road so badly. I favor the 1 Kihei to Kipahulu connection points as it accesses Makawao and Haiku as well as the rest of upcountry.

Warmest Aloha,

[Signature]

Leah Wesson
84 Kilauea Place
Pukalani, HI 96768
An Upcountry terminus at the Hōnaunau Highway/Pākūkaiki intersection is still under consideration. However, a Kahi terminus at the Pākūkaiki Highway/Waio Street intersection is not being considered (see Section 2.2.1).

11/8/91

STATE DEPT. OF TRANSPORTATION

I wish to state that the proposed Kāhele-Upcountry Highway is not necessary, especially in these uncertain times. As a "Reform Highway" it makes no sense, and neither the State of Hawaii nor the federal government have the money to build it—both are unable to balance their books.

Frank W. White
To: The Honorable Ben Cayetano
Governor, State of Hawaii
c/o Director of Environmental Quality Control
220 South King Street, 6th Floor
Honolulu, Hawaii 96813

From: Florence Mikes
Director of Health

Subject: Final Environmental Assessment
Upcountry Highway Project
Kihei, Maui

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

Any work in any of the streambeds may require approval from the U.S. Army Corps of Engineers (COE). The applicant should contact the COE to identify whether a Federal permit is required. If a federal permit is required, a Section 401 Water Quality Certification is required from the Department of Health’s, Clean Water Branch.

If you have questions, you may call Mr. Herbert Matsubayashi,
Chief Sanitarian, Maui District Health Office at 243-5255.

cc: H. Matsubayashi (MOHO)
Draft Environmental Impact Statements

(4) Kibei-Uponcountry Maui Highway

The State of Hawaii Department of Transportation and Federal Highway Administration are issuing a Draft Environmental Impact Statement for the Kibei-Uptoncountry Maui Highway project. This project involves the development of a major new overpass across Killa Highway and the construction of a new highway to connect Kilauea Highway with Keahole Highway.

The alternatives under consideration are all eight combinations of two Kibei and four Uptoncountry sections. The two Kibei are numbered 1 and 2, and are located at the Kilauea Highway/Kaua’i Highway intersection and the Kilauea Highway/Kaua’i Highway intersection, respectively. The four Uptoncountry sections are located at the Kilauea Highway/Kaua’i Highway intersection, at the Keahole Highway/Pokai Bay Road intersection, at the Keahole Highway/Waiako Road intersection, and at the Keahole Highway/Waiako Road intersection, respectively. The four Uptoncountry sections correspond to a two-mile stretch of the Five Pine Ten intersection, and at Kilauea Highway just south of Pokai Road, respectively. The five intersections for the Five Pine Ten intersection in the Kilauea Highway/Kaua’i Highway intersection are called Alternative 11D-6.

The project would facilitate transportation for Kibei and Uptoncountry, thereby reducing traffic in urban areas, increasing employment opportunities, and improving the overall environment. In addition, there is an interest in the project because it would facilitate transportation between the four communities and the rest of the Kilauea Highway/Kaua’i Highway intersection, and it would provide a connection to the Kilauea Highway/Waiako Road intersection, respectively. The project would provide a new highway to connect Kilauea Highway with Keahole Highway.

The project includes the following improvements: a new overpass across Killa Highway and the construction of a new highway to connect Kilauea Highway with Keahole Highway.

To ensure that the full range of issues related to this proposal are addressed, significant issues identified, comments and concerns are invited from all interested parties.

J. Deaver<br>Deputy Director<br>Department of Transportation and Federal Highway Administration
Federal Register / Vol. 65, No. 161 / Friday, August 20, 2000 / Notices


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Kihei-Upcountry Maui Highway
DRAFT EIS Distribution List

Federal Agencies

Advisory Council on Historic Preservation
U.S. Department of Agriculture
Natural Resource Conservation Service
U.S. Department of Commerce
National Marine Fisheries Service
National Oceanic and Atmospheric Administration
U.S. Department of Defense
Army Corps of Engineers
U.S. Department of Energy
Division of NEPA Affairs
U.S. Department of Interior
Fish and Wildlife Service
National Park Service (Haleakala National Park)
Office of Environmental Project Review
U.S. Geological Survey, Water Resources Division
U.S. Department of Transportation
Federal Aviation Administration
Federal Transit Administration
Environmental Protection Agency
Office of Federal Activities
Pacific Islands Contact Office Region IX
Federal Emergency Management Agency
Office of Natural and Technological Hazards Programs

U.S. Legislators

The Honorable Daniel K. Inouye
The Honorable Daniel K. Akaka

State Agencies

The Honorable Patsy Mink

State of Hawaii Agencies

Department of Accounting and General Services
Department of Agriculture
Department of Business, Economic Development and Tourism (DBEDT)
Director
DBEDT Library
Office of Planning
Energy Resources and Technology Division
Department of Defense
Department of Hawaiian Home Lands
Department of Education
Department of Health
Department of Land and Natural Resources
State Historic Preservation Division
Land Management Division
Division of Forestry and Wildlife
Department of Transportation
Airport Division
Harbors Division
Office of Environmental Quality Control
Office of Hawaiian Affairs
University of Hawaii Environmental Center
Water Resources Research Center

State Senators

The Honorable Norman Mizuguchi, Senate President

Systematic EIS Distribution List

The Honorable Calvin Say, Speaker of the House
The Honorable Kenneth T. Hsiai, Chair House Transportation Committee
The Honorable Seo Kehuuhahula, District 7
The Honorable Joseph M. Soul, District 8
The Honorable Bob Nakazone, District 9
The Honorable David Morikane, District 10
The Honorable Chris Hadfield, District 11

County of Maui

The Honorable James Aiona, Mayor
County Council of Maui
Board of Water Supply
Department of Fire Control
Department of Parks and Recreation
Department of Public Works and Waste Management
Economic Development Agency
Planning Department
Molokai Police Department

Libraries

Hawaii State Library
Hawaii Kai Regional Library
Hilo Regional Library
Kaimuki Regional Library
Kaneohe Regional Library
Libre Regional Library
Pearl City Regional Library
Waalua Regional Library
Kael Public Library
Laahina Public Library
Maunaloa Public Library
Wailuku Public Library

Media

Honolulu Advertiser
Honolulu Star Bulletin
The Maui News
South Maui Times

Major Land Owners Affected by at Least One Alternative

Alexander & Baldwin
Dowling Company, Inc.
Haleakala Ranch
The Hawaii Department of Transportation (HDOT) and the Federal Highway Administration (FHWA) propose to construct a new two-lane motorway access highway that would directly link Kula-Upscountry and Upcountry Maui. Different alternatives for the highway range between 9 and 11 miles long and would connect Palihoi Highway in Kula to either Hana Highway or Kula Highway in Upcountry.

The highway would be constructed on the western slope of Haleakala (see map below). This land is currently used for sugarcane and pineapple cultivation and ranching. The communities near the proposed project include Kula, Waihee, Makawao, Kipahulu, Haliimaile, and Kula.

A State and federal Draft Environmental Impact Statement (EIS) was prepared and announced in the August 8, 1999 edition of the State Environmental News and the August 20, 1999 edition of the Federal Register. The purpose of the Draft EIS is to document the environmental and social impacts that could result from the project, and provide the public with an opportunity to comment on the project. After the close of the public comment period, HDOT and FHWA will evaluate the information received and select a "Preferred Alternative," which could be the "No Build." HDOT will announce the selection after it is made, and the selection will be disclosed in the project's Final EIS.

Why is this Project Needed?

Improve Maui's Roadway System

The circuitous route between Kula and Upcountry is 15 to 24 miles long, even though the straight-line distance between the regions is only 9 to 12 miles. A highway directly linking these regions could cut travel time and distance up to 50%.

Relieve Congested Conditions on Other Highways

Major traffic along the route between Kula and Upcountry is currently at or near capacity during peak travel periods. A Kula to Upcountry highway would divert some of the traffic onto an alternative route, reducing overall congestion.

Address Increasing Travel Demand

The proposed Palihoi-Laulae Access Road (February 1999), is projected to increase 70% from 1990 to 2020. Many of these trips would be generated by the visitor industry, including industry workers and visitors. Many of these trips would occur between Kula and Upcountry.

Cultural Considerations

Kula is a place of cultural significance due to its proximity to Kula. The included land is a part of the Kula region of Upcountry, which is culturally significant.

Research Activities

Activities at the Maui R & T Park and Science City are helping to diversify Maui's economy by attracting high-tech industries and creating new jobs. The proximity of the R & T Park and Science City produces interesting synergies, which are being used by some enterprises and help attract new endeavors. The road would facilitate transportation between these two high-tech centers.

Support Maui's Visitor Industry

Kula is one of Maui's principal visitor attractions. This area has an economic relationship with Upcountry Maui because of Upcountry Maui's tourist attractions, such as Haleakala National Park, and is a popular residential area.

What are the Alternatives?

In addition to the "No Build," eight alternative alignments are being considered that consist of all possible combinations of two Kula and four Upcountry terminus options (see map). The Kula termini are named K1 and K2. K1 is located at the Palihoi Highway / Kaahumanu Street intersection, K2 is located at the Hana Highway / Kula Airport Road intersection. The Upcountry terminus are named 11, U1, U2; U3-U8 and U9. U1 is located at the Hana Highway / Kaahumanu Road intersection, U2 is located at the Hana Highway / Kula Bypass / Kula Highway ("Five Trees") intersection. U3 is located on Kula Highway almost one-half mile south of the Five Trees intersection; U4 is located on Kula Highway just south of Puukala Gulch. The names of the alternatives correspond to the terminus names, and are listed to the right.

The U2-A Alternative (U2-A-K1 and U2-A-J2) would require the modification of the "Five Trees" intersection (see sketch). Kula-Upcountry Maui Highway would reduce the Hana Highway log (5-foot line) and Hana Highway would be realigned to intersect and form a T -intersection with Puukala Bypass approximately 1300 feet north of the "Five Trees" intersection.
What is the Cost of Each Alternative?

The total estimated cost of each alternative is provided below. These costs include construction and right-of-way acquisition.

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What are the Benefits of the Project?

The project would result in substantial travel time savings for motorists traveling between Kula and Upcountry Maui. Depending on the origin and destination, the new highway could reduce trip time by up to 50%. It would also reduce traffic congestion along U.S. Highways 30 and 30A at the interchange of the new highway and the existing highways.

Traffic Patterns

A U1, U2-A or U2-B alternative may encourage some motorists traveling between Kula and Upcountry Maui to use the Kula-Uplands Route rather than the existing U.S. Highways 30 and 30A. This may decrease traffic congestion on the existing highways at the interchange of the new highway and the existing highways.

Archaeological Resources

The highway would affect a number of archeological sites important for data recovery and preservation. Depending on the alternative, up to 12 such sites may be affected.

Visual Resources

The view of Haleakala from Kula would be affected by a new roadway and associated embankments climbing the slope. To lessen this impact, landscaping consistent with the natural landscape would be provided to improve the appearance of the roadway.

When Will the Project Be Constructed?

If this project proceeds, construction is expected to begin in 2002 and would last about three years.

How Long Will It Last?

Kula-Uplands Maui highway would offer motorists a feasible scenic route.

U.S. Highways 30 and 30A would be better than U1, U2-A alternative with regard to reduction of traffic congestion.

Kula-Uplands Maui highway would offer motorists a feasible scenic route.

What are the Advantages of the Project?

The project's Draft EIS contains detailed information on the alternatives' benefits and adverse impacts. It also includes measures that would help to avoid, minimize, or mitigate adverse impacts. From impacts to larger-scale agriculture, the project would not result in severe environmental impacts. Below are brief descriptions of the project's major impacts. Measures to mitigate or minimize these impacts are also provided.

Sediment

Certain alignments would cross and displace active sugarcane and pineapple fields. Not only would production be lost, operations would also be hindered. The U2 alternatives would cause the greatest impact to sugarcane operations, although the U2-A and U2-B alternatives would also displace and divide active sugarcane fields. The U1 alternatives would not affect sugarcane cultivation. All the alternatives would cause and displace pineapple fields. The U3 alternatives would cross a County agricultura parcel.

Farmers affected by right-of-way requirements would be monetarily compensated for land acquisition and crop damage, if necessary. To retain the productivity of affected or divided fields, irrigation systems would be implemented, such as modifying or reconstructing existing flood control and irrigation and drainage systems. Unsuitable or remote agricultural land would be purchased.

Traffic Patterns

A U1, U2-A or U2-B alternative may encourage some motorists traveling between Kula and Upcountry Maui to use the Kula-Uplands Route rather than the existing U.S. Highways 30 and 30A. This may decrease traffic congestion on the existing highways at the interchange of the new highway and the existing highways.

Traffic conditions at the intersections of Kula and Upcountry Maui highways would be monitored after completion of the project to determine whether one or both would be feasible. Signage would provide directions to motorists to the proper route to the Kula-Uplands Route summit.

Archaeological Resources

The highway would affect a number of archeological sites important for data recovery and preservation. Depending on the alternative, up to 12 such sites may be affected.

An inventory survey will be conducted along the preferred alignment, which would be identified following receipt of public comments on the Draft EIS. After construction, data recovery at sites would be performed, and buffer zones would be established to protect important archeological sites for future development of the highway. If additional sites are discovered during construction work, they would immediately be protected and the appropriate State and County officials would be notified.

Visual Resources

The view of Haleakala from Kula would be affected by a new roadway and associated embankments climbing the slope. To lessen this impact, landscaping consistent with the natural landscape would be provided to improve the appearance of the roadway.
What Will Happen After the Public Hearings?

HDOIT and FHWA will select a Preferred Alternative which will be announced and identified in the Final EIS. If the Final EIS is accepted by the Governor of the State of Hawaii and the Division Administrator of the FHWA, a Record of Decision (ROD) will be prepared that will specify all mitigation commitments. The issuance of the ROD by the FHWA marks the completion of the project's planning phase. Next, design and right-of-way acquisition would begin, which is expected to last approximately two years.

How Can I Comment?

You can provide comments at this public hearing. You can either write your own comments (a comment sheet is available from the sign-in attendant), or you can provide oral comments to a court reporter stationed at this hearing. If you write your own comments, you may drop them in the comment box or send them later to:

Mr. Kazu Hayashida
Director of Transportation
State Department of Transportation
Highways Division
869 Punchbowl St.
Honolulu, Hawaii 96813

Written comments will be accepted through October 28, 1999.

Where Can I Get More Information About This Project? Who Can I Contact If I Have Questions?

The Draft EIS for this project, which is available at Waikiki Regional Library, Kihei Public Library, Lahaina Public Library, Makawao Public Library, Kahului Public Library and the Maui District Office of the State Department of Transportation, contains more information about the project. You may also contact Mr. Kenneth Au, HDOIT Advance Planning Engineer, at (808) 587-1843 (or HDOIT's toll-free voice access number 1-800-2-4HDOIT, ext. 17843), if you have any questions.

Kihei-Upcountry Maui Highway
How to Use This Public Hearing

Watch our Project Video
12 minute long video on continuous loop play

Visit our Display Area
Experts available to answer your questions
Stations are:
- Project Purposes
- Alternatives Screening
- Project Description
- Transportation Impacts
- Environmental Impacts

Comment on the Project
Pick up a comment sheet and write your own comments
OR:
- Speak to a court reporter
- Take comment sheets for neighbors
- Send in comments by October 28, 1999
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<th>Name</th>
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<td>Gene Thurlow</td>
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**Kihei-Upcountry Maui Highway ✤ Public Hearing**  
**September 30, 1999 ✤ Mayor Hannibal Tavares Community Center**

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# Kihei-Upcountry Maui Highway ♦ Public Hearing
**October 13, 1999 ♦ Kahului School Cafetorium**

## Attendee Register

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<td>Diane Kim</td>
<td></td>
<td>1400</td>
<td></td>
</tr>
<tr>
<td>Wayne Sekutari</td>
<td></td>
<td>524 Kamae Pl, Wailuku 96775</td>
<td>844-7358</td>
</tr>
<tr>
<td>NWELMA KUKU</td>
<td></td>
<td>320 Hina Ave, Kahului 96732</td>
<td>671-6980</td>
</tr>
<tr>
<td>Dono Hironaka</td>
<td></td>
<td>P.O. Box 134, Han, 96779</td>
<td>575-3375</td>
</tr>
<tr>
<td>Laurel Murphy</td>
<td></td>
<td>901 F                        996 Kepaniwai, Kihei</td>
<td>878-3111</td>
</tr>
</tbody>
</table>
APPENDIX C

Cooperating Agency Letter
Endangered Species Act Coordination Letters
Farmland Protection Policy Act Coordination Letters
National Historic Preservation Act Coordination Letters
Clean Water Act Coordination Letter
Coastal Zone Management Letters
Other Agency Consultation Letters
Mr. Phung, P.E.,
Transportation Engineer
U.S. Department of Transportation
Federal Highway Administration
350 Alaka Place
Room 3252
Honolulu, Hawaii 96813

Dear Mr. Phung:

Thank you for your letter of March 18, 1996, regarding the Kiloa-Upo country Maui highway project located on Maui, Hawaii. The proposed action is likely to require a Department of the Army (DA) permit due to work in jurisdictional waters of the U.S. In accordance with regulations at 40 CFR 1231.6 and the Memorandum of Understanding for Surface Transportation Projects in the State of Hawaii, the Corps accepts your invitation to be a cooperating agency in this project for MPA and regulatory purposes.

Mr. Lolly Silva of my Operations staff will be the point-of-contact for initial coordination. Ms. Silva can be reached by telephone at 438-2299, extension 17, by facsimile at 438-4060, or by e-mail at Laurens.Silva@podi.usace.army.mil.

Sincerely,

[Signature]

George P. Young, P.E.,
Chief, Operations Branch
November 25, 1996

Brooks Harper, Field Supervisor
Ecology Services
Fish & Wildlife Service
U.S. Department of the Interior
P.O. Box 50167
Honolulu, Hawaii 96809

Subject: Kiihi-Ucountry Highway, Maui, Hawaii
Section 7 Consultation

Dear Mr. Harper:

We are currently preparing a NEPA environmental impact statement for the subject project. We requested that the U.S. Fish & Wildlife Service (Service) identify the listed and proposed to be listed, endangered and threatened species in the vicinity of the proposed project. A map showing the project area and the alignments of the alternatives is enclosed.

The Service was previously contacted in September, 1994. In October, 1994, the Service indicated there are no endangered, threatened, or candidate species of birds recorded in the project area. However, we cannot find a record of this consultation in our files. For your information, the National Park Service in an October 25, 1994 letter identified bird and plant species in the area with a number of listed or proposed endangered plant species recognized by the Service (see Enclosure).

If you have any questions or need additional information, please call me at 566-2236.

Sincerely yours,

Jason Yamao

Enclosures: Project Area Map
Letter from the National Park Service dated October 25, 1994

cc: Steven Chang, DOT, HWY-PA
Pat Plung, FHWA
Waiwaa Char, Char & Associates
these species per se but may reflect the paucity of biological surveys in some areas. We therefore suggest that, where appropriate, surveys be conducted along the proposed route. The Service will be happy to assist in determination of appropriate sites to be surveyed.

The Service appreciates your concern for endangered and threatened species, and we look forward to reviewing any environmental documents that are produced in relation to the proposed project. If you have any questions regarding these comments, please contact our Program Leader for Interagency Cooperation, Ms. Margo Stahl, or Fish and Wildlife Biologists Christa Russell or Dr. Annie Marshall at 808-541-3441.

Sincerely,

Anna Brooks Harper
Field Supervisor
Ecological Services

U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION
HAWE DEC DIVISION
300 Ala Moana Boulevard, Room 3108
Honolulu, HI 96813
December 1, 1997

Mr. Brooks Harper
Field Supervisor
U.S. Department of the Interior
Fish and Wildlife Service
Pacific Islands Region
300 Ala Moana Boulevard, Room 3108
P.O. Box 50088
Honolulu, Hawaii 96813

Attn: Ms. Margo Stahl

Dear Mr. Harper:

Subject: Kīhei-Upono: Māui Highway Project
Island of Māui, Hawaii
Project Coordination Under Section 7, Endangered Species Act

On January 8, 1997, the U.S. Fish and Wildlife Service (Service) provided a letter regarding the subject project stating that the K2 roadway alignment alternatives pass within a mile of Pua o Kahi, a dryland forest area which may contain Federal Trust species (see enclosed). The Service also reported that the U2 alignment passes near a reservoir which may be used by migratory or endangered waterbirds. Since the January 8, 1997 letter, alignments U2-A and U2-B were developed as alternatives to the media portion of the original U2 alignment. However, the section of the U2 alignment near the reservoir was not affected.

Recent botanical surveys which covered all alignment alternatives being addressed in the project’s forthcoming Draft Environmental Impact Statement (EIS), which is being prepared in accordance with the National Environmental Policy Act (NEPA) and the State of Hawai‘i EIS law, did not identify any listed, proposed or candidate threatened or endangered plant species, or any plant species of concern (see enclosed report). Specifically, none of the plant species identified in the Service’s January 8, 1997 were found. Therefore, the FHWA finds that the proposed project will have no impact on the plant species identified in the Service’s January 8, 1997 letter or other listed, proposed or candidate threatened or endangered plant species known at the time the surveys were conducted.

The concern about potential impacts to endangered or migratory waterbirds resulted in telephone consultations between your staff and Parsons Brinckerhoff on April 2 and May 9, 1997. Service staff indicated that the January 8, 1997 letter did not require federal surveys of the alignments and the reservoir. Additional consultation with the Maui Nature Conservancy telephone conversation
on April 2, 1997) reported the Service's position that there would likely be no endangered or threatened fauna species along the alignment. However, Service staff recommended that the project's EIS acknowledge that the reservoir could attract migratory or endangered waterbirds. At nearest approach, the edge of the U-2 alignment right-of-way would be approximately 220 feet from the reservoir with an elevational difference between the road and the reservoir of approximately 60 vertical feet. None of the U-2 alternatives would modify the reservoir or its functions during or after construction. Therefore, the FHWA finds that the reservoir's use as habitat for migratory waterbird species would not be affected, so the project will have no effect on migratory or endangered waterbirds that use the reservoir.

Based on the information herein provided, we request that the Service provide written concurrence with these findings for each Federal Trust species listed in the January 8, 1997 letter. We also request that the Service provide information on listed, proposed or candidate endangered or threatened species likely to be in the project area that may have been added since the January 8, 1997 letter.

Please contact me at 341-2556 if you have any questions or require additional information. Thank you.

Sincerely yours,

Pat V. Phung, P.E.
Transportation Engineer

4. Botanical Survey Kilahui-Upcountry Maui Highway, Additional Studies -- U-2 Alignment, Char & Associates, October 1997 (Note: U-2 alternatives are not being considered in the draft EIS)

cc: Mr. Steven Chang, HPY-PA
Mr. Jason Yadar, Panaro Brokerhoff Qualls & Douglas, Inc.

Re: Consultation letter and species list for the proposed Kilahui-Upcountry Maui Highway project, Maui, Hawaii

Dear Mr. Phung:

The U.S. Fish and Wildlife Service (Service) has received your December 2, 1997, letter requesting concurrence under section 7 of the Endangered Species Act and an additional species list for the proposed Kilahui-Upcountry Maui Highway project, Maui, Hawaii. On January 8, 1997, the Service provided a letter regarding the subject project. Since that letter, alignments U-2A and U-2B were developed as alternatives to the main portion of the original U-2 alignment, and botanical surveys were made along the two new alternative routes.

The Service has reviewed the updated information provided with your request and pertinent information in our files. Based on our review of this information, the Service has the following comments.

The alternative routes added since January 8, 1997, pass through disturbed areas, mainly abandoned pineapple fields, mixed shrubland, mixed pasture land, and exotic vegetation, some of which include any federally listed plants. In addition, there are no federally listed, proposed or candidate endangered or threatened wildlife species known from these areas. Therefore, since the proposed routes will not affect the reservoir or the dryland forest at Puu o Kaili, the Service will concur with a determination that this project is not likely to adversely affect any federally listed, proposed, or candidate endangered or threatened species. In view of this, we believe that the requirements of section 7 of the Endangered Species Act (Act) have been satisfied. However, obligating under section 7 of the Act must be reconsidered if (1) new information reveals impacts of this identified action that may affect listed species or critical habitat in a manner not previously considered, (2) this action is subsequently modified in a manner that was not considered in this assessment, or (3) a new species is listed or critical habitat determined that may be affected by the identified action.
July 25, 1995

Ms. Jan Reichelderfer
Parsons Brinckerhoff
Pacific Tower, Suite 300
1001 Bishop Street
Honolulu, Hawaii 96813

Dear Jan,

Subject: Proposed Kilei-Upcountry Highway Alternatives

Jan, attached are forms AD-1006, Farmland Conversion Impact Rating, covering the nine alternatives. Part III of the form was to be filled out by the federal agency involved, meaning the FHWA. I filled out the average noting the highway lengths times the 160 feet right of way you noted. If those figures are different, you need to inform me and I would need to recalculate the information.

Call me at (808) 244-3729 for any information.

Sincerely,

Neal R. Pulver
District Conservationist

[Form AD-1006]
October 15, 1997

Mr. Neal S. Fujinara
District Conservationist
Natural Resources Conservation Service
U.S. Department of Agriculture
210 Ina Kaha Street
Suite 209
Wahiawa, Hawaii 96783-2100

Subject: Kauai-Upcountry Maui Highway Project
Farm and Protection Policy Act, Form AD-1006

Dear Mr. Fujinara:

In July 1995, you provided Forms AD-1006 for ten alternative alignments of the above federal aid project to Mr. Jon Recheider of Parsons Brinckerhoff (see enclosed transmittal letter and copies of Forms AD-1006). We are presently preparing a NEPA Draft environmental impact statement for this project which we hope to have completed by early next year. However, the alternative alignments now being considered are different from the alternatives in 1995. Therefore, in order to comply with the Farm and Protection Policy Act, we need Farm and Conversion Impact Ratings for our current alternatives (completed Parts II, IV, V of AD-1006).

The alternatives now being considered are eight possible combinations of four Upcountry termini, named U1, U2-A, U2-B and U3, and two Kauai termini, named K1 and K2 (see enclosed project location map with the alternatives). The proposed right-of-way for Kauai-Upcountry Maui Highway is still 100 feet. The current alternatives' lengths and my calculations of "Total Acres To Be Converted Directly" are as follows:

<table>
<thead>
<tr>
<th>Alternative</th>
<th>Length (miles)</th>
<th>Acres</th>
</tr>
</thead>
<tbody>
<tr>
<td>U1(K1)</td>
<td>10.9</td>
<td>188</td>
</tr>
<tr>
<td>U1(K2)</td>
<td>10.9</td>
<td>188</td>
</tr>
<tr>
<td>U2-A(K1)</td>
<td>9.7</td>
<td>188</td>
</tr>
<tr>
<td>U2-A(K2)</td>
<td>9.7</td>
<td>188</td>
</tr>
<tr>
<td>U2-B(K1)</td>
<td>10.9</td>
<td>188</td>
</tr>
<tr>
<td>U2-B(K2)</td>
<td>10.9</td>
<td>188</td>
</tr>
<tr>
<td>LR(K1)</td>
<td>10.1</td>
<td>155</td>
</tr>
</tbody>
</table>

I am also enclosing soils maps with the current alignments.

We would appreciate it if you can provide completed Parts II, IV and V as soon as possible. If you have any questions, please feel free to call me at (808)523-2335 or you can e-mail me at yaizawa@ptworld.com.

Sincerely yours,

[Signature]

Parsons Brinckerhoff Guade & Douglas, Inc.

Enclosures: 1. Letter from Natural Resources Conservation Service to Jan Recheider, Parsons Brinckerhoff, dated July 25, 1995
2. Forms AD-1006 completed in July 1995
3. Project location map with alternatives
4. Soils map with alternatives
October 17, 1997

Mr. Neal S. Fujimura
District Conservationist
Natural Resources Conservation Service
U.S. Department of Agriculture
210 Ina Kula Street
Suite 209
Wailuku, Hawaii 96793-2100

Subject: Kilai-Upcountry Maui Highway Project
Fairland Protection Policy Act, Form AD-1006

Dear Mr. Fujimura,

This letter is a follow-up to the letter I sent you on October 15, 1997. I have just received preliminary engineering data on the anticipated right-of-way requirements of each of the alternatives. Please replace the information I previously provided to you with this new information:

<table>
<thead>
<tr>
<th>Alternative</th>
<th>Right-of-Way Required (Acres)</th>
</tr>
</thead>
<tbody>
<tr>
<td>U1K1</td>
<td>241.2</td>
</tr>
<tr>
<td>U1K2</td>
<td>277.3</td>
</tr>
<tr>
<td>U2-AK1</td>
<td>243.3</td>
</tr>
<tr>
<td>U2-AK2</td>
<td>279.4</td>
</tr>
<tr>
<td>U2-BK1</td>
<td>245.6</td>
</tr>
<tr>
<td>U2-BK2</td>
<td>281.7</td>
</tr>
<tr>
<td>U3K1</td>
<td>219.3</td>
</tr>
<tr>
<td>U3K2</td>
<td>252.5</td>
</tr>
</tbody>
</table>

Again, if you have any questions, please feel free to call me at (808)356-2235 or you can e-mail me at yazawa@hawaii.igworld.com. Thanks.

Sincerely yours,

[Signature]

Mr. Jason Yazawa
Parnass Brinckerhoff Quade & Douglas, Inc.
1001 Bishop Street, Suite 1000
Honolulu, Hawaii 96813

October 29, 1997

Mr. Nathan Holston
District Conservationist
Natural Resources Conservation Service
U.S. Department of Agriculture
210 Ina Kula Street
Suite 209
Wailuku, Hawaii 96793-2100

Subject: Kilai-Upcountry Maui Highway Project
Fairland Protection Policy Act, Form AD-1006

I am enclosing completed forms AD-1000, Fairland Conversion Impact Rating, regarding the alternatives to the Kilai-Upcountry Maui Highway Project.

If you have any questions, call me at (808) 244-3729 or email me at nholston@hawaii.igworld.com.

Sincerely,

[Nathan Holston]
District Conservationist
## Farmland Conversion Impact Rating

### U.S. Department of Agriculture

#### Part I (To be completed by Federal Agency)

- **Title of Project:** [Project Title]
- **Area Showing Unrelated Alternative:** [Area]
- **Participating State:** [State]
- **Date of Submission:** [Date]

#### Part II (To be completed by SCI)

- **Scoring:** [Score]
- **Relaxed Rating:** [Rating]
- **Rating:** [Rating]

#### Part III (To be completed by Federal Agency)

- **Farmland Land Use:** [Use]
- **Site Description:** [Description]
- **Date of Site Evaluation:** [Date]

#### Part IV (To be completed by SCI)

- **Farmland Land Use:** [Use]
- **Site Description:** [Description]
- **Date of Site Evaluation:** [Date]

## Farmland Conversion Impact Rating

### U.S. Department of Agriculture

#### Part I (To be completed by Federal Agency)

- **Title of Project:** [Project Title]
- **Area Showing Unrelated Alternative:** [Area]
- **Participating State:** [State]
- **Date of Submission:** [Date]

#### Part II (To be completed by SCI)

- **Scoring:** [Score]
- **Relaxed Rating:** [Rating]
- **Rating:** [Rating]

#### Part III (To be completed by Federal Agency)

- **Farmland Land Use:** [Use]
- **Site Description:** [Description]
- **Date of Site Evaluation:** [Date]

#### Part IV (To be completed by SCI)

- **Farmland Land Use:** [Use]
- **Site Description:** [Description]
- **Date of Site Evaluation:** [Date]

## Farmland Conversion Impact Rating

### U.S. Department of Agriculture

#### Part I (To be completed by Federal Agency)

- **Title of Project:** [Project Title]
- **Area Showing Unrelated Alternative:** [Area]
- **Participating State:** [State]
- **Date of Submission:** [Date]

#### Part II (To be completed by SCI)

- **Scoring:** [Score]
- **Relaxed Rating:** [Rating]
- **Rating:** [Rating]

#### Part III (To be completed by Federal Agency)

- **Farmland Land Use:** [Use]
- **Site Description:** [Description]
- **Date of Site Evaluation:** [Date]

#### Part IV (To be completed by SCI)

- **Farmland Land Use:** [Use]
- **Site Description:** [Description]
- **Date of Site Evaluation:** [Date]
Mr. Saku Nakamura
U.S. Department of Agriculture
Natural Resources Conservation Service
P.O. Box 30004
Honolulu, Hawaii 96850

Dear Mr. Nakamura:

Subject: Kahal-Uplcountry Maui Highway
Project No. NPS-9203(1)

As per previous unofficial discussions, we are submitting the Farmland Conservation Impact Ratings (Form AD-1006(10-83)) for the Kahal-Uplcountry Maui Highway project. The U.S. Department of Transportation, Federal Highway Administration, has concurred with this submission. We, therefore, request a determination as to whether the proposed conversion is consistent with the Farmland Protection Policy Act of all Department of Agriculture's internal policies.

Very truly yours,

DAI HAYASHI
Director of Transportation

 Enclosures

/\bc: Warren S. Unemori Engineering, Inc.
Subject: Kīhei-Uponaui Maui Highway, Maui, Hawaii
Archaeological Survey of Alternatives

The State of Hawaii Department of Transportation is evaluating alternatives for a new highway that would link Kīhei-Makena to Upounaui Maui. You were referred to us by the State Historic Preservation Division because of your knowledge of historic and archaeological resources in the study area.

The alternatives under consideration in the upcoming Draft Environmental Impact Statement (EIS) are all eight combinations of two Kīhei and four Upounaui terminus options. The Kīhei terminus and segments are called K1 and K2, and the Upounaui terminus and segments are called U1, U2-A, U2-B, and U3. The eight alternative alignments are:

1. U1,K1
2. U1,K1
3. U2-A,K1
4. U2-A,K2
5. U2-B,K1
6. U2-B,K2
7. U3,K1
8. U3,K2

Enclosed are archaeological reconnaissance survey reports prepared for this project by Cultural Surveys Hawaii (CSH).

The following historic properties are within the path (within a 400-foot wide corridor) of the alternatives, and therefore, may be destroyed by the construction of the highway:

- CSH Sites 8, 16, 20, 21, and 22
- CSH Sites 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 21, and 22
- CSH Sites 8, 16, 20, and 22
- CSH Sites 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, and 22
- CSH Sites 8, 16, 20, and 22
- CSH Sites 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, and 22
- CSH Sites 6, 16, 18, 19, and 20
- CSH Sites 6, 9, 10, 11, 12, 13, 14, 15, 17, 18, and 19

CSH recommended only data recovery of the above properties. An inventory-level survey will be conducted on the project's Preferred Alternative, which will be selected after receiving public comments on the project's forthcoming Draft EIS. For sites requiring additional data recovery, if any, a data recovery plan will be prepared and implemented after the Final EIS.

If you have knowledge of other traditional or historic properties at or near the proposed project, and/or have comments on the CSH report, we would very much appreciate your input. Any comments you submit will be forwarded to the State Historic Preservation Division to assist in its evaluation of the reports. Please submit your comments by March 20, 1999.

If you have any questions, please call Kemesha Auk at 581-1843.

Very truly yours,

KAZU HAYASHIDA
Director of Transportation

Enclosures

ECGM

cc: DLNR - SHPO, WSU Engineering, Inc., HWY-PA
Similar letter sent to the following:

Mr. Leslie Kulokie
Maui/Lanai Island Burial Council
c/o State Historic Preservation Division
Department of Land and Natural Resources
601 Kamokila Boulevard, Room 555
Kapolei, Hawaii 96797

Reverend David Kua’abukaa
606 Pohala Place
Waikiki, Hawaii 96793

Mr. Charles Maxwell
157 Alika Place
Pukalani, Hawaii 96768

Ms. Helen Fesling
South Maui Heritage Corridor
2846 Paniolo Rd.
Kahului, Hawaii 96733

Mr. Brian Mikan
Kihei Community Association
P. O. Box 662
Kihei, Hawaii 96753

Ms. Dana Hall
Wailuku/Kuakini Homestead Association
2017 Wailoa Street
Wailuku, Hawaii 96793

Mr. Raymond Suen, Chairperson
Department of Hawaiian Homelands
P. O. Box 1879
Honolulu, Hawaii 96805

Mr. Ed Lindsey
1087A Pookela Road
Makawao, Hawaii 96768

Mr. Matheniki Kalosekamali
Ulupalakua Ranch
P. O. Box 901
Kula, Hawaii 96790

Mr. Randall Ogata
Administrator
Office of Hawaiian Affairs
711 Kapahulu Avenue, Suite 500
Honolulu, Hawaii 96813

Mr. Timothy E. Johns
Hawaiian Preservation Administrator
State of Hawaii
Department of Land and Natural Resources
33 South King Street, 6th Floor
Honolulu, Hawaii 96813

Attention: Mr. Dan Hubbard

Subject
Kīhei-Upcountry Maui Highway, Maui, Hawaii
Section 106 of the National Historic Preservation Act
Request for Concurrence on Significance Evaluations and Treatment Measures of Sites, and Effect Determination

In accordance with Section 106 of the National Historic Preservation Act, the Federal Highway Administration (FHWA) submits the enclosed archaeological reconnaissance survey reports, prepared by Cultural Surveys Hawaii (CSH), for subject project. The project's alternatives that will be evaluated in the upcoming Draft environmental impact statement (EIS) are all eight combinations of two Kīhei and four Upcountry terminus options (see enclosed figure). The Kīhei termini and segments are called K1 and K2, and the Upcountry termini and segments are called U1, U2-A, U2-B, and U3. The eight alternative alignments are:

1. U1, K1
2. U1, K2
3. U2-A, K1
4. U2-A, K2
5. U2-B, K1
6. U2-B, K2
7. U2, K1
8. U3, K2

Adjustments to Alternatives

The original U2 and U3 alignments were modified to avoid important archaeological sites found by CSH. These changes are described below:

• The most-likely section of the U2 alignment was modified to Alignments U2-A and U2-B because of U2's potential impacts to CSH Sites 1 and 2 (see below). Later when important sites (CSH sites 101 and 102, see below and Alternative U2-A report) were discovered within the U2-A alignment, the alignment was shifted to Alignment U2-A.
(New) to avoid both sites and CSH site 103. However, CSH determined that this new U2-A would indirectly affect a heiau (Site SS 50-30-10-3701) because it would interfere with the heiau's makai (north to west) viewpoint (see Alternative U2-A (New) report). Therefore, another U2-A alignment was developed as a combination of the original U2-A and U2-A (New). This U2-A (Hybrid) would avoid CSH sites 101, 102 and 103, and shift the alignment to the south (makai) of the heiau, as recommended by CSH. A reconnaissance survey of the U2-A (Hybrid) alignment is not necessary because the alignment embodies both the original U2-A and U2-A (New) alignments. CSH reviewed the U2-A (Hybrid) alignment, and determined that it would not affect the heiau.

- Part of the U3 alignment at Pu’alehu Gulch was shifted to avoid CSH site 7 (see below). A reconnaissance survey was not conducted on the re-aligned segment. Therefore, it is not known whether this shift would affect another site(s). However, as recommended by the State Historic Preservation Division during project scoping, an inventory survey will be conducted on the preferred alternative after the Draft EIS (see below).

Solicitation of Comments

Copies of the archaeological reports are being provided to the following individuals and organizations, as recommended by Mr. Boyd Dixon of your staff who provided this list in November 1997:

- Maui Island Island Burial Council
- Reverend David K. Skiles
- Charles Maxwell, Cultural Specialist
- South Maui Heritage Corridor
- Kūhīi Community Association
- Waināhi Kūkahi Homestead Association
- Ed Lindsey, Cultural Specialist
- Mahalani Kāikana, Native Forest Specialist

In addition, the Office of Hawaiian Affairs and the Department of Hawaiian Home Lands will receive copies of the reports. We will provide copies of the material to the State Historic Preservation Division. These individuals and organizations will have 30 days to submit comments after receiving the reports. Any comments received will be forwarded to the State Historic Preservation Division.

Site Evaluations

In the reports, CSH applied Significance Criteria from the National and State Registers of Historic Places and evaluated the sites. These evaluations are reported in the following sections:

- Original report (Note that the makai-most section of the U2 alignment was modified to the U2-A and U2-B alignments)
- Section IV: Significance of the Historic Properties

- Table 1: Significance of Sites Located During Reconnaissance Survey, and
- Section VII: Conclusions and Recommended Treatments,
- Alternative U2-A report (Note that this alignment was modified to the U2-A (new) alignment)
- Section III: Significance of the Historic Properties, and
- Section IV: Recommendations;
- Alternative U2-A (New) report (Note that this alignment was modified to the U2-A (Hybrid) alignment)
- Section IV: Significance of the Historic Properties, and
- Section V: Recommendations; and
- Alternative U2-B report:
- Section III: Significance of the Historic Properties, and
- Section IV: Recommendations

In summary, CSH had following site evaluations and recommended treatment measures. The FHWA agrees with CSH’s findings and recommendations:

- CSH sites 1, 7, 22, 101 and 102 were evaluated as significant under Criteria D and E, and these sites were recommended for preservation in a manner acceptable to the State Historic Preservation Officer (SHPO). The U2, U2-A and U3 alignments were modified or shifted to avoid all these sites.
- CSH site 103 was evaluated as significant under Criteria C and D, and was recommended for only data recovery. The U2-A alignment was shifted to avoid this site.
- State Site 50-50-10-2701 was evaluated as significant under Criteria D and E, and was recommended for preservation in a manner acceptable to the SHPO. The U2-A alignment was shifted to the south (makai) of the heiau so that it would not affect the heiau’s makai (north to west) viewpoint.
- All the other sites (CSH sites 2 through 6 and 8 through 22) were evaluated as significant under Criteria D, and these sites were recommended for data recovery only. These sites are still within the path (within a 400-foot wide corridor) of the alternative alignments.
- With regards to Pu’owelli (see Alternative U2-B report), CSH requested that the SHPO determine its historic property status. CSH stated that Pu’owelli may have a relationship with the surrounding petroglyphs (i.e. context to Hawaiian history), which would make the site significant under Criteria C, D, and E. CSH also stated that the site’s possible historic significance could be related to kolea’s development, which would make the site significant under Criteria C. Pu’owelli is in the path of the U2-B alignment.
Data recovery of Site 50-50-10-4181 was completed by others, and the site is no longer considered to be significant as an historic property.

Assessment of Effect and Adverse Effect

Based on the CSH's recommended treatment measures, the FHWA completed the following assessments in accordance with 36 CFR 800.5:

**Alternative**

**Effect Determination**

**U1-K1**

"no adverse effect" on five (5) sites (CSH Sites 8, 10, 12, 14, 15, 16, 21, 22)

**U1-K2**

"no adverse effect" on twelve (12) sites (CSH Sites 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 21, 22)

**U2-A-K1**

"no adverse effect" on four (4) sites (CSH Sites 101, 102, 103 and State Site 50-50-10-2701)

**U2-A-K2**

"no adverse effect" on eleven (11) sites (CSH Sites 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 22); and "no effect" on four (4) sites (CSH Sites 101, 102, 103 and State Site 50-50-10-2701)

**U2-B-K1**

"no adverse effect" on four (4) sites (CSH Sites 16, 20, 27); and "no effect" on one (1) site (State Site 50-50-10-4181), note that an effect determination of Pa'ouwell is not included, pended the SHPO's decision of its historic property status.

**U2-B-K2**

"no adverse effect" on eleven (11) sites (CSH Sites 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 22); and "no effect" on one (1) site (State Site 50-50-10-4181), note that an effect determination of Pa'ouwell is not included, pended the SHPO's decision of its historic property status.

**U3-K1**

"no adverse effect" on five (5) sites (CSH Sites 6, 16, 18, 19, 20); and "no effect" on one (1) site (CSH Site 7)

**U3-K2**

"no adverse effect" on eleven (11) sites (CSH Sites 6, 9, 10, 11, 12, 13, 14, 15, 17, 18, 19); and "no effect" on one (1) site (CSH Site 7)

Proposed Mitigation

Following identification of the project's preferred alternative, which will be made after receiving agency and public comments on the forthcoming Draft EIS, an inventory-level survey will be conducted on the preferred alternative to gather more information about affected sites and determine whether further data recovery work is required for any site. The Final EIS will not be released until after the SHPO has approved the inventory survey. For sites requiring additional data recovery, if any, a data recovery plan will be prepared and implemented after the Final EIS is in coordination with the SHPO and other agencies and organizations as required by the SHPO.

During construction, fenced buffer zones will be placed around known archaeological preservation features at and near the construction site. If unknown historic or archaeological sites are uncovered during construction, work will stop immediately and the State Historic Preservation Division will be notified and consulted on the appropriate treatment measures. Consultation would only resume after approval from the proper authorities.

Request to the SHPO

The FHWA requests that the SHPO concur with the significance evaluations, treatment measures, and effect determinations provided in this letter. If you have any questions, please call me at (808) 341-2700 ext. 365.

Sincerely yours,

[Signature]

Pam Phang, P.E.
Transportation Engineer

Enclosures:

1. Archaeological Reconnaissance Survey of the Proposed Khek in Kula Road Corridors, Kaiser to Kula's Aina (TMR 2.2 and 2.3), Maui County and Wailea Districts, Island of Maui, Cultural Surveys Hawaii, December 9, 1997

2. Alternative U2-A: An Addendum to Archaeological Reconnaissance Survey of the Proposed Khek in Kula Road Corridors, Kaiser to Kula's Aina (TMR 2.2 and 2.3), Maui County and Wailea Districts, Island of Maui, Cultural Surveys Hawaii, November 14, 1997

3. Alternative U2-B: An Addendum to Archaeological Reconnaissance Survey of the Proposed Khek in Kula Road Corridors, Kaiser to Kula's Aina (TMR 2.2 and 2.3), Maui County and Wailea Districts, Island of Maui, Cultural Surveys Hawaii, November 14, 1997

4. Alternative U3: A (new), An Addendum to Archaeological Reconnaissance Survey of the Proposed Khek in Kula Road Corridors, Kaiser to Kula's Aina (TMR 2.2 and 2.3), Maui County and Wailea Districts, Island of Maui, Cultural Surveys Hawaii, July 1998

5. Figure showing archaeological sites in relation to alternative alignments

cc:

Mr. Stephen Chang, State of Hawaii Department of Transportation
Mr. Warren Leeser, Warren S. Uehlecke Engineering, Inc.
Mr. David Atkin, Parsons Brinkerhoff Quade & Douglas, Inc.
Mr. Fauh Watahbe, Corps of Engineers
June 21, 1999

Mr. Abraham Wong
United States Department of Transportation
Federal Highway Administration
300 Ala Moana Boulevard
Honolulu, Hawaii 96813

Dear Mr. Wong:

Subsequent to our discussions with the State of Hawaii Department of Transportation, Highway Division, our office has examined the five reconnaissance survey reports prepared by Cultural Surveys Hawaii, Archæological Reconnaissance Survey of the Proposed Kilualai to Kula Road Corridors, Kahului to Kula ‘ole ‘Ahu‘a (K&K-2.2) and (K&K-2.1), Molokai and Wailuku Districts, Island of Maui (December 9, 1997), Alternate U-2-A. An Addendum to Archæological Reconnaissance Survey of the Proposed Kilualai to Kula Road Corridors, Kahului to Kula ‘ole ‘Ahu‘a (K&K-2.2 and 2.3), Molokai and Wailuku Districts, Island of Maui (November 14, 1997), Alternate U-2-B. An Addendum to Archæological Reconnaissance Survey of the Proposed Kilualai to Kula Road Corridors, Kahului to Kula ‘ole ‘Ahu‘a (K&K-2.2 and 2.3), Molokai and Wailuku Districts, Island of Maui (November 14, 1997), and Alternate U-2-A (new), An Addendum to Archæological Reconnaissance Survey of the Proposed Kilualai to Kula Road Corridors, Kahului to Kula ‘ole ‘Ahu‘a (K&K-2.2 and 2.3), Molokai and Wailuku Districts, Island of Maui (July, 1998). We concur with the Federal Highway Administration’s determination that the twenty-five sites identified along the project’s alternative alignments appear to meet the criteria for listing in the National Register of Historic Places.

Sincerely,

Don Hibbard
Administrator and Deputy
State Historic Preservation Officer
If there are other that you feel should be consulted, please let us know. We will forward to you any comments we may receive.

To assist you in reviewing the reports, we would like to provide a summary of the public involvement activities regarding the identification and assessment of potential impacts to historic properties.

Public Review of Archaeological Reconnaissance Surveys

CSDL conducted archaeological reconnaissance surveys for all proposed alternative alignments considered in the project's Draft EIS. These alternatives included all eight combinations of two Kāhehi and four Upcountry terminals options. The Kāhehi terminal and segments are called K1 and K2, and the Upcountry terminal and segments are call U1, U2-A, U2-B and U3. The eight alternative alignments are:

1. U1 K1
2. U1 K2
3. U2 A K1
4. U2 A K2
5. U2 B K1
6. U2 B K2
7. U3 K1
8. U3 K2

The U2 and U3 alignments were modified or shifted prior to the Draft EIS to avoid important archaeological sites identified by CSDL.

In February 1999, the reconnaissance reports were submitted for comments to OHA and the DHHL as well as those individuals and organizations listed above. Since none of these organizations and individuals provided comments within the time requested, each of them were contacted by phone in March 1999. The calls resulted in comment letters from OHA, DHHL, and Mr. Ed Lindsey. These letters were forwarded to the SHPD in April 1999 to assist with the SHPD review of the reconnaissance reports. Copies of these letters are enclosed in this letter.

Draft Environmental Impact Statement

The project's Draft EIS, which met the requirements of both the National Environmental Policy Act and HRS Chapter 243, was announced and released to the public in August 1999. Three formal public hearings were held on September 29 and 30, and October 13, 1999 at Kāhehi Aquatic and Community Center in Kāhehi, Maho‘ālalal Tavares Community Center in Poipu, and Kahului School, respectively. The public hearings were "open house," a format in which no formal presentation is made, but information about the project is provided by "science fair" types of displays, and experts are available to answer questions. A portion of the display area was devoted to the subject of historic resources, and was staffed by Mr. Halani Hamman, principal of CSDL, who was available at all three public hearings. This historic resources display area included maps showing the location of the historic sites found and photographs of some of the more notable sites (e.g., the petroglyphs that were avoided by the modifications in some of the alternatives).

Public review of the Draft EIS produced over 400 written and oral comments, of which, only one, a letter from Mr. Charles Maxwell, provided information about historic properties in the project area. OHA also provided a Draft EIS comment letter. Both letters are provided with this letter as enclosures.

Summary of Comments received Regarding Historic and Cultural Properties

DHHL - DHHL stated that they have no knowledge of historic properties in the study area.

OHA - In the letter providing comments on the reconnaissance surveys, OHA requested additional information on Site 4776 (previously identified as CSD 201) and the sites along the K2 alignment, and requested that a cultural analysis be conducted. The second request was repeated in the letter providing comments on the project's Draft EIS.

Ed Lindsey - Requested a more detailed analysis of the preferred alignment.

Charles Kauwela Maxwell - Provided information about burial caves in Kahupulau and Kalitolani Gulch in the vicinity of the U2-A and U2-B alignments, and about Site 2701, the Heiau adjacent to the U2-A alignment.

We complied with OHA's request to include a cultural assessment in the Draft EIS, the result being the cultural impacts study. The inventory survey complied with OHA and Mr. Lindsey's request for additional information. Mr. Maxwell's concern was alleviated by the selection of the U1-K1 alignment as the preferred alternative, instead of one of the U2-A or U2-B alignments.

Thank you for your time and effort. We would highly appreciate your immediate attention on this matter so that we may proceed with the Section 106 and Chapter 65 process. If you approve the report, we will send it thereafter submit effect determinations.
Memo to Don Hibbard, Ph.D.
Page 4

FEB 8 2001

If you have any questions, please call Wayne Kawahara, Advance Planning Section, Planning Branch, Highways Division, at 387-6357.

Enclosures

Mr. Randall Ogata
Administrator
Office of Hawaiian Affairs
711 Kapiohi Boulevard, Suite 500
Honolulu, Hawaii 96813

Dear Mr. Ogata:

Subject: Proposed Kahei-Upcountry Maui Highway, Maui, Hawaii Inventory Survey of the UI, K3 Alternative, Cultural Impacts Study

Two years ago we asked for your review and comments on archaeological reconnaissance survey reports prepared for the subject project. Since then, we have completed a Draft Environmental Impact Statement (EIS) for the project, held public hearings, solicited agency and public comments on the Draft EIS, and selected a preferred alternative. The preferred alternative is the UI, K3 Alternative, an alignment from the Hana Highway/Kaanapali Road intersection to the Hana Highway/Kaanapali Street intersection.

Following selection of the preferred alternative, Cultural Surveys Hawaii, Inc. (CSH) conducted an archaeological inventory survey of this alignment. The inventory survey report identifies several sites that were evaluated by CSH as being significant per criteria of the National and Hawaii Register of Historic Places. In addition, Scientific Consultant Services, Inc. conducted a cultural impact study for all the alternatives. The cultural impact study did not identify any traditional cultural properties at or near the alternatives. Both reports are enclosed for your review and comments.

We would very much appreciate your input, and any comments you submit will be forwarded to the State Historic Preservation Division to assist in their evaluation of the reports. Please submit your comments by March 2, 2001 to:

State of Hawaii
Department of Transportation
Highways Division
Advance Planning Section
869 Kapiolani Boulevard, Room 301
Honolulu, Hawaii 96813

Attention: Wayne Kawahara
Mr. Raymaud Soem, Chairman
Department of Hawaiian Home Lands
P. O. Box 1879
Honolulu, Hawaii 96805

Dear Mr. Soem:

Subject: Proposed Kīhei-Ua'upolu Maui Highway, Maui, Hawaii
Inventory Survey of the U1, K1 Alternative, Cultural Impacts Study

Two years ago we asked for your review and comments on archaeological reconnaissance survey reports prepared for the subject project. Since then, we have completed a Draft Environmental Impact Statement (EIS) for the project, held public hearings, solicited agency and public comments on the Draft EIS, and selected a preferred alternative. The preferred alternative is the U1, K1 Alternative, an alignment from the Hānaikahua Highway/Hālimale Road intersection to the Kīhei Highway/Kaanalani Street intersection.

Following selection of the preferred alternative, Cultural Surveys Hawaii, Inc. (CSH) conducted an archaeological inventory survey of this alignment. The inventory survey report identifies several sites that were evaluated by CSH as being significant per criteria of the National and Hawaii Registries of Historic Places. In addition, Scientific Consultants, Inc. conducted a cultural impacts study for all the alternatives. The cultural impacts study did not identify any traditional cultural properties at or near the alternatives. Both reports are enclosed for your review and comments.

We would very much appreciate your input, and any comments you submit will be forwarded to the State Historic Preservation Division to assist in their evaluation of the reports. Please submit your comments by March 2, 2001 to:

State of Hawaii
Department of Transportation
Highways Division
Planning Branch
Advance Planning Section
869 Kapalani Boulevard, Room 301
Honoalu, Hawaii 96813

Attention: Wayne Kawahara

Very truly yours,

[Signature]

BRIAN K. MIWA
Director-Designate of Transportation
Enclosures
Mr. Leslie Kuloloio
Maui/Lana'i Island Burial Council
dc/o State Historic Preservation Division
601 Kamokila Boulevard, Room 555
Kapolei, Hawaii 96707

Dear Mr. Kuloloio:

Subject: Proposed Kīhei-Upcountry Maui Highway, Maui, Hawaii
Inventory Survey of the UI, K1 Alternative, Cultural Impacts Study

Two years ago we asked for your review and comments on archaeological reconnaissance survey
reports prepared for the subject project. Since then, we have completed a Draft Environmental
Impact Statement (EIS) for the project, held public hearings, solicited agency and public comments
on the Draft EIS, and selected a preferred alternative. The preferred alternative is the UI, K1
Alternative, an alignment from the Hālekahi Highway/Halulani Road intersection to the Pīhala
Highway/Kēōnāula Street intersection.

Following selection of the preferred alternative, Cultural Surveys Hawaii, Inc. (CSH) conducted an
archaeological inventory survey of this alignment. The inventory survey report identifies several
sites that were evaluated by CSH as being significant per criteria of the National and Hawaii
Registers of Historic Places. In addition, Scientific Consultant Services, Inc. conducted a cultural
impacts study for all the alternatives. The cultural impacts study did not identify any traditional
cultural properties at or near the alternatives. Both reports are enclosed for your review and
comments.

We would very much appreciate your input, and any comments you submit will be forwarded to the
State Historic Preservation Division to assist in their evaluation of the reports. Please submit your
comments by March 2, 2001 to:

State of Hawaii
Department of Transportation
Highway Division
Planning Branch
Advance Planning Section
889 Kapalama Boulevard, Room 301
Honolulu, Hawaii 96813

Attention: Wayne Kawahara
Mr. Charles Maxwell
157 Ala Place
Pahoa, Hawaii 96773

Dear Mr. Maxwell:

Subject: Proposed Kihel-Upcountry Maui Highway, Maui, Hawaii Inventory Survey of the U1, K1 Alternative, Cultural Impact Study

Two years ago we asked for your review and comments on archaeological reconnaissance survey reports prepared for the subject project. Since then, we have completed a Draft Environmental Impact Statement (EIS) for the project, held public hearings, solicited agency and public comments on the Draft EIS, and selected a preferred alternative. The preferred alternative is the U1, K1 Alternative, an alignment from the Holaeka’ala Highway/Hololani Road intersection to the Pualani Highway/Kaunoa Street intersection.

Following selection of the preferred alternative, Cultural Surveys Hawaii, Inc. (CSH) conducted an archaeological inventory survey of this alignment. The inventory survey report identifies several sites that were evaluated by CSH as being significant per criteria of the National and Hawaii Registers of Historic Places. In addition, Scientific Consultant Services, Inc. conducted a cultural impacts study for all the alternatives. The cultural impacts study did not identify any traditional cultural properties at or near the alternatives. Both reports are enclosed for your review and comments.

We would very much appreciate your input, and any comments you submit will be forwarded to the State Historic Preservation Division to assist in their evaluation of the reports. Please submit your comments by March 2, 2001 to:

State of Hawaii
Department of Transportation
Highways Division
Planning Branch
Advance Planning Section
809 Kapiolani Boulevard, Room 301
Honolulu, Hawaii 96813

Attention: Wayne Kawahara
Mr. Charles Maxwell  
FEB 8 2001

FAX Number: 587-1787
If you have any questions, please contact Wayne Kawahara at 587-6257.

Very truly yours,

Brian K. Mina
Director-Designate of Transportation

Enclosures

Mr. Helen Feshig
South Maui Heritage Corridor
2864 Puu Ho'ola'au
Kahului, Hawaii 96733

Dear Mr. Feshig:

Subject: Preformed Kihel-Upcountry Maui Highway, Maui, Hawaii
Inventory Survey of the UI, K1 Alternative, Cultural Impacts Study

Two years ago we asked for your review and comments on archaeological reconnaissance survey reports prepared for the subject project. Since then, we have completed a Draft Environmental Impact Statement (DEIS) for the project, held public hearings, solicited agency and public comments on the Draft EIS, and selected a preferred alternative. The preferred alternative is the UI, K1 Alternative, an alignment from the Haliimaile Highway/Haili Street intersection to the Pillau Highway/Kamilo Street intersection.

Following selection of the preferred alternative, Cultural Surveys Hawaii, Inc. (CSH) conducted an archaeological inventory survey of this alignment. The inventory survey report identifies several sites that were evaluated by CSH as being significant per criteria of the National and Hawaii State Historic Preservation Act. In addition, Cultural Surveys Hawaii, Inc. conducted a cultural impacts study for all the alternatives. The cultural impacts study did not identify any traditional cultural properties at or near the alternatives. Both reports are enclosed for your review and comments.

We would very much appreciate your input, and any comments you submit will be forwarded to the State Historic Preservation Division to assist in their evaluation of the report. Please submit your comments by March 2, 2001 to:

State of Hawaii
Department of Transportation
Highways Division
Planning Branch
Advance Planning Section
699 Kapolei Boulevard, Room 301
Honolulu, Hawaii 96813

Attention: Wayne Kawahara
If you have any questions, please contact Wayne Kawahara at 587-6397.

Very truly yours,

BRIAN K. MINAAI
Director-Designee of Transportation

Encl.

Kīhei Community Association
P. O. Box 662
Kīhei, Hawaii 96753

Dear Members:

Subject: Proposed Kīhei-Upcountry Maui Highway, Maui, Hawaii
Inventory Survey of the U1, K1 Alternative, Cultural Impacts Study

Two years ago we asked for your review and comments on archaeological reconnaissance survey reports prepared for the subject project. Since then, we have completed a Draft Environmental Impact Statement (EIS) for the project, held public hearings, solicited agency and public comment on the Draft EIS, and selected a preferred alternative. The preferred alternative is the U1, K1 Alternative, an alignment from the Hālekāla Highway/Halimaile Road intersection to the Pūlaua
Highway/Kaanapali Street intersection.

Following selection of the preferred alternative, Cultural Surveys Hawaii, Inc. (CSHI) conducted an archaeological inventory survey of this alignment. The inventory survey report identifies several sites that were evaluated by CSHI as being significant per criteria of the National and Hawaii Registers of Historic Places. In addition, Scientific Consultant Services, Inc. conducted a cultural impacts study for all the alternatives. The cultural impacts study did not identify any traditional cultural properties at or near the alternatives. Both reports are enclosed for your review and comments.

We would very much appreciate your input, and any comments you submit will be forwarded to the State Historic Preservation Division to assist in their evaluation of the reports. Please submit your comments by March 2, 2001 to:

State of Hawaii
Department of Transportation
Highways Division
Planning Branch
Advance Planning Section
809 Kapahulu Boulevard, Room 301
Honolulu, Hawaii 96813

Attention: Wayne Kawahara
Kahului Community Association
Page 2

HWY-PA 2.1544

FAX Number: 587-1787

If you have any questions, please contact Wayne Kawahara at 587-6357.

Very truly yours,

BRIAN K. MINAAI
Director-Designate of Transportation

Enclosures

Ms. Dana Hall
Waihali/Kenake Homestead Association
2087 Waihele Street
Kula, Maui, Hawaii 96793

Dear Ms. Hall:

Subject: Proposed Kahului-Uponona Maui Highway, Maui, Hawaii

Inventory Survey of the U1, K1 Alternative, Cultural Impacts Study

Two years ago we asked for your review and comments on an archaeological reconnaissance survey report prepared for the subject project. Since then, we have completed a Draft Environmental Impact Statement (EIS) for the project, held public hearings, solicited agency and public comments on the Draft EIS, and selected a preferred alternative. The preferred alternative is the U1, K1 Alternative, an alignment from the Honoapiilani Highway/Halamaile Road intersection to the Pauwela Highway/Kihei Road intersection.

Following selection of the preferred alternative, Cultural Surveys Hawaii, Inc. (CSHI) conducted an archaeological inventory survey of this alignment. The survey report identifies several sites that were evaluated by CSHI as being significant per criteria of the National and Hawaii Registers of Historic Places. In addition, Scientific Consultants, Inc. conducted a cultural impacts study for all the alternatives. The cultural impacts study did not identify any traditional cultural properties at or near the alternatives. Both reports are enclosed for your review and comments.

We would very much appreciate your input, and any comments you submit will be forwarded to the State Historic Preservation Division to assist in their evaluation of the report. Please submit your comments by March 1, 2001 to:

State of Hawaii
Department of Transportation
Highways Division
Planning Branch
Advance Planning Section
869 Kapalolei Boulevard, Room 301
Honolulu, Hawaii 96813

Attention: Wayne Kawahara
If you have any questions, please contact Wayne Kawahara at 587-6557.

Very truly yours,

BRIAN K. MINANA
Director-Designate of Transportation

Enclosures

Mr. Ed Lindsey
108A Poolele Road
Mailewa, Hawaii 96708

Dear Mr. Lindsey:

Subject: Proposed Kīhei-Uponony Maui Highway, Maui, Hawaii
Inventory Survey of the U1, X1 Alternative, Cultural Impacts Study

Two years ago we asked for your review and comments on archaeological reconnaissance survey reports prepared for the subject project. Since then, we have completed a Draft Environmental Impact Statement (EIS) for the project, held public hearings, solicited agency and public comments on the Draft EIS, and selected a preferred alternative. The preferred alternative is the U1, X1 Alternative, an alignment from the Hāleiwa Highway/Hālili Road intersection to the Pūluae Highway/Kūroʻolu Street intersection.

Following selection of the preferred alternative, Cultural Surveys Hawaii, Inc. (CSH) conducted an archaeological inventory survey of this alignment. The inventory survey report identifies several sites that were evaluated by CSH as being significant per criteria of the National and Hawaii Registers of Historic Places. In addition, Scientific Consultant Services, Inc. conducted a cultural impacts study for all the alternatives. The cultural impacts study did not identify any traditional cultural properties at or near the alternatives. Both reports are enclosed for your review and comments.

We would very much appreciate your input, and any comments you submit will be forwarded to the State Historic Preservation Division to assist in their evaluation of the reports. Please submit your comments by March 9, 2001 to:

State of Hawaii
Departments of Transportation
Highways Division
Planning Branch
Advance Planning Section
69 Kapalulau Boulevard, Room 301
Hauula, Hawaii 96713

Attention: Wayne Kawahara
Mr. Ed Lindsey

Page 2

FEB 8 2001

Fax Number: 587-1787

If you have any questions, please contact Wayne Kawahara at 587-6357.

Very truly yours,

Brian E. Minnai
Director-Designate of Transportation

Enclosures

Mr. Mohrani Kaiokamalii
Ulupaua Ranch
P.O. Box 901
Kula, Hawaii 96790

Dear Mr. Kaiokamalii:

Subject: Proposed Kaele-Upcountry Maui Highway, Maui, Hawaii

Inventory Survey of the UI, KI Alternative, Cultural Impacts Study

Two years ago we asked for your review and comments on archaeological reconnaissance survey reports prepared for the subject project. Since then, we have completed a Draft Environmental Impact Statement (EIS) for the project, held public hearings, solicited agency and public comments on the Draft EIS, and selected a preferred alternative. The preferred alternative is the UI, KI Alternative, an alignment from the Hueluaka Highway/Halimaile Road intersection to the Pilani Highway/Kamehame Street intersection.

Following selection of the preferred alternative, Cultural Surveys Hawaii, Inc. (CSHI) conducted an archaeological inventory survey of this alignment. The inventory survey report identifies several sites that were evaluated by CSHI as being significant per criteria of the National and State Register of Historic Places. In addition, Scientific Consultant Services, Inc. conducted a cultural impacts study for all the alternatives. The cultural impacts study did not identify any traditional cultural properties at or near the alternatives. Both reports are enclosed for your review and comments.

We would very much appreciate your input, and any comments you submit will be forwarded to the State Historic Preservation Division to assist in their evaluation of the reports. Please submit your comments by March 2, 2001 to:

State of Hawaii
Department of Transportation
Highways Division
Planning Branch
Advance Planning Section
869 Kapolei Boulevard, Room 301
Honolulu, Hawaii 96813

Attention: Wayne Kawahara
February 28, 2001

Mr. Brian Minami
Department of Transportation
869 Punchbowl Street
Honolulu, HI 96813-5097

Subject: Proposed Kibi-Uplountry Maui Highway, Maui, Hawaii
Inventory Survey of the UI, R1 Alternative, Cultural Impact Study

Dear Mr. Minami:

Thank you for the opportunity to comment on the referenced project. We apologize for our late response.

The Office of Hawaiian Affairs previously commented on the need for the preparation of a cultural impact statement. The cultural impact study prepared by Scientific Consultant Services, Inc. concluded that there were no Traditional Cultural Properties within the project area. Consultation with 50 individuals knowledgeable about Hawaiian culture confirmed the existence of archeological sites but did not reveal any cultural practices.

The anthropological inventory survey recommends data recovery of those identified sites and preservation of two sites. OHA requests the opportunity to review the data recovery plan and preservation plan prepared for these sites.

If you have any questions, please contact Charity Mauley, assistant policy analyst at 594-1944, or e-mail her at shamueli@oha.org.

Sincerely,

Colin C. Kippen, Jr.
Deputy Administrator

CK: srm
cc: Board of Trustees
    Randall K. Ogata
    Maui CAC
March 3, 2001:

To: The Honorable Brian K. Minaei
    Director/Chairman
    Department of Transportation

From: Harold E. Son, Chairman
    Maui Interloper Commission

Subject: Proposed Kīhei-Uplcountry Maui Highway
         Archaeological Inventory Survey Report and
         Cultural Impacts Assessment Report

Thank you for providing copies of the assessment reports on the archaeological and cultural significance of the lands and features within the proposed U1-M1 Alternative highway corridor proposed to connect Upcountry Maui and Kīhei.

Your cover letter (MHW-PA 2.1544) advises us that this UI-M1 Alternative, connecting the Haleakalā Highway/Keawalai Road intersection to the Pūlaua Highway/Kana‘ooli Street intersection, is the preferred alternative.

In our January 15, 1998, and March 24, 1999, responses regarding the highway project, the Department of Hawaiian Home Lands (DHHL) gave support to the proposed U2-K2 alignment and asked that we be consulted as part of the process to finalize the alignment selection and the locations of possible on/off ramps. We believe that the U1-M2 alignment will offer more opportunities for more

It appears that the UI-M1 Alternative will not relieve the traffic along already heavily-used portions of the Kīhei will still head

The Honorable Brian K. Minaei
March 2, 2001
Page 2

Makai (West) to use the new route, competing with those... in Kīhei. During the afternoon peak hours, the same conflicts will occur, only in reverse.

DHHL would like to review Origin-Destination studies that support the UI-M1 Alternative as the most reasonable (preferred) alternative.

We have reviewed the archaeological and cultural reports provided and have no comments to offer.

If you have any questions, please call me at 586-3801. You can have your staff call Joe Chu at our Planning Office at 587-6621.
CORRECTION

THE PRECEDING DOCUMENT(S) HAS BEEN REPHOTOGRAPHED TO ASSURE LEGIBILITY
SEE FRAME(S) IMMEDIATELY FOLLOWING
February 28, 2001

Mr. Brian Minnai
Department of Transportation
681 Punchbowl Street
Honolulu, Hi 96813-5097

Subject: Proposed Kihei-Upono Maui Highway, Maui, Hawaii
Inventory Survey of the Ut, U3 Alternative, Cultural Impacts Study

Dear Mr. Minnai:

Thank you for the opportunity to comment on the above-referenced project. We apologize for our late response.

The Office of Hawaiian Affairs previously commented on the need for the preparation of a cultural impact statement. The cultural impact study prepared by Scientific Consultant Services, Inc. concluded that there were no Traditional Cultural Properties within the project area. Consultation with 50 individuals knowledgeable about Hawaiian culture confirmed the existence of archeological sites but did not reveal any cultural practices.

The archeological inventory survey recommends data recovery of three identified sites and preservation of two sites. OHA requests the opportunity to review the data recovery plans and preservation plans prepared for these sites.

If you have any questions, please contact Sheila Muesley, assistant policy analyst at 594-3944, or e-mail her at sh-muesley@oha.org.

Sincerely,

Colin C. Klippen, Jr.
Deputy Administrator

CC: none
Board of Trustees
Randall K. Ogata
Mauli CAC
March 2, 2001

The Honorable Brian K. Minaal
March 2, 2001

Page 2

Makai (East) to use the new route, competing with those
toward to Kahului-Wailuku. When they exit at Ki, they
will be at the busiest section of the Piilani Highway
in Kihei. During the afternoon peak hours, the same
conflicts will occur, only in reverse.

DBHL would like to review Origin-Destination studies that
support the UI-KL Alternative as the most reasonable
(preferred) alternative.

We have reviewed the archaeological and cultural reports
provided and have no comments to offer.

If you have any questions, please call me at 586-3801, or
have your staff call Joe Chu of our Planning Office at
587-6421.

The Honorable Brian K. Minaal
March 2, 2001

Page 2

Thank you for providing copies of the assessment reports on
the archaeological and cultural significance of the lands
and features within the proposed UI-KL Alternative Highway
corridor proposed to connect Upcountry Maui and Kihei.

Your cover letter (HWY-PA 2.1544) advises us that this
UI-KL Alternative, connecting the Kuleana
Highway/Halimaile Road intersection to the Piilani
Highway/Kaunakakui Street intersection, is the preferred
alternative.

In our January 15, 1998, and March 24, 1999, responses
regarding the highway project, the Department of Hawaiian
Home Lands (DHHL) gave support to the proposed UI-K2
alignment and asked that we be consulted as part of the
process to finalize the alignment selection and the
locations of possible on/off ramps. We believe that the
UI-K2 alignment will offer more opportunities for more
drivers to avoid the high traffic concentrations that will
occur at the busiest highway segments and intersections
during peak hours.

It appears that the UI-KL Alternative will not relieve the
traffic along already heavily-used portions of the
Kuleana and Piilani Highways. In the morning, residents
of Makawao-Pukalani wishing to go to Kihei will still need

The Honorable Brian K. Minaal
March 2, 2001

Page 2
May 10, 2001

Halef H. Hammatt, Ph.D.
Cultural Surveys Hawaii
735 North Kalihi Avenue
Kailua, Hawaii 96734

Dear Dr. Hammatt,

SUBJECT: Review of An Archaeological Inventory Survey of the Proposed Kīhei to Kula Road Corridor, Kula to ʻIao Valley Shelter, Makawao and Waikoloa, Maui

THURS. 4-25-00:1; por. 101, 202, 203, 204; 2-25-00:2; por. 101, 301, 305, 401, 406; 2-26-00:1; por. 101, 301, 305, 401, 406; 3-09-00:1; por. 101

Thank you for the opportunity to review this report which our staff received on 12 February 2001 (John Stinier, Crews, Bush, and Hammatt, 2000, Archaeological Inventories Survey of the Proposed Kīhei to Kula Road Corridor, Kula to ʻIao Valley Shelter, Makawao and Waikoloa, Maui, TMR 2-25-00:1; por. 101, 202, 203, 204; 2-25-00:2; por. 101, 301, 305, 401, 406; 2-26-00:1; por. 101, 301, 305, 401, 406; 3-09-00:1; por. 101, Cultural Surveys Hawaii Inc.). We apologize for the delay in our response.

The background section acceptably establishes the shelter's settlement pattern and predicts the likely site pattern in the project area.

The survey has adequately covered the project area documenting 17 historic properties in the project area (six of which were previously identified). The site descriptions and interpretations are acceptable. The functional classifications for the historic properties include seven temporary habitation sites (3742, 3743, 3745, 5032, 5033, and 5035), three agricultural sites (3728 and 3729 precontact, 4785 Hawaiian), two petroglyph sites (5029 and 5031, each with only 3 petroglyphs one cattle wall site (5020), one mokapu (3728), one mokapu (3728), and three sites related to historic military training activities (4773, 4774, and 4778).

We agree that 15 of the sites are significant solely for their information content (Criterion "D" of the National Register of Historic Places). We believe, however, that the two petroglyph sites are significant for their information content (D) and also as representative examples of small petroglyph sites in the lower Kula watersheds (Criterion "C"). If you agree, please correct the significance evaluation for these two sites to include Criterion "C" and send us a replacement page. If you disagree, please contact our Maui Archaeologist to discuss the situation. Regardless of the resolution of the specificity of significance, we can agree by consensus that all 17 historic properties are technically eligible for inclusion on the National Register of Historic Places.

We agree with the mitigation proposals. No mitigation (preservation or data recovery) is warranted for 12 of the sites (3727, 3728, 3729, 3742, 3743, 3745, 4785, 4773, 4774, 4775, 5032, 5033, and 5035). These are small sites and a reasonable and adequate amount of their significant information was recovered during the survey, and in the cases of 3742, 3743, and 3745 temporary habitation sites (5032, 5033, and 5035) are to undergo archaeological data recovery.

We understand that this is a project with federal involvement (Federal Highway Administration). Thus, following the rules of the U.S. Advisory Council on Historic Preservation, mitigation of the 5 sites is required to take place under a Memorandum of Agreement (MOA). We see this as a very simple MOA with stipulation for preservation (and an attached preservation plan) and another stipulation for archaeological data recovery (with an attached data recovery plan). Please be sure that your client and the federal agency that is involved contact with native Hawaiian groups and the interested public on the findings and the proposed mitigation. Parties that wish to be involved should have the opportunity to comment on the MOA. We will await receiving a copy of the draft MOA.

If you have questions, please contact Dr. Melissa Kihonudd (Mahalo! SHPO 243-5169) as soon as possible to resolve these concerns.

Sincerely,

[Signature]

Glen Riddell, Administrator
State Historic Preservation Division

McGann

[Contact Information]
Mr. Gilbert Coloma-Agana  
Chairperson and State Historic Preservation Officer  
State of Hawaii Department of Land and Natural Resources  
601 Kamohala Boulevard, Room 155  
Kapolei, Hawaii, 96707  

Attention: Mr. Ross Cooey  

Subject: Proposed Kiholo-Upcountry Maui Highway  
County of Maui, Hawaii  
Section 106 of the National Historic Preservation Act  
Request for Concurrence on Effect Determinations  

Dear Mr. Coloma-Agana:  

In accordance with Section 106 of the National Historic Preservation Act, this letter requests that the State Historic Preservation Office (SHPO) concur on effect determinations regarding historic properties in the subject project's Area of Potential Effect (APE).  

The U1K1 alignment has been identified as the preferred alternative. The U1K1 alignment would run from the Waiheka Road / Halamaile Road intersection to the Pilani Highway / Kaonoli Street intersection.  

An inventory survey of this area was conducted by Cultural Surveys Hawaii (CSH). The survey report (Archaeological Inventory Survey of the Proposed Kiholo to Ka'a Road Corridor, Kahului and Kalana'ula, Maui County, Hawaii, December 2000) was reviewed by the State Historic Preservation Division (SHPD), with review comments provided in the letter of May 10, 2001 (ref. LOG NO: 27324, DOC NO: 601424001). The report has been accepted by the SHPD.  

The following historic properties were identified in the APE of the preferred alternative:  

<table>
<thead>
<tr>
<th>State Site Number</th>
<th>Function</th>
<th>50-10-10-0372</th>
<th>Military</th>
<th>50-10-10-0373</th>
<th>Agriculture</th>
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<tbody>
<tr>
<td>50-10-10-0374</td>
<td>Agricultural</td>
<td>50-10-10-0375</td>
<td>Military</td>
<td>50-10-10-0376</td>
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<td>50-10-10-0391</td>
<td>Military</td>
</tr>
<tr>
<td>50-10-10-0392</td>
<td>Temporary Habitation</td>
<td>50-10-10-0393</td>
<td>Military</td>
<td>50-10-10-0394</td>
<td>Military</td>
</tr>
<tr>
<td>50-10-10-0395</td>
<td>Temporary Habitation</td>
<td>50-10-10-0396</td>
<td>Military</td>
<td>50-10-10-0397</td>
<td>Military</td>
</tr>
</tbody>
</table>

With due consideration for both the results of the inventory survey report and input from public review, the Federal Highway Administration (FHWA) renders "no adverse effect" determinations on State sites 50-10-10-0372, 3728, 3728, 3742, 3743, 3745 4765, 4771, 4778, 5032, and 5034. None of these sites warrant preservation and sufficient documentation of these sites has been previously collected by CSH and others. The SHPD agreed in the May 19, 2001 letter that no further work is needed on these sites.  

The FHWA renders "adequate effect" determinations on State sites 50-10-10-0392, 5033 and 5035, sites that are functionally related to the subject project. Two of the sites (5032 and 5033) are located 190 to 150 feet from the alignment centerline, just inside the APE. None of these temporary habitation sites warrant preservation. However, additional data recovery is needed if subsequent project phasing confirms that these sites will be displaced by the project. A draft Memorandum of Agreement (MOA) is enclosed.  

Two petroglyph sites (State sites 5029 and 5031) are located approximately 200 feet from the alignment centerline in Kalalaani and Waikolu Gulches. Because of this distance, and since Kiholo-Upcountry Maui Highway will cross both gulches via two-lane bridges, both petroglyph sites are outside the APE. Nevertheless, the project's Record of Decision (ROD) will specify that buffer zones around the petroglyphs, demarcated with bright colored markers, be established during construction to prevent accidental damage to the sites. The ROD will instruct the State Department of Transportation to consult with the SHPD to determine adequate buffer zones.  

If you have any questions or require additional information, please do not hesitate to call me at 541-2700 (ext. 302).  

Sincerely yours,  


Domingo Salicion, P.E.  
Structural Engineer
Enclosure: Draft Memorandum of Agreement Among the Federal Highway Administration, and the Hawaii State Historic Preservation Office Regarding the Displacement of Three Temporary Habitation Sites for the Kiluea-Upcountry Maui Highway, County of Maui, Hawaii, Project No. HDFS-920X(1)

cc: Dr. Melissa Kirkendall, State Historic Preservation Division
Mr. Wayne Kawahara, State of Hawaii Department of Transportation
Mr. Warren Eshomori, Warren & Eshomori Engineering, Inc.
Mr. Jason Yazawa, Parsons Brinckerhoff Quade & Douglas, Inc.
Ms. Laura Kang, FHWA
September 26, 2001

Mr. Clyde Namu'o, Administrator
State of Hawaii Office of Hawaiian Affairs
711 Kapiolani Blvd., Suite 500
Honolulu, Hawaii 96813

Subject: Proposed Kehei-Uipcountry Maui Highway
County of Maui, Hawaii
Nanional Historic Preservation Act, Section 106 Consultation
Memorandum of Agreement

Dear Mr. Namu'o:

The State of Hawaii Department of Transportation (DOT) and the Federal Highway Administration (FHWA) thank the Office of Hawaiian Affairs for its participation in the planning of this project. OHA has provided valuable comments on numerous occasions, most recently through the OHA review of the cultural impact study and archaeological inventory survey of the preferred alignment alternative (from the Hakaakawaa Highway / Hauhau Road intersection in Upcountry to the Piilani Highway / Kaaloulo Street intersection in Kihei).

In accordance with Section 106 of the National Historic Preservation Act, the FHWA has determined that the project will not have adverse effects on the historic properties listed in the National Register of Historic Places. Although these sites, designated as significant, warrant preservation, additional data recovery is needed if subsequent project planning confirms that these sites will be disturbed by the project. The State Historic Preservation Office (SHPO) is expected to concur with these effect determinations.

Enclosed please find a draft Memorandum of Agreement (MOA) between the FHWA and the SHPO regarding the three sites. The State Historic Preservation Division has already reviewed the draft MOA. We respectfully ask the OHA to also review the MOA before it is signed. Please provide any comments you may have by October 26, 2001.

Please do not hesitate to call me at 586-2335 should you have any questions. I will be on vacation from October 10 to October 29. If you need to contact us during this period, please call Mr. David Akin at 586-2205.

Sincerely yours,

Paysons Brinkerhoff Quade & Douglas, Inc.

[Signature]

Cc: Domingo Galicano, FHWA (two enclosures)
Wayne Kawamura, DOT (two enclosures)

October 16, 2001

Mr. Jason Yazawa
Paysons Brinkerhoff
Pacific Tower, Suite 2000
1901 Bishop Street
Honolulu, HI 96813

Subject: Proposed Kehei-Uipcountry Maui Highway Memorandum of Agreement (MOA)

This letter is provided as a response to the materials of September 26, 2001, produced by Paysons Brinkerhoff for FHWA, requesting review and comments relating to the above MOA. OHA finds the terms of the MOA to be sound and reasonable, and has no further comments to add in its review.

Thank you for the opportunity to review and comment relating the proposed project. If you have any questions, please contact Wayne Kawamura, Policy Analyst at 594-1966, or e-mail him at: waynek@hono.dot

Sincerely,

Colin Kippen, Jr.
Deputy Administrator
cc: DOT ADM
MEMORANDUM OF AGREEMENT

Among the FEDERAL HIGHWAY ADMINISTRATION and the HAWAII STATE HISTORIC PRESERVATION OFFICER

Regarding the Displacement of Three Temporary Habitation Sites for the Kona-Ukumei Maul Highway, County of Maui, Hawaii Project No. HDP-5023(1)

WHEREAS, the Federal Highway Administration (FHWA) has determined that State Sites 50-50-10-0022, 5023 and 5025, which functioned as temporary habitation, are eligible for inclusion in the National Register of Historic Places (NRHP), and that their displacement by the construction of Kona-Ukumei Maul Highway will have an adverse effect, and FHWA has consulted with the Hawaii State Historic Preservation Officer (SHPO) and the Advisory Council on Historic Preservation (Council) pursuant to 26 CFR Part 600, regulations implementing Section 106 of the National Historic Preservation Act (16 U.S.C. 470);

WHEREAS, the State of Hawaii Department of Transportation (HDO) participated in the consultation and has been invited to concur in this Memorandum of Agreement (MOA);

WHEREAS, the State of Hawaii Office of Hawaiian Affairs participated in the consultation; and

NOW, THEREFORE, the FHWA and the Hawaii SHPO agree that the displacement of State Sites 5022, 5023 and 5025 shall be implemented in accordance with the following stipulations in order to take into account such actions' effect on historic properties.

STIPULATIONS

1. Prior to the displacement of State Sites 5022, 5023 and 5025 (the undertaking), the HDOT shall arrange the preparation of a data recovery plan for these sites. HDOT will submit this plan to the State Historic Preservation Division (SHPD) for review. Once approved by the SHPO, HDOT shall arrange the data recovery of State Sites 5022, 5023 and 5025.

2. Upon SHPO's acceptance of the data recovery report, HDOT will be allowed to commence the undertaking.

3. The FHWA shall submit a copy of the executed MOA to the Council with the appropriate documentation pursuant to 26 CFR Section 600.11 prior to the undertaking.

4. Should a party to this agreement object within 30 days to any terms submitted pursuant to this agreement, the FHWA shall consult with the objection party to resolve the objection. If the FHWA determines that the objection cannot be resolved, the FHWA shall request comments of the Council pursuant to 26 CFR Section 600.3. Any Council comment provided in response to such a request shall be taken into account by the FHWA with reference only to the subject of the dispute; the FHWA's responsibility to carry out all actions under this agreement that are not the subjects of the dispute will remain unchanged.

5. Any party to this MOA may request that it be amended, whereupon the parties shall consult in accordance with 26 CFR Section 600 to consider such amendment.

6. Should the undertaking not take place within five (5) years of the executed MOA, the parties shall consult in accordance with 26 CFR Section 600 to determine whether amendments should be considered.

Execution of this MOA by the FHWA and the Hawaii SHPO, and implementation of its terms shall be evidence that FHWA has afforded the Council the opportunity to comment on the project entitled, "Kona-Ukumei Maul Highway, Island of Maui, Hawaii, Project No. 1-HDP-5023(1)" and its effects on historic properties, and that FHWA has taken into account the effects of the undertaking on State Sites 50-50-10-0022, 5023 and 5025.

FEDERAL HIGHWAY ADMINISTRATION

By: ____________________________ Date: 1/2/01

ABRAHAM WONG
Division Administrator

HAWAII STATE HISTORIC PRESERVATION OFFICER

By: ____________________________ Date: 1/24/01

ORLENE COLOMA-MAGANA
State Historic Preservation Officer

CONCURRED BY:

STATE OF HAWAII DEPARTMENT OF TRANSPORTATION

By: ____________________________ Date: 1/24/01

KIRAN MINJAI
Director of Transportation
Mr. Pat V. Phung, P.E.
Transportation Engineer
U.S. Department of Transportation
Federal Highway Administration
300 Ala Moana Boulevard, Room 3202
Honolulu, Hawaii 96815

Dear Mr. Phung:

This letter is in regards to the Kula-Upcountry Maui Highway project located in Maui, Hawaii.

Based on information contained in the Environmental Assessment and a meeting held on February 9, 1999 with Mr. Masayuki Watanabe of my staff, Mr. Steven Cheng, State DOT and yourself, it was determined that a Department of the Army permit would be required. The proposed project appears to have minor environmental impacts, therefore could possibly be authorized under Nationwide Permit #14, Road Crossing. In addition, a Coastal Zone Management Federal Consistency determination from the Office of Planning will be required. The State Department of Health has issued a blanket Section 401 Water Quality Certification for this NPDES permit and a Best Management Plan addressing any discharge of fill materials into intermittent streams will need to be submitted.

File number 990000205 has been assigned to this project. Please refer to this number in any future correspondence with this office. Should you have additional questions or need further information, you may call Mr. Watanabe at 436-9250, extension 14.

Sincerely,

George P. Young, P.E.
Chief, Operations Branch

Copy furnished:
Clean Water Branch, Environmental Management Branch, Honolulu, Hawaii
DLNR, State Historic Preservation Office, Honolulu, Hawaii
DBEDT, Office of Planning, Coastal Zone Management Office, Honolulu, Hawaii
U.S. Fish and Wildlife Service, Honolulu, Hawaii
Environmental Protection Agency, Honolulu, Hawaii
Mr. David W. Blane, Director
Office of Planning, Department of Business, Economic
Development and Tourism
Hawaii Coastal Zone Management Program
P.O. Box 2359
Honolulu, HI 96810

January 29, 2001

HAWAII COASTAL ZONE MANAGEMENT PROGRAM

ASSESSMENT FORM

For
Kilei-Upcountry Maui Highway
Maui County, Hawaii

Submitted To:
STATE OF HAWAI'I
DEPARTMENT OF BUSINESS, ECONOMIC DEVELOPMENT, AND TOURISM
Office of Planning
Coastal Zone Management Program

Submitted By:
STATE OF HAWAI'I
DEPARTMENT OF TRANSPORTATION
And
U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION

November 2000

Subject: Kilei-Upcountry Maui Highway, Federal Activity Consistency,
Hawaii Coastal Zone Management (CZM) Program

Dear Mr. Blane:

We have enclosed for your review a CZM Program Assessment Form for the above Federal-aid
highway project. The proposed project is located within the State’s CZM area. As required by 15
CFR 930.32, federal activities undertaken in or affecting Hawaii’s coastal zone must be consistent
with the State’s CZM objectives and policies.

The Draft Environmental Impact Statement for this project was completed in July 1999. We
provided your office with a copy of this Draft EIS for your review. The Final EIS is expected to be
completed by this spring, so we are requesting a CZM Consistency Determination prior to issuance
of the Final EIS.

If there are any questions or comments, please call me at 541-2700 ext. 302. We appreciate your
assistance in making the determination.

Sincerely yours,

Domingo Galicia, P.E.
Structural Engineer

Enclosures

cc: Jason Yazawa, Faznews licked Oaile & Douglas, Inc.
Wayne Kawahara, HWY-P
CORRECTION

THE PRECEDING DOCUMENT(S) HAS BEEN REPHOTOGRAPHED TO ASSURE LEGIBILITY
SEE FRAME(S) IMMEDIATELY FOLLOWING
Mr. David W. Bland, Director
Office of Planning, Department of Business, Economic Development and Tourism
Hawaii Coastal Zone Management Program
P.O. Box 2159
Honolulu, HI 96804

Subject: Kahului-Uppcountry Maui Highway, Federal Activity Consistency, Hawaii Coastal Zone Management (CZM) Program

Dear Mr. Bland:

We have enclosed for your review a CZM Program Assessment Form for the above Federal-aid highway project. The proposed project is located within the State’s CZM area. As required by 13 CFR 930.32, federal activities undertaken in or affecting Hawaii’s coastal zone must be consistent with the State’s CZM objectives and policies.

The Draft Environmental Impact Statement for this project was completed in July 1999. We provided your office with a copy of this Draft EIS for your review. The Final EIS is expected to be completed by this spring, so we are requesting a CZM Consistency Determination prior to issuance of the Final EIS.

If there are any questions or comments, please call me at 541-2700 ext. 302. We appreciate your assistance in making the determination.

Sincerely yours,

Domingo Calicosa, P.E.
Structural Engineer

Enclosures

cc: Jason Yazawa, Parsons Brinckerhoff Quade & Douglas, Inc.
Wayne Kawashiro, HWY-P

HAWAII COASTAL ZONE MANAGEMENT PROGRAM

ASSessment FORM

For
Kahului-Uppcountry Maui Highway
Maui County, Hawaii

Submitted To:
STATE OF HAWAII
DEPARTMENT OF BUSINESS, ECONOMIC DEVELOPMENT, AND TOURISM
Office of Planning
Coastal Zone Management Program

Submitted By:
STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION

And
U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION

November 2000
INTRODUCTION

This assessment describes the impacts that the proposed Kīhei-Uncountry Maui Highway project would have on recreational resources, historic resources, scenic and open space resources, coastal ecosystems, economic uses, coastal hazards, managing development, public participation, beach protection, and marine resources. These topics areas were reviewed to assess the project's conformance with Hawai'i's Coastal Zone Management (CZM) program.

The State of Hawai'i Department of Transportation (SDOT) and the Federal Highway Administration (FHWA) propose to construct a two-lane limited access highway connecting the Uncountry area of East Maui with the coastal Kīhei area. The purposes of the project are the following:

- Improve Maui's road system by providing a direct link between Uncountry Maui and the Kīhei-Ma'alaea region;
- Support further economic development of the established visitor industry and the growing "high technology" industry centered at the Maui Research and Technology (MaR&T) Park in Kīhei and Science City on the summit of Haleakalā;
- Address vehicular capacity deficiencies on Maui highways;
- Satisfy the increasing travel demand of Maui's growing population;
- Promote the national interest as expressed through a legislative directive supporting research activities being conducted at the Maui R&T Park and Science City; and
- Increase the coastal evacuation capacity of the Kīhei-Ma'alaea region.

Construction of a two-lane highway is proposed initially because projections indicate that two lanes will be sufficient to accommodate travel demand in the design year, 2000. However, right-of-way will be acquired for a four-lane highway. The width of the right-of-way will be at least 150 feet in rural areas and at least 120 feet in urban areas. The precise widths of the right-of-way at all places will depend on local terrain features. Along most of the alignment, earthwork will only be done for a two-lane roadway. However, where the highway crosses certain gulches, and where an urban design (provision of gutters, sidewalks, etc.) is proposed, earthwork for the ultimate four-lane configuration will be conducted during the initial construction phase.

The alignments that were considered in this project's Draft Environmental Impact Statement (EIS) are the eight possible combinations of four Uncountry and two Kīhei terminus options (see Figures 1 and 2). The Kīhei terminus and segments are named U1, U2, U3, and U4. Both the maile terminus options in Kīhei fall on the mauka boundary of the Special Management Area (see Figure 3). A No Build alternative was also considered. Brief descriptions of the build alternatives are provided below:

1. Alternative U1, K1. This alternative would start at the Hālākula Highway/Hālima'alea Road intersection in Uncountry and follow a southeasterly alignment to the Kāna'oulu Street/Pitaua Highway intersection. The length of this alternative is approximately 9.9 miles.

2. Alternative U1, K2. This alternative shares the same Uncountry terminus as Alternative U1, K1. However, this alternative would proceed southwest to the Ke Aliʻi Aliinui Street/Pitaua Highway intersection. The length of Alternative U1, K2 is approximately 10.8 miles.

3. Alternative U2, K1. This alternative would extend from the Pukalani Bypass/Hālākula Highway /Kūlani Highway "Five Trees" intersection in Uncountry, and follow a generally west to southwest alignment to the Pitaua Highway/Kāna'oulu Street intersection in Kīhei. The length of this alternative is approximately 9.8 miles.

4. Alternative U2, K2. This alternative would extend from the "Five Trees" intersection to the Ke Aliʻi Aliinui Street/Pitaua Highway intersection. The length of this alternative is approximately 10.8 miles.

5. Alternative U2, B1. This alternative would extend west from a point on Kula Highway approximately 2.300 feet south of the "Five Trees" intersection. The alignment runs parallel to Segment U2-A for about 10,000 feet, and then joins the U2-A alignment. This alternative's Kīhei terminus is at the Pitaua Highway/Kāna'oulu Street intersection. The length of this alternative is approximately 9.6 miles.

6. Alternative U2, B2. This alternative shares the same Uncountry terminus as Alternative U2, B1. This alternative's Kīhei terminus is at the Pitaua Highway/Ke Aliʻi Aliinui Street intersection. The length of this alternative is approximately 10.8 miles.

7. Alternative U3, K1. This alternative would extend west from Kula Highway, south of Pukalani Gulch in Kula, to the Pitaua Highway/Kāna'oulu Street intersection in Kīhei. The length of this alternative is approximately 9.0 miles.

8. Alternative U3, K2. This alternative shares the same Uncountry terminus as Alternative U3, K1. This alternative's Kīhei terminus is at Pitaua Highway/Ke Aliʻi Aliinui Street. The length of this alternative is approximately 10.0 miles.

The Department of Business, Economic Development, and Tourism, Office of Planning, Coastal Zone Management Program was asked to review the Draft EIS for this project. Please refer to the Draft EIS for additional information.

After analyzing a wide range of factors including cost, transportation benefits, potential environmental impacts, comments received on the Draft EIS, conformance with government plans and policies, and community sentiment, SDOT selected the U1, K1 alignment as the preferred alternative. The FHWA approved this decision. The forthcoming Final EIS will identify the U1, K1 alignment as the preferred alternative. The selection of the preferred alternative was announced through the island of Maui news media.
HISTORIC RESOURCES

Objective: Protect, preserve, and where desirable, restore those natural and man-made historic and pre-historic resources in the coastal zone management area that are significant in Hawaiian and American history and culture.

Policies:
1. Identify and analyze significant archaeological resources;
2. Maximize information retention through preservation of remains and artifacts or salvage operations; and
3. Support State goals for protection, restoration, interpretation, and display of historic resources.

Check either "Yes" or "No" for each of the following questions.

1. Is the project site within a historic/cultural district? Yes No X
2. Is the project site listed or nominated to the Hawaii or National Register of Historic Places? X
3. Does the project site include undeveloped land, which has not been surveyed by an archaeologist? X
4. Has a site survey revealed any information on historic or archaeological resources? X
5. Is the project site within or near a Hawaiian fishpond or historic settlement area? X

Discussion:
As suggested by the Department of Land and Natural Resources, State Historic Preservation Division (SHPD), reconnaissance-level surveys were conducted on the alignments considered in the Draft EIS. The SHPD suggested an archaeological inventory survey be conducted only on the preferred alternative, which was subsequently determined to be U1-K1. This approach was followed, with the results of the reconnaissance surveys disclosed in the Draft EIS. Subsequent to the identification of the preferred alternative, an inventory survey was performed on this alignment. Fieldwork was completed in October 2000, and the upcoming inventory survey report will be used to determine project compliance with Section 106 of the National Historic Preservation Act. It is expected that a Section 106 Memorandum of Agreement (MOA) will be signed for this project.

In addition, a traditional cultural properties / practices (TCPs) study for the project was completed in September 2000. The study did not identify any TCPs that would be affected by the proposed project. The TCP study will be submitted to the SHPD for review.

The project area is either undeveloped or agricultural land. The archaeological reconnaissance surveys conducted in 1997 identified a total of 25 sites within 400 feet of the disposal conning on the eight proposed alignments. Twenty of these sites were newly discovered. All of the sites were evaluated as eligible for the National Register of Historic Places. In a letter dated June 21, 1999, the Deputy State Historic Preservation Officer (SHPO)-certified that the sites found are eligible for the National Register. The archaeological reconnaissance survey report was included in the Draft EIS as an appendix. The archaeological inventory survey of the U1-K1 alternative (the preferred alternative) identified ten distinct sites that may be eligible for the National Register, which is an increase from five sites identified during the reconnaissance survey of this alignment. The inventory survey will be included in the Final EIS as an appendix.

Impacts to all sites eligible for the National and Hawaii Registers of Historic Places, and recommended for preservation-in-place, were avoided by modifying the alignments of the alternatives. These sites include petroglyphs located in the gulches crossing the alignments and one alae in the vicinity of the U2-K alignment. The alignments were not adjusted to avoid those sites affected that were not recommended for preservation, such as temporary habitation sites, agricultural sites, and military sites. The upcoming MOA will specify data recovery requirements for these sites. Further details on how impacts to archaeological sites were avoided and minimized are provided in the Draft EIS.

Archaeological resources are addressed in Sections 3.10 and 4.10 of the Draft EIS. Correspondence with the SHPD and SHPO is included in Appendix C.

Hawaiian fishponds are located along the coastal area of Kailua, approximately one mile from the proposed makai terminus of the highway. Because of this geographic separation, the proposed highway will not affect the fishponds on Kailua's coast.
SCENIC AND OPEN SPACE RESOURCES

Objective: Protect, preserve, and where desirable, restore or improve the quality of coastal scenic and open space resources.

Policies:
1. Identify valued scenic resources in the coastal zone management area;
2. Ensure that new developments are compatible with their visual environment by designing and locating such developments to minimize the alteration of natural landforms and existing public views to and along the shoreline;
3. Preserve, maintain and, where desirable, improve and restore shoreline open space and scenic resources; and
4. Encourage those developments, which are not coastal dependent to locate in inland areas.

Check either "Yes" or "No" for each of the following questions.

1. Does the project site abut a scenic landmark? Yes X
2. Does the proposed action involve the construction of a multi-story structure or structures? X
3. Is the project site adjacent to undeveloped parcels? X
4. Does the proposed action involve the construction of structures visible between the nearest coastal roadway and the shoreline? X
5. Will the proposed action involve construction in or on waters seaward of the shoreline? On or near a beach? X

Discussion:
Kihel-Upcountry Maui Highway will convert about 10 miles of open space used for grazing and agriculture to a transportation use. Hawaiian Commercial & Sugar Company, the owner of the agricultural land, has indicated that they will continue to cultivate sugarcane on parcels adjacent to the highway. Kihel-Upcountry Maui Highway is not expected to cause substantial urban development in Upcountry because the urban growth potential of Upcountry is limited by scarce water availability, not limited transportation infrastructure. Despite the recent development of a well in Hauu, and diversion of a portion of the well production to the Kula Mauka development, Upcountry will continue to rely on surface water resources which are highly vulnerable to drought conditions. Therefore, as stated in the Makawao-Pukalani-Kula Community Plan, the County does not intend to allow substantial urban development in Upcountry, despite the proposed Kihel-Upcountry Maui Highway.

Views from Upcountry feature panoramic scenes of Central Maui and its open agricultural lands, the rugged and picturesque West Maui Mountains, and the open ocean and shoreline. Kihel-Upcountry Maui Highway will not affect views from Upcountry because the terrain drops away towards Central Maui and the ocean. The views of the ocean, West Maui Mountains, and Central Maui from Upcountry will not be affected.

Views from Kihel offer near sea-level perspectives of the ocean and coastline, distant views of the West Maui Mountains and upland views of Haleakula. Kihel-Upcountry Maui Highway will affect the view of Haleakula from Kihel. A paved roadway and associated embankments climbing the slope will be visible, similar to the view of Haleakula Highway from Hauu.

Visual resources and impacts are discussed in Sections 3.12 and 4.13 of the Draft EIS.
COASTAL ECOSYSTEMS

Objective: Protect valuable coastal ecosystems from disruption and minimize adverse impacts on all coastal ecosystems.

Policies:

1. Improve the technical basis for natural resource management;
2. Preserve valuable coastal ecosystems of significant biological or economic importance;
3. Minimize disruption or degradation of coastal water ecosystems by effective regulation of stream diversions, channelization, and similar land use factors, recognizing competing water needs; and
4. Promote water quantity planning and management practices, which reflect the tolerance of fresh water and marine ecosystems and prohibit land and water uses, which violate State water quality standards.

Check either "Yes" or "No" for each of the following questions.

1. Does the proposed action involve dredge or fill activities? X
2. Is the project site within the Shoreline setback area (20 to 40 feet land of the shoreline)? X
3. Will the proposed action require some form of effluent discharge into a body of water? X
4. Will the proposed action require earthwork beyond clearing and grubbing? X
5. Will the proposed action include the construction of special waste treatment facilities, such as injection wells, discharge ponds, or cesspools? X
6. Is there an intermittent or perennial stream located on or near the project site? X
7. Does the project site provide habitat for endangered species of plants, birds, or mammals? X
8. Is there a wetland on the project site? X
9. Is the project site situated in or abutting a Natural Area Reserve? X
10. Is the project site situated in or abutting a Marine Life Conservation District? X
11. Is the project site situated in or abutting an estuary? X

Discussion:

Surface water resources in the study area consist of intermittent streams that flow in gulches on the western flanks of Haleakula, Kula in Wailuku, Pukalilik, Kula in Waihee, Kula in Waiheka, Waianae, Kau, and Waialua. These gulches collect rainfall and direct flows toward the ocean. However, the gulches are usually dry, and in many places their streambeds have eroded to bedrock. There are no perennial streams in the project area.

Kīhei-Uopaku Maui Highway will cross several of these gulches. These crossings will either be by bridge or embankment. Embankments will include culverts to maintain the flow of water in the gulch. The decision to use a bridge or embankment partially depends on stream water flow in the affected gulches. Culverts will be used for these gulches with storm water flows below 3,000 cubic feet per second from a 100-year design storm. In gulches where these would be peak flows greater than 3,000 cubic feet per second from a 100-year design storm, bridges would be constructed. In either case, the crossing will not cause upstream improvements, and there will be no hydraulic impacts, except perhaps during conditions that exceed the 100-year design storm. As shown on Figure 5, the preferred alternative would require seven bridges, including two underpasses where the highway crosses cause hali roads.

Storm water runoff containing roadway pollutants (petroleum products, rubber) will drain into the gulches and in most cases percolate into the ground. However, during heavy rains, storm water runoff could enter coastal waters. Since roadway pollutant loads are related to vehicle-miles traveled (VMT), a reduction of total regional VMT would reduce the pollutant loading of coastal waters from roadways. Kīhei-Uopaku Maui Highway will reduce total regional VMT because it will substantially shorten the travel distance between some of Maui's major travel markets. Therefore, the Kīhei-Uopaku Maui Highway would reduce roadway pollutant discharges to Maui's coastal waters in comparison to the future No-Build condition.

Although U.S. Fish and Wildlife Service (USFWS) National Wetlands Inventory Maps show wetlands within some of the gulches that would be crossed by the proposed highway, biological surveys did not identify any evidence (vegetation, soils, or hydrology) of wetlands in any of the gulches where they would be crossed by any of the alternatives. Therefore, no wetlands would be affected by construction of Kīhei-Uopaku Maui Highway.

The USFWS stated that certain alternatives, namely the C2 alignment, would pass within one mile of Pu'ukou Kali, one of the few remaining examples of dryland forest in the State, which may contain three federally endangered plants (Abutilon menziesii, Hacquetia behrensi, and Acanthaceae) and some rare plant species (Arctostaphylos, Adiantum capillus, and Neurotrichum capillus). None of the alternatives would affect Pu'ukou Kali and this special forest. In fact, all the
alterations, the preferred alternative is further from this resource. Botanical survey of the
undisturbed plant species, or any plant species of concern,

The terrestrial and bird species found in the project area are common throughout the Hawaiian
islands, although the U.S. agency notes that many of the Hawaiian species have become
endangered. However, the U.S. agency notes that the species in the project area are not
endangered and are unlikely to become so in the future.

Legend:
- Existing Freeway
- Proposed Freeway
- Proposed Terminals
- Proposed Bridges
- Proposeddocoments
ECONOMIC USES

Objective: Provide public or private facilities and improvements important to the State's economy in suitable locations.

Policies:
1. Concentrate in appropriate areas the location of coastal dependent development necessary to the State's economy;
2. Insure that coastal dependent development such as harbors and ports, visitor industry facilities, and energy generating facilities are located, designed, and constructed to minimize adverse social, visual, and environmental impacts in the coastal zone management area; and
3. Direct the location and expansion of coastal dependent developments to areas presently designated and used for such development and permit reasonable long-term growth at such areas, and permit coastal dependent development outside of presently designated areas when:
   a) Utilization of presently designated located is not feasible;
   b) Adverse environmental effects are minimized; and
   c) Important to the State's economy.

Check either "Yes" or "No" for each of the following questions.

Yes  No
1. Does the project involve a harbor or port?  X
2. Is the project site within a designated tourist destination area?  X
3. Does the project site include agricultural lands or lands designated for such use?  X
4. Does the proposed activity relate to commercial fishing or seafood production?  X
5. Does the proposed activity relate to energy production?  X
6. Does the proposed activity relate to seabed mining?  X

Discussion:
Kihei-Upcountry Maui Highway links Kihei-Makena, Maui's second largest visitor accommodation region, with Upcountry Maui, an area containing visitor attractions in its own right, lying on the way to Haleakula National Park. The new highway will enhance the visitor experience by providing a more direct vehicular access between Kihei, Upcountry, and Haleakula National Park. Socio-economic impacts of the project not related to agriculture are discussed in Section 4.3 of the Draft EIS.

In terms of agricultural impacts, the makahua portion of the Kihei-Upcountry Maui Highway will cross agricultural lands, and the maio portion will cross grazing lands (see Figure 6). The preferred alternative would cause the greatest impact on active sugarcane land, and it will bisect one pineapple field. The U2A and U2B would also cross sugarcane land, as well as bisecting two pineapple fields and the Maui County agricultural park. No privately-owned Kula small-scale farm would be directly affected by any of the alternatives. To maintain the productivity of agricultural lands adjacent to the highway, mitigation measures will be implemented. These mitigation measures will include modifying or reconstructing irrigation and drainage systems and haul roads affected by the highway. The preferred alternative will not create isolated, unworkable remnant parcels. Some of the alternatives, including the preferred alternative, could modify travel patterns in a manner that may adversely affect certain Kula farms. Traffic on Onomea and Puakehu Roads may increase, potentially interfering with farm vehicle movements.

To minimize impacts to ranching activities, stock-proof fencing will be erected along both sides of the highway in grazing areas. Provisions will also be made to keep cattle may be herded from one pasture to another without disrupting traffic.

A detailed discussion of farmlands in the project area is provided in Sections 3.2 and 4.2 of the DEIS.
COASTAL HAZARDS

Objective: Reduce hazard to life and property from tsunami, storm waves, stream flooding, erosion, and subsidence.

Policies:
1. Develop and communicate adequate information on storm wave, tsunami, flood erosion, and subsidence hazard;
2. Control development in areas subject to storm wave, tsunami, flood, erosion, and subsidence hazard;
3. Ensure that developments comply with requirements of the Federal Flood Insurance Program; and
4. Prevent coastal flooding from inland projects.

Check either "Yes" or "No" for each of the following questions.

1. Is the project site on or abutting a sandy beach? Yes No X
2. Is the project site within a potential tsunami inundation area as depicted on the National Flood Insurance Program flood hazard map? Yes No X
3. Is the project site within a potential flood inundation area according to a flood hazard map? Yes No X
4. Is the project site within a potential subsidence hazard area according to a subsidence hazard map? Yes No X
5. Has the project site or nearby shoreline areas experienced shoreline erosion? Yes No X

Discussion:
The tsunami evacuation areas along the Kihei-Makena coastline are shown in Figure 7. As shown in the figure, the proposed highway is outside the tsunami inundation area. Moreover, Kihei-Uponcountry Maui Highway will increase the evacuation capacity of the Kihei-Makena region. This is one of the purposes of the project.

The Kihei coastline has experienced shoreline erosion. However, since Kihei-Uponcountry Maui Highway will terminate approximately one mile away from the shoreline, it will not have an effect on shoreline erosion.
MANAGING DEVELOPMENT

Objective: Improve the development review process, communication, and public participation in the management of coastal resources and hazards

Policies:
1. Effectively utilize and implement existing law to the maximum extent possible in managing present and future coastal zone development;
2. Facilitate timely processing of application for development permits and resolve overlapping or conflicting permit requirements; and
3. Communicate the potential short- and long-term impacts of proposed significant coastal developments early in their life cycle and in terms understandable to the general public to facilitate public participation in the planning and review process.

Check either "Yes" or "No" for each of the following questions.

1. Will the proposed activity require more than two (2) permits or approvals? [X]
2. Does the proposed activity conform with the State and County land use designations for the site? [X]
3. Has or will the public be notified of the proposed activity? [X]
4. Has a draft or final environmental impact statement or an environmental assessment been prepared? [X]

Discussion:
Public participation has been an important element of this project. Many scoping and coordination meetings have been held with governmental agencies, elected officials, and the general public throughout the planning process, as described in detail in Chapter 5 of the Draft EIS, which was published in July 1999.

Construction of KealauI-UPcountry Maui Highway will require the federal, State, and County permits listed in Section 4.18 of the Draft EIS. Aside from a Coastal Zone Management consistency determination concurrence, those permits pertaining to the protection of coastal resources include:
- Section 404 permit (Nationwide) from the U.S. Department of the Army;
- Stream Channel Alteration Permit from the State Department of Land and Natural Resources; and
- NPDES and Water Quality Certification permits from the State Department of Health.
The highway will traverse land designated Agricultural and Urban by the State Land Use Commission. A State Highway is an allowable use in these zones.

Pilikai Highway, at the makai terminus of the project, forms the mauka boundary of the Special Management Area (SMA). Because project work would be limited to the mauka side of the highway, an SMA permit from the County is not needed.

PUBLIC PARTICIPATION

Objective: Stimulate public awareness, education, and participation in coastal management.

Policies:

1. Maintain a public advisory body to identify coastal management problems and to provide policy advice and assistance to the coastal zone management program.

2. Disseminate information on coastal management issues by means of educational materials, published reports, staff contact, and public workshops for persons and organizations concerned with coastal-related issues, developments, and government activities.

3. Organize workshops, policy dialogues, and site-specific mediations to respond to coastal issues and conflicts.

Discussion:

Public participation has been an important element of this project. Many scoping and coordination meetings have been held with government agencies, elected officials, and the general public throughout the planning process, as described in detail in Chapter 5 of the Draft EIS, which was published in July 1999.
BEACH PROTECTION

Objective: Protect beaches for public use and recreation.

Policies:
1. Locate new structures inland from the shoreline setback to conserve open space and to minimize loss of improvements due to erosion.
2. Prohibit construction of private erosion-protection structures seaward of the shoreline, except when they result in improved aesthetic and engineering solutions to erosion at the sites and do not interfere with existing recreational and waterfront activities; and

Discussion:
Construction of Kahului Airport Maui Highway will not affect the shoreline setback area or have an impact on coastal erosion. The Highway will not be adjacent to or about the shoreline. At the point of closest approach to the shoreline, the proposed roadway would be approximately one mile from the coastline.

MARINE RESOURCES

Objective: Implement the State's ocean resources management plan.

Policies:
1. Exercise an overall conservation ethic, and practice stewardship in the protection, use, and development of marine and coastal resources;
2. Ensure that the use and development of marine and coastal resources are ecologically and environmentally sound and economically beneficial;
3. Coordinate the management of marine and coastal resources and activities management to improve effectiveness and efficiency;
4. Assist and articulate the interests of the State as a partner with federal agencies in the sound management of ocean resources within the United States exclusive economic zone;
5. Promote research, study, and understanding of ocean processes, marine life, and other ocean resources in order to acquire and inventory information necessary to understand how ocean development activities relate to and impact upon ocean and coastal resources; and
6. Encourage research and development of new, innovative technologies for exploring, using, or protecting marine and coastal resources.

Discussion:
Kahului Airport Maui Highway will not directly affect marine and coastal resources. Some indirect impacts are possible because of erosion during construction, and roadway runoff during extreme storm events. A NPDES permit will be obtained prior to construction. The permit application will specify Best Management Practices (BMPs) to be implemented to minimize erosion. Since Kahului Airport Maui Highway will reduce road use, roadway pollutant loading of coastal waters will be less than under the future No Build condition.

Kahului Airport Maui Highway will improve access to coastal areas, especially from the Upcountry region. Improving accessibility to coastal resources will help raise public awareness and support of ecologically-minded coastal resource management. The Draft EIS and the project's public outreach efforts have included discussions about the importance of minimizing the project's impact on the natural environment.
FEDERAL CONSISTENCY
SUPPLEMENTAL INFORMATION FORM

Project Title: Kīhei-Upcountry Maui Highway
County of Maui, Hawaii

Island: Maui
Tax Map Key No.: Various

Est. Start Date: October 2001
Construction: 2003

APPLICANT OR AGENT

Name & Title: Abraham Wong, Division Administrator
Agency: Federal Highway Administration
Address: P.O. Box 50006, Honolulu, Hawaii
Zip: 96850

TYPE OF APPLICATION (check one only)

[X] Federal Activity
   Statement "a"
   "The proposed activity is consistent with and will be conducted in a manner consistent to the maximum extent practicable with the Hawaii Coastal Zone Management Program."

Signature: [Signature]
Date: [Date]

[ ] Permit or License
   Statement "b"
   The proposed activity complies with Hawaii's Coastal Zone Management Program and will be conducted in a manner consistent with such a program.

Signature: [Signature]
Date: [Date]

[ ] OCS Plan/Permit
[ ] Grant & Assistance

DEPARTMENT OF BUSINESS, ECONOMIC DEVELOPMENT & TOURISM
OFFICE OF PLANNING
235 South Beretania Street, 9th Floor, Honolulu, Hawaii 96813
Office Address: P.O. Box 2254, Honolulu, Hawaii 96804

Ref. No. P-9041

March 30, 2001

Mr. Domingo Galiacian, P.E.
Structural Engineer
U.S. Department of Transportation
Federal Highway Administration
300 Ala Moana Boulevard, Room 2202
Honolulu, Hawaii 96815

Dear Mr. Galiacian:

Subject: Hawaii Coastal Zone Management (CZM) Program
Federal Consistency Review for the Proposed Kīhei-Upcountry Maui Highway, Island of Maui, Hawaii

This is to update you on the status of our CZM federal consistency review. To date we have reviewed the CZM Assessment and Draft Environmental Impact Statement (EIS) and have consulted with the public and various government agencies. After thorough review of the information provided, it is determined that we require additional information critical to our review. Information and discussion of impacts to scenic and open space resources, public participation and historical resources which will be included in the Final EIS is essential for review.

We understand that the Final EIS will not be complete until June 2001, however we have a federally mandated deadline of April 16, 2001. Therefore, we recommend the agreement of an alternative review schedule with a deadline of 30 days after receipt of the Final EIS.

Please submit a notification of your agreement to an alternative review schedule with a deadline of 30 days after receipt of the Final EIS. After concurrence of the alternative review
schedule, the CZM review will resume upon receipt of the additional information and/or the Final EIS. Should you have questions, please call Debra Tom of our CZM Program at 587-2846.

Sincerely,

David W. Blase, AICP
Director
Office of Planning

c: U.S. Army Corps of Engineers
U.S. National Marine Fisheries Service, Pacific Area Office
U.S. Fish and Wildlife Service, Pacific Islands Ecregion
Department of Health, Clean Water Branch
Department of Land & Natural Resources
Commission on Water Resources Management
Historical Preservation Division
Planning Department, County of Maui
Wayne Kawahara, State Department of Transportation, HWY-P
Jason Yakawa, Parsons Brinckeroff Quade & Douglas, Inc.
January 15, 1998

To: The Honorable Kazu Hayashida
    Director of Transportation

From: Kali Watson, Chairman
      Hawaiian Home Commission

Subject: Kīhei-UpCountry Maui Highway: HWY-PA 2.7195

Thank you for sending a copy of the subject map (revised: July 2, 1996) showing alternative termini and alignment segments for the proposed Kīhei-UpCountry Maui Highway. The Department of Hawaiian Home Lands (DHHL) supports the proposed U-2 alignment.

DHHL has 6,111 acres at Kula comprised of TRK 2-2-22: 14, 15, & 16. The K2 alignment runs within 0.5 miles of the makai portion of DHHL's Kula property and a road connection may be possible in the future. This would provide access to the Kīhei-Wailea area.

The U2 alignment provides a connection to the Kula area Project above Pukalani which includes sites for a Hawaiian agency complex, such as a DHHL office and new Kaheakole School.

DHHL is currently working on water system improvements to serve a residential subdivision at Waikōhulu (318 lots) below Palihi Road and an agricultural subdivision (72 lots) below the Kula Hospital. Construction of onsite improvements will proceed over the next 2-5 years.

We would like to undertake a review and update of our existing plans in conjunction with the results of DOT planning efforts for the Kīhei-UpCountry Maui Highway. We request that DHHL be consulted as part of your process to finalize the alignment selection and the locations of possible on/off ramps.

If you have any questions, please call Joe Chu of our Planning Office at 566-3836.

cc: Maui Commissioner
    Maui District Office
APPENDIX D

Environmental Assessment
KIHEI-UPCOUNTRY MAUI HIGHWAY
ENVIRONMENTAL ASSESSMENT

Submitted Pursuant to
Chapter 943, Hawaii Revised Statutes (HRS)

Prepared for:
State of Hawaii Department of Transportation (SDOT)
Highways Division

The following person may be contacted for additional information concerning this document:
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State of Hawaii, Department of Transportation
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May 1995

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1.0 PURPOSE OF AND NEED FOR ACTION

1.1 Introduction

The Highways Division of the State of Hawaii Department of Transportation (SDOT) is filing this Environmental Assessment (EA) with the Office of Environmental Quality Control (OEQC) as the lead local agency for the Kihei-Upcountry Maui Highway project.

Figure 1-1 shows the general project location in Maui County, Hawaii. The proposed highway would connect Pilani Highway with either Halasakula Highway or Kula Highway within an area bounded on the east by Halasakula and Kula Highways, starting at the Halasakula/Haleakula Road intersection, continuing south past the Kula Sanatorium, toward Upalaua, and turning northwest to adjoin Pilani Highway, the western boundary of the area.

The proposed project would be a rural, limited access arterial roadway between the coastal area of Kihei and Upcountry Maui. Design speeds would vary along the roadway depending on the terrain, as indicated below:

- Level Terrain: 100 km/h (62 mph)
- Rolling Terrain: 80 km/h (50 mph)
- Mountainous Terrain: 60 km/h (37 mph)

Depending on the alignment selected, the roadway length would range from 14.3 kilometers (8.9 miles) to 17.0 kilometers (10.6 miles) in an east-west (mauka-makai) direction. The minimum width of the roadway right-of-way would be 49 meters (160 feet) and would include two 3.6 meter (12.0-foot) lanes in each direction and a 6.8 meter (22.2-foot) median. The roadway shoulders would be paved, with a 1.8 meter (6.0-foot) shoulder between the median and the travel lane, and a 2.4 meter (8.0-foot) shoulder outside of the roadway (see Figure 1-2). Although the highway would ultimately have four lanes, an interim phase may be constructed initially which would consist of one through lane in each direction and a truck climbing lane in the eastern (mauka) direction.
The planning phase of the project is projected for completion by September 1996, final design would occur from 1997 to 1999, and construction would begin in 1999 and be completed by 2003. The estimated cost of the project is $50 million.

Upon completion, the highway would satisfy the following four needs: roadway system linkage; existing and projected transportation demand and capacity requirements; economic development requirements; and legislative mandates.

1.2 Roadway System Linkage Needs

There is a need to provide more efficient travel between the Maui Research and Technology (MRT) Park in Kihei and the related scientific facilities at the summit of Haleakala, called Science City. Currently, motorists must traverse Piilani Highway, Mokulele Highway, Puunene Highway, Hansen or Dairy Road, Hana Highway, Haleakala Highway, and finally Haleakala Crater Road to travel from Kihei to Science City. A new highway would provide a more direct route and reduce the 72 kilometer (45-mile) journey by approximately 15.3 kilometers (9.5 miles). In addition to facilitating trips between Kihei and Science City, a more direct roadway would facilitate travel between Kihei and the Upcountry area.

1.3 Transportation Demand and Capacity Needs

The Maui-Kihei Road Study Travel Demand Forecast and Benefit-Cost Analysis (1989) estimated existing and future levels of travel demand between Kihei and Upcountry. This study identified a roadway alignment with a benefit-cost ratio greater than one.

Subsequently the Maui Long-Range Highway Planning Study Island-Wide Plan (1991) (hereinafter referred to as the Maui Long-Range Plan) identified several areas where roadway and intersection capacity was deficient, including the Hana Highway-Haleakala Highway intersection. Based on 1987 traffic data collected by SDOT, this study concluded that Haleakala Highway southeast (mauka) of this intersection exceeds a volume/capacity (v/c) ratio of 90 percent during both the a.m. and p.m. peak hour travel periods, producing a level of service (LOS) of "F" during these periods. The segment of Hana Highway southwest of Haleakala Highway operates at LOS F in the outbound direction during the p.m. peak hour.

Since the completion of the 1991 Maui Long-Range Plan, SDOT has monitored traffic conditions at the Hana Highway-Haleakala Highway intersection on a biennial basis. The latest traffic data were collected in June 1993. These data indicate that daily traffic volume on Haleakala Highway southeast of the Hana Highway-Haleakala Highway intersection has grown approximately 24 percent since 1987, and daily traffic volume on Hana Highway southwest of this intersection has grown approximately 29 percent. Given the levels of congestion in 1987, the 1993 data indicate that congestion has worsened substantially. The proposed highway would help alleviate existing and projected future congestion by providing more roadway capacity between Kihei and the Upcountry area.

1.4 Economic Development Needs

Projected economic growth in West and South Maui is expected to result in the Kīhei-Makana area becoming one of the state's major employment centers. The number of jobs in this area is expected to increase from 5,644 in 1987 to 19,353 in 2010 (Maui County Community Plan Update Program, Socio-Economic Forecast Report (Volume 1), 1994—hereinafter referred to as the Maui County Community Plan) Growth in the visitor industry is expected to stimulate most of this 83 percent growth.

Population increases in Kīhei-Makana are not expected to be sufficient to fully satisfy the local labor market, however. Most of the population increases are expected in the Wailuku-Kahului and Upcountry areas. According to the Maui County Community Plan, population in the Wailuku-Kahului area is expected to increase from 29,833 in 1987 to 48,132 in 2010 (61 percent). Likewise, population in the Upcountry area (Makawao-Pukalani-Kula) is expected to increase by 41 percent, from 17,339 in 1987 to 24,613 in 2010. Consequently, increased commuter travel is expected between the employment center (Kīhei) and the growing residential communities of Upcountry and Wailuku-Kahului.

In addition, the average daily visitor count for Maui is expected to increase by 122 percent between 1987 and 2010, from 32,195 to 71,520 visitors (Maui County Community Plan).
Therefore, visitor travel, such as trips between Kihei, Upcountry and Haleakala National Park, is expected to increase.

The proposed highway would help satisfy future economic demands by linking the growing residential area of Upcountry with the growing labor market of Kihei, and by facilitating growing volumes of tourist travel.

1.5 Legislative Mandate

Federal funding for this project was appropriated because the highway would provide an improved connection between defense-related activities at the Maui RST Park in Kihei and Science City at the Mākena summit.

2.0 PROPOSED PROJECT ALTERNATIVES

The No Build alternative, one transportation system management (TSM) and public transit alternative, and ten Build alternatives are considered in this EA. Section 3.0 of this EA discusses the possible level of impact associated with the Build alternatives.

2.1 No Build Alternative

The No Build alternative consists of those roadway improvements apart from this project that are expected to be implemented by 2022 as stated in the Maui Long Range Plan.

2.2 Transportation System Management (TSM) and Public Transit Alternative

The TSM and public transit alternative to the project would consist of implementing transit or para-transit systems in the region and selected transportation control measures (TCMs) such as High Occupancy Vehicle (HOV) lanes and ridesharing programs. New roadways would not be built.

2.3 Build Alternatives

Ten alignments are being considered in this EA (see Figure 2-1). The Build alternatives are numbered 1 through 10, and include 4A, 4B, 6A, and 6B. These alignments were generated from.
• alignments that were proposed in prior studies and reports;
• a new examination of the study area, and
• other input provided to SDOT through scoping activities that have occurred to date.

Study of a Kihel-Upcountry Highway began more than 20 years ago when, in 1970, the County studied the feasibility of a road between Upcountry and Kula. The next study, the County of Maui Toll Road Study (1988), developed Alternatives 5, 65, and 7. The next study, the Maui Long-Range Plan (1991), developed Alternative 3. Alternatives 1, 2, 4, and \( 6 \) were derived from the eight alternatives contained in the State/County Joint Task Force Upcountry/Kihei Highway Final Report (1993). Alternatives 4B and 8 were developed subsequently to link more roadway termini.

The alternatives are described below:

1. Alternative 1. This alignment would extend from the Hālekōa Highway/Kalimala
   Road intersection in the Upcountry area to Pilani Highway/Keaouhou Street in Kula.
   The minimum horizontal radius would be 510 meters (2,000 feet). The alignment's
   maximum grade would be 3.5 percent. This 14.3 kilometers (8.9 miles) alignment would
   traverse Agriculture zoned land, affecting five large agricultural parcels. Approximately
   9.7 kilometers (6.0 miles) of the alignment would traverse cane fields.

2. Alternative 2. This alignment would extend from the Hālekōa Highway/Kalimala
   Road intersection in the Upcountry area to the Maui R&T Park in Kula. The minimum
   horizontal radius would be 915 meters (3,000 feet). The alignment's maximum grade
   would be 5.0 percent. This 16.3 kilometer (10.1 mile) alignment would traverse about
   6.4 kilometers (4.0 miles) of cane field and would affect six large Agriculture zoned
   parcels.

3. Alternative 3. This alignment would extend from Hālekōa Highway, between
   Kalimala Road and Pukalani in the Upcountry area, to the Pilani Highway/Keaouhou
   Street intersection in Kula. The minimum horizontal radius would be 525 meters (1,750
   feet). The alignment's maximum grade would be 4.2 percent. This 15.5 kilometer (9.6-
   mile) alignment would affect approximately five large parcels zoned for Agriculture.
   The alignment would also skirt the east (mauka) edge of approximately 6.4 kilometers
   (4.0 miles) of cane field. The uppermost portion of the alignment is immediately west of
   Urban zoned lands.

4. Alternative 4A. This alignment would extend from Kula Highway, east of the Pukalani
   Bypass Road in the Upcountry area, to the Maui R&T Park in Kula. The minimum
   horizontal radius would be 715 meters (2,300 feet). The alignment's maximum grade
   would be 6.7 percent. This 18.6 kilometer (11.6-mile) alignment would affect
   approximately 12 parcels, most of which are used for grazing. At least two parcels are
   being used for pineapple cultivation. All except the uppermost 1.5 kilometer (0.9 mile)
   of this alignment traverses agricultural lands. The uppermost portion traverses land
   designated for urban residential use in the Makawao-Pukalani-Kula Community Plan

5. Alternative 4B. This alignment would extend from Kula Highway, east of the Pukalani
   Bypass Road in the Upcountry area, to the Pilani Highway/Keaouhou Street intersection
   in Kula. The minimum horizontal radius would be 710 meters (2,300 feet). The
   alignment’s maximum grade would be 6.6 percent. This 15.5 kilometer (9.6-mile)
   alignment would affect approximately six parcels, most of which are used for grazing. At
   least two parcels are being used for pineapple cultivation. All except the uppermost
   1.5 kilometer (0.9 mile) of this alignment traverses agricultural lands. The uppermost
   portion traverses land designated for urban residential use in the Makawao-Pukalani-

6. Alternative 5. This alignment would extend from Kula Highway, south of Pu'ulehu Gutch
   in Kula, to the Pilani Highway/Keaouhou Street intersection in Kula. The minimum
   horizontal radius would be 275 meters (900 feet). The alignment’s maximum grade
   would be 6.8 percent. This 14.0 kilometer (8.7-mile) alignment would affect
   approximately eight parcels zoned as Agriculture land. One parcel near the Kula
   terminus is in pineapple cultivation, and another is being utilized for truck farming. The
   other parcels are used for grazing.

7. Alternative 6A. This alignment would extend from Kula Highway, approximately 1.2
   kilometers (0.7 mile) north of the Hālekōa Highway/Kula Highway intersection in Kula.
to the Maui R&T Park in Kilie. The minimum horizontal radius would be 245 meters (800 feet). The topography is fairly steep and would require switchbacks in order to keep maximum grade below 6.8 percent. This 17.5 kilometer (10.9-mile) alignment would traverse five parcels, two of which are owned by the Department of Hawaiian Home Lands.

- **Alternative 6B.** This alignment would extend from Kula Highway, west of the Keaauke Highway/Kula Highway intersection in Kula, to Pilani Highway, near the Kilie Regional Park. The location of the Kilie terminus would be accessed from the proposed east-west collector (Keaau Traffic Master Plan (1989)). The minimum horizontal radius would be 245 meters (800 feet). The topography is fairly steep and would require switchbacks in order to maintain a maximum grade of 7.0 percent. This 16.3 kilometer (10.1-mile) alignment would traverse five parcels, two of which are owned by the Department of Hawaiian Home Lands.

- **Alternative 7.** This alignment would connect Kula Highway to Pilani Highway by extending Kula Highway south from the Kula Sanitarium to Ulupalakua, and turning northwest toward Pilani Highway. The minimum horizontal radius would be 150 meters (500 feet). The grade of this alignment between the Kilie terminus and Ulupalakua would be nearly the 7.0 percent maximum desired grade. The 14.4 kilometer (8.9-mile) alignment would traverse approximately 12 parcels. In order to meet current highway safety standards, about 6.0 kilometers (3.7 miles) of the existing substandard section of road between Ulupalakua and the Sanitarium would be reconstructed.

- **Alternative 8.** This alignment would extend from Hanaekela Highway below Pukalani to Molokai Highway, along the old Government road of Kula. The minimum horizontal radius would be 60 meters (200 feet). The maximum grade along the existing alignment would be about 10.0 percent. This 14.6 kilometer (9.1-mile) alignment would traverse 13.6 kilometers (8.5 miles) of cane land.

### 3.0 IMPACTS

Adverse and beneficial impacts would result from the construction of the Kilie-Upcountry Highway. The following sections summarize the current understanding of potential impacts.

#### 3.1 Social and Economic Activity

Construction and operation of the Kilie-Upcountry Highway would potentially affect the following components of the existing social and economic conditions:

- residential communities;
- land use values;
- commercial activities, including agriculture and tourism; and
- transportation service.

Although no residential relocations would be required for any of the Build alternatives, the Kilie-Upcountry Highway would potentially affect the character of existing residential areas, particularly Upcountry. Facilitation of access to this area, and increased traffic volumes, could be perceived as incongruent with the current character of the Upcountry area. However, even without the proposed roadway, the population of Makawanupukalani-Kula is projected to increase by 41 percent between 1987 and 2010. Therefore, some change in the character of this area seems inevitable regardless of the roadway. In addition, the highway could enhance access to Hawaiian Home Lands located in the eastern portion of the project area, thus helping to satisfy residential demand.

The highway could also increase land values in the area by enhancing circulation and access, providing potential access to new areas, and increasing the highest and best use of lands adjacent to the roadway.

The roadway would encourage tourist activity by enhancing access to popular tourist destinations, such as Upcountry and Hanaekela. The enhancement of access would facilitate other types of economic activities as well.
Although agricultural activities on or immediately adjacent to the roadway alignment could be adversely impacted, agricultural activity in the general area may be enhanced by providing a more direct route between agricultural areas and the Kula urban center.

Another beneficial economic impact would be the expenditure of approximately $50 million of construction funds.

Although the Kula-Uplcountry Highway would have beneficial impacts on residential, commercial, and tourist activities, and increase business opportunities by enhancing accessibility, regional circulation, and the level of transportation service, the full range of social and economic impacts of the project are presently unknown. Therefore, further study is appropriate to better determine the potential level of impact.

3.2 Traffic

The project would create new intersections and roadway crossings and produce a redistribution of traffic volumes on roadways in the region. More detailed traffic studies must be performed to better understand the potential level of impact.

3.3 Environmental Resources

3.3.1 Air and Noise

Construction of the highway would have localized, short-term air quality impacts, primarily caused by air-born particulate matter (dust). There would also be an air quality impact from vehicles on the new highway after the roadway opens.

Trucks, construction vehicles, and construction equipment would temporarily affect ambient noise levels, and after the roadway opens, traffic would affect ambient noise levels.

Additional analysis is necessary to determine the potential level of air quality and noise impacts.

3.3.2 Water Resources

Surface Water

Surface water resources in the area consist primarily of intermittent streams (gulches) within the project corridor. The more prominent gulches include:

- Kulaikoa Gulch
- Waikakoa Gulch
- Kulanihakai Gulch
- Waipuakau Gulch
- Kaunolu Gulch

Although the roadway would cause surface water runoff to increase because of an increase in impervious surface, with appropriate mitigation, the roadway is not expected to have an adverse impact on surface water resources in the vicinity. Mitigation measures would include maintenance of flow in the gulches at points where the proposed roadway crosses the gulches.

Wetlands

Wetlands are not expected to be encountered along any of the alignments.

Floodplains

According to Flood Insurance Rate Maps (FIRM), the project area is contained within Zone C, indicating that the land is prone to minimal flooding.

Special Management Area (SMA)

The proposed Kula-Maui Highway would not be located within the County’s Special Management Area (SMA).
Ground Water

Mau'i's four principal groundwater sources are fresh basal water, brackish basal water, artesian/confined water, and perched water. With appropriate mitigation, the roadway is not expected to have an adverse impact on groundwater resources.

3.3.3 Farmlands
Agriculture is the dominant economic activity in the Upcountry area, a major vegetable and flower producing region of the State. Major crops include pineapple, cabbage, lettuce, oranges, and ornamental flowers. There is also ranching activity, with 80 to 85 percent of the length of Alternatives 4B, 5A, 6A, 6B, and 7 traversing lands presently used for grazing.

Agricultural areas within the footprint of the project would be converted to a transportation use. Access to agricultural areas could also be affected. One of the alternative alignments would divide a County agricultural park.

The roadway would traverse soils which have been ranked as "prime" and "important" by the federal and State Departments of Agriculture. "Prime" farmlands proposed for conversion to a transportation corridor are subject to the Farmland Protection Policy Act.

Further study is required to evaluate the level of potential impact on current agricultural activities and "prime" and "important" farmlands.

3.3.4 Terrestrial Flora
Vegetation communities would be cleared for the roadway. However, it is expected that the vegetational communities which would be affected are abundant in the region.

3.3.5 Endangered and Threatened Species
Information on the occurrence of endangered and threatened species was requested from the U.S. Fish and Wildlife Service (FWS) on September 1, 1994. In October, the U.S. FWS indicated that there are no endangered, threatened, or candidate species of birds recorded in the project area. However, an October 19, 1994 letter from the National Park Service identified "lowland dry forests ... that contain a number of listed or proposed endangered plant species recognized by the U.S. FWS." Therefore, a botanical survey and a biological assessment may be necessary to determine the presence of any listed or proposed endangered species, and the potential impact of the project on such species.

3.3.6 Historic and Archaeological Resources
The State Historic Preservation Division (SHPD) has stated that few archaeological surveys have been conducted in the undeveloped areas between Kula and Ke`ana. However, a number of historic sites are known to exist in the gulches of Kula. These include:

- Hawaiian petroglyphs;
- burial caves;
- habitational shelters (occurring in Kalajalani, Kalakau, Puheha, Hiapaka, Wailoa, and Ahi Gules); and
- heiau sites (occurring on ridges to the west of Kula Highway in Omaipo, Wailoa, Ke`ekoa, Wainoni, Keeauni, and Kamehaha).

In addition, the following traditional Hawaiian sites could occur in areas not previously disturbed by agricultural activities:

- ekoia (mauka-makai) trails and associated temporary shelters;
- ahupua`a boundary walls;
- burial caves;
- special purpose resource gathering sites; and
- dry land agricultural features.

An archaeological inventory survey would be required to determine the potential level of project impact on archaeological resources. The discovery of such sites within the project area could lead to consultations with the SHPD, the Maui County Burial Council, the
3.3.7 Parklands and Preserves
Khelo Regional Park and Harold M. Rice Memorial Park are in proximity to the project area. The proposed highway is not expected to affect either park although Alternative EE would be located immediately east of Khelo Regional Park, and Alternatives BA and BB would be adjacent to Rice Memorial Park. In general, the proposed highway would enhance access to the parks, and adverse impacts are not anticipated.

3.3.8 Visual and Aesthetic Setting
The Khelo area is primarily commercial and will be undergoing further urbanization, while the Upcountry area is generally rural. The proposed highway would be visible from both project termini, and would create new vistas for highway users. Depending on the alternative selected, the present viewshed and the width of the construction zone would vary. After the establishment of the landscaping to be provided as part of the project, the project is not expected to alter viewsheds or have significant adverse visual impacts, and would create new vistas for highway users.

Enhancement of access to Upcountry could have an adverse impact on Kula’s aesthetic setting; however, some adverse impacts are expected in any case because of the population increase projected for the area.

In summary, the project’s adverse visual impact, with mitigation, is expected to be minor, and would be offset by the creation of new vistas.

3.4 Permits
The following permits or approvals may be required prior to the construction of the highway. Additional permits and approvals may also be necessary.

State
* State Department of Health - National Pollutant Discharge Elimination System (NPDES) Permit (storm water from construction site)

Office of State Planning - Coastal Zone Management Consistency Concurrence
State Department of Land and Natural Resources - Historic Sites Review

County
* Department of Public Works - Grading, Grubbing, Stockpiling and Excavation Permit
* Department of Public Works - Permit for Excavation of Highway

4.0 DETERMINATION
In consideration of the information presented in Section 3.0, an Environmental Impact Statement (EIS) is deemed appropriate because the potential level of project impact in several areas is presently unknown and could be significant. Additional investigations are warranted and their results would be reported in the draft EIS. The potential need for mitigation measures would also be disclosed in the draft EIS.

The draft EIS would address all of the topics included in this EA. Based on the information analyzed to date, it is expected that the following areas would be emphasized:
* Social and Economic Activity,
* Traffic,
* Air and Noise,
* Farmlands,
* Endangered and Threatened Species,
* Historic and Archaeological Resources, and
* Visual and Aesthetic Setting.

In addition, the draft EIS would assess the alternatives described in Section 2.0 in more detail, and select from those the three most meriting detailed investigation in the draft EIS.

5.0 PUBLIC AND AGENCY COORDINATION AND CONCERNS
In May 1992, SDOT and the County of Maui appointed a joint task force to assist and advise in the planning of the Khelo-Upcountry Highway. In its final report, the Task Force provided conclusions and recommendations for the proposed roadway. Some of the concerns documented in that report included...
### Table 5-1

**PUBLIC AND AGENCY CONSULTATION**

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<tr>
<th>Agency</th>
<th>Sept. 1, 1994 Consultation Correspondence</th>
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**SDOT initiated its consultation process on September 1, 1994, by issuing a letter to the agencies and individuals shown in Table 5-1 followed by a subsequent letter on September 15, 1994, outlining the proposed route and its potential impacts.**

- Disruption to natural land and farming activities
- Endangered species and Ecological features
- Archaeological features
- Potential for real estate development
- Impacts on cultural resources
- Impacts on marine resources
- Impacts on wildlife
- Impacts on public safety
- Impacts on transportation
- Impacts on public health

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SDOT initiated its consultation process on September 1, 1994, by issuing a letter to the agencies and individuals shown in Table 5-1. Responses to the September 1 letter are shown in Table 5-1. 

The proposed route includes the following key concerns:

- Disruption to natural land and farming activities
- Endangered species and Ecological features
- Archaeological features
- Potential for real estate development
- Impacts on cultural resources
- Impacts on marine resources
- Impacts on wildlife
- Impacts on public safety
- Impacts on transportation
- Impacts on public health

In addition, an ES planning meeting for preparatory discussions was held on October 31, 1994, to discuss the potential impacts and mitigation measures proposed in Table 5-1. 

Concerns noted at the meeting included:

- Access to Hawaiian Home Lands
- Hawaiian Home Lands
- Roadway impacts
- Corridors to Hawaiian Home Lands

The ES was not to discuss these issues in detail.
### Table 5-1
PUBLIC AND AGENCY CONSULTATION (continued)

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### Table 5-1
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APPENDIX E

Alternatives Analysis Report
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EXECUTIVE SUMMARY AND FINDINGS

A two-tiered alternatives screening analysis was performed to evaluate alignment alternatives, a widening of adjacent roadways alternative and a transportation systems management (TSM) alternative for the Kula-Uppercountry Maui Highway Project, Maui County, Hawaii. The purpose of the screening was to eliminate alternatives that would have no chance of being selected as the preferred alternative, and to reduce the number of alternatives to a more limited number to receive detailed analysis in the project’s draft environmental impact statement (EIS). The No-Build alternative was not evaluated in this screening analysis because it is automatically included in the draft EIS as a reference against which the project impacts are assessed. The No-Build alternative entails the recommended roadway improvements contained in the Maui Land Use Land Transportation Plan (Draft Final Report, February 1996), except for the proposed Kula-Uppercountry Highway.

Alternatives were developed from planning studies, scoping and public participation activities, and FHWA requirements. The screening criteria, developed from technical and planning documents and the project’s public participation activities, were separated into two groups. The first group consisted of "slate list" criteria. An alternative had to satisfy all of these criteria to be considered under tier two, a group of criteria retaining the nature or degree of adverse or beneficial impact. An alternative had to satisfy all of the tier two criteria to pass the evaluation.

Four alternatives passed the screening evaluation:
- Alternative 2B: Haliimaile Road/Haleakala Highway intersection to Kana'uloa Street/Pi'ilani Highway intersection,
- Alternative 2C: Haliimaile Road/Haleakala Highway intersection to the proposed Road F/Pi'ilani Highway intersection (south of the Kula Regional Park),
- Alternative 4B: Kula Highway east of Pukalani Bypass Road to Kana'uloa Street/Pi'ilani Highway intersection, and
- Alternative 5: Kula Highway south of Pu'alehu Gulch to Kana'uloa Street/Pi'ilani Highway intersection.

The selection of these four alternatives, however, forced the consideration of two new alternatives produced by combining the makua and makei portions of the alternatives passing the screening analysis (see Figure 1). Using the same alignment segments that passed the screening, the two new alternatives would link the proposed Road F/Pi'ilani Highway intersection terminus with termini at Kula Highway east of Pukalani Bypass Road and Kula Highway south of Pu'alehu Gulch. Therefore, it is recommended that these two new alternatives join the four alternatives that passed the screening analysis and move forward for detailed analysis as the build alternatives in the forthcoming draft EIS. It is also recommended that the existing alternative naming system be changed to identify alternatives by their Upcountry and Kula termini as shown on Figure 1.
1. INTRODUCTION

The proposed Kīhei-Upcountry Maui Highway would be located in Maui County, Hawai'i (see Figure 2). The proposed highway would connect Pīilani Highway and either Hālekulu Highway or Kula Highway within a study area bounded on the west by Hālekulu and Kula Highways, continuing south past the Kula Sanatorium, toward Ulupalakua, and turning northeast to join Pīilani Highway, the western boundary of the study area.

The project would satisfy several goals:

- improvement of the connection between the Māui Research and Technology (MRT) Park and Science City, at the summit of Hālekulu;
- establishment of a roadway linkage between Kīhei and the Upcountry area;
- provision of additional roadway capacity to meet existing and future travel demand in the region; and
- provision of roadway infrastructure to accommodate projected growth and development.

2. PURPOSE OF REPORT

The purpose of this report is to:

- restate the project alternatives that were identified in the project's Environmental Assessment (EA); Kīhei-Upcountry Maui Highway Environmental Assessment, May, 1995;
- examine whether input received through project screening activities conducted since publication of the EA warrants the development of additional alternatives;
- present the methodology used to reduce the number of alternatives to be carried forward in the planning phase; and
- present the alternatives that have been selected for detailed study in the forthcoming draft EIS.

An evaluation of the No-Build alternative is not included in this report because this alternative is required to be analyzed in the project's draft EIS as reference against which the selected alternatives' impacts are assessed. The No-Build alternative includes the recommended roadway improvements contained in the Maui Lāna'i Ranch and Transporter (draft Final Report, February, 1995) except for the Kīhei-Upcountry Highway, and contains of primarily widening existing roadways.

3. ALIGNMENT ALTERNATIVES

Ten alignment alternatives were developed during the public and agency screening process that preceded the issuance of the project's EA (induced in the OEDC Bulletin on September 23, 1995 and the Federal Register on September 22, 1995). Descriptions of these ten alignment alternatives (see Figure 3) are provided in the Appendix.

The alignment alternatives were developed from January 1996.
Khool-Upcountry Maui Highway Project  
Alternatives Analysis, Final Report


- Scoping input received before the publication of the EA (May, 1993): Alternative B, utilization of an abandoned government right-of-way, was suggested at an agency scoping meeting held in October, 1994.

Federal Highway Administration (FHWA) participation in the project requires that Transportation Systems Management (TSM) be considered among the alternatives. TSM would consist of implementing a transit system and/or augmenting Maui's para-transit system in the region and selected transportation control measures (TSMs), such as high-occupancy vehicle (HOV) lanes and ride-sharing.

4. SCOPING ACTIVITIES FOLLOWING PUBLICATION OF THE EA

Four major scoping activities have taken place since publication of the EA: written comments generated in response to the EA; oral testimony given at two public information meetings held in October, 1993; testimony provided during a second round of public information meetings held in May 1995, and written comments following the May 1995 information meetings. Information received was reviewed to determine whether alternative alignments were warranted. Most of the testimony focused on the need for the project, its cost, or characteristics of specific alignments. Some comments suggested potential new alignment alternatives.

Analysis of public comments resulted in the conceptual engineering of three new alternatives: Alternatives 2B and 2C (modifications of Alternative 2) and the "widening of adjacent roadways" alternative (see Figure 4).

Alternative 2B would extend from Haholahola Highway/Kahumulu Road intersection in the Upcountry area, as Alternative 2, but would then share portions of Alternative 4B's realignment near the Hawaiian Commercial & Sugar Company (HC&S) land to Kula at Kamehameha Street. The length of this alternative would be approximately 15.64 kilometers (9.72 miles).

Alternative 2C would maintain the Kahului Junction Upcountry terminus and share Alternative 4B's alignment near the HC&S land. However, its Kula terminus would be located at the intersection of Piliakoa Highway and the proposed Road F. The length of alternative 2C would be approximately 17.5 kilometers (10.9 miles).

Alternatives 2B and 2C were developed in response to comments regarding the impact on the Hawaiian Commercial and Sugar (HC&S) Company land, non-use of the highway west of the Maui RI41 Park, and moving the Kula terminus as far south as possible to create an alternative evacuation route for South Kula and to support hotels and resorts in Wailea/Makena.

The "widening of adjacent roadways" alternative was also developed in response to public comments provided since issuance of the EA. This alternative provides an additional lane in each direction beyond the widening improvements proposed in the Maui Long-Range Plan.
Kīhei-Upcountry Maui Highway Project  Alternatives Analysis, Final Report

Transportation Plan (February 1996) The following roadways are included in the widening of adjacent roadways alternative:

- Hālabalūka Highway (12.4 kilometers (7.7 miles))
- Hana Highway (3.2 kilometers (2.0 miles))
- Dāri Road (1.3 kilometers (0.8 miles))
- Puunene Avenue/Makuhana Highway (10.5 kilometers (6.5 miles))
- Pālihō Highway (4.8 kilometers (3.0 miles))

5. Screening Analysis

The screening analysis is used to review candidate alternatives and eliminate those with the lowest benefits or overriding adverse characteristics so that only those alternatives that best maximize benefits while minimizing adverse impacts are examined in detail in the project's draft EIS. This section presents the methodology and results of the screening analysis conducted for this project.

5.1 Sources of Candidate Criteria

The following sources were used to develop possible criteria for evaluating the project alternatives:

- Federal, State, County, and local comments to a project initiation letter issued by DOT on September 1, 1994.
- An agency screening meeting held on October 20, 1994.
- Written comments received in response to publication of the EA, and
- Comments (oral and written) made at the public information meetings held on Maui on October 17 and 19, 1995, and on May 15 and 16, 1996.

Forty-two letters were received in response to the project's EA and the October 1995 informational meetings. Nine of the letters addressed alignment selection criteria, as summarized in Table 1.

The May public information meetings generated oral comments and 11 subsequent comment letters. Table 2 summarizes the written and oral comments relating to alignment selection criteria.
Table 1
Criteria Mentioned in EA Comment Letters and October 1995 Public Information Meeting Comments

<table>
<thead>
<tr>
<th>Economic Impact</th>
<th>Cost</th>
<th>Consistency with Comm. Plan</th>
<th>Impacts to Archaeology</th>
<th>Safety</th>
<th>Impacts to Endangered Species</th>
<th>NPS</th>
<th>Access to HNL</th>
</tr>
</thead>
<tbody>
<tr>
<td>HCSS Rocks</td>
<td>Road</td>
<td>Roadblock</td>
<td>OCEC</td>
<td>SPPO</td>
<td>Safety Judge</td>
<td>NPS</td>
<td>Recheck</td>
</tr>
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</table>

Abbreviations: Hawaiian Commercial & Sugar Company (HC&S), Maui & Pineapple (M&P), National Park Service (NPS), Office of Environmental Quality Control (OEQC), and State Historic Preservation Office (SHPO)

Table 2
Criteria Mentioned in Response to the May 1995 Public Information Meetings (Oral and Written Comments)

<table>
<thead>
<tr>
<th>Roadname</th>
<th>Impacts to Agriculture</th>
<th>Access to HNL</th>
<th>Evaluation from Amphi</th>
<th>Edna Road Park</th>
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<td>Honokaa</td>
<td>HCSS</td>
<td>Thompson</td>
<td>Thompson</td>
<td>Maui RST Park</td>
</tr>
<tr>
<td>Maalaea</td>
<td>M&amp;P Planning</td>
<td>Maui Planning</td>
<td>Maui Planning</td>
<td>Maui RST Park</td>
</tr>
<tr>
<td>Kapalua</td>
<td>Juhi</td>
<td>Maui</td>
<td>Honokaa</td>
<td></td>
</tr>
</tbody>
</table>

5.2 Evaluation Process
A two-tiered evaluation process was used for this project. An alternative must satisfy all of the Tier One criteria to be considered in Tier Two.

5.2.1 Tier One Screening

5.2.1.1 Satisfaction of Project Goals
The alternatives were evaluated with respect to whether they satisfied the project goals stated in Section 1, such as establishing a roadway linkage between the Keiki and Upcountry Maui. An alternative received a "Y" (yes) score if it would satisfy the project goals. A "N" (no) score would mean the alternative would not satisfy the project goals.

5.2.1.2 Design Feasibility
The alternatives were evaluated to determine whether they met engineering design criteria for a rural, limited access arterial roadway, such as minimum curve radius and design speed. A "Y" (yes) would signify that the alternative would have a conforming design, whereas a "N" (no) would mean that its design would not conform to the criteria.

5.2.1.3 Benefit-Cost Ratio
A preliminary benefit-cost analysis to the year 2033 (completion of construction plus 20 years) was performed to eliminate alternatives that would clearly not be cost-effective in achieving the goal of linking Keiki and Upcountry Maui. Calculation of the benefit-cost ratio (BCR) for each alternative was based on its differential comparison with the future No-Build Alternative of travel time between two centroids, one located at the Maui RST Park in Keiki and the other in Pukalani, Upcountry Maui. Other factors used to calculate the BCRs included:

9 January 1997

10 January 1997
cost of each alternative, consisting of initial cost (construction, right-of-way acquisition, design) and annual roadway maintenance; user costs for vehicle operation and maintenance; and economic factors, such as the expected long-term inflation rate and discount rate.

The methodology conformed to procedures described in the Manual On User Benefit Analysis of Highway and Bus Transit Improvements (AASHTO, 1997). Normally, an alternative's BCR would have to be greater than one (1) in order for the investment to be economically justified (the benefits of the project are greater than its cost). However, because of the preliminary nature of the analysis and the limited definition of what is considered a benefit, an alternative would have to have an extremely low BCR to be considered to have a BCR-related "fatal flaw" at this stage. A more precise benefit-cost analysis will be performed for the alternatives receiving detailed analysis in the draft EIS.

5.2.1.4 Biurcane Maui R&T Park

The master plan for the Maui R&T Park has recently been revised to create a more campus-like atmosphere, in contrast to the light industrial park atmosphere that was originally envisioned. The revised draft master plan (February 1996) has, as its central roadway element, a large roundabout or "green" located at the core of the park. This plan is being coordinated with the County Council as part of the Kula-Makawao Community Plan update. Any alignment that divides the Maui R&T Park would be inconsistent with the park's proposed campus-like roadway system. Because the Maui R&T Park is intended to be one of the major beneficiaries of the proposed highway, conformance with the draft master plan's proposed campus-like roadway system was elevated to a Tier One level of significance. Those alternatives that bifurcate the Maui R&T Park were given a "Y" (yes), while those that did not were given a "N" (no). A "Y" score for this criterion indicates that the alternative has a "fatal flaw."

5.2.1.5 Evaluation of Alternatives Considered in Tier One

Table 3 summarizes the outcome of the Tier One evaluation. Scores not satisfying the criteria are shaded. In summary, Alternatives 6A, 6B through 8B, the widening of adjacent roadways alternative, and the SLM alternative were eliminated from further study. Non-satisfaction of the project goals eliminated the widening of adjacent roadways and SLM alternatives. The widening of adjacent roadways alternative would not establish a roadway linkage between Kula and the Uupalua area. The SLM alternative would also not satisfy this goal, nor other goals, such as providing additional roadway capacity and infrastructure to meet existing and future travel demand in the region.

The design feasibility criteria eliminated Alternative 8 because it is constrained to an existing government right-of-way that does not conform modern highway design standards. The preliminary benefit-cost analysis generated BCRs ranging from 0.04 to 1.53 (see Table 3). After noting the spread of the results and considering the preliminary nature of the analysis, the allowable threshold was set at 0.67 which eliminated Alternatives 6A, 6B, and 7.
5.2.2 Tier Two Screening

The candidate Tier Two criteria (listed in Section 5.1) were evaluated to determine whether they would be useful in screening the remaining alternatives (1, 2B, 3C, 4B and 5). Criteria rejected for the Tier Two screening and the rationale for rejection are described below:

- Potential Impacts on Historic and Archaeological Resources: The overview analysis that would have been conducted for this screening would not satisfy Section 106 requirements of the National Historic Preservation Act. Section 106 can only be fulfilled by conducting an inventory survey. Furthermore, the overview analysis would lengthen the project schedule and increase costs. Therefore, the appropriate level of archaeological detail will be conducted in the EIS phase of work. Should archaeological resources be encountered, the alternatives are still sufficiently conceptual to allow realignment of the alignment to avoid the resource, or the alternative should not be selected as the preferred alternative.

- Noise impacts. FHWA STAMINA 2.0 Highway Traffic Noise Modeling Program will be used to predict future noise levels for the project for the alternatives carried into the draft EIS. If appropriate, noise mitigation would be provided. Therefore, because noise impacts can be mitigated, potential noise impacts are not viewed as an alignment selection criterion.

- Displacement/Relocations: None of the alignment alternatives involve relocations or displacements of residential or commercial structures. Therefore, this criterion would not discriminate among the alternatives.

- Beneficial and Adverse Impacts on Existing Communities: This criterion was not selected for Tier Two screening because of its importance. For example, the potentially adverse social impacts of the highway on the Upcountry Kula area would be a key concern in the draft EIS. Therefore, a cursory examination of this criterion in the initial screening analysis would not be sufficient. A detailed analysis of community impacts of those alternatives that satisfy the other Tier Two criteria is deferred to the draft EIS.

- Enhancement of evacuation from Kiku: At present, evacuation of Kiku must be tunneled through the critical junction of Makalei Highway, Pulehu Highway and Kiku Road. While a second access route may be highly desirable to relieve this choke point, enhancement of evacuation from Kiku is not a goal of this project. However, with the exception of Alternative 8 which was eliminated in Tier One, all the alternatives would provide additional evacuation capacity.

5.2.2.1 Adverse Agricultural Impact

The number of hectares presently used for agriculture, such as pineapple or sugarcane cultivation and Upcountry truck farms, which would be displaced was calculated. Impacts on pasture lands were not considered as important because of the abundance of pasture land in the area and the proportionate reduced investment in irrigation, drainage and other infrastructure. The following five-point scale was defined based on the acreage of encroachment for each alternative:

1. less than 10 hectares
2. 10 to 20 hectares
3. 20 to 30 hectares
4. 30 to 40 hectares
5. over 40 hectares

The draft EIS will contain a more complete analysis of impacts on agricultural activity for these alternatives selected for detailed study.

5.2.2.2 Cost

This criterion compares the estimated cost of land acquisition, site work, roadway construction, and drainage system of each alternative. The following five-point scale was used to score these costs:

1. less than $45 million
2. $45 to $55 million
3. $55 to $65 million
4. over $65 million

Impacts on prime, unique, or important soils: The alignment alternatives have all been rated by the US Natural Resources Conservation Service for their impact on special soil types. Scores ranged from 51 to 77. In order to trigger the provisions of the Fairland Property Policy Act, a score of 160 is necessary. Therefore, because all of the alternatives are scored fairly, and far below the threshold of 160, this criterion does not indicate substantial differences among the alternatives with respect to this criterion.

Extent of right-of-way acquisition: This criterion was not selected because it is a component of the project cost, and cost was rated separately as a Tier Two criterion.

The remaining Tier Two criteria include adverse agricultural impacts, cost, conformance with community plans, highway operations, potential impacts on endangered and threatened species, enhancement of access to Pulehu parcel, and visual impacts. Six of the selected Tier Two criteria were mentioned in the public comment letters and oral comments received on the project's EA and public information meetings (see Tables 1 and 2). The selected Tier Two criteria are now described...
5.2.2.3 Conformance with Community Plans

There are nine planning regions in Maui County for which community plans have been prepared. The plans report current and anticipated conditions, and anticipate advance planning goals, objectives, policies and implementation considerations to guide decision making for each region. The study area overlaps planning areas addressed by the Kīhei-Makena Community Plan and the Makawao-Pukalani-Kula Community Plan. Although the community plans are not official until adopted by the County Council and the Mayor, it is customary on Maui to use the most recent proposed update to the community plans to assess conformance with county planning.

The most recent proposed update for the Kīhei area is the Proposed Kīhei-Makena Community Plan (October 1993). This proposed plan recommends a roadway that would link the primary residential area of Upcountry and job centers within the Kīhei region. The Plan, therefore, favors these alternatives with mauka terminus near Pukalani, and lehua terminus at north of the Maui R & T Park. The 1993 plan is now in the early stages of being updated.

The proposed Community Plan Update of Makawao-Pukalani-Kula (July 1996) "relocates" the proposed Kīhei-Upcountry Maui Highway, and states that the N-Build alternative is favored over any built alternative. However, the recommendations also include provisions that if the roadway is built, the preferred Upcountry terminus should be in the vicinity of Haumāna Road. This Plan has recently passed second reading by the County Council, and the Mayor is expected to officially approve the plan shortly.

The alternatives that best conform to the community plans were scored a "Y" (yes). Alternatives that did not conform as well were scored a "P" (poor). Alternatives that do not conform to the plans were scored a "N" (no).

The draft EIS will contain an updated and more complete analysis of conformance with community plans for those alternatives selected for detailed study.

5.2.2.4 Highway Operations

While all of the alternatives entering the Tier Two screening can be designed to conform with applicable engineering standards (see Section 5.2.1.3), there may be operational problems with certain alternatives when connected to the existing roadway network. Those alternatives that would connect well with the existing roadway network were scored a "B" (better), those that did not were scored a "N" (no).

5.2.2.5 Impact on Endangered and Threatened Species

A biological reconnaissance was conducted to rank the alternatives in terms of their relative adverse impact on those areas where endangered or threatened plant species might exist. The survey included:

- a helicopter reconnaissance of the project area;
- government agency interviews and literature search.

5.2.2.6 Enhancement of Access to Hawaiian Home Lands Parcel

The Kīhei-Upcountry Maui Highway Statutory Joint Task Force's Final Report (October 1, 1993) identified access to the Hawaiian Home Lands parcel (T&H 2-032-002-014) as a desirable benefit of this project. Alignment alternatives that would enhance future access to the HNL parcel received a "B" (better), while those alternatives that would not enhance access received a "N" (no).

5.2.2.7 Visual Impact

Since all of the alternatives share a common typical design (see Figure 5: Typical Section) and a similar setting (agricultural lands on the western flank of Haleakalā), the amount of earthmoving (cut plus fill) required for roadway construction was used as an approximate indicator of the project's long term visual impacts. It is assumed that the more material moved during construction, the greater the potential for visual disturbance of the existing landscape, even after the establishment of new plantings.

A four-point scale was developed to score the total amount of cut and fill required for each alternative. Alternatives requiring less earthmoving received lower scores, while those requiring the most activity received a "4."

1. less than 1.5 million cubic meters
2. 1.5 to 2.0 million cubic meters
3. 2.0 to 2.5 million cubic meters
4. over 2.5 million cubic meters.

The draft EIS will contain a more complete analysis of potential visual impacts for those alternatives selected for detailed study.

5.2.2.8 Evaluation of Alternatives Considered in Tier Two

Table 4 summarizes the Tier Two screening analysis. An alternative need not satisfy every criteria to pass the screening and move forward to the draft EIS. However, in order...
Table 4

<table>
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<th>Criteria</th>
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<tr>
<td>Notes  B: Better</td>
<td>Y: Yes</td>
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Based on the Tier Two criteria, Alternatives 1 and 3 were dropped from future study in the draft EIS for the following reasons:

- **Alternative 1.** This alternative would produce a substantially greater displacement of cultivated fields than any other alternative. It would displace approximately 56.2 hectares (139 acres), while the alternative with the next largest impact, Alternative 3, would displace approximately 32.6 hectares (81 acres), 42 percent less.

- **Alternative 3.** This alternative was eliminated because of its poorer operational aspects, particularly at its maska terminus at the intersection of Haileab Aberra Highway and Pakhali Bypass Highway where there is a seven percent grade. Because of this steep grade, a very long left turn lane would be required for maska-bound traffic on
Kihel-Upcountry Maui Highway Project  Alternatives Analysis, Final Report

Haleakalā Highway turning left onto Kīhei-Upcountry Highway. The length of this left turn lane plus the proximity of the two intersections would cause a conflict in turning movements. Furthermore, this alternative scored a four (4) in terms of displacement of cultivated acreage.

Alternatives 2B, 2C, 4B and 5 passed the screening evaluation for the following reasons:

- **Alternative 2B.** The advantages of Alternative 2B are its cost (the second cheapest alternative), and its relatively minimal environmental impacts in those disciplines selected for this screening analysis. Although this alternative scored a three (3) in the agricultural impact criterion, the alignment was coordinated with HCAS officials to minimize adverse impacts to their sugarcane operations.

- **Alternative 2C.** Since this alternative is similar to Alternatives 2B and 4B, it too passed the Tier Two screening. The major disadvantage of this alternative, in comparison to these other two alternatives, is its cost (21 percent greater than Alternative 2B and 10 percent greater than Alternative 4B). Its advantages are that it is the only remaining alternative that facilitates access to the HIL parcel and it provides another Kīhei terminus option (Alternatives 2B, 4B and 5 all have the same Kīhei terminus at Kanaolu Street).

- **Alternative 4B.** This alternative compares favorably against other alternatives regarding level of impact, such as its moderate cost, impacts to cultivated fields and visual environment. It scores relatively high (3) under the "potential impact to endangered and threatened species" criterion. However, because the botanical reconnaissance was done from the air and because there is some similarity in modifying alternatives to avoid sensitive locations (see Section 5.2.2.5), this moderately high score did not warrant eliminating this alternative at this stage.

- **Alternative 5.** The primary benefits of this alternative are its cost (the least expensive alternative) and its least impact on cultivated fields. The negative aspects of this alternative are its higher probability of encountering endangered species habitat, and its "P" (poor) score in regard to conformance to the Kīhei-Ulupalu Community Plan (October 1993). However, these factors did not warrant eliminating this alternative.

In general, the alternatives passing Tier Two would generate comparatively fewer adverse environmental impacts in the topics selected for the screening analysis, and would not present operational difficulties interfacing with the existing roadway network. Only one of the selected alternatives would facilitate access to the HIL parcel. Potential community impacts, such as air quality and noise impacts, and other impact categories, such as potential impacts to archaeological resources, were not included in this analysis. However, these types of impacts will be addressed in detail in the draft EIS.

6. FINDINGS AND RECOMMENDATIONS

Twelve alignment alternatives, a widening of adjacent roadways alternative, and a TSM alternative for a Kīhei-Upcountry Maui Highway were evaluated using two sets of screening criteria that were developed from previous planning efforts, engineering guides and public input. Eight alternatives (2A, 6A, 6B, 7 and 8, widening of adjacent roadways, and TSM) were dropped because they did not satisfy the first tier of screening criteria.

The Tier Two criteria were used to evaluate the remaining six alternatives. The Tier Two criteria eliminated Alternatives 1 and 3 because of their agricultural impacts and operational difficulties.

The remaining four alternatives (2B, 2C, 4B and 5) were then reconceptualized as combinations of mauka and makai segments. By combining two mauka termini with three makai termini, it became possible to generate six alternatives composed of common roadway segments.

Figure 6 shows the Upcountry and Kīhei terminus choices and the alignment segments or "footprints" that would be used by the six alternatives. As shown in the figure, it is recommended that the Upcountry termini and segments be named U-1, U-2 and U-3 and the Kīhei termini and segments be named K-1 and K-2. The descriptions of these segments are as follows:

- **Segment U-1:** Hāna Road/Haleakalā Highway intersection to Omaopio Road, and ending at the common point of all the segments located on Waiākao Ridge approximately 7.75 km (4.8 miles) mauka (east) from Piilani Highway (see Figure 6).
- **Segment U-2:** Kula Highway east of Puahiku Bypass Road to Omaopio Road and ending at the common point.
- **Segment U-3:** Kula Highway south of Puahiku Gulch, down Waiākao Ridge and ending at the common point.
- **Segment K-1:** Kanaolu Street/Piilani Highway intersection to Waiākao Ridge and ending at the common point.
- **Segment K-2:** Proposed road Piilani Highway intersection to the common point.

Table 5 provides the suggested naming system for the alternatives.
### Table 5
Suggested Alternative Naming System

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APPENDIX
KIHEI-UPCOUNTRY HIGHWAY
MAUI, HAWAII

INITIAL TEN ALTERNATIVES FROM THE ENVIRONMENTAL ASSESSMENT

Alternative 1. This alignment would extend from the Hakeakam Highway/Hakanaloa Road intersection in the Upcountry area to Piilani Highway/Kamehameha Street in Kihei. The minimum horizontal radius would be 810 meters (2,650 feet). The alignment’s maximum grade would be 3.5 percent. This 14.3 kilometer (8.9-mile) alignment would traverse Agriculture zoned land, affecting five large agricultural parcels. Approximately 9.7 kilometers (6.0 miles) of the alignment would traverse cane fields.

Alternative 2. This alternative would extend from the Hakeakam Highway/Hakanaloa Road intersection in the Upcountry area to the Maui R&T Park in Kihei. The minimum horizontal radius would be 915 meters (3,000 feet). The alignment’s maximum grade would be 5.0 percent. This 16.3 kilometer (10.1-mile) alignment would traverse about 6.4 kilometers (4.0 miles) of cane fields and would affect six large Agriculture zoned parcels.

Alternative 3. This alignment would extend from Hakeakam Highway, between Hakanaloa Road and Pukalani in the Upcountry area, to the Piilani Highway/Kamehameha Street intersection in Kihei. The minimum horizontal radius would be 535 meters (1,750 feet). The alignment’s maximum grade would be 4.2 percent. This 15.5 kilometer (9.6-mile) alignment would affect approximately five large parcels zoned for agriculture. The alignment would also skirt the west (mauka) edge of approximately 0.4 kilometers (0.25 miles) of cane field. The uppermost portion of the alignment is immediately west of urban zoned lands.

Alternative 4A. This alignment would extend from Kula Highway, east of the Pukalani Bypass Road in the Upcountry area, to the Maui R&T Park in Kihei. The minimum horizontal radius would be 715 meters (2,350 feet). The alignment’s maximum grade would be 6.7 percent. This 16.6 kilometer (10.3-mile) alignment would affect approximately 12 parcels, most of which are used for grazing. At least two parcels are being used for pineapple cultivation. All except the uppermost 1.5 kilometer (0.9 mile) of this alignment traverses agricultural lands. The uppermost portion traverses land designated for urban residential use in the Maluaulu-Pukalani-Kula Community Plan (1991).

Alternative 4B. This alignment would extend from Kula Highway, east of the Pukalani Bypass Road in the Upcountry area, to the Piilani Highway/Kamehameha Street intersection in Kihei. The minimum horizontal radius would be 790 meters (2,600 feet). The alignment’s maximum grade would be 6.6 percent. This 15.5 kilometer (9.6-mile) alignment would affect approximately 8 parcels, most of which are used for grazing. At least two parcels are being used for pineapple cultivation. All except the uppermost 1.5 kilometer (0.9 mile) of this alignment traverses agricultural lands. The uppermost portion traverses land designated for urban residential use in the Maluaulu-Pukalani-Kula Community Plan (1991).
APPENDIX A
KIHEI-UPCOUNTRY HIGHWAY
MAUI, HAWAII

INITIAL TEN ALTERNATIVES FROM THE ENVIRONMENTAL ASSESSMENT

Alternative 1. This alignment would extend from the Halaakula Highway/Kīkīkaila Road intersection in the Upcountry area to Pilkati Road/Kaanolu Street in Kīhei. The minimum horizontal radius would be 910 meters (2,990 feet). The alignment's maximum grade would be 3.5 percent. This 14.3-kilometer (8.9-mile) alignment would traverse Agriculture zoned land, affecting five large agricultural parcels. Approximately 8.7 kilometers (5.4 miles) of the alignment would traverse canefields.

Alternative 2. This alignment would extend from the Halaakula Highway/Kīkīkaila Road intersection in the Upcountry area to the Maui RST Park in Kīhei. The minimum horizontal radius would be 915 meters (3,000 feet). The alignment's maximum grade would be 5.0 percent. This 16.9-kilometer (10.5-mile) alignment would traverse about 64.6 kilometers (40.2 miles) of canefield and would affect six large Agriculture zoned parcels.

Alternative 3. This alignment would extend from Halaakula Highway, between Kalama Road and Pukalani in the Upcountry area, to the Pilkai Highway/Kīkīkaila Street intersection in Kīhei. The minimum horizontal radius would be 915 meters (3,000 feet). The alignment's maximum grade would be 4.2 percent. This 15.5-kilometer (9.6-mile) alignment would affect approximately five large parcels zoned for Agriculture. The alignment would also cross the east (moku) edge of approximately 6.4 kilometers (4.0 miles) of canefield. The uppermost portion of the alignment is immediately west of Urban zoned lands.

Alternative 4A. This alignment would extend from Kīhei Golf Course, east of the Pukalani Bypass Road in the Upcountry area, to the Maui RST Park in Kīhei. The minimum horizontal radius would be 715 meters (2,350 feet). The alignment's maximum grade would be 6.7 percent. This 16.9-kilometer (10.5-mile) alignment would affect approximately 12 parcels, most of which are used for grazing. At least two parcels are being used for pineapple cultivation. All except the uppermost 1.5-kilometer (0.9-mile) of this alignment traverses agricultural lands. The uppermost portion traverses land designated for urban residential use in the Makawao-Pukalani/Zuk Community Plan (1981).

Alternative 4B. This alignment would extend from Kīhei Golf Course, east of the Pukalani Bypass Road in the Upcountry area, to the Pilkai Highway/Kīkīkaila Street intersection in Kīhei. The minimum horizontal radius would be 710 meters (2,320 feet). The alignment's maximum grade would be 6.6 percent. This 15.5-kilometer (9.6-mile) alignment would affect approximately eight parcels, most of which are used for grazing. At least two parcels are being used for pineapple cultivation. All except the uppermost 1.5-kilometer (0.9-mile) of this alignment traverses agricultural lands. The uppermost portion traverses land designated for urban residential use in the Makawao-Pukalani/Kula Community Plan (1981).
### Kinh-Uppcountry Highway Benefit-Cost Analysis

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### Related Information

- **Inflation Factors:**
  - **2006 Base Year:**
  - **2010 Project Year:**

### Notes

- The tables above represent the cost-benefit analysis for Kinh-Uppcountry Highway under Alternatives 1 and 2, respectively. The data includes the number of events (N), amounts, and the adjusted values over a range of years from 2006 to 2033.

---

**Calculations:**

- Cost-Benefit Analysis (CBA) is calculated as follows:
  - Cost (excluding inflation adjustment) = Initial Cost + Projected Cost + Inflation Cost
  - Benefit (excluding inflation adjustment) = Initial Benefit + Projected Benefit + Inflation Benefit
  - Adjusted Value = Initial Value + Projected Value + Inflation Value

- The Adjusted Value is used to compare the effectiveness of different alternatives under inflationary conditions.
### Kinh Upcountry Highway

**Benefit-Cost Analysis**

**Alternative 4B**

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**INTRODUCTION**

The purpose of this report is to describe the air pollutants associated with motor vehicle exhaust, discuss applicable air quality standards and regulations, summarize the existing air quality conditions in the study area, and identify and quantify the potential air quality impacts of Kihel-Upcountry Maui Highway.

1. **PROJECT DESCRIPTION**

The Highways Division of the State of Hawaii Department of Transportation (EHDOT) and the Federal Highway Administration (FHWA) are proposing the Kihel-Upcountry Maui Highway project on the island of Maui, Hawaii. Figure 1 shows the general project location. The proposed federal-aid two-lane limited access highway would link the Kihel-Makana and Upcountry Maui regions.

The alternatives under consideration are eight possible combinations of two Kihel terminus options and four Upcountry terminus options. The Kihel termini and segments are named K1 and K2, and the Upcountry termini and segments are named U1, U2, A, U2-0, and U3.

Descriptions of the alternatives are as follows:

1. **Alternative U1,K1** This alternative would start at the Hanaikala Highway / Haliimaile Road intersection in Upcountry and follow a south to southwest alignment to the Kaoaula Street / Pilani Highway intersection. The length of this alternative is approximately 15.8 km (9.9 miles).

2. **Alternative U1,K2** This alternative is the same as Alternative U1,K1 from the Upcountry terminus to where the alternative alignments cross. However, this alternative would proceed southwest to the Ke Ali Ali Street / Pilani Highway intersection. The length of Alternative U1,K2 is approximately 17.5 km (10.9 miles).

3. **Alternative U2,A,K1** This alternative would extend from the existing Pukalani Bypass Road/Hanaikala Highway/Kula Highway “Five Trees” intersection in Upcountry, to an alignment common with U1. The Kihel terminus would be at the Kaoaula Street/Pilani Highway intersection.

4. **Alternative U2,A,K2** This alternative would be from the “Five Trees” intersection to the Kula Ali Aina Road/Plani Highway intersection.

5. **Alternative U2-0,K1** This alternative would extend from Kula Highway at approximately 700 in (2330 ft) south of the “Five Trees” intersection to the Pilani Highway/Kaoaula Street intersection.
6. Alternative U2-B.K7: This alternative shares the same Upcountry terminus and alignment as the Alternative U2-B.K1. This alternative’s Kula terminus is at the Pilani Highway/Ki Ali Alame Street intersection.

7. Alternative U2.K1: This alternative would be from Kula Highway, south of Puhihu Gulch in Kula, to the Pilani Highway/Kaumolu Street intersection in Kula.

8. Alternative U2.K2: This alternative would extend from Kula Highway, south of Puhihu Gulch in Kula, to the Ke Ali Alani Street/Pilani Highway intersection.

The proposed highway would be a limited access arterial roadway with one 3.6 m (12 ft) lane in each direction. The minimum width of the roadway right-of-way would be 49 m (160 ft) in rural areas and at least 37 m (120 ft) in urban areas. Additional right-of-way is being reserved to allow for future widening to a four-lane divided highway if appropriate in the future. Paved shoulder widths would vary from 70 km/h (45 mph) in urban areas to 90 km/h (55 mph) in rural areas.

2. RELEVANT POLLUTANTS

Potential air quality impacts are estimated by quantifying the change in estimated air quality levels anticipated under each Build alternative with the levels estimated under the No Build alternative. 'Air Pollution' is a general term that refers to one or more chemical substances that degrade the quality of the atmosphere. Individual air pollutants degrade the atmosphere by reducing visibility, damaging property, reducing the productivity of crops or natural vegetation, or by reducing human or animal health.

Seven air pollutants have been identified by the U.S. Environmental Protection Agency (EPA) as being of concern nationwide. The pollutants are carbon monoxide, hydrocarbons, nitrogen oxides, ozone, particulate matter, sulfur oxides, and lead.

2.1 Carbon Monoxide

Carbon monoxide (CO) is a colorless and odorless gas, which is generated in the urban environment primarily by the incomplete combustion of fossil fuels in motor vehicles. Relatively high concentrations of CO are typically found near crowded intersections and along heavily used roadways carrying slow-moving traffic. CO chemically combines with the hemoglobin in the red blood cells to decrease the oxygen-carrying capacity of blood. Prolonged exposure can cause headaches, dizziness, or loss of equilibrium.

2.2 Hydrocarbons

Hydrocarbons (HC) include a wide variety of organic compounds emitted principally from the storage, handling, and use of fossil fuels. Though HC can cause eye irritation and breathing difficulty, their principal health effects are related to their role in the formation of ozone.
2.3 Nitrogen Oxides
Nitrogen oxides (NOx) constitute a class of compounds that includes nitrogen dioxide (NO2) and nitric oxide (NO), both of which are emitted by motor vehicles. Although NO2 and NO can irritate the eyes and nose and impair the respiratory system, NOx is also of concern primarily because of its role in the formation of ozone.

2.4 Ozone
Ozone (O3), or photochemical oxidants, is a major cause of lung and eye irritation in an urban environment. It is formed through a series of reactions involving HC and NOx, which take place in the atmosphere in the presence of sunlight. Relatively high concentrations of O3 are normally found only in the summer.

2.5 Particulate Matter
Particulate matter includes both liquid and solid particles of a wide range of sizes and composition. Of particular health concern are those particles that are smaller than or equal to 10 microns (PM10) in size. The principal health effects of airborne particulate matter are on the respiratory system. Relatively large particulate matter is emitted by gasoline-fueled motor vehicles. On July 16, 1991, EPA established a new standard for particulates with a diameter smaller than 2.5 microns (PM2.5). Medical evidence indicated that these smaller particles are also of serious concern to human health, since they lodge deeply in the lungs and can cause premature deaths and respiratory problems.

2.6 Sulfur Oxides
Sulfur oxides (SOx) constitute a class of compounds of which sulfur dioxide (SO2) and sulfur trioxide (SO3) are of great importance. The health effects of SOx include respiratory illness, damage to the respiratory tract, and bronchitis/constriction. Relatively high levels of SOx are emitted from motor vehicles.

2.7 Lead
Lead is a stable element that persists and accumulates both in the environment and in animals. Its principal effects in humans are on the blood-forming, nervous, and renal systems. Historically, motor vehicles constituted the major source of lead emissions to the atmosphere. Lead levels in the urban environment from motor vehicles have significantly decreased due to the federal mandates to switch to lead-free gasoline and, in general, no longer of concern.
On the island of Maui, ambient concentrations of carbon monoxide and hydrocarbons (and thus ozone) are predominantly influenced by motor vehicle activity. Emissions of nitrogen oxides come from both mobile and stationary sources, and emissions of particulate matter, sulfur oxides and lead are associated mainly with various stationary sources of emissions.

3. NATIONAL AND STATE AMBIENT AIR QUALITY STANDARDS
As required by the Clean Air Act, National Ambient Air Quality Standards (NAAQS) have been established for seven major air pollutants: carbon monoxide, nitrogen oxides, ozone, particulate matter smaller than 10 microns (PM10), particulate matter smaller than 2.5 microns (PM2.5), sulfur oxides, and lead. The State of Hawaii has also established its own standards for these pollutants.
Both the national and state ambient air quality standards are summarized in Table 1. The "primary" standards have been established to protect the public health. The "secondary" standards are intended to protect the nation's welfare and account for air pollutant effects on soil, water, visibility, materials, vegetation, and other aspects of the general welfare. The State of Hawaii issues its ambient air quality standards in terms of a single standard that is designed to protect public health and welfare and to prevent the significant deterioration of air quality.

4. AIR QUALITY REGULATIONS AND PLANNING
The Clean Air Act Amendments of 1990 (Amendments) direct the EPA to implement strong environmental policies and regulations that will ensure cleaner air quality. These Amendments will affect proposed transportation projects such as the proposed Kahului-Upscountry Maui Highway. According to Title I, Section 101, Paragraph F of the Amendments, "No federal agency may approve, accept or fund any transportation plan, program or project unless such plan, program, or project has been found to comply with any applicable state implementation plan (SIP) in effect under this act." Title I of the Amendments defines conformity as follows:
- Conformity to an implementation plan's purpose of eliminating or reducing the severity and number of violations of the National Ambient Air Quality Standards (NAAQS) and achieving expeditious attainment of such standards; and
- That such activities will not:
  (i) Cause or contribute to any new violation of any National Ambient Air Quality Standard (NAAQS) in any area;
  (ii) Increase the frequency or severity of any existing violation of any NAAQS in any area; or
  (iii) Delay timely attainment of any NAAQS or any required interim emissions reductions or other milestones in any area.
The determination of conformity is to be based on the most recent estimates of pollutant emissions, and such estimates are to be determined from the most recent population, employment, travel and congestion estimates as determined by the responsible metropolitan planning organizations or other agency authorized to make such estimates.

### Table 1
National and State Ambient Air Quality Standards

<table>
<thead>
<tr>
<th>Pollutant</th>
<th>Standard</th>
<th>Hawaii State</th>
<th>Federal Primary</th>
<th>Federal Secondary</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carbon Monoxide (CO)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 Hour</td>
<td>10 ppmv</td>
<td>15 ppmv (12 pm)</td>
<td>15 ppmv (12 pm)</td>
<td></td>
</tr>
<tr>
<td>Nitrogen Dioxide (NO2)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 Hour</td>
<td>50 ppmv</td>
<td>50 ppmv (6 pm)</td>
<td>50 ppmv (6 pm)</td>
<td></td>
</tr>
<tr>
<td>Annual Average</td>
<td>70 ppmv</td>
<td>50 ppmv (0.05 ppm)</td>
<td>50 ppmv (0.05 ppm)</td>
<td>50 ppmv (0.05 ppm)</td>
</tr>
<tr>
<td>Particulate Matter &lt; 10 micrometers (PM10)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>24 Hour</td>
<td>150 ppmv</td>
<td>150 ppmv (0.12 ppm)</td>
<td>150 ppmv (0.12 ppm)</td>
<td>150 ppmv (0.12 ppm)</td>
</tr>
<tr>
<td>72 Hour</td>
<td>-</td>
<td>50 ppmv (0.05 ppm)</td>
<td>50 ppmv (0.05 ppm)</td>
<td>50 ppmv (0.05 ppm)</td>
</tr>
<tr>
<td>Annual Average</td>
<td>10 ppmv</td>
<td>15 ppmv (0.05 ppm)</td>
<td>15 ppmv (0.05 ppm)</td>
<td>15 ppmv (0.05 ppm)</td>
</tr>
</tbody>
</table>

5. AMBIENT AIR QUALITY IN THE STUDY AREA

5.1 Local Meteorology

The large Pacific semipermanent high pressure cell, which is usually centered north of the Hawaiian Islands, is one of the important climatic controls affecting the circulation of air in the islands. Over the central North Pacific, this cell produces a rather persistent flow of air from the northeast known as the Northeast Trades. The trade wind flow is almost constant during the spring and summer months, from May to October. In the fall and winter months, wind is more variable although, on average, the trades persist more than 50 percent of the time during these seasons.

Mau’s climate varies according to altitude and leeward/windward location. Lowland areas tend to have a semi-tropical climate, while higher elevations are characterized by temperate climates. Mau is cooled by northeast trade winds approximately 70 percent of the year. Trade winds are affected by local topographic conditions. The northeast trade wind becomes northeasterly as they are funneled between the West Maui Mountains and Molokai, often attaining speeds of 55 to 72 km/h (40 to 45 mph) at Kahului Airport. Areas in the ‘wind shadows’ are sheltered.

The climate of Upcountry Maui is conducive to farming, being mild with warm days and cool evenings. Palani and Kula are relatively dry with rainfall ranging between 50 to 100 cm (20 to 40 inches) annually. The amount of rainfall increases northeastward towards Makawao and Haiku to approximately 125 to 250 cm (50 to 100 inches) annually. Temperatures range from around 15°C (60°F) during the winter to the High 20s°C (mid 80s°F) in the summer.

Kulanaoa is on the south side of the island, in the rain shadow of Haleakalā. The region is generally sunny, warm and dry the entire year. Temperatures range from a minimum of 17 degrees (C) (60 degrees (F)) in February to a maximum of 33 degrees (C) (90 degrees (F)) in July. Average annual precipitation is less than 28 cm (15 inches) per year. Most of this precipitation occurs during the winter months when storms are usually accompanied by south winds.

5.2 Attainment Status of Study Area

Section 107 of the 1977 Clean Air Act Amendment requires the EPA to publish a list of all geographic areas in compliance with the NAAQS, as well as those not attaining the NAAQS. Areas not in compliance with the NAAQS are termed nonattainment areas. These areas have insufficient data to make a determination are unclassified, and are treated as being attainment areas until proven otherwise. The designation of an area is made on a pollutant-by-pollutant basis.

The State of Hawaii is designated as an attainment area for all of the applicable pollutants.

5.3 Monitored Air Quality

The State of Hawaii Department of Health (DOH) monitors air pollutant levels in Hawaii through a network of sampling stations. There are two stations on Maui at Kahului and Kula. The stations were established in mid 1996, and are strategically located downwind of several sugarcane fields as special PM-10 sampling stations for sugarcane burning activities. Currently there are no other pollutants monitored on Maui by DOH other than PM-10.
Ambient background air quality data for other criteria pollutants on the island of Maui was obtained from the air quality study for the Proposed Kahului Airport Improvements, Kahului, Maui (R.D. Neal & Associates, December 1995). Monitored data cited in the above report was from the Prevention of Significant Deterioration Permit Application for Maui’s Combined Cycle Project, Maui Electric Company (MECO), August 1999.

The pollutants data monitored at the HDOH stations and by MECO are presented in Table 2, and are the best representation of the air quality conditions in the project area. All of the monitored levels are well below the applicable standards.

Table 2
Air Quality Summary for Study Area
HDOH and MECO Monitoring Stations

<table>
<thead>
<tr>
<th>Pollutant</th>
<th>Maui (HDOH Site)</th>
<th>Kahului (HDOH Site)</th>
<th>Pole (HDOH Site)</th>
<th>MECO (HDOH Site)</th>
<th>MECO (MECO Site)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carbon Monoxide (CO)</td>
<td>1 Hour 14 ppm (504 ppm)</td>
<td>14 ppm (504 ppm)</td>
<td>14 ppm (504 ppm)</td>
<td>14 ppm (504 ppm)</td>
<td>14 ppm (504 ppm)</td>
</tr>
<tr>
<td>8 Hour 6 ppm (150 ppm)</td>
<td>6 ppm (150 ppm)</td>
<td>6 ppm (150 ppm)</td>
<td>6 ppm (150 ppm)</td>
<td>6 ppm (150 ppm)</td>
<td>6 ppm (150 ppm)</td>
</tr>
<tr>
<td>Nitrogen Dioxide (NO2)</td>
<td>Annual Arithmetic Mean 346 ppm (51 ppm)</td>
<td>346 ppm (51 ppm)</td>
<td>346 ppm (51 ppm)</td>
<td>346 ppm (51 ppm)</td>
<td>346 ppm (51 ppm)</td>
</tr>
<tr>
<td>Particulate Matter &lt; 10 micrometers (PM10)</td>
<td>1 Hour 26 ppm (150 ppm)</td>
<td>26 ppm (150 ppm)</td>
<td>26 ppm (150 ppm)</td>
<td>26 ppm (150 ppm)</td>
<td>26 ppm (150 ppm)</td>
</tr>
<tr>
<td>8 Hour 6 ppm (150 ppm)</td>
<td>6 ppm (150 ppm)</td>
<td>6 ppm (150 ppm)</td>
<td>6 ppm (150 ppm)</td>
<td>6 ppm (150 ppm)</td>
<td>6 ppm (150 ppm)</td>
</tr>
<tr>
<td>Particulate Matter &lt; 2.5 micrometers (PM2.5)</td>
<td>Annual Arithmetic Mean 14 ppm (504 ppm)</td>
<td>14 ppm (504 ppm)</td>
<td>14 ppm (504 ppm)</td>
<td>14 ppm (504 ppm)</td>
<td>14 ppm (504 ppm)</td>
</tr>
<tr>
<td>24 Hour 24 Hour</td>
<td>24 Hour 24 Hour</td>
<td>24 Hour 24 Hour</td>
<td>24 Hour 24 Hour</td>
<td>24 Hour 24 Hour</td>
<td>24 Hour 24 Hour</td>
</tr>
<tr>
<td>Ozone (O3)</td>
<td>1 Hour 60 ppm (150 ppm)</td>
<td>60 ppm (150 ppm)</td>
<td>60 ppm (150 ppm)</td>
<td>60 ppm (150 ppm)</td>
<td>60 ppm (150 ppm)</td>
</tr>
<tr>
<td>8 Hour 24 Hour</td>
<td>24 Hour 24 Hour</td>
<td>24 Hour 24 Hour</td>
<td>24 Hour 24 Hour</td>
<td>24 Hour 24 Hour</td>
<td>24 Hour 24 Hour</td>
</tr>
<tr>
<td>Sulfur Dioxide (SO2)</td>
<td>Annual Arithmetic Mean 3 ppm (504 ppm)</td>
<td>3 ppm (504 ppm)</td>
<td>3 ppm (504 ppm)</td>
<td>3 ppm (504 ppm)</td>
<td>3 ppm (504 ppm)</td>
</tr>
<tr>
<td>24 Hour 24 Hour</td>
<td>24 Hour 24 Hour</td>
<td>24 Hour 24 Hour</td>
<td>24 Hour 24 Hour</td>
<td>24 Hour 24 Hour</td>
<td>24 Hour 24 Hour</td>
</tr>
<tr>
<td>Lead (Pb)</td>
<td>Annual Arithmetic Mean 1.5 ppm (1.5 ppm)</td>
<td>1.5 ppm (1.5 ppm)</td>
<td>1.5 ppm (1.5 ppm)</td>
<td>1.5 ppm (1.5 ppm)</td>
<td>1.5 ppm (1.5 ppm)</td>
</tr>
</tbody>
</table>

Note: NM = not monitored


6. IMPACT ASSESSMENT

6.1 Pollutants for Analysis

Pollutants that can be traced principally, or in large measure, to motor vehicles are those that are a matter of concern in examining the effects of the project. These pollutants include CO, HC, NOx and O3. Transportation sources account for a very small percentage of regional emissions of SO2 and particulate matter (PM10-10), and detailed analyses for these contaminants are not warranted.

Motor vehicles have historically constituted a major source of lead emissions to the atmosphere. As laid out, lead levels have decreased significantly and will continue to do so, due to the mandated decrease and elimination of lead in gasoline. Therefore, a detailed analysis of the impact of lead emissions is also not warranted.

CO impacts are localized. Even under the worst meteorological conditions and most congested traffic conditions, high concentrations are limited to within a relatively short distance (300 to 600 feet) of heavily traveled roadways. Consequently, it is appropriate to predict concentrations of CO on a localized or 'microscale' basis.

HC and NOx emissions from automotive sources are of concern primarily because of their role as precursors in the formation of ozone. Ozone is formed through a series of reactions that take place in the atmosphere in the presence of sunlight. Since the reactions are slow and occur as the pollutants are diffusing downward, elevated ozone levels are often found many miles from sources of the precursor pollutants. The effects of HC and NOx emissions are therefore generally examined on a regional or 'mesoscale' basis.

6.2 Mesoscale Analysis

Changes in "pollutant burdens" (i.e., the total tons of pollutants emitted in the study area each day or year) provide an indication of the general change in air quality in the region. This analysis is useful in assessing relative changes in the concentrations of CO, HC and NOx between the Build and No Build alternatives. These pollutant burdens are computed based on the estimated vehicle miles traveled (VMT), vehicle hours traveled (VHT), average travel speed and vehicle types for all major roadways in the study area.

6.3 Microscale Analysis

The analysis of mobile sources, which must be undertaken for a localized (microscale) area, applies mathematical models that simulate physical conditions to predict carbon monoxide (CO) concentrations at specific receptor locations. Mobile source dispersion models are the basic analytical tools used to estimate carbon monoxide concentrations expected under given conditions of traffic, roadway geometry and meteorology. The mathematical expressions and formulations that comprise the various models attempt to describe an extremely complex physical phenomenon. However, because all models contain simplifications and approximations of actual conditions, result obtained from these dispersion models tend to be conservative.
6.4 Methodology
The potential adverse impacts of the Kolea-Upcountry Maui Highway due to increased vehicular activity in the study area must be investigated. Localized areas of concern for CO, such as heavily utilized and/or congested intersections, referred to as potential "hot spots", were analyzed consistent with FHWA and EPA project impact review requirements.

As stated in the EPA Conformity Guidelines, the need for a hot spot analysis is determined as follows:

- A hot spot analysis may be necessary if the project worsens an intersection’s traffic level of service (LOS) from C or D.
- A hot spot analysis may be necessary if the intersection LOS is D or worse and the project substantially increases vehicular delay.

After reviewing the traffic data developed for the Kolea-Upcountry Air Quality Analysis, and based on FHWA and EPA project impact review requirements, it was determined that a detailed microscopic "hot spot" analysis would be required to meet federal air quality requirements. However, Hawai'i’s 1- and 8-hour SAOAS for CO are 4.5 and 9 ppm, respectively, much more restrictive than the NAAQS of 9 and 35 ppm, respectively. Therefore, to ensure conformance to both the SAOAS and NAAQS, study intersections were ranked according to build LOS and volumes, and only the following two sites received detailed CO analysis because they represent the limit with the worst predicted traffic conditions:

- Site #1: Hahimale Road / Hulekula Highway / Kolea-Upcountry Maui Highway intersection - Alternatives U1.K1 and U1.K2; and
- Site #2: Kaanapali Street / Pillar Highway / Kolea-Upcountry Maui Highway intersection - Alternative U1.K1

The two sites are worst-case representatives of predictions for all study area intersections under Build conditions, and for that reason an intersection by intersection comparison with estimated NOx Build levels was not necessary to determine conformity to both the SAOAS and NAAQS.

Microscopic air quality modeling was performed using the most recent version of the EPA mobile source emission factor model (MOBILE 5A) and the CAL3QHC version 2 air quality dispersion model to estimate Build CO levels.

6.4.1 Vehicular Emissions

The type of vehicles using the facility affects total emissions. The percentages of each type of vehicle used for this analysis were based on the EPA's recommended national average fleet mix.

Emissions estimates account for three possible vehicle operating conditions: cold-vehicle operation, hot-start operation and hot stabilized operation. CO emissions are greatest when engines are cold (cold-vehicle operation) and when engines are restarted shortly after they were shut off (hot-start operation). EPA-recommended vehicular operating conditions were used in this analysis (20.6% cold, 27.3% hot).

Emissions are also greatly affected by speed, ambient temperature, vehicle age and mileage distribution. Ambient temperature was recommended by EPA, as was the usage of national average vehicle age and mileage distribution. Emission estimates used for this analysis can be found in Appendix B.

6.4.2 Dispersion Model
Mobile source models are the basic analytical tools used to estimate CO concentrations expected under given traffic, roadway geometry, and meteorological conditions. The mathematical expressions and formulations that comprise the various models attempt to describe an extremely complex physical phenomenon as closely as possible. The dispersion modeling program used in this study for estimating pollutant concentrations near roadway intersections is the CAL3QHC dispersion model (Version 2.0) developed by the U.S. Environmental Protection Agency. Version 2, released in 1992, allows a more specific determination of the traffic characteristics occurring at a roadway intersection.

CAL3QHC is a Gaussian model recommended in the EPA Guidelines for Modeling Carboxy Monoxide from Roadway Intersections (EPA-45R-92-005). Gaussian models assume that the dispersion of pollutants downstream of a pollution source follow a normal distribution around the center of the pollution source.

Different emission rates occur when vehicles are stopped (stopping), accelerating, decelerating and moving at different average speeds. CAL3QHC simulates these different emission rates in the following two components:

- Emissions when vehicles are stopped (stopping) during the red phase of a signaled intersection;
- Emissions when vehicles are in motion during the green phase of a signaled intersection.

The CAL3QHC version 2 air quality dispersion model has undergone extensive testing by the EPA and has been found to provide reliable estimates of mid (non-reactive) pollutant concentrations resulting from emissions from motor vehicles. A complete description of the model can be found in the User's Guide to CAL3QHC version 2.0: A Modelling Methodology for Predicting Pollutant Concentrations near Roadway Intersections, EPA-45R-92-005.

Appendix C contains all CAL3QHC version 2 data and output information.
6.4.3 Receptor Locations

CO levels resulting from motor vehicles using the proposed project and associated roadways were estimated near the two sites selected for detailed analysis based on the ranking of terminus intersections as outlined above. The sites were modeled using the CAL3QHC version 2 model and receptors were placed in accordance with EPA’s Guidelines for Modeling Carbon Monoxide from Roadway Intersections, EPA-454-R-92-005.

6.4.4 Meteorological Conditions

The transport and concentration of pollutants emitted from motor vehicles are influenced by three principal meteorological factors: wind direction, wind speed, and the temperature profile of the atmosphere. The values for these parameters were chosen to maximize pollutant concentrations at each prediction site (i.e., to establish a conservative worst case situation).

- **Wind Direction**: Maximum CO concentrations are normally found when the wind is assumed to blow approximately parallel to a single roadway adjacent to the receptor location. At complex intersections, however, it is difficult to predict which wind angle will result in maximum concentrations. At each receptor location, therefore, the approximate wind angle that would result in maximum pollutant concentrations was used in the analysis. All wind angles from 0° to 360° (±5° increments) were considered.

- **Wind Speed**: CO concentrations are greatest at low wind speeds. A conservative wind speed of 4 meters per second (8.8 miles per hour) was used to predict CO concentrations during peak traffic periods. This wind speed is the lowest average monthly wind speed recorded at the Kahului Airport in Local Climatological Data Annual Summary for 1980.

- **Temperature and Profile of the Atmosphere**: An ambient temperature of 76°F, a mixing height (the height in the atmosphere to which pollutants will rise) of 1000 meters, and a 0° or neutral atmospheric stability condition were used in estimating mesoscale CO concentrations. The selection of these meteorological parameters was based on recommendations from the Hawaii Department of Transportation and the EPA. This data was found to be the most representative of the conditions existing along the project area.

The estimated CO levels will be the maximum concentrations which could be expected to occur at each air quality receptor site analyzed because they result from assuming the simultaneous occurrence of all worst-case parameters (peak hour traffic condition, conservative vehicle operating conditions, low wind speeds, low atmospheric temperature, neutral atmospheric conditions, and the maximizing wind direction).

6.4.5 Persistence Factor

Peak 8-hour concentrations of CO were obtained by multiplying the highest peak hour CO estimates by 0.7. This factor, recommended by USEPA, takes account of the fact that over eight hours (as distinct from a single hour) vehicle volumes will fluctuate downward from the peak, vehicle speeds may vary, and meteorological conditions including wind speeds and wind direction will change to some degree as compared to the very conservative assumptions used for the single hour.

6.4.6 Analysis Years

Microscale carbon monoxide analysis has been performed using traffic for the project's design year of 2002.

6.4.7 Background Concentrations

Microscale modeling is used to predict CO concentrations resulting from emissions from motor vehicles using roadways immediately adjacent to the location at which predictions are being made. A CO background level must be added to this value for CO entering the area from other sources upwind of the location at which predictions are being made.

A background level of 0.012 ppm was used for both the one- and eight-hour study periods. This level was based on 1999 ambient CO background monitored data used in the PSD Permit Application for Mauiqiq Combined Cycle Project, Maui Electric Company (MECO), August 1990.

6.4.8 Traffic Information

Traffic data for the air quality analysis was derived from a traffic inventory provided by the State DOT and traffic developed for the air quality analysis. The microscale carbon monoxide analysis was performed based on data from this network for the AM and PM peak traffic periods. These are the periods when maximum traffic volumes are expected to occur, and when the greatest traffic and air quality impacts of the proposed project are expected.

Appendix D contains all traffic information used for the air quality analysis.

7. POTENTIAL IMPACTS

7.1 Mesoscale Impacts

Since the change in regional VMT is predicted to be smaller under the Build condition than under the No Build condition, no quasadual regional air quality analysis was conducted. In addition, a mesoscale analysis was not required as the Kilaeua-Uwcountry Maui Highway is included in the current State of Hawaii Statewide Transportation Improvement Program (STIP), 1997, for Fiscal Years 1995-2000, and the regional effects of this project are incorporated into and satisfied the requirements of the conforming STIP.
7.2 Microscale Impacts

Maximum 1-hour and 8-hour carbon monoxide levels were predicted at sensitive receptor sites within the proposed Kīhei-Uponcountry's study area. The results of this analysis are given in Tables 3 and 4.

The levels predicted in this analysis are expected to be the highest microscale impacts due to the project within the study area. The three study intersections are worst-case representations of predictions for all study intersections under build conditions. No violations of the Federal or State one or eight hour CO standards are predicted.

As the project is not predicted to cause or exacerbate a violation of the applicable air quality standards, it conforms to the goals set forth in the Clean Air Act Amendments.

Table 3

**Predicted Worst-Case 1-Hour Carbon Monoxide Concentrations (ppm)**

<table>
<thead>
<tr>
<th>Site</th>
<th>Description</th>
<th>Alternative</th>
<th>State Std.</th>
<th>Build (Year 2022)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Hanalei Rd / Kaleolani</td>
<td>U/I/K1</td>
<td>9</td>
<td>0.81</td>
</tr>
<tr>
<td>1</td>
<td>Hanalei Rd / Hālaihulani</td>
<td>U/I/K2</td>
<td>9</td>
<td>0.91</td>
</tr>
<tr>
<td>2</td>
<td>Kīhei Rd / Piʻilani Hwy</td>
<td>U/I/K1</td>
<td>9</td>
<td>0.81</td>
</tr>
</tbody>
</table>

Note: * 1-hr CO Background = 0.12 ppm

Table 4

**Predicted Worst-Case 8-Hour Carbon Monoxide Concentrations (ppm)**

<table>
<thead>
<tr>
<th>Site</th>
<th>Description</th>
<th>Alternative</th>
<th>State Standard</th>
<th>Build (Year 2022)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Hanalei Rd / Kaleolani</td>
<td>U/I/K1</td>
<td>4.5</td>
<td>0.07</td>
</tr>
<tr>
<td>1</td>
<td>Hanalei Rd / Hālaihulani</td>
<td>U/I/K2</td>
<td>4.5</td>
<td>0.68</td>
</tr>
<tr>
<td>2</td>
<td>Kīhei Rd / Piʻilani Hwy</td>
<td>U/I/K1</td>
<td>4.5</td>
<td>0.07</td>
</tr>
</tbody>
</table>

Note: * 8-hr CO Background = 0.12 ppm

8. CONFORMANCE WITH THE STATE IMPLEMENTATION PLAN (SIP) FOR AIR QUALITY

The State of Hawaii has been classified as an attainment area for ozone, PM10, and carbon monoxide. As an attainment area, the State must demonstrate that the National Ambient Air Quality Standards will continue to be attained. The microscale analysis for the Kīhei-Uponcountry Maui Highway demonstrates that no violations of the National Ambient Air Quality Standards are predicted. The goals set forth in the Clean Air Act Amendments of 1990 are to ensure that no violations of these standards are created or worsened. The project meets these goals and as such will not affect the State of Hawaii’s current attainment status.

The Kīhei-Uponcountry Maui Highway project has been included in the current SIP, 1997, for Fiscal Years 1998-2000. As described elsewhere, the SIP is a multi-year, multi-modal transportation improvement program that has been developed using existing transportation plans and policies, and current highway, transit, and transportation programming processes as required under the Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA).

9. CONSTRUCTION IMPACTS

The air quality impacts of the proposed action would be limited to short-term increased fugitive dust and mobile source emissions during construction.

9.1 Fugitive Dust Emissions

Fugitive dust is airborne particulate matter, generally of a relatively large particulate size. Construction-related fugitive dust would be generated by haul trucks, concrete trucks, delivery trucks, and other earth-moving vehicles operating around the construction site. This would be due primarily to particulate matter resuspended by vehicle movement over paved and unpaved roads and other surfaces, dirt tracked onto paved surfaces from unpaved areas at access points, and material blown from uncovered haul trucks.

Generally, the distance that particles drift from their source depends on their size, emission height, and wind speed. Small particles (20 to 100 microns range) can travel several hundred feet before settling to the ground, depending on wind speed. Most fugitive dust, however, is made up of relatively large particles (i.e., particles greater than 100 microns in diameter). These particles are responsible for the reduced visibility often associated with this type of construction. Given their relatively large size, these particles tend to settle within 20 to 30 feet of their source.

In order to minimize the amount of construction dust generated, the guidelines below should be followed. Since the project is in a PM10 non-attainment area, all the proposed particulate control measures related to construction activities should be
followed. The following preventive and mitigative measures should be taken to minimize the possible particulate pollution problem:

I. Site Preparation
A. Minimize land disturbance;
B. Use water trucks to minimize dust;
C. Cover trucks when hauling dirt;
D. Stabilize the surface of dirt piles if not removed immediately;
E. Use windbreaks to prevent any accidental dust pollution;
F. Limit vehicular paths and stabilize these temporary roads; and
G. Pave all unpaved construction roads and parking areas to road grade for a length no less than 50 feet where such roads and parking areas exit the construction site to prevent dirt from washing onto paved roadways.

II. Construction
A. Cover trucks when transferring materials;
B. Use dust suppressants on traveled paths which are not paved;
C. Minimize unnecessary vehicular and machinery activities; and
D. Minimize dirt track-out by washing or cleaning trucks before leaving the construction site (alternative to this strategy is to pave a few hundred feet of the exit road, just before entering the public road).

III. Post Construction
A. Revegetate any disturbed land not used;
B. Remove unused material;
C. Remove dirt piles; and
D. Revegetate all vehicular paths created during construction to avoid future off-road vehicular activities.

9.2 Mobile Source Emissions

As discussed previously, carbon monoxide (CO) is the principal pollutant of concern when considering localized air quality impacts of motor vehicles. Since emissions of CO from motor vehicles increase with decreasing vehicle speed, disruption of traffic during construction could result in short-term elevated concentrations of CO, the temporary reduction of roadway capacity, and the increased queue lengths. In order to minimize the amount of emissions generated, every effort should be made during the construction phase to limit disruption to traffic, especially during peak travel periods.

10. REFERENCES


U.S. Congress, Clean Air Act Amendments of 1990 (P.L. 101-549)


Table 4-14  Island of Kauai: Monthly Summary of 24-hour Average PM-10 (µg/m²)

<table>
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<th>Jan</th>
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Table 4-15  Island of Maui: Monthly Summary of 24-hour Average PM-10 (µg/m²)

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<th>Feb</th>
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* Kīhei station started operation in June 1998
* Paia station started operation in August 1998
AIR QUALITY STUDY
FOR THE PROPOSED
KAHULUI AIRPORT IMPROVEMENTS

KAHULUI, MAUI

Prepared for:

December 1995

B. D. NEAL & ASSOCIATES
Environmental, Urban Planning, Architectural, Engineering Services
P.O. BOX 1038, MAUNA PEARL, HAWAII 96720
TELEPHONE (808) 871-7221 • FAX (808) 871-7222

Table 7
AMBIENT BACKGROUND AIR QUALITY DATA FOR
MAALEA, MAUI - JUNE 1989 THROUGH DECEMBER 1989

<table>
<thead>
<tr>
<th>Pollutant</th>
<th>Averaging Period</th>
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<td>3-hour</td>
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<td></td>
<td>Annual</td>
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<td>Nitrogen Dioxide</td>
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<td>Ozone</td>
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<td></td>
<td>Annual</td>
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<td>Carbon Monoxide</td>
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<tr>
<td>Particulate Matter</td>
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Notes:
1. The data given in the table were obtained by Maui Electric Company at Site No. 231 located approximately 1 mile north of Maalaea Power Plant. Concentrations shown in the table for averaging times shorter than annual are the highest concentrations recorded during the period June 10, 1989 through December 31, 1989. Annual average concentrations for all pollutants are based on the 7-month period.
2. Concentrations shown in the table for averaging times shorter than annual do not include periods when the on-shore flow (Northerly flow between 135 and 225 degrees) persists, as this would include the Maalaea Generating Station emissions.

## Traffic

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<tr>
<td>Peds</td>
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<td>SB Right</td>
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</tr>
<tr>
<td>Peds</td>
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**Signal Operations**

- Green: 18.0A
- Yellow/AR: 5.0

**Cycle Length:** 90 secs

### Intersection Performance Summary

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<th>Delay</th>
<th>LOS</th>
<th>Approach:</th>
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**Approach:** 18.1 C

**Intersection Delay:** 25.5 sec/veh

**Intersection LOS:** D
### Intersection Performance Summary

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**Lost Time/Cycle:** 9.9 sec, **Critical V/eq = 0.931**
**MCH: SIGNALIZED INTERSECTION SUMMARY**  Version 2.4e  08-03-1990
Parsons Brinckerhoff Quade & Douglas

### Traffic Data

#### Volume
- **Eastbound**:
  - **Lanes**: 3
  - **Vehicles per Hour**: 1,662
- **Westbound**:
  - **Lanes**: 3
  - **Vehicles per Hour**: 1,700
- **Southbound**:
  - **Lanes**: 2
  - **Vehicles per Hour**: 1,977
- **Northbound**:
  - **Lanes**: 1
  - **Vehicles per Hour**: 1,482

#### Lane Utilization

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<td>Left</td>
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<tr>
<td>Thru</td>
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### Intersection Performance Summary

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</tbody>
</table>

### Signal Delay

- **Total Delay**: 18.4 sec/veh

### Intersection LOS

- **Southbound**: C

---

**MCH: SIGNALIZED INTERSECTION SUMMARY**  Version 2.4e  08-03-1990
Parsons Brinckerhoff Quade & Douglas

### Traffic Data

#### Volume
- **Eastbound**: 393
- **Westbound**: 1765
- **Southbound**: 187
- **Northbound**: 59

#### Lane Utilization

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<th>Lane</th>
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### Traffic Operations

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<th># Lanes</th>
</tr>
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<tr>
<td>Left</td>
<td>2</td>
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<tr>
<td>Thru</td>
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### Intersection Performance Summary

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<th>Capacity</th>
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<td>0.005</td>
<td>0.156</td>
<td>4.9</td>
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</tr>
</tbody>
</table>

### Signal Delay

- **Total Delay**: 18.4 sec/veh

### Intersection LOS

- **Southbound**: C

---

**Note:** The document contains tables and figures related to traffic data and intersection performance, including volume, lane utilization, traffic operations, and intersection delay and loss of service (LOS) ratings. The data is specific to the dates 08-03-1990 and 08-30-1990.
### HCM: SIGNALIZED INTERSECTION SUMMARY

**Version 2.4a**

**07-31-1998**

**Parameters Brinckerhoff Quade & Douglas**

**Streets:** (E-W) Kanneh/Bypase

**(N-S) Pillar Highway**

**File Name:** KANH/BYP

**Area Type:** Other

**Connects:** Year 202, UIK

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APPENDIX G

Noise Analysis Technical Memorandum
Kihei-Upcountry Maui Highway Project

Project Number: HDPS-9203(1)

Noise Analysis Technical Memorandum

Prepared for:
State of Hawaii
Department of Transportation
U.S. Department of Transportation
Federal Highway Administration

Prepared by:
Parsons Brinckerhoff Quade & Douglas, Inc.

October 1996

---

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1. INTRODUCTION

This report documents an analysis of potential traffic noise impacts of the proposed Kīhei-Upcountry Maui Highway project on the island of Maui, Hawaii. This study was prepared in accordance with Federal Highway Administration (FHWA) rules and procedures and the State of Hawaii Department of Transportation (SDOT) Noise Analysis and Abatement Policy (October 1996, approved by FHWA on June 26, 1997) (hereinafter referred to as Noise Policy). Its elements include:

1. Measurements of existing noise levels at representative noise sensitive receptors;
2. Prediction of future traffic noise levels;
3. Comparison of existing and predicted future traffic noise levels with the FHWA Noise Abatement Criteria (NAC);
4. Recommendations to reduce noise impacts;
5. Evaluation of possible noise barriers; and
6. The effects of construction noise and proposed mitigation measures.

2. PROJECT DESCRIPTION

The Highways Division of the State of Hawaii Department of Transportation (SDOT) and the Federal Highway Administration (FHWA) are proposing the Kīhei-Upcountry Maui Highway project on the island of Maui, Hawaii. Figure 1 shows the general project location. The proposed highway would connect Pi'ilani Highway with either Hāna Highway or Kīna'ole Highway, directly linking the Kīhei-Mākena region with the Upcountry Maui region.

The alternatives under consideration are eight possible combinations of two Kīhei terminus options and four Upcountry terminus options. Figure 2 shows the candidate Upcountry and Kīhei termini and the alignment segments or "footprints" that would be used to link the termini. As shown on this figure, the Kīhei termini and segments are named K1 and K2, and the Upcountry termini and segments are named U1, U2-A, U2-B, and U3.

Descriptions of the alternatives are as follows:

1. Alternative U1(K1). This alternative would extend from the Hāna Highway/Pālī Road intersection in Upcountry, following a south to southwest alignment for approximately 10 km (6.25 miles), and then a western alignment to the Kaanapali Street/Pālī Road intersection.

2. Alternative U1(K2). This alternative is the same as Alternative U1(K1) from the Upcountry terminus. However, instead of terminating at the Kaanapali

...
3. **Existing Conditions**

3.1 **Background**

Noise is defined as any sound that is undesirable or interferes with normal human activities. The decibel (dB) scale is used to quantify sound intensity and represents the ratio between a given sound and the faintest sound detectable by human hearing. Because sound pressure levels vary widely within the range of human hearing, the dB scale is logarithmic. The human ear is not equally sensitive to all frequencies within the entire sound spectrum. Accordingly, noise measurements are made using an A-weighting (dB(A)) scale to correspond to human perceptions of noise. A scale sound levels are currently in use in many communities and city noise ordinances and in state and city highway or traffic noise codes.
Time variation in noise exposure is typically accounted for as a constant energy level equivalent (L_{eq}) for a given time period. The L_{eq} is the constant noise level over some specified period of time that is equivalent in energy to a fluctuating (or Brief) noise "averaged" over that period of time. L_{eq} is also a function of time and is expressed as L_{eq} (time period). For example, L_{eq}(h), expressed in A-weighted decibels (dBA), is the calculated constant noise over one hour which is equivalent in total energy to the varying noise levels actually measured during that one hour.

### 3.2 Noise Standards

The SDOT Noise Policy implements FHWA regulations on noise abatement (23 CFR 772) for the State of Hawaii. The regulations and policy require that a noise analysis be performed whenever potentially affected receptors exist, either as developed lands or lands that are planned, designed or programmed for future use.

The FHWA has established Noise Abatement Criteria (NAC), shown on Table 1, for different exterior and interior land use activities. The NAC do not constitute legally enforceable noise standards, but represent a yardstick for evaluating the effect of project noise on the surrounding community. The NAC have been adopted by the State of Hawaii as its standard.

Under SDOT policy, a noise impact occurs when the predicted traffic noise levels approach or exceed the NAC, or when the predicted traffic noise levels substantially exceed the existing noise levels. "Approach" means at least 1 dBA less than the NAC, and "substantially exceed" means an increase of at least 15 dBA. If the NAC are approached or exceeded, or if there is a substantial increase above the existing noise level, noise abatement measures must be considered.

Changes in traffic noise are assessed using human perceptions of sound level changes. Generally, changes in noise levels of less than 3 dBA are barely perceptible to most listeners, but a 10 dBA change is perceived as a doubling (or halving) of noise levels. These guidelines permit estimation of an individual's probable perception of changes in noise levels.

### 3.3 Noise Sensitive Sites and Existing Noise Levels

Existing and future planned noise sensitive land uses, and activities adjacent to the project alternatives were identified from site inspections and existing mapping. These land uses include residences, recreation and park areas, and institutions such as schools. A total of eleven sites were selected as representative of existing and future noise sensitive land uses, and their locations are shown on Figure 3. Only Site 4 is presently used for sugarcane cultivation, and there are no official plans to convert this area to an urban land use. Therefore, this site is considered Activity Category D (see Table 1) and has no NAC. This site was selected because it is the location of the U1 termum. The other 12 sites are considered Activity Category B (see Table 1), and have a NAC of L_{eq}(h) 67 dBA.

### Table 1: Noise Abatement Criteria (NAC)

<table>
<thead>
<tr>
<th>Activity Category</th>
<th>L_{eq}(h) for Neighbors Traffic Hour - dBA</th>
<th>Description of Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>57 (Exterior)</td>
<td>Lands on which activity and quiet are of exceptionally high significance and serve an important public need and where the presence of these qualities is essential if the area is to continue to serve its intended purpose</td>
</tr>
<tr>
<td>B</td>
<td>67 (Exterior)</td>
<td>Parks areas, recreation areas, playgrounds, active sports areas, parks, residences, motels, hotels, schools, churches, libraries, and hospitals</td>
</tr>
<tr>
<td>C</td>
<td>72 (Exterior)</td>
<td>Developed lands, presence, or activities not included in Categories A or B</td>
</tr>
<tr>
<td>D</td>
<td></td>
<td>Undeveloped lands</td>
</tr>
<tr>
<td>E</td>
<td>52 (Interior)</td>
<td>Residences, motels, parks, public eating rooms, schools, churches, libraries, hospitals, and auditoriums</td>
</tr>
</tbody>
</table>

**Note:** L_{eq}(h) is the one-hour equivalent sound level.

Interior noise level standards apply to:
1. Indoor activities for those parcels where no exterior noise sensitive land use or activity have been identified, and
2. Situations where the exterior activities are either remote from the highway or shielded, so that while the exterior activities remain undisturbed, noise nevertheless affects interior activities.

**Source:** Federal Highway Administration

Noise measurements at the noise receptor sites were taken in June, 1997, from between the hours of 9:00 a.m. to 5:00 p.m. Only Site 1, which is located in a residential community east (mauka) of Pillawai Highway near the K1 alignment, was not measured between the hours. This site is approximately 600 m (2000 ft) from the K1 alignment, and under normal circumstances would probably not have been selected as a noise receptor site because of this far distance. It was selected because of comments from people living in that community, that noise impacts would occur from early morning transports (buses, vans, cars) to the Haleakala Summit. Many tourists staying in West Maui and Koloa-Makanu travel to the summit daily to watch its
spectacular sunrise. Noise measurements at this site were taken 5:00 a.m. All noise measurements were sampled for 20-minute periods, and the results are presented in Table 2.

Existing noise levels at the 13 noise receptor sites range from 39 dBA to 68 dBA. The only site that approaches the NAC of L_{eq} (67 dBA) is Site 7. The high noise level at this site, and the noise levels at many of the other sites, are primarily caused by traffic movements on nearby roadways.

<table>
<thead>
<tr>
<th>Site No.</th>
<th>Location</th>
<th>Land Use Activity</th>
<th>Noise Level (L_{eq} (dBA))</th>
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<tbody>
<tr>
<td>1</td>
<td>Chokai community (Chokai St)</td>
<td>Residential</td>
<td>39</td>
</tr>
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<td>2</td>
<td>Kamalana Elementary School</td>
<td>School</td>
<td>59</td>
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<tr>
<td>3</td>
<td>Omaoao Homesteads</td>
<td>Residential</td>
<td>53</td>
</tr>
<tr>
<td>4</td>
<td>Honaunau Ave / Hana Rd. Intersection</td>
<td>Agriculture</td>
<td>68</td>
</tr>
<tr>
<td>5</td>
<td>Pukalani community (Alii St.)</td>
<td>Residential</td>
<td>57</td>
</tr>
<tr>
<td>6</td>
<td>Kula 200 community</td>
<td>Residential</td>
<td>51</td>
</tr>
<tr>
<td>7</td>
<td>Kula residence along Kula Hwy.</td>
<td>Residential</td>
<td>66</td>
</tr>
<tr>
<td>8</td>
<td>Punalu‘u community (Helekena Rd.)</td>
<td>Residential</td>
<td>47</td>
</tr>
<tr>
<td>9</td>
<td>Future Kamehameha School</td>
<td>School</td>
<td>63</td>
</tr>
<tr>
<td>10</td>
<td>Papaikou St. Intersection</td>
<td>Residential</td>
<td>60</td>
</tr>
<tr>
<td>11</td>
<td>Future Kihe Regional Park</td>
<td>Park</td>
<td>45</td>
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<td>12</td>
<td>King Keku‘ula High School</td>
<td>School</td>
<td>49</td>
</tr>
<tr>
<td>13</td>
<td>Kula Hwy / Haleakula Hwy near Five Trees intersection</td>
<td>Residential</td>
<td>49</td>
</tr>
</tbody>
</table>

Source: Parsons Brinckerhoff, June 1997

4. FUTURE TRAFFIC NOISE IMPACTS

4.1 Prediction Methodology

The future year 2030 traffic noise levels were estimated at thirteen noise sensitive sites along the proposed project alternative alignments using the SHA-2.0 Highway Traffic Noise Modeling Program (FHWA, 1992). Impacts were calculated for the Year 2030.
Input variables to noise modeling and analysis include traffic volumes, speeds and vehicle fleet mix (auto, medium truck, and heavy truck percentages). The noise analysis considers the following traffic scenarios:

- Two-lane facility - summer hours (5:00 a.m. to 6:00 a.m.);
- Two-lane facility - peak hour;
- Two-lane facility - roadway operating at level of service (LOS) C and
- Four-lane facility - roadway operating at LOS C.

LOS C is a qualitative traffic condition, on a scale from A to F, where traffic volume is at the capacity of the roadway and vehicles operate at the allowable speed limit. This is considered to be the most of the six level of service conditions. The analysis assumes that existing and future traffic conditions have the same vehicle mix and vehicle speeds. The traffic modeling assumptions are presented in Appendix A.

4.2 Noise Impact Analysis

In terms of the one-hour (L_{1h}) noise descriptor, noise impacts could potentially require mitigation if either of the following conditions is predicted to occur:

- future year traffic approaches or exceeds the FHWA NAC; or
- future year traffic substantially exceeds (15 dBA or more) the existing ambient noise level.

Table 3 summarizes the results of the noise modeling at the thirteen receptor sites.

4.2.1 No-Build Alternative

Under the No-Build alternative, predicted future traffic noise levels are expected to be no more than 1 dBA over the existing noise levels. The NAC of L_{1h} 87 dBA is predicted to be approached at Site Y (see Table 3). All other sites are predicted to remain below the NAC.

4.2.2 Build Alternatives

This section describes the noise impacts of Kibat-Ucpountry Mail Highway under the five traffic scenarios described in Section 4.1. The predicted Build noise levels presented in Table 3 were modeled under alternative alignments (e.g., U1, U2-A, K2, etc.). The “Segment” column in Table 3 specifies the alignment. The discussion in this section describes the noise impacts from a particular alignment, which in effect, applies to two or four alternatives. For example, if a statement is made, “a U1 alignment is predicted to cause a X dBA increase at Site Y,” then the impact would come from Alternatives U1, K1 and U2-K2.

Two Lane Facility - Summer Hours

The predicted noise levels, presented in Table 3, represent the effects of traffic on the projected highway and other roadways during the early morning hours. As described in Section 3.3, much of the early morning travel demand is caused by...
5. CONSTRUCTION NOISE IMPACTS

Construction noise represents a short term impact on the noise environment. The duration and level of construction noise depend on the phase of activity, such as:

- ground clearing, demolition and removal of existing structures, trees, rocks and soil;
- excavation;
- placement of foundations and roadbeds;
- erection of structures including retaining walls and fill construction, including grading, paving, landscaping and cleanup operations.

The first two phases, ground clearing and excavation, typically generate the highest noise levels. Noise generated by construction equipment, including trucks, graders, bulldozers, concrete mixers and portable generators can reach levels from 67 dBA to 79 dBA at 15 m (50 ft). Construction equipment noise emissions are regulated by the Environmental Protection Agency's Noise Control Program (40 CFR Part 204 of Title 40, Code of Federal Regulations). Presently, air compressors are the only equipment under regulation, and no new regulations are currently under consideration. The State of Hawaii, Department of Health also regulates noise from construction activities (Hawaii Administrative Rules, Chapter 11-45, Community Noise Control).

Noise levels for equipment which might be used during the excavation and construction of the proposed project are presented in Table 6. The noise levels presented are at a reference distance of 15 m (50 ft). Since construction equipment noise levels decrease at a rate of approximately 6 dBA per doubling of distance, at 30 m (100 ft) the noise levels would be about 6 dBA less than the levels shown at 15 m (50 ft). Similarly, at 60 m (200 ft) the noise levels would be 12 dBA less than shown. Intervening structures or topography can act as a noise barrier to further reduce noise levels.
6. MITIGATION MEASURES

6.1 Future Traffic Noise

Noise abatement measures must be considered as part of the project if traffic noise impacts are identified. An impact occurs when traffic noise levels approach or exceed the NMC or if traffic noise levels substantially exceed (15 dBA or more) the existing ambient levels. The SDOT Noise Policy is used to determine whether noise abatement measures can be implemented, depending on whether these measures are reasonable and feasible based on the following criteria:

- Provides a minimum noise reduction of 5 dBA.
- Cost of noise abatement is not to exceed $35,000 per residence benefitted. The number of residences protected will include all dwelling units - owner occupied houses, rental units, mobile homes, etc. All units benefited by a 5 dBA or more noise reduction will be counted regardless of whether or not they were identified as impacted.
- Views from impacted residences are a major consideration in the reasonableness of noise abatement measures.
- Greater considerations to residential areas where absolute traffic noise levels are expected to occur, e.g., greater than 70 dBA, or where large increases over existing noise levels are anticipated.
- Greater consideration to residential areas along highways in a new location, residential areas constructed before an existing highway, residential areas in place along an existing highway for an extended period of time.
- Consideration of adverse environmental effects and beneficial reduction of construction noise.

Noise abatement would only be considered at existing residential or planned development sites where building permit approvals have been obtained. The abatement would only apply to outdoor ground level areas.

According to Section 4.2.2, noise impacts are predicted to occur at Site 11 under three of the four traffic scenarios (two-lane facility - peak hour, two-lane facility - LOS C, and four-lane facility - LOS C) and at Sites 3 and 10 under the four-lane facility - LOS C traffic scenario.

At Site 11, a noise barrier does not appear to be a reasonable abatement measure because the site represents a future regional park and the barrier would have adverse visual effects and would not be appropriate in a park setting. An abatement measure that appears to be reasonable and feasible is a buffer zone between the roadway right-of-way and areas of the park where human activities would occur.

Noise impacts at Sites 3 and 10 could be mitigated with a 3 to 3.8 meter (10 to 12 feet) noise barrier wall or earthen berms at the roadway right-of-way. For Site 3, the wall or berm would be located along Kīhei-Upcountry Maui Highway (U.S.A or U.S.B alternative). For Site 10, the wall or berm would be located along Pihea Highway. If a noise barrier wall or berm is considered, the height, length and location of the barrier would be determined during preliminary engineering design.

6.2 Construction Phase

Noise control measures during construction would be required to minimize impacts on existing noise sensitive land uses. The measures recommended in this section should be re-evaluated in greater detail during preliminary design because impacts to residences cannot be accurately determined without detailed construction plans and schedules. General mitigation measures presented below are recommended as guidelines in developing construction plans that consider the adverse impacts of construction noise.

1. Design Considerations - During the early stages of construction plan development, natural and artificial barriers, such as ground elevation changes and existing buildings, can be considered for use as shielding against construction noise. Strategic placement of stationary equipment, such as compressors and generators, could reduce impacts at the sensitive receptors.

2. Construction of Noise Barriers During Initial Stages - Noise barriers planned to ultimately be constructed along the right-of-way for traffic noise abatement could be constructed during the initial stages to reduce the impacts of construction. Initial construction of noise barriers would significantly reduce construction noise impacts at the sensitive receptors.

3. Alternate Construction Methods - Certain phases of highway construction work such as pile driving may produce noise levels in excess of acceptable limits, even when feasible noise reduction methods are used. These impacts may be reduced by using alternate methods of construction. In the case of pile driving, vibration or hydraulic insertion could be used. Diluted noise for cost-in-place...
piles are another alternative that would produce significantly lower levels of noise.

4. Source Control - The contractor shall comply with SDOT Standard Specifications and all local sound control and noise level rules, regulations and ordinances which apply to any work performed pursuant to the contract. Each internal combustion engine used for any purpose on the job or related to the job shall be equipped with a muffler of a type recommended by the manufacturer. No internal combustion engine shall be operated on the project without a muffler.

5. Time and Activity Constraints - The noisiest activity involving large machinery could be limited to daytime hours when most people normally impacted are either not present or engaged in less noise sensitive activities. Nighttime construction would require a variance. Compliance with local noise Ordinances will mitigate impacts associated with construction noise. To comply with the ordinance, all construction activities adjacent to residential uses will be limited to daytime hours (7:00 a.m. to 7:00 p.m.) on Monday through Saturdays.

6. Community Relations - Community meetings can be held to explain the construction work, time involved, and the control measures to be taken to reduce the impact of the construction noise.

The measures above can be incorporated into site specific construction plans to minimize noise impacts to sensitive receptors along the project corridor. Noise emission limits could be developed. Construction hours could be set, and noise level criteria could be decided upon and adhered to during construction.

7. REFERENCES


APPENDIX H

Community Impact Assessment
Kihei-Upcountry Maui Highway Project

Project Number HDPS-9203(1)

Community Impact Assessment

Prepared for:
State of Hawaii
Department of Transportation
U.S. Department of Transportation
Federal Highway Administration

Prepared by:
Parsons Brinckerhoff Guade & Douglas, Inc.

October 1998

Kihei-Upcountry Maui Highway Community Impact Assessment

SUMMARY

The Highways Division of the State of Hawaii Department of Transportation (SDOT) and the Federal Highway Administration (FHWA) are proposing the Kihei-Upcountry Maui Highway project, on the island of Maui, Hawaii. The proposed highway would link the Kihei-Makena and Upcountry Maui regions. Eight alternative alignments are under consideration, representing all possible combinations of two candidate Kihei terminus and four candidate Upcountry terminus (the two alternatives with the U-3-B terminus have since been eliminated).

This community impact assessment was prepared in response to comments expressed by communities at the consultation on the existence of the area, especially the existing rural character of the Upcountry area. To address these concerns, the scope of the area was designed to assess possible impacts of the proposed highway. Mitigation measures are suggested.

The project area includes the coastal communities of Kihei, Wailea and Makena and the communities on the Hanakapiai Valley slope known as Upcountry Maui. The Upcountry area is characterized by the urban-Luau-urban environmental of Kihei and the well-planned 'upscale' resort areas of Wailea and Makena. Most developed during the 1970s and 1980s, this community is the second largest visitor accommodation area on Maui. Upcountry Maui consists of the suburban community of Pukalani, Makena, and the more rural communities of Kula. Kula is known for its small farms which produce some of the best vegetables and flowers in the State, but it is also, doted on for its calm, picturesque views and rural environment. The project area is also used for large-scale sugarcane and pineapple cultivation, and ranching.

In evaluating the alternatives' effect on land use patterns and consistency with existing community plans, it was found that there are other major factors controlling future land use in the Kihei-Makena area, including Pukalani Highway and South Maui's rolling landscape. The health of Maui's tourism industry would influence the potential of the highway because of the Upcountry area's reliance on the industry. For Upcountry, the major concern is the effect on the area's development growth, which is already being planned for residential areas, commercial and institutional development. The proposed project, and its impact, are based on Upcountry's desirability as a residential area. The Kula terminus alternative...
are not likely to cause secondary land development in Kula, an area in which urban land uses are discouraged and constrained by a limited water supply system.

The highway would change existing travel patterns. The obvious intended change would be the diversion of some travel demand from Hana Highway, Kula Highway, and Pākākā Road to Kula. However, the upper or lower Pākākā alternatives would encourage some motorists traveling between Paauilo and Kula to use the narrow and winding Pākākā and Kula Roads as a "short-cut." Similarly, the Kula terminus alternatives would encourage some motorists traveling to the summit of Hana Highway to use local residential roads running between Kula and Hana-use Highways. Increasing vehicle use of these roads would adversely affect farmers and residents along these roads by interfering with farm vehicle movements, jeopardizing roadway safety and increasing highway-related noise.

No alternative would cut through or isolate portions of existing neighborhoods. Some of the alternatives would, however, cut through sugarcane and pineapple fields adversely affecting the current cropping practices of large-scale agricultural enterprises which have been experiencing suburban encroachment for several decades. The alternatives would increase accessibility to certain pasture lands, however. No small privately-owned Kula farms would be directly affected. However, the U3 alternatives would cross a County agricultural park. Mitigation measures would have to be implemented to offset adverse impacts to agricultural production, and to prevent cattle from entering the highway right-of-way.

The economic impacts of the project are mostly beneficial. The project would reduce up to $68 million of federal funds into the local economy, increasing short-term employment and the purchase of local goods and services. Longer-term employment opportunities would depend on how well the alternatives facilitate urban development and employment-producing land uses in areas approved by the County. Impacts to existing highway-dependent businesses and business districts are expected to be minimal or non-existent.

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## INTRODUCTION

The Highways Division of the State of Hawaii Department of Transportation (HDOT) and the Federal Highway Administration (FHWA) are proposing the Koko-ʻAloha Highway project on the island of Oahu, Hawaii. Figure 1-1 shows the general project location. The proposed federal-aid interchange limited access highway would link the Koko-ʻAloha and Upcountry Oahu region.

### 1.1 Description of the Proposed Action

The alternatives under consideration are all eight possible combinations of two Koko ʻAloha terminus options and four Upcountry terminus options. Figure 1-2 shows the candidate Upcountry and Koko terminus and the alignment segments or "template" that would be used to link the termini. As shown on this figure, the Koko termini and segments are named K1 and K2, and the Upcountry termini and segments are named U1, U2-A, U2-B, and U3. The U2-B alternative has since been eliminated from consideration.

Descriptions of the alternatives are as follows:

1. **Alternative U1-K1**: This alternative would start at the H-3/ʻAleʻalea Road intersection in Upcountry and follow a route to the southwest alignment to the Koko-ʻAloha Highway/ʻAina Highway intersection. The length of this alternative is approximately 15.6 km (10 miles).

2. **Alternative U1-K2**: This alternative is the same as Alternative U1-K1 from the Koko-ʻAloha terminus to the Upcountry terminus, except that the alignment segments cross. However, this alternative would proceed southeast to the Koko-ʻAloha Highway/ʻAina Highway intersection. The length of Alternative U1-K2 is approximately 17.5 km (11 miles).

3. **Alternative U2-A-K1**: This alternative would extend from the existing Koko-ʻAloha Highway/Kaʻūkīhuā Highway alignment in the ʻAina highway to an alignment common with U1. The Koko terminus would be at the Koko-ʻAloha Highway/ʻAina Highway intersection.

4. **Alternative U2-A-K2**: This alternative would be from the "Five Trees" intersection to the Koko-ʻAloha Highway/ʻAina Highway intersection.

5. **Alternative U2-B-K1**: This alternative would extend from Koko Highway at approximately 700 m (2000 ft) south of the "Five Trees" intersection to the Kaʻūkīhuā Highway/Kaʻūkīhuā Highway intersection.

6. **Alternative U2-B-K2**: This alternative is the same as the alternative Upcountry terminus and alignment of the Alternative U2-B-K1. This alternative's Koko terminus is at the ʻAina Highway/Kaʻūkīhuā Highway intersection.
1.3 Scope of this Report

This community impact assessment examines potential impacts to social and economic conditions of the affected neighborhoods and the region, existing and future land uses, mobility and access, safety, and the provision of public services. The FHWA’s Guidance for Preparing and Processing Environmental Impact Statements (1996) and the California Department of Transportation report, Conducting Social-Economic Analysis, Guidance for Consultants (May 1989) were used as technical guides in preparing this report. Other sources of information included U.S. Census data, the Maui County Data Book (December 1994), the Kilaeua-Makena Community Plan (July 1995), the Makawao-Pukalani-Kula Community Plan (July 1995), and interviews of “key informants” from the community.

The report is organized in the following manner:

- Description of study area and affected communities
  - Brief history of study area,
  - Physical characteristics,
  - Demographic and economic characteristics,
  - General economic characteristics,
  - Issues, concerns, and views of the community, and
  - Development trends
- Analysis of impacts on :
  - Neighborhood cohesion,
  - Agriculture,
  - Land use patterns and development trends,
  - Displacement,
  - Mobility and access,
  - Provision of public services;
- Crime and safety, and
- Economic impacts on :
  - Tax revenues,
  - Public expenditures,
  - Employment opportunities, and
- Businesses
- Suggested avoidance, minimization and mitigation measures
2. STUDY AREA AND COMMUNITY PROFILE

This chapter presents a summary of the history, present land use and socio-economic conditions of the study area. This chapter also presents a summary of major concerns and issues expressed by residents within the context of the County of Maui's community planning process, the Niihau-Maunaloa Highway Task Force process, and interviews conducted for this report.

2.1 Definition of the Study Area

The project is located in the area between the coastal community of Kilea and areas on the Hakanuma's Crater known as Upcountry Maui (see Figure 1-1). This study area is within the County of Maui's Niihau-Maunaloa and Makawao-Pukalani-Kula Community Planning Area. Defined neighborhoods or communities in the vicinity of the proposed project include Makana, Wailua, Kilea, Pukalani, Haiku, Makawao, and the Kula communities of Olowalu, Pali Pali, Waikane, and Keokea. The locations of these neighborhoods or communities are shown on Figure 2-1. For some of the sections in this chapter, the study area is divided into two regions, for descriptive purposes, Kilea-Maunaloa and Upcountry Maui.

2.2 History and Physical Character of the Study Area

This section briefly describes the Kilea-Maunaloa and Upcountry regions' history and physical makeup. Histories of the regions are taken from the Kilea-Maunaloa and Makawao-Pukalani-Kula Community Plans.

2.2.1 Kilea-Maunaloa Region

The Kilea-Maunaloa region was well populated prior to western contact. Between 1840 and 1850, large expanses of land were acquired by foreigners and native Hawaiians were displaced. By 1841, sugar being produced in Ulupaka for Kanahamanu III was being shipped out from a government sugar mill at Mauna. A second private sugar mill established at Makana Bay became one of the three busiest sugar mills on Maui in the nineteenth century. It was phased out after a government sugar mill was built at Keawakapu in the early 20th century.

Development of the Kilea-Maunaloa region has occurred primarily because of the phenomenal growth of Maui's sugar industry since the 1960s. Today, the Kilea-Maunaloa region is comprised of the urban mixed-use environment of Kilea and the resort land uses of Wailea and Mauna. This region is the second largest resort accommodation area on Maui (behind the Kapalua/Kaanapali/Lahaina region on the western side of the island). Kilea, the largest and most populous of these coastal communities, consists of a wide mix of housing types from single-family to multi-family townhouses to medium density units, small to medium sized commercial malls, and small to medium sized hotels along South Kihei Road. The Wailea-Maunaloa area is a resort community, similar in size and scale to other resort communities on Maui such as
Kahului-Uponcountry Maui Highway

Community Impact Assessment

Kapalu'a and Kaanapali, and in terms of urban design and socio-economic conditions, it is vastly more "upscale" than Kahului which is basically a working class community. Wailea-Makena contains some of Maui's most luxurious condominiums and resort hotels, such as the Grand Wailea Resort & Spa, the Maui Inter-Continental Resort, the Four Seasons Resort, and the Maui Prince Hotel.

2.2.2 Upcountry Maui Region

Hawaiian settlement in Upcountry Maui prior to western contact is evident from the large numbers of archaeological sites within the region. There are numerous recorded and unrecorded heiaus, stone walls, building platforms and peleho'okapu which evidence intensive habitation and land use.

Large scale sugarcane production was established from the 1850s to the 1870s. A partnership between S.T. Alexander and H.P. Baldwin in 1870 began the large sugarcane plantation which now Hawaiian Commercial and Sugar Company, Inc. In 1876, the construcción of Hanalea Ditch brought water to the dry central Valley of Maui and northwestern slopes of Haleakala, making sugarcane production possible where only scrub land had existed in terms of total acreage, cattle ranching ranked second to sugarcane in the Upcountry area. Haiku, Kaunakakai, Ewaheh and Upalula Ranches were the largest, and still raise cattle. Pineapples, first grown in Maui in the 1850s, is now grown at generally higher elevations than sugarcane.

The availability of homesteads in Kula began the habitation of farm families in this area. The cool and relatively dry climate, good soil, and elevation makes the Kula area exceptional for a number of crops, such as the famous Maui oranges, cabbages and cut flowers.

Culturally, Upcountry Maui became home to immigrants from Portugal, Japan, Russia, Germany, Philippines, Puerto Rico and China. Most were recruited as contract workers for the sugarcane plantations. When their contracts were fulfilled, many immigrants settled in the Upcountry area.

In general, the Portuguese gravitated towards ranching and related vocations such as blacksmithing and operating feed stores. The region's ranching "paniolo" heritage and activities were centered in Makawao. The Chinese settled largely in Keokea and Makawao, working as farmers and merchants. The Japanese arrived somewhat later, but contributed significantly to the formation of the area's character and development.

Since the early 1900s, Upcountry Maui has experienced significant residential growth because of the region's cool climate, rural setting and spectacular views. The area offers a desirable place to live. In particular, the Kula area has attracted luxury residences. This has sometimes conflicted with farming activities through the loss of agricultural lands and the present incompatibilities between the two uses.

Today, the Upcountry Maui communities of Makawao, Pukalani and Haialale are characterized as a mixture of suburban and rural, with Pukalani being the most suburban of the three. Pukalani and Makena contain most of Upcountry's conventional land uses. Pukalani's businesses are mostly located along Hana Highway and are typical of a suburban community (neighborhood shopping center, convenience stores, small offices, etc.). Businesses in Makena, centered around the intersection of Makena and Baldwin Avenues, are generally smaller and more pedestrian-oriented than the businesses in Pukalani. Makena's businesses consist of restaurants, gift shops and other tourist-oriented businesses. Recently created urban design guidelines for Makena maintain street-oriented, pedestrian-friendly building patterns, and preserve the area's historic character.

The Kula region contains a mixture of rural and agricultural uses with human settlement concentrated in Waialae. Single-family residences, on lots up to 0.4 ha (1 acre), are generally found between Hana Highway/Keokea Avenue and Kula Highway. The area and the area west (makaha) of Kula Highway is also used for small truck farms and agricultural lots. The small lots to five hectares (five to ten acres) farm produce vegetables, such as the famous Maui onions, and flowers. Large-scale sugarcane and pineapple activities extend from the west slopes of Haleakala, generally west (makaha) of Hana Highway/Keele Avenue, and on the lower west and south slopes of Haleakala. The low commercial activities in Kula are focused primarily along the route to Hana and the westernmost part of Kula around Wailea.

2.3 Demographic, Housing and Income Characteristics

As shown on Figure 2.2, U.S. Census tracts (CTs) 303.01, 304.02, 304.03, and 307 generally encompass the study area. CT 303.01 covers the Kula neighborhoods of Pu'ukūlā, Ma'eku, Keokea, Kula and Pahokee. CT 304.02 includes Wailea and Makena; CT 304.01 includes Makawao and Hāna. CT 304.02 includes Pukalani and parts of Kula, and CT 307 includes Kīhei.

2.3.1 Demographic Characteristics

Table 2.1, exhibits selected demographic characteristics of the Kīhei-Uponcountry Maui study area. In 1990, the population of the study area is estimated by the above CTs to be 34,171, or 34 percent of the County of Maui's total population. Population growth is significant. In comparison, County of Maui and State of Hawaii, annual average population growth is 7.5 percent. In the same period Kīhei, the percentage increase was 3.4 percent per year. The Pukalani-Kula area of 3.5 percent per year. Kula (CT 304.01) White-Makena (CT 302.02) and Pukalani (CT 307) each had annual average growth rates of 3.8 percent. 7.3 percent, and 5.1 percent, respectively.

Table 2.1 also displays the number of household types, families, ethnicity and age distributions for the study area in 1990. Overall whites made up 56 percent of the total population. The foreign-born population made up 34.2 percent of the total population. Hawaiian and other Pacific Islander made up 15.5 percent of the total population. The median age of householders was 36 years, and the median age of the population was 32 years.

2-3
Table 2-1
Demographic Characteristics in Selected Kula-Upcountry Areas, 1990

<table>
<thead>
<tr>
<th></th>
<th>Kula</th>
<th>Kula-Makena</th>
<th>Hana-Makena</th>
<th>Puunene-Kula (Parish)</th>
<th>Kula</th>
<th>Total</th>
<th>Maui County</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>CT 303.01</td>
<td>CT 303.02</td>
<td>CT 304.01</td>
<td>CT 304.02</td>
<td>CT 305.01</td>
<td></td>
<td></td>
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<tr>
<td>Population</td>
<td>5,507</td>
<td>2,918</td>
<td>7,174</td>
<td>6,584</td>
<td>12,663</td>
<td>34,171</td>
<td>100,374</td>
</tr>
<tr>
<td>Sex</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Males</td>
<td>50%</td>
<td>51%</td>
<td>52%</td>
<td>51%</td>
<td>52%</td>
<td>52%</td>
<td>51%</td>
</tr>
<tr>
<td>Females</td>
<td>50%</td>
<td>49%</td>
<td>48%</td>
<td>49%</td>
<td>48%</td>
<td>48%</td>
<td>49%</td>
</tr>
<tr>
<td>Households</td>
<td>1,940</td>
<td>1,943</td>
<td>2,283</td>
<td>1,919</td>
<td>4,902</td>
<td>12,087</td>
<td>33,140</td>
</tr>
<tr>
<td>Families</td>
<td>1,439</td>
<td>661</td>
<td>1,373</td>
<td>1,570</td>
<td>3,112</td>
<td>5,581</td>
<td>23,672</td>
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<tr>
<td>Ethnicity</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>White</td>
<td>64%</td>
<td>80%</td>
<td>54%</td>
<td>43%</td>
<td>65%</td>
<td>60%</td>
<td>60%</td>
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<tr>
<td>Chinese</td>
<td>3%</td>
<td>1%</td>
<td>2%</td>
<td>2%</td>
<td>2%</td>
<td>2%</td>
<td>2%</td>
</tr>
<tr>
<td>Filipino</td>
<td>2%</td>
<td>4%</td>
<td>1%</td>
<td>1%</td>
<td>2%</td>
<td>2%</td>
<td>2%</td>
</tr>
<tr>
<td>Japanese</td>
<td>18%</td>
<td>5%</td>
<td>11%</td>
<td>25%</td>
<td>5%</td>
<td>12%</td>
<td>17%</td>
</tr>
<tr>
<td>Other Asian</td>
<td>1%</td>
<td>2%</td>
<td>1%</td>
<td>1%</td>
<td>1%</td>
<td>1%</td>
<td>1%</td>
</tr>
<tr>
<td>Hawaiian</td>
<td>9%</td>
<td>3%</td>
<td>14%</td>
<td>14%</td>
<td>5%</td>
<td>10%</td>
<td>15%</td>
</tr>
<tr>
<td>Pacific Islander</td>
<td>0%</td>
<td>1%</td>
<td>2%</td>
<td>0%</td>
<td>1%</td>
<td>1%</td>
<td>1%</td>
</tr>
<tr>
<td>Black</td>
<td>0%</td>
<td>2%</td>
<td>0%</td>
<td>2%</td>
<td>1%</td>
<td>0%</td>
<td>1%</td>
</tr>
<tr>
<td>Other Race</td>
<td>2%</td>
<td>2%</td>
<td>3%</td>
<td>2%</td>
<td>2%</td>
<td>2%</td>
<td>2%</td>
</tr>
<tr>
<td>Age</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Less than 5 Years</td>
<td>10%</td>
<td>7%</td>
<td>11%</td>
<td>10%</td>
<td>9%</td>
<td>9%</td>
<td>5%</td>
</tr>
<tr>
<td>5 to 17 Years</td>
<td>17%</td>
<td>12%</td>
<td>20%</td>
<td>20%</td>
<td>21%</td>
<td>14%</td>
<td>17%</td>
</tr>
<tr>
<td>18 to 24 Years</td>
<td>20%</td>
<td>22%</td>
<td>28%</td>
<td>23%</td>
<td>31%</td>
<td>26%</td>
<td>20%</td>
</tr>
<tr>
<td>25 to 64 Years</td>
<td>41%</td>
<td>48%</td>
<td>34%</td>
<td>35%</td>
<td>39%</td>
<td>35%</td>
<td>30%</td>
</tr>
<tr>
<td>65 or More Years</td>
<td>12%</td>
<td>12%</td>
<td>7%</td>
<td>8%</td>
<td>8%</td>
<td>8%</td>
<td>11%</td>
</tr>
</tbody>
</table>

Note: CT = Census Tract

Source: U.S. Census Bureau, 1990 Census of Population and Housing, Hawaii
population of the study area. Japanese, Filipinos and Hawaiians were the second, third and fourth most common racial groups, respectively. Within the study area, the proportion of whites was equal to the total resident to a high of 80 percent in the Wailea-Makena area to a low of 43 percent in the Pukalani-Kula (partial) area. The age distribution of residents in the study area does not appear to be substantially different than the age distribution for the entire county.

2.3.2 Housing Characteristics

Table 2-2 exhibits certain housing characteristics of selected Kiihi-Ucupcountry areas in 1990. Overall, 54 percent of the housing units were one-unit structures. However, this ratio varied by community within the study area. In the Ucupcountry areas, such as Kula (CT 303.01), Makawao-Pukalani (CT 304.01), and Pukalani-Kula (partial) (CT 304.02), one-unit housing types made up more than 90 percent of all housing units, consistent with Ucupcountry's suburban and rural characteristics. The coastal areas of Wailea-Makena (CT 303.02) and Kiihi (CT 307) have a mix of housing types consistent with these areas more urban characteristics.

The age ratios of structures (see Table 2-2) is a good indicator of the ages of the neighborhoods within the CTs. From the information presented in Table 2-2, Wailea-Makena (CT 303.03) and Kiihi (CT 307) are relatively young communities in comparison to all communities combined on the Island. Very few of the houses in these areas are older than 20 years. In terms of age of their communities, Kula (CT 303.01) and Pukalani-Kula (partial) (CT 304.02) are very similar to the Island overall. The age ratios of Halihali-Makawao indicate that they are older communities that have recently experienced surges in residential growth.

Overall the owner versus renter occupancy ratio for the study area was 58.4% in 1990, roughly the same as the owner-occupant occupancy ratio for the county. Within communities of the study area, this ratio varied from 69.35 in Makawao-Pukalani to 51.49 in Kiihi. According to the Maui County Data Book (December 1994), approximately 32 percent of the housing units in the Kiihi to Makena area were used for seasonal or recreational purposes in 1990. In the Ucupcountry area, only two to three percent of the housing units were used for such purposes.

2.3.3 Income Characteristics

Table 2-3 exhibits certain income characteristics for selected Kiihi-Ucupcountry areas in 1990. Median household incomes in the study area were higher than the median for the County of Maui, which was $39,771 in 1989. Incomes varied from a low of $24,483 in Kula (CT 303.01) to a high of $56,694 in Wailea-Makena (CT 303.02). The poverty rates of residents in Kiihi-Ucupcountry areas were slightly higher than the rate for the County. The percentage of households with incomes below the poverty level ranged from a low of six percent in Pukalani-Kula (partial) (CT 304.02) to a high of 12 percent in Wailea-Makena (CT 303.02). From 1989 to 1993, the unemployment rate for Maui Island ranged from 2.2 percent in 1989 to 7.6 percent in 1992. The average in this period was 4.9 percent. The Kiihi to Makena region is one of the Island's major employment centers.
2.4 Economic Characteristics

Maui’s most important industry is tourism. From 1989 to 1993, an average of over 2.3 million visitors arrived on Maui per year. The peak for this period was 1991 when there was over 2.5 million visitors. Most of Maui’s hotels, resorts, and visitor-related businesses are located in West Maui from Lahaina to Kapalua, and in South Maui from Kīhei to Makaha. In the latter area, there were 84 visitor-accommodation facilities in 1993 providing a total of 7,518 visitor rental units, approximately 43 percent of all visitor-related units on Maui. In contrast, the Upcountry areas had only 63 visitor-related units. The Kīhei-Maunalei region held about 14.8 percent of the employment on Maui, ranking third behind West Maui and Wailuku-Kahului in the number of jobs on the island.

Unlike Kīhei-Maunalei, agriculture is Upcountry Maui’s prime economic activity. Major crops or agricultural activities in Upcountry Maui include large-scale sugarcane and pineapple cultivation, and ranching. Sugarcane and pineapple activities are located on the west slopes of Haleakalā Crater to central Kīhei. Cattle ranching generally occurs in the area east (maula) of Haleakalā Highway/Iao Valley Avenue and on the lower west and south slopes of Haleakalā Crater. In Kula, major agricultural crops include vegetables, such as head cabbage, lettuce, round onions, and flowers, such as cattanities and protea. Unlike sugarcane and pineapple cultivation, agricultural activities in Kula are on much smaller farms, mostly of five to ten acres. Upcountry Maui also has some small to medium size commercial activities mostly within Pukalani and Makawao. The medium size commercial town uses are exclusively within Pukalani. Makawao’s business district contains pedestrian-oriented small retail stores and restaurants. Kula has very few commercial activities.

Scientific research is becoming an increasingly important industry on Maui. This industry is located primarily at Science City on the summit of Haleakalā and at the Maui Research and Technology (MaRT) Park in Kīhei. Science City, a federal facility, is used for space- and defense-related research and development. The Maui R&T Park currently houses the Maui High Performance Computing Center, Boeing-Rocketdyne, Sunsource, the U.S. Air Force, the Pacific Disaster Center, Lockheed Martin, the University of Hawaii, the University of New Mexico, and a number of small companies.

2.5 Community Facilities, Parks and Services

The Kīhei-Maunalei region contains three major beach parks, Kā'anapali, Kamaole I, II and III and Mā'alaea Ocean Park, as well as other smaller beach parks along the Kīhei to Māna'ula coastline. This community also supports a county recreation center, Sherwood Golf Course, and two private golf courses in Wailuku. A Kīhei District Regional Park is being planned for the area east (maula) of Pālihāna Highway near its intersection with Hālawa Avenue. Parks and recreation facilities in Upcountry Maui include the Makawao Parks/Mayor Eddie Tam Memorial Center, the Upcountry Youth Center, Pukalani Park and Community Center, Kula Botanical Garden, Harold F. Rice Park, Kealia Park, and the Pukalani Country Club Golf Course.
There are three schools in the Kihei-Makana region: Kihei Elementary School, Lokelani Intermediate School, and the new Kamalii Elementary School. Schools in Upcountry Maui include Makawao Elementary, Haleakula Elementary, Pukalani Elementary, Kula Elementary, Paia Elementary, Kahului Intermediate, Seabury Hall (private), and the new King Kekaulike High School which opened in 1995.

Police patrols for Kihei-Makana and Upcountry Maui operate out of the main police headquarters in Wailuku. The Makawao Community Police Office maintains an office in the town. There are plans to construct a police sub-station in Kihei. Fire stations are located on South Kihei Road near Kamauma, in Makawao, and in Kula near Waiahu.

Mau Memorial Hospital in Wailuku is the principal hospital on Maui. Smaller hospitals are in Hana and Kula. The general hospital in Kula provides care for tuberculosis, mental and long-term patients. An ambulance stationed in Makawao provides emergency service between the Upcountry area and Mau Memorial Hospital. There is no 24-hour ambulance service in Kula. Emergency medical service in Kihei is provided by Mau Memorial Hospital.

2.6 Community Issues and Concerns

This section describes community issues and concerns expressed through the update processes of the Kihei-Makana and Malu-Makana-Kula Community Plans and the State/County Joint Task Force on the Upcountry/Kihei Highway.

2.6.1 Community Plans

In the Proposed Kihei-Makana Community Plan (October 1993), the Kihei-Makana Community Plan Citizens Advisory Committee (CAC) expressed the following problems, issues and concerns regarding their community:

- **Transportation**: Inadequate traffic circulation and lack of public transportation.
- **Community Facilities**: Lack of youth programs, community facilities and plying fields in relation to its size as the third largest residential community on Maui. Recreation facilities such as a community swimming pool and sports fields, and a community center to house forums and events are particularly needed.
- **School Environment**: Problems expressed included an overall shortage of educational facilities, an uneven distribution of schools, and the school's proximity to Pilani Highway. These circumstances result in overcrowded, uncomfortable and generally poor classroom learning environments.
- **Public Services**: The lack of emergency medical facilities is a concern because of Maui Memorial Hospital's distance from Kula. Greater police presence is needed to control crime. A ladder truck at Kihei Fire Station is needed to fight high-rise fires. A new Kihei community library would enhance learning for students. A general lack of social services, including child day care, was noted.

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2.12

- **Upcountry Transportation**: A transportation connection to the Upcountry area would save valuable commuter time between residential areas of Upcountry and job centers in the Kihei region. In choosing the alignment for this connection, the major concern should be improving transportation services for the maximum number of residents.

The Makawao-Pukalani-Kula Community Plan (July 1999) CAC expressed the following problems, opportunities and interregional issues regarding their community:

**Problems**

- **Water**: Limited development of water resources and distribution systems to meet the needs of the region. Water resources should be allocated in the following order of priority: (1) preservation of agriculture and development of Department of Hawaiian Home Lands parcels; (2) ensure the long-term viability of the region's residences and economic base.
- **Loss of Rural Character**: The loss of Upcountry's rural ambiance is a significant concern. Preservation of the rural setting and open space of Upcountry is an important goal for the region.
- **Transportation**: Issues of concern include the inadequate transportation network, the need to address interregional access, and the need to provide alternative modes of transportation.

- **Public/Quasi-Public Services and Facilities**: Inadequate public and quasi-public facilities are cited as a major community issue. These facilities should be upgraded, expanded, or constructed to meet the growing needs of the region's residents.

**Opportunities**

- **Rural Community Character**: The region's rural qualities, characterized by its low crime rate, clean environment, abundant outdoor recreation opportunities, and vast open space and natural resources provide an opportunity to preserve Upcountry Maui's unique identity.
- **Land Use**: The land use patterns of the region should provide an opportunity to preserve the region's rural and agricultural setting. Planning of existing and future communities should retain their rural character, and agricultural lands and related activities must be recognized as key land use elements. To retain the integrity of the region's land use character, agricultural lands and related activities must be recognized as key land use elements which make Upcountry a special place.

**Interregional Issues**

- **Kihei-Uponcountry Highway**: The selection of an alignment must consider the growth-inducing impacts on the region's agriculture, rural character and open...
spaces. The need to maintain the unique Upcountry ambiance should be an essential criterion in analyzing alternatives.

- **Economic Well-Being**: The Upcountry region should continue to contribute to the overall economic health and stability of the county by maintaining sugarcane and pineapple cultivation, the region's rural character, and scenic and recreational resources.

- **Water**: A comprehensive water management strategy must be developed to balance various interests and accommodate environmental, agricultural, and residential needs.

### 2.6.2 Joint Task Force on the Kīhei-Upcountry Highway

A task force made up of citizens, businesses, and State and county officials was created in 1992 to explore and recommend alternatives for the Kīhei-Upcountry Maui Highway. The goal of the task force was to facilitate early community participation in the project's planning process and provide the SDOT with useful information and enhance the acceptance of the project.

As part of the Task Force effort, opinion surveys were conducted to obtain input on terminus preferences. These surveys consisted of a questionnaire appearing in the July 19, 1992 addition of the Maui News and surveys of hotel and HCAS employees. Table 2-4 displays the results.

Two Task Force meetings were held to discuss project alternatives. The first meeting on May 14, 1992 introduced the project and task force process to participants. The second meeting, held on April 8, 1993, surfaced more substantive comments, such as the highway's potential impacts on agricultural activities in Upcountry Maui. These concerns included taking agricultural land for the highway's right-of-way, dividing farms which would reduce their efficiency or make them non-viable, and adversely impacting agriculturally-related traffic movements on Omao Road and other roadways. A sampling of these concerns follows:

- "Major consideration should be given to the conservation of productive agricultural lands and the economic impact of withdrawal of such land for the highway. There is the potential that the most productive of these agricultural lands will be impacted by the highway."  
- "I don't know how practical it is to have a road running right through some of the best farm land on Maui."  
- "If we had any road coming down through there connected to Kīhei, Pulehu and Omao Road will become the main link with the exterior highway. Right now Omao and Pulehu are loaded with bus moves. Half of the guys are speeders."  
- "If there is going to be any road coming down through here it is going to be murder trying to cross that (Kīhei-Upcountry Maui Road) road from Omao Road trying to cross that (Kīhei-Upcountry Maui Road) road from Omao Road. Try getting to Hansen Road from Puunene in rush hour. Can't do it. Only way you can do it is because there are nice guys on the road that give you a chance. But not on the highway, nobody is going to stop for you."

### Table 2-4

**Terminus Preference Survey Results**

<table>
<thead>
<tr>
<th>Terminus Terminals</th>
<th>Maui News</th>
<th>Hotel Employees</th>
<th>HCAS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Upper Maui</td>
<td>13.5%</td>
<td>15.0%</td>
<td>2.0%</td>
</tr>
<tr>
<td>Upper Kula</td>
<td>11.6%</td>
<td>11.6%</td>
<td>5.1%</td>
</tr>
<tr>
<td>Lower Kula</td>
<td>22.0%</td>
<td>23.0%</td>
<td>0.4%</td>
</tr>
<tr>
<td>Above Puuanane</td>
<td>33.3%</td>
<td>23.2%</td>
<td>0.0%</td>
</tr>
<tr>
<td>Below Puuanane</td>
<td>18.5%</td>
<td>23.6%</td>
<td>0.4%</td>
</tr>
<tr>
<td>Other</td>
<td>3.1%</td>
<td>0.1%</td>
<td>2.0%</td>
</tr>
<tr>
<td>Kīhei Termini</td>
<td>12.5%</td>
<td>15.0%</td>
<td>0.0%</td>
</tr>
<tr>
<td>1st Suka Store</td>
<td>10.0%</td>
<td>15.0%</td>
<td>0.0%</td>
</tr>
<tr>
<td>Lāilā/Pākī Park</td>
<td>10.0%</td>
<td>15.0%</td>
<td>0.0%</td>
</tr>
<tr>
<td>Pony Park</td>
<td>10.0%</td>
<td>15.0%</td>
<td>0.0%</td>
</tr>
<tr>
<td>West Maui</td>
<td>10.0%</td>
<td>15.0%</td>
<td>2.0%</td>
</tr>
<tr>
<td>Other</td>
<td>2.2%</td>
<td>0.0%</td>
<td>2.0%</td>
</tr>
</tbody>
</table>

**Source**: State/County Joint Task Force Upcountry Highway, Final Report, October 1, 1993

- "Nothing would be worse to a small farmer than to have the highway cut his ten acre farm in half. (If you) subdivide even HCAS into a hundred little lots, (it is) no longer a farm."
- "About 150,000 acres of prime agricultural land from Kula to Wāhīpā is going to have nothing but guava trees and palalai. There is not going to be any legal farming there because there is no legal prosperous crop including cattle or anything else that we can make any money on. Consequently it's no longer prime agricultural."
- "If we are going to really preserve agriculture, a lot of the issues brought up here are extremely important. If you subdivide and don't provide agriculture with easy access and easy transportation, you create a real problem."
- "I have a major problem on Mīkūali. In fact, the first day we tried to cross, we had back up for four hours without being able to cross the highway. (On the first day) we had six accidents."
- "I knew the (Kīhei-Upcountry Highway) would be a mess. There are a lot of guilis, a lot of hard rock. But there is not a lot of good soil where farmers can grow onions and grow cabbage. I don't think that should be disrupted with a bunch of tourists and automobiles and everything coming through there."
- "Any one of these alternatives will encourage more Upcountry development. If people working in Kīhei, wouldn't it make sense to have more development in Kīhei than encourage people to move to Upcountry and put more strain on existing resources?"

There were also disagreements on which type of agricultural land (small farmers or large-scale agriculture) should bear the brunt of impacts. Comments related to this issue are stated below.
Kihie-Upscountry Mule Highway

Community Impact Assessment

• "When you mention the plantation and sugar, I think people, the agricultural lots are more important than the sugar because it's lifestyle of the people."
• "There's a lot of operating farms there. And if I had to trade off obviously small operating farms in the Omatopio homesteads versus cane or pineapple land, I think the trade should be in favor of the (smaller) land owners versus the larger land owners."
• "I don't understand wanting to preserve HCAS land, but the bread basket of our agricultural industry are independent farms in the Omatopio, Pulehu, Nāahele areas, this is the area that should be preserved."
• "Good farm land is only good if you can make a profit on it. If you can't make a profit on it, it doesn't matter what else it has. It has to have economic viability. So if you take away economic viability from 1,500 farmers (working for HCAS), you destroy their 35,000 acres of what was prime agricultural land and turn it in to 30,000 acres of unusable farm land."

2.7 Interviewee Information

Often key individuals who are well informed about community issues, expectations and concerns can often provide good insight into the existing social condition of the affected neighborhoods. The three types of "key informants" that were used for this study: community leaders, business owners, and government agency personnel. Many of the key informants are present or past leaders of neighborhood or community organizations, and were interviewed for their knowledge of social groups, networks and activities. The business owners interviewed represented both large and small business enterprises. They provided insight into the project's potential impacts to their businesses. Government agency personnel were interviewed for their particular knowledge of certain key information or issues.

This section summarizes some of the information obtained from "key informants" in the community, specifically:

• how "key informants" feel about their communities;
• how their communities have changed; and
• recent issues or problems their communities have faced.

2.7.1 Kihie-Makekua Region

"Key Informants" from Kihie generally thought of their communities as being working class and tourist-oriented. They noted that the de facto population (inclusive of visitors) is almost twice the residential population. However, they identified certain neighborhoods in Kihie as sharing some of the qualities characterizing Upscountry communities such as rural setting. The Waiakea-Makekua communities are very different from Kihie in that the majority of their population, at any one time, is visitors or hotel employees. They are over two, thousand condominium units in Waiakea-Makekua. However, most of these units are owned by absentee owners. Only a small fraction of the owners are full-time residents.

"Key Informants" described Kihie's sandy beaches as being "great" with good public access. Although parking is a problem, they consider these beaches to be one of Kihie's most valuable assets.

The "key informants" stated that Kihie has not changed very much in the last few years, mainly because the visitor industry has slowed since the early 1990s which caused the construction industry to wane. During the 1980s, Kihie to Makekua experienced phenomenal residential and hotel/resort growth in response to growing visitor counts. The resident population doubled and the de facto population quadrupled during this period. The peak of this development growth spurt occurred from 1988 to 1992.

When asked about present or recent community problems and issues, "key informants" identified traffic congestion, especially at the vicinity of North Kihie, and crime as being the major complaints of the community. They believed that little can be done about the crime problem because of Kihie's heavy reliance on the visitor industry. Efforts in recent years that have helped alleviate crime include rental car companies utilizing their cars and a citizen's patrol along South Kihie Road. Unfortunately, these efforts forced criminals into other types of property crime and caused criminal activities to increase in inner neighborhoods.

2.7.2 Upscountry Maui Region

"Key informants" from Kula, regardless of where they live, almost unanimously identified their communities as being rural or country. They also identified the importance of agriculture, the richness of the area, and similar lifestyles and values among neighbors. "Key informants" from Makawao and Puuiki identified slightly different responses, defining their neighborhoods as being more suburban. However, they also identified certain rural qualities, such as the pedestrian orientation of Makawao and open space.

All the "key informants" mentioned substantial increases in population and housing, especially from ten to 20 years ago. This has caused overdevelopment of schools and increased traffic. Some of the "key informants" mentioned that 20 years ago, there were a lot more horseback riders.

"Key Informants" noted that a substantial number of newcomers came from the mainland. Their impact on the social and cultural environment of Upscountry elicited mixed reactions. For example, some felt that new newcomers fit in well to the community, and were credited with reviving Makawao's business district. Negative comment about newcomers, regardless of whether they came from the mainland or within the State, included an assessment that they brought increased crime and drug use into the community, and that they do not share the same lifestyles and interests of long-time residents.

Recent or current community issues identified by interviewees included water availability, increasing traffic which raises safety concerns; the controversial location of the new King Kauai High School, a divergent issue that occurred a few years ago involving a proposal for hotel zoning near the Puukulani Golf Course which led to the dismantling of the Puukulani Community Association, teenagers loitering in Makawao.
supposedly adversely affecting businesses; and the lack of 24-hour ambulance and other medical services in Kula.

Water availability for Kula farmers is a critical issue that can affect their business. For residents, it is more of an inconvenience. A Kula resident stated the problem succinctly: "It has been "a blessing and a hardship." The blessing is that the lack of water has prevented development and maintained open space. The hardship is that residences frequently have to endure restrictions on water use.

3. DEVELOPMENT TRENDS

This chapter describes current land use and development trends from the perspective of the County of Maui's Community Plans for the affected regions, and the wishes and desires of the "key informant."

3.1 Community Plans

The County prepares nine Community Plans to help guide its decisions regarding development. Two of these plans are of relevance to the proposed project—the Kīhei-Makānena Community Plan (July 1995) and the Makawao-Pukalani-Kula Community Plan (July 1998). Their planning areas are displayed on Figure 3-1.

3.1.1 Kīhei-Makānena Community Plan

The Kīhei-Makānena Community Plan (July 1995) is currently being updated, and a Proposed Plan (October 1998) is under review by the County Council. As shown on Figure 3-1, the planning region stretches from the southern shoreline to Wailuku and Lahaina. However, most of the population and development in this region is centered around the Kīhei to Makānena area.

The Proposed Plan raised issues regarding Kīhei-Makānena's physical and social infrastructure, emphasizing that community facilities are not keeping up with growth. Therefore, objectives were established to limit hotel and residential development until adequate public facilities and services, such as schools, are established to meet existing needs. The exception to this recommendation is that the Proposed Plan encouraged development of appropriate commercial and light industrial activities to diversify the region's economic base.

Based on the Proposed Plan, the following land use trends can be expected:

- Vacant land between Pilihi Highway and South Kīhei Road to Kīhōkina Road would be developed as an urban mix, such as single-family and multi-family residences and commercial land uses (shopping centers, hotels, etc.). The pace of this development would depend on market conditions and the availability of long-term employment.
- Limited commercial/light industrial expansion in areas makaha of Pilihi Highway would be developed, such as the Kapiolani parcel and the build-out of the Maui RST Park.
- Resorts and resort-related activities (some residences, retail commercial, etc.) would continue to be developed in the existing resort area of Wailea and Makānena.

3.1.2 Makawao-Pukalani-Kula Community Plan

The Makawao-Pukalani-Kula Community Plan (July 1996) seeks to protect and enhance the unique qualities of this region through policies and recommendations to expand the
region's agricultural base and enhance the rural and agricultural qualities associated with Upcountry Maui. The Plan seeks to accomplish this by directing growth into and adjacent to already established urbanization centers. For example, Pukelani would be the region's "hub" for business, commercial and housing land uses. Makanao and Waikaku's unique town ambiance and Kula's rural and agricultural atmosphere are intended to be maintained. According to the Community Plans, the following land use trends can be expected:

- Agriculture and open space would be maintained.
- Residential growth would be directed into and adjacent to the established urbanized communities of Pukelani, Makanao and Halawa. These areas would accommodate most of the residential growth (about 5,000 by the year 2010).
  - In Makanao:
    - businesses would develop around the established central core; and
    - the country town ambiance would be maintained.
  - In Pukelani:
    - residential growth would be located within (in-lin) and to the north (makai) and south (makai) of the community;
    - multi-family residences (for senior housing in the Kulanao development) would be consistent with community's site and character; and
    - would be developed as Upcountry's geographic, public service and commercial hub.
  - In Halawa:
    - some small-scale commercial uses would serve existing and proposed residences, and
    - limited single-family residential growth would be contiguous with existing residences.
- Small-scale agriculture in Kula, particularly on the west (makai) side of Kula Highway, would be preserved.
- Waikaku developed as Kula's town center:
  - some low density residential uses;
  - some small scale commercial, and
  - no urban sprawl.
- Some residences in Kula would generally be allowed in the area between Kula Highway and Hana Highway. The lot sizes would be no larger than 0.2 ha (0.5 acre).
- The Keoea area would be developed for homesteads by the Department of Hawaiian Home Lands (DHHL).
- No large-scale retail or heavy industrial land uses.
- Existing communities would remain separated with no-in-fill development between communities.

3.2 General Economic Trends

Maul's visitor industry is expected to continue to be its most important in the future. Economic forecasts (land use constrained) conducted for the County of Maui indicate that the number of visitor accommodation units and visitors for the county would
increase by 55 percent and 78 percent from 1990 to 2010, respectively. (Unconstrained forecasts would have had these indicators double from 1990 to 2010.) Recently completed 2000 socio-economic projections prepared by the State of Hawaii Department of Business, Economic Development and Tourism (BEDIT) indicates that these two indicators would increase by 44 percent and 52 percent, respectively. The two existing visitor-accommodation regions, Lahaina-Kaanapali-Kapalua and Kiele-Makena, would continue to be the primary resort areas.

HCS5, MLSP, the ranches, and the Kula small farms are expected to continue to be viable businesses into the 21st century, and constitute a fair portion of the county's economy. However, their growth would likely be moderate at best. These businesses may continue to face many of the same obstacles that have adversely affected them in the past, such as urban encroachment and world competition.

Maui's high technology industry is growing. Although the Maui R&T Park has currently a little more than 300 employees, it is only eight percent built-out. By the year 2020, Park officials estimate the entire 168 ha (415 acres) complex would be completed. For County ordinance, fifty percent of the R&T Park must be dedicated to research and development, forty percent to support facilities and only ten percent to light manufacturing and general industrial. Park officials expect new major industries to locate in the park, such as bio- and medical-technology; arts and entertainment; environmental, earth and ocean sciences; information processing and exchange; defense mission; and education and international training and technology conferencing.

3.3 Interviewee Views

3.3.1 Kiele-Makena Region

"Key informants" from Kiele stated that they do not anticipate a lot of changes in Kiele because there is little incentive for developers to construct new hotels and housing. They noted that most of the prime resort locations are already developed, and the only areas to develop are in South Makena. With very little anticipated hotel development, the "key informants" believed that job growth would be modest. Therefore, they believe residential development would be slow, even though the area between Pilani Highway and South Kiele Road is only about one-third developed.

"Key informants" expressed the desire to prevent or limit shoreline development and maintain coastal access. They also stated that Kiele, as a tourist town, should have a network of greenways running along the coastline and parallel to and between Pilani Highway and South Kiele Road, with several east-west (mauka-makai) collectors (looking like a ladder). These greenways would be used for cycling and other recreational activities, and would support the tourist industry.

3.3.2 Upcountry Maui Region

Upcountry "key informants" almost unanimously stated that they want to maintain Upcountry's rural, country setting, its agricultural base; its open space; and its quiet atmosphere. Some spoke about the need for residents to maintain their "local" values and culture. Those who spoke about the "local" culture defined it as having "Aloha," caring about the land and their communities, having similar goals for their communities, and having tolerance of other people's beliefs and lifestyles. "Key informants" generally wanted the Upcountry's "urban" area to remain in Pukalani and Kula-Makawao. They believed these towns to be appropriate areas for Upcountry's businesses and community and public services. "Key informants" from Pukalani and Makawao spoke about responsible zoning, and residential and commercial land uses that are consistent with the size and scale of the existing towns. For example, commercial uses in Makawao should be consistent with the country town atmosphere of its main street, and as a "bedroom community," Pukalani should not have inappropriate land uses such as bars and lounges.

According to the "key informants," threats to this desired future, include uncontrolled or inappropriate development, newcomers (from the mainland and in-State) not having "local" Upcountry values; increased tourism activities; and the water supply problem. One commenter specifically identified the proposed Kiele-Upcountry Highway as a threat to his desired future, stating that the highway would "single-handedly wipe out the community."

For "key informant" desired zero growth. Some said that without growth, the community would die. One person said that they need to provide land for their children so they too can live in the county. Another said that opportunities were needed for other Maui residents to move to Upcountry. The concern among all "key informants" was that too much or inappropriate development would destroy many of the things people value about Upcountry. For example, if the number of residences near the Kula farms increase, these farms may not survive. One person thought that if development cannot be controlled, Upcountry would not be a desirable place to live.

"Key informants" were willing to accept changes to Upcountry from the DHIL development. Those who spoke about tourism see it as a threat or obstacle to their ideal future if a "Disney-type" tourist attraction is allowed. "Key informants" do not object to tourists traveling to the Haleakala summit now or in the future. They do, however, object to tourism drawing through Upcountry's rural neighborhoods.

The water availability problem was seen as a threat primarily to Kula farmers who depend on a steady supply of water.
4. POTENTIAL SOCIAL IMPACTS

This chapter analyzes potential social impacts of the six alternative alignments for the Kihei-Upcountry Maile Highway.

The impact analyses of this chapter are based on the guidance documents identified in Section 1.3. Impacts identified if any of the following project-related effects occur:

- For neighborhood impacts:
  - Changes in neighborhoods or community cohesion. These changes may include splitting neighborhoods or isolating portions of neighborhoods or ethnic groups.
  - Impacts on specific social groups, such as the elderly, handicapped, non-drivers, transit-dependent and minority and ethnic groups.

- For impacts on agriculture:
  - Would there be a loss of farmland? If so, which farmland would be affected?
  - How would current agricultural practices be affected?

- Effect on current land use patterns and development trends. Questions to be answered for this type of impact include:
  - What is the growth inducement potential of each alternative and where would its generated growth be located?
  - Would the project be in compliance with local land use plans and zoning?
  - Are there other factors to be considered in determining land use patterns and development trends?

- If there are displacement or relocation impacts, the following questions would determine the level of impact:
  - How many residences would be displaced?
  - How many businesses and farms would be displaced?
  - Are there available sites to accommodate those displaced?

- Changes in mobility and travel patterns and their effects on existing socio-economic activities.

- Impacts on school districts, recreation areas, churches, businesses, police and fire protection, etc., including any changes in accessibility.

- Impacts of alternatives on highway and traffic safety as well as on overall public safety, including crime.

4.1 Neighborhood Impacts

Figure 2.1 identifies the neighborhoods or communities in the study area. Portions of the study area midway between Upcountry and Kihei are owned by a few large land owners, such as Alexander & Baldwin and Hāloaakala Ranch, and are used for large scale sugarcane and pineapple cultivation and pasture. The following describes the alignments' physical relationships with existing neighborhoods:

- Segment U1 is located approximately 1200 m (4000 ft) west to northwest (makua) of Puahākini.
- At its closest point, Segment U2-A is located approximately 150 m (500 ft) south of Puahākini and approximately 300 m (1000 ft) north of a few Omaoio homeowners.

- Segment U2-B is located approximately 275 m (900 ft) south of Puahākini and approximately 240 m (800 ft) of the Omaoio homesteads. The lower part of a residential subdivision, Kula 200, is directly east (makua) of the U2-B/Kula Highway intersection. However, this subdivision is unseen from the terminus.

- Segment U3 is located approximately 240 to 700 m (800 to 2300 ft) north of residences along Pulehu Road. U3's intersection with Kula Highway is approximately 500 m (1600 ft) southwest of the Kula Kai Subdivision which is located east (makua) of Lower Kula Road.

- Segment K1 is located approximately 500 m (1600 ft) at its closest point from a residential subdivision located makua of Pilani Highway. West (makua) of K1's intersection with Pilani Highway, Kahaulu Estates, is the nearest residential subdivision.

- At the K3/Pilani Highway intersection, the nearest residential area is approximately 500 m (1600 ft) north of this location, located west (makua) of Pilani Highway.

Based on the information above, none of the alternatives would split any existing neighborhood, nor isolate parts of neighborhoods from the greater community. Therefore, the alternatives would not in themselves adversely affect community cohesion. However,

Although none of the alternatives would change land use patterns in Upcountry in a way different from the future development described in the Community Plan (see Section 4.3), implementation of the Community Plan may affect the rural community lifestyle of Upcountry by increasing the population and density, increasing traffic and associated roadway noise, and encroaching onto agricultural land.

Some of the alternatives have the potential to change existing travel patterns in a way that could adversely affect certain existing neighborhoods. These potential impacts are discussed in Section 4.5.

4.2 Agricultural Impacts

Hawaiian Commercial and Sugar Company (HC&S) cultivates approximately 14,000 ha (35,000 acres) of sugarcane on land on the west slopes of Haleakulā and in Central
Maui (see Figure 4-1). HC&S operates two sugar mills, located in Punaena and Pata, which also export electricity to the Maui electric grid. Other highways, such as Hana and Kahekili Highways, already cross HC&S fields (see Figure 4-1), and these highways adversely affect productivity for several reasons. For example, only some public road-haul road crossings are signalized, and these crossings delay the transport of sugarcane to the mills. In addition, suburban encroachment interferes with operations, such as cane burning and aerial spraying.

Proximity to urban areas adversely affects the efficiency of HC&S sugarcane operations because cane burning has to be regulated (i.e., no cane burning during Kona [south wind] weather), dust control measures have to be used (the 126,000 kg [350,000 lb] cane hauling vehicles traveling on unpaved cane roads produce tremendous amount of dust), and trespassers are more frequent, leaving debris vehicles and other waste in the fields. As one of the few remaining sugar producing companies in Hawaii, HC&S believes that to remain competitive in the world market they must be as efficient as possible, and continue to produce high yields at least cost.

HC&S feels that any project that brings more urbanization near their fields detracts from efficiency.

The other large-scale crop production business in the study area is Maui Land & Pineapple Company (ML&P), the last pineapple processor in the State. ML&P's pineapple fields are located around Haliiakale, Makawao and Puukala, and in lower Kula (see Figure 4-1). In addition to their own land holdings, ML&P leases land to cultivate pineapple because market demand exceeds supply. ML&P selected these areas to cultivate pineapple because they have good soil conditions and access to water. Similar to HC&S, urban encroachment has adversely affected ML&P productivity. The other major constraint for ML&P is obtaining land with access to water.

Cattle ranching generally occurs east (mauka) of Hana Highway/Kahekili Avenue and on the lower west and south slopes of Halaakale. Ranching enterprises in the study area are the Hanaakale and Kaanapali Ranches. Similar to HC&S and ML&P, urban encroachment has adversely affected the ranches because of complaints about noise and cattle crossing public roadways.

Small farms are located in Kula around Omaopio, Pulehu Nalaa, Waikolu, and Keokea. As described in Sections 2.2 and 2.4, these two to four hectare (five to ten acre) farms cultivate vegetables and flowers. Kula farmers face problems similar to those expressed by HC&S and ML&P: urban encroachment and periodic water use restrictions during drought conditions. Urban encroachment affects Kula farmers through speculation (increasing land values), neighbor complaints of chemical use by farmers, and increased traffic (see Section 4.5).

The alternatives would cross agricultural land, and convert it to a transportation use (see Figure 4-1). Most of the agricultural impacts would occur on existing sugarcane and pineapple fields (see below). The degree of impact would depend on the alignment selected. No privately-owned Kula small-scale farm would be directly affected by any of the alternatives, although leased fields located in the Kula Agricultural Park owned by Maui County could be affected depending on the alignment.
selected (see below). Also, some of the alternatives could modify travel patterns in a way that may adversely affect certain Kula farms. This is discussed in Section 4.5, “Traffic Patterns and Highway Safety.”

When an alternative encroaches on lands used for cultivation, it would adversely affect agricultural operations, such as planting, aerial spraying, irrigation, drainage and harvesting, for several reasons. For example, the roadway could interfere with agricultural infrastructure, such as existing service roads and irrigation and drainage systems. In addition, the roadway could isolate portions of fields, making them inaccessible and unworthy for cultivation. However, this project would not create unworkable remnants or parcel size in most cases because mitigation measures are in place to maintain the productivity and marketability of the affected fields is implemented if an alternative is selected.

The impacts of alternative alignments are described below:

- Segment U1 would cross sugarcane fields owned by Hawaiian Commercial and Sugar Company (HC&S) west (makai) of Pukalani (see Figure 4-2). The alignment would separate approximately 900 ha (2,200 acres) of sugarcane land from larger fields and cross existing cane haul roads and irrigation and drainage systems. The isolated parcel would remain productive because mitigation measures, as described in Section 6.1, would be implemented if either a U1 or U2 alternative is selected.

- Segment U1A2-U1B-B would cross a Maui Land and Pineapple Company (MLC) pineapple field located along Pukalani Road, affecting existing roads, water conveyance infrastructure and drainage systems (see Figure 4-1). The two newly created parcels would remain productive because mitigation measures are in place to maintain the productivity and marketability of the affected fields, as described in Section 6.1, would be implemented if either a U1 or U2 alternative is selected.

- Segment U12-A12-B would separate approximately 25 ha (60 acres) of HC&S sugarcane land from a larger field (see Figure 4-1). It would also cross two major water ditches, the Hanakulai Ditch and the Reserve Ka Ditch. The U12-A12-B alignment would also cross a MLC pineapple field located south (makai) of Pukalani separating two parcels from a larger field. These affected fields would remain productive because mitigation measures are in place to maintain the productivity and marketability of the affected fields, as described in Section 6.1, would be implemented if a U12-A12-B alternative is selected.

- Segment U12 would cross two MLC pineapple fields located along Pukalani Road (see Figure 4-1). At the western (makai) field, two fields would be created. However, both fields would remain productive because mitigation measures are in place to maintain the productivity and marketability of the affected fields, as described in Section 6.1, would be implemented if a U2 alternative is selected. At the eastern (makai) field, unworkable remnants of the affected field may be created because of the small size of the isolated parcel. The U2 alignment would also cross the Kula Agricultural Park owned by Maui County (see Figure 4-1). The Ag Park leases few-acre parcels to small-scale farmers. Some of the parcels would be converted to the roadway. The remaining parcels and parcels modified because of the roadway alignment would remain productive because mitigation measures, as described in Section 6.1, would be implemented if a U2 alternative is constructed.

Segments K1 and K2 do not affect existing cropland. The alternatives would also cross land used for cattle ranching and grazing. Segment U1A2-U1B-B, U12, K1 and K2 would traverse cattle ranching and pasture land located toward the southern portion of the study area, south of the sugarcane fields and west (makai) of the small Kula farms. The proposed highway would increase accessibility to pasture land.

3.3.3 Land Use Impacts

To evaluate the potential urban development impacts of a highway project, one compares the proposed transportation project to the extent of planned growth within the project area. Highway projects allow remove impediments to urban growth by enhancing access to vacant land or increasing transportation capacity. Therefore, assessment of the potential urban growth impacts of the proposed roadway is based on the question of whether the transportation infrastructure would facilitate planned growth, or induce unplanned growth. In this case, the planned growth would be according to the Pukalani-Kula-Makena Development Plan (October 1993) and the Makena-Kula-Kula Community Plan (July 1996) (see Section 3.1.4.2). The alternatives would support planned growth because all of them would improve transportation between Kula and Upcountry by reducing travel time (see Section 1.2.1). The issue of whether Kula-Upcountry Maui Highway would induce unplanned growth is addressed below.

Kula-Makena

Growth facilitation would be beneficial in Kula-Makena where there is ample room between Pukalani Highway and South Kula Road Additional development would conform to Kula’s vision for a compact urban environment. However, other factors such as future hotel and resort development and the pace of development of Maui’s “high-technology” industry, are expected to determine the speed and extent of growth in Kula more than the Kula-Upcountry Maui Highway. As indicated in the Kula-Makena...
to the Maui County system in response to the Makawao-Pukalani-Kula Community Plan (July 1996), and has approved private development plans to drill a well in Haiku to free water in the Makawao system for the Kulalima development located south of Pukalani. Recent and planned projects for the Upper and Lower Kula systems are intended to improve service to current customers so that during drought conditions in the Maui BWS does not have to implement water use restrictions as they have done many times in the past (telephone conversation with Maui BWS, May 5, 1998).

Providing more water to the Kula systems to support unplanned development in Upcountry, particularly Kula, is unlikely mainly because the system relies on surface water. Surface water resources are vulnerable to drought conditions, whereas groundwater resources provide a sustainable yield even during a year or two of limited rainfall. According to the Maui BWS, he high cost and substantial risk of developing alternative sources of water (i.e., wells) has stopped many development proposals in Upcountry. The Kulalima developer is able to assume the high cost and risk of drilling a well in Haiku because of the size and scale of the development (telephone conversation with Maui BWS, May 5, 1998). Therefore, water supply limitations is likely to remain the constraint to development in Upcountry in the future, despite the efforts of the Maui BWS to improve its Upcountry systems and despite the construction of the Kulalima-Maui Highway.

Since the Maui BWS is planning to accommodate developments in Pukalani (Makawao system), the U1 alternatives could facilitate Pukalani's growth westward (mauka) toward the highway. This growth increment would be partially consistent with the Makawao-Pukalani-Kula Community Plan because there are parcels on the west (mauka) side of Pukalani designated for residential growth (see Figure 4-2). The U1 alternatives could facilitate development beyond Pukalani's urban growth boundary if the landowners, Alexander and Baldwin (AB), chooses to develop its land west (mauka) of Pukalani. Similarly, the U1 alternatives may induce development in Kulalima beyond what is designated in the Makawao-Pukalani-Kula Community Plan (see Figure 4-2).

The U2A and U2B alignments may have very little influence in the area south (makai) of Pukalani. The area south (makai) of Pukalani is planned to be used for Kulalima, and its developer will be making substantial improvements to the water supply infrastructure. Since for this project already have State urban classification, the County has approved zoning and Community Plan amendments supporting the project (Maui News, December 2, 1997). With water availability not being a constraint, Kulalima would be developed with or without Kula-Upcountry Maui Highway. However, the U2A and U2B alternatives, unlike the U1 or U3 alternatives, would support this development by providing additional transportation infrastructure to the site (i.e., Kulalima residents would not have to use Haleakala or Kula Highways to travel to Kula). In particular, the U2B alignment was suggested by the Kulalima developer, and therefore would be more supportive of the development than the U2A alignment. The U2A and U2B alignment may facilitate 45% growth along Pukalani's southern (makai) side. According to the Community Plan, some of Pukalani's growth is directed toward this area (see Figure 4-2).

Segment U3 is located approximately 5 km (3 miles) south (makai) of Upcountry's "urban" areas of Pukalani and Makawao, in an area where the Community Plan...
designates very little additional growth. The developments that are planned include small scale commercial and residential uses in Wailuku and upper Kula. The latter, particularly the residential, are not dependent on the highway because of Kula’s attractiveness as a residential area. However, these developments will have to receive other governmental approvals (e.g., zoning, subdivision, etc.) and obtain water meters. The latter could be difficult (see above). In summary, U3 would facilitate planned growth but not induce unplanned growth.

4.4 Displacements and Relocations

Depending on the alternative, Kula-upcountry Maui Highway would require right-of-way from the landowners identified below (the properties’ existing uses are provided in parentheses):

- Alexander & Baldwin (Hawaiian Commercial and Sugar Company (HC&S)) sugarcane cultivation (U1, U2-A and U2-B alternatives);
- County of Maui (Kula Agricultural Park): tested diversified agriculture (U3 alternatives);
- Dowling Company: vacant, but future Kula Valley development (U2-A and U2-B alternatives);
- Hala Forest: pasture land and pineapple cultivation (all alternatives);
- Kaaawa Ranch: pasture land (U2-A and U2-B alternatives);
- Malama Mahila Corp.: vacant, but future agricultural uses (U2-A and U2-B alternatives);
- Maui Land & Pineapple Company: pineapple cultivation (U2-A, U2-B and U3 alternatives);
- Van Tienhoven Trust: pasture land (U3 alternative).

While the mitigation measures to lessen the adverse impact on agricultural and ranching activities would be provided (see Section 6.1), none of these landowners or operators would be relocated due to right-of-way requirements. All of the enterprises mentioned above could continue operations at their present locations after acquisition of roadway right-of-way.

No alternative would require the displacement of any residence.

4.5 Travel Patterns and Highway Safety

Traffic Diversion

All alternatives would cause major changes to existing traffic patterns in the project area. All would divert most, if not all, trips between Kula, Upcountry and Uplands onto the new highway and off of Hana Highway. U3 and U2 alternatives will divert traffic from Upcountry onto the existing Hana Highway route. If a U1 alternative is selected, some of the travel demand between Upcountry and West Maui would also be diverted.
onto the new highway. Kīhei-Upoʻoupaʻou might be cut by half, depending on the alternative, and the origin and destination. However, the K1 alternatives would increase traffic volumes on Pāliki Highway, north of the K1 terminus, and North Kīhei Road, as traffic is diverted from the other routes and Hoʻokanani Highway (part of the existing Upōʻoupaʻou-West Maui routes). The traffic diversion impacts on Pāliki Highway and North Kīhei Road would not be substantial under the K2 alternatives.

**Agricultural Movements**

Omaopio and Pulehu Roads (see Figure 4.3) are county facilities used by Kula farmers to cultivate their fields (e.g., moving equipment from field to field) and transport agricultural products to Kahului Harbor. Although these roads are narrow and winding, they are used by some motorists as an alternative to Hāleakalā Highway to travel to Kahului or other parts of Maui. It has been reported that motorists often speed on these roads. One key informant stated that some motorists use the even more narrow Pīkani Road, a local access road approximately 1.4 km (0.85 miles) long that is parallel to and off of Omaopio Road, because it is straighter, allowing motorists to speed even faster. The use of these roads as a through route has adversely affected nearby and adjacent farmers and residents by interfering with farm equipment movements, increasing traffic noise, and compromising traffic safety through excessive speeds on inappropriate roadways. Motor vehicle accident data from the Maui Police Department shows a high number of vehicle accidents on these roads. For example, in 1990, there were 34 vehicle accidents on Omaopio Road. As a comparison, Hāleakalā Highway from the “Five Trees” intersection to Pāliki Highway, a roadway that has many times the traffic volumes as Omaopio Road, had only nine vehicle accidents in the same year.

The U1, U2-A, and U2-B alternatives would intersect both Omaopio and Pulehu Roads (see Figure 4.3), and would cause an increase in the use of these agricultural roads as “short-cuts.” The traffic on these roads would be higher under the U1 alternatives because the U1 terminus is farther from Kula than the U2-A or U2-B terminus. By increasing the use of Omaopio and Pulehu Roads as through routes, greater impacts than anticipated from the inappropriate use of these roads would be expected. These impacts include interference with farm equipment movements, increased traffic noise, and lower traffic safety through excessive speeds on inappropriate roadways. However, the County is planning to improve Omaopio and Pulehu Roads.

In addition, the U1 or U2-AU2-B crossings would have a slight adverse effect on farm product transportation from Kula to Kahului because delivery trucks would cross the new highway. However, the highway would enhance product transportation to Kīhei-Mākena.

The U3 alternatives would only intersect Pulehu Road (see Figure 4.3). Since the U3 terminus is a short distance away from the Pulehu Road/Kula Highway intersection, the traffic diversion onto Pulehu Road would be minimal.
Residential Areas

U3 alternatives may encourage travelers to and from the Haiku/Kula area to use local residential roads between Kula Highway and Haiku/Kula Highways. The preferred route for this trip is for motorists to stay on Kula and Haiku/Kula Highways. Some drivers who are unfamiliar with the Upcountry roads may choose to use the local east-west (Makawao) roads between Kula and Haiku/Kula Highways because they may appear to be "short-cut" to the summit. Increasing traffic volumes on local residential roads would adversely affect the adjacent neighborhoods through increased traffic noise (including travel to the summit early in the morning to watch the sunrise), and the increased potential for accidents on roadways not designed for heavy volumes.

King Kekaulike High School

"Key Informants" have reported that students of the new King Kekaulike High School located on the southeastern corner of the Pukalani Bypass/Haiku/Kula Highway/Kula Highway "Five Trees" intersection west along Kula Highway, which has no sidewalks. They also report that students of Kekaulike High School located along the Kula Highway/Kula Highway "Five Trees" intersection west along Kula Highway, which has no sidewalks. The "key informants" were also worried that student "inexperienced" drivers would have difficulty driving to and from the school if an alternative is selected that is near the school because of the high traffic volumes associated with the highway, such as travel demand to and from the school and the more populous communities of Pukalani and Makawao.

The location of the U3A terminus at the "Five Trees" intersection would facilitate access to King Kekaulike High School. This alternative would have minimal effects to the school's main entrance, which is located approximately 200 ft (600 ft) south of the intersection on Kula Highway, because much of the high traffic volumes associated with the highway would use Haiku/Kula Highways. Some of this traffic would, however, pass in front of the school's second entrance on Haiku/Kula Highways. Under any of the U2B alternatives, the majority of traffic would pass in front of the main entrance and through the school, and therefore may make it more difficult for "inexperienced" drivers to enter or exit the school.

Bicycling Injuries

Bicycle tourism is a popular tourist activity on Maui. Tourism normally starts from the summit of Haleakala, run through Ocean View Road, Haiku/Kula Highway and Baldwin Avenue, and end in Paia. Although Kiele/Pukalani University/Maui Highway was not identified in the project bicycle tour plan (April 1994) as a potential bicycle route, the Kiele-Pukalani region would be a natural area to end some of the Haleakala bike tours. The proposed roadway would have efficient room for bicyclists riding single file because bike lanes would be provided at urban roadway sections and adequate shoulders would be provided at rural roadway sections. Bicycle operators would be less likely to modify their routes if U1 or U3 is selected because of their distance from the "Five Trees" intersection.

Highway Safety

Engineering design standards for a rural, limited access arterial roadway, as specified by the American Association of State Highway and Transportation Officials (AASHTO), were used as a criteria in selecting alternatives for the project. Therefore, all the alternatives would provide a safe transportation facility. Regardless of the alternative selected, the Kiele and Upcountry lawsuit was filed. However, since the U1, U2A, and U2B alternatives could divert traffic onto Ulupono and Puaa Kanae, and because these roadways are not designed to accommodate high volumes of traffic, accidents could increase on these two roadways.

Community Facilities, Services and Parks

None of the alternatives would directly affect (through right-of-way impacts) existing public facilities and services, parks or recreational facilities. However, access to these facilities and services would be enhanced by any of the alignment alternatives because of the decreased travel time between Kiele and Upcountry.

Crime

Table 4-1 exhibits the crime rates of the communities in the study area for selected offenses for the years 1993 to 1996. This table indicates that for property crimes, such as burglary and theft, the Kiele to Pukalani communities have crime rates two to four times the rate of Upcountry communities. The crime rate differences for other offenses, such as criminal property damage, are not as great. Several communities in the Upcountry communities have higher rates than the Kiele/Pukalani communities. The information presented in this table supports views expressed by "key informants" from Kiele who identified crime as a social problem affecting Kiele community, and views expressed by Upcountry "key informants" that crime is not a problem.

Surveying activities and interviews conducted for this study indicated a strong belief among some Upcountry residents that Kiele-Upcountry Maui Highway would increase the crime rate in Upcountry because the crime rate in Kiele will have more convenient access to Upcountry. Makawao and Kula police office interviewed for this study could not speculate on whether the highway would increase the crime rate in Upcountry, although both officers agreed that the proposed highway would facilitate better police response through additional highway infrastructure.
5. POTENTIAL ECONOMIC IMPACTS

This chapter analyzes potential economic impacts of the alternatives for the Kihel-Upo country Highway project. The following economic impacts of the proposed project are discussed:

- effects of the project on local tax revenues, public expenditures, and employment opportunities;
- impacts on the existing highway-related businesses and the economic viability of established business districts; and
- impacts on the local or regional economy.

### 5.1 Tax Revenues and Employment

Property values could increase over the long term for lands adjacent to the highway, particularly at the termini, if they could be developed (i.e., proper zoning and water availability), resulting in increased property tax revenues for Maui County. None of the alignment alternatives would decrease property values in adjacent parcels. These parcels would more likely be affected by current land use and economic development trends.

Because of right-of-way requirements, property taxes that would be collected by Maui County would decrease by $13,000 to $17,000 per year (1997 dollars) for the four alternatives that have Upo country termini at U1 and U2. The four alternatives with the U2-A and U2-B termini would produce property tax decreases of approximately $44,000 to $66,000 per year (1997 dollars). This higher impact is attributable to the conversion of vacant land designated urban to roadway right-of-way. The U1 and U3 alternatives would convert almost exclusively lands designated agricultural, which have much lower property values.

The proposed project would influence up to $56 million (depending on the alternative) in federal funds for construction into the local economy, which would increase short-term employment and the purchase of local goods and services. The potential for additional employment opportunities depends on how well the proposed project facilitates employee-producing land uses in areas approved by the County. For example, the U2-A and U2-B alternatives would support current land use plans for parcels near the maunaileenus of these alignments (Kula/Uka), including business either U2-A or U2-B alternative being selected, both alternatives would directly and employment opportunities. The Kula/Uka developer formally suggested the U2-B alignment, and has developed a master plan with the U2-B alignment. A U2-A alignment may create the developer to modify the Kula/Uka master plan.
5.2 Impacts on Highway-Related Businesses and Business Districts

Existing commercial districts in Upcountry are located in Puakalani and Makawao (see Section 2.2). Kihei’s commercial districts are along South Kihei Road and at a parcel in North Kihei, west (makua) of Panihi Highway. Regardless of the alternative chosen, the proposed highway is not expected to adversely affect these districts because the roadway would not function as a commercial district bypass, except for Kahului. In contrast, Puakalani Bypass adversely affects certain Puakalani businesses. The proposed highway would not function in such a manner. Puakalani’s impacts to Makawao were less profound. A Makawao business owner stated that Makawao centers to very few drive-by visits because of its location away from the main traffic route. Most business patrons intend to visit Makawao for its shops and restaurants.

Although the proposed project would enable many motorists to bypass Kahului, economic impacts to Kahului businesses would be minimal. Residents would continue to travel to Kahului regardless of the proposed project because of Kahului’s attractiveness as the island’s principal commercial center (Kahumanu Shopping Center, K-Mart, Costco, Eagle Hardware, etc.).

5.3 Impacts on Regional and/or Local Economy

The proposed project would divert up to $52 million (up to $66 million in federal funds) into the local economy, providing job opportunities and the purchase of goods and other services needed to complete the project. In that respect, the proposed project, regardless of the alternative, would have a positive impact on the local economy. Further, if Segments U1, U2-A or U2-B is selected, this would probably facilitate expansion of Puakalani in the direction of the roadway, providing further benefits to the local economy through construction job creation, purchases of goods and services, and possible long-term employment opportunities.

All the build alternatives would enhance access to tourist destinations in Upcountry and Haleakala National Park, and therefore would have a positive affect on this industry. The proposed project may facilitate economic activities catering to visitors.

Impacts on agricultural activities are discussed in Section 4.2.

The proposed project would support Maui’s efforts to develop high technology industry. The roadway would provide increased synergism between Science City on the summit of Haleakala Crater and the R&I Park in Kihei. Currently, Science City receives technical support from defense contractors occupying space in the R&I Park.

6. MITIGATION MEASURES

The following are suggested measures to mitigate or minimize adverse impacts described in previous sections.

6.1 Agriculture and Ranching

Isolated or divided fields require mitigation measures to maintain their productivity. These measures should include road crossings (the U1 alternative should include two undercrossings), and the modification and reconstruction of existing irrigation and drainage systems. Access provisions for farm equipment to reach the isolated fields should be made. If U2-A or U2-B is selected, Hamakua and Reserve 40 Ditches should be protected and remain operative during and following construction.

If a U3 alternative is selected, SDOT should purchase any unworkable remnant MLSP land based on guidelines of the Uniform Relocation Assistance and Real Property Acquisition Policies Act. Also, if a U3 alternative is selected, SDOT should work with Maui County to modify the Kula Agricultural Park

Stock-proof fencing should be erected along both sides of the highway where there is cattle grazing. These fences may be constructed of hog wire with barbed wire along the top and bottom of the fence. Provisions should be made at various bridge crossings so that cattle could be herded from one pasture to another without disrupting traffic. If a U3 alternative is selected, the nearby cattle coral should be relocated based on guidelines of the Uniform Relocation Assistance and Real Property Acquisition Policies Act.

6.2 Land Use Impacts

Mitigation should not be required because the proposed project is not anticipated to cause unplanned development. However, it is nevertheless recommended that the SDOT deny access to the new highway from parcels other than those with approved development that is approved by Maui County and is consistent with appropriate State and County land use objectives and guidelines. If DPHL requests access to the proposed highway for their Ulupau area homesites, the SDOT should consider granting such a request in order to relieve increasing traffic volumes on Kula Highway from this development.

6.3 Traffic Patterns and Safety

Under a U1, U2-A or U2-B alternative, at least one of the intersections of the proposed highway with Onaupao and Puahleau Roads should be signalized to facilitate crossing by heavy trucks. If possible, the timing of this signal(s) can be set to discourage motorists from using Onaupao and Puahleau Roads as a “short cut.” This, of course,
would be an inconvenience for Kula farmers who previously had an uninterrupted route to Hana Highway.

If a U3 alternative is selected, signage should be provided to direct motorists to the proper route to the Halakahua summit.

Regardless of the alternative selected, the SDOT should consider constructing sidewalks along both sides of Kula Highway from the "Five Trees" intersection to at least the school. Since it is expected that development would occur on the south (mauka) side of Pukalani, sidewalks should also be appropriate on the east (makai) side of Kula Highway.

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6-2
Appendix A

Interview Questions

1. How long have you lived in [location]?
2. How would you define your neighborhood? What makes it a "neighborhood"?
3. How old is your neighborhood?
4. How well do your neighbors know one another?
5. Would you say there is a sense of neighborhood? If so, in what way?
6. What kind of issues or problems has your neighborhood experienced in the last few years?
7. How were these issues or problems resolved?
8. [If interviewer is part of community association] What kinds of issues does your community association get involved with?
9. Is there something about [location] that you wish to stay the same?
10. What would you like to change?
11. What are the threats to the things you value about this place, if anything?
12. How have things changed in [location] in the last five years? Ten years? Twenty years?
13. What do you think [location] will be like in 20 years?
14. What kind of future would you like for [location]?
15. What are some of the obstacles to this future?
16. What are some of the opportunities or what can be done for this future to come true?
17. How do you feel about this project?
18. What kinds of impacts do you expect to your neighborhood from this project?
19. Would a certain alternative make a difference?
20. How can the negative impacts be prevented or minimized?
21. How will [location] benefit from this project? How about the island? Neighborhood?
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<thead>
<tr>
<th>Name</th>
<th>Position</th>
<th>Organization</th>
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<tbody>
<tr>
<td>Peter Baldwin</td>
<td>President</td>
<td>Haleakala Ranch</td>
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<tr>
<td>Virginia Batroun</td>
<td>new 200 resident</td>
<td></td>
</tr>
<tr>
<td>Wayne Batroun</td>
<td>Legislative Analyst</td>
<td></td>
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<tr>
<td>Michele Bocrum</td>
<td>Director</td>
<td></td>
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<tr>
<td>David Crotts</td>
<td>small business owner</td>
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<tr>
<td>Medelin D'Eroo</td>
<td>Maui Police Department</td>
<td></td>
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<tr>
<td>Kris Dean</td>
<td>Maui Community Police Officer</td>
<td></td>
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<tr>
<td>Dan Event</td>
<td>Past President</td>
<td></td>
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<tr>
<td>Paul Evils</td>
<td>long time Pukalani business owner</td>
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<tr>
<td>Will Freeman</td>
<td>Partner</td>
<td>Board of Water Supply, County of Maui</td>
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<tr>
<td>Gary Getto</td>
<td>President</td>
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<td>G Stephen Gettay</td>
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<td>John Hoeis</td>
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<td>Buck Jones</td>
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<td>Dave Jones</td>
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<td>Russ Kneathy</td>
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<td>Alan Kaufman</td>
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<td>R. Kaye</td>
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<td>Mabel Lopez</td>
<td>President</td>
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<tr>
<td>L. Douglas MacCluer</td>
<td>Plantation Manager</td>
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<tr>
<td>Dick Moyer</td>
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<td>Peter Neuskes</td>
<td>Past President</td>
<td>Kula Community Association</td>
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<tr>
<td>Brian Mokas</td>
<td>President</td>
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**List of "Key Informants"**

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<thead>
<tr>
<th>Name</th>
<th>Position</th>
<th>Organization</th>
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<tbody>
<tr>
<td>Randall Moore</td>
<td>Land Manager</td>
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<tr>
<td>Wesley Nossa</td>
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<tr>
<td>Bill Overton</td>
<td>Manager</td>
<td>Maui Pineapple Company</td>
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<td>Susan Scolardi</td>
<td>Principal and Pukalani resident</td>
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<td>Ernest Storrs</td>
<td>Kula Community Police Officer</td>
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<td>Wayne Storrs</td>
<td>Vice President</td>
<td>Max-Land &amp; Pineapple Company</td>
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<td>Steve Suno</td>
<td>Past President</td>
<td>Kula Community Association</td>
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<tr>
<td>Masa Unadome</td>
<td>Past President</td>
<td>Kula Community Association</td>
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APPENDIX I

Archaeological Reconnaissance Survey Report

Archaeological Inventory Survey Report
of the Preferred Alternative

Cultural Impacts Assessments Report
ARCHAEOLOGICAL RECONNAISSANCE SURVEY OF THE PROPOSED KHEI TO KULA ROAD CORRIDORS, KAILUA TO KANA‘ALOE AHUPU‘A, MAKAWAO AND WAILUKU DISTRICTS, ISLAND OF MAUI

TNR 2-2 AND 2-3

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ABSTRACT

An archaeological reconnaissance survey of six proposed alternate routes for the Khei to Kula road corridor was conducted by Cultural Surveys Hawaii, Inc. from 18 February through 6 March 1997. Subsequent to the original reconnaissance survey additional alternatives, UZA and UZB were also subjected to reconnaissance survey. The alternate corridors are four hundred feet wide and over 121,176 linear feet (12,27) across. The alternate routes under study are located in the Makawao and Wailuku Districts of Maui Island on the western slopes of Haleakalā. They extend from Kailua at about 2,300 ft. (700 m.) above mean sea level south at the north, through thirteen ali`i kule`ahu, to Kamaole at about 100 ft. (30 m.) and in the south.

The reconnaissance survey included fieldwork to assess archaeological sites, archival research of historical documents and maps, and research of previous archaeological studies. The fieldwork was conducted by three archaeologists walking each 400 feet wide corridor along a stake line centerline.

A total of 25 historic properties, or sites, were recorded. Twenty of these were new sites, designated State Sites #50-50-10-1700 through #50-50-10-4779. Previously recorded sites are the Kohala Pu‘u site #50-50-10-1661; Kohala Pu‘u Kukutak site #50-50-10-1662; Kohala Pu‘u Kii Pu‘u site #50-50-10-170; an historic cattle wall #50-50-10-4380; and two pineapple plantation clearing mounds, #50-50-10-4381. The new sites include enclosures, wall, mound and cairn, middens and lithic scatter, modified outcrop, road, ditch, rockshelter and petroglyph sites. The primary functions of the majority of the sites found were agricultural and rockshelter (tanoa closures). Although there were four recurrent habitation sites, 1 permanent habitation site, symbolic function for petroglyphs, and military function for a complex of enclosures.

In the UZA corridor historic properties, or sites, were found in two locations along Alternate UZA. The first, in Kohala Pu‘u, are two tiers of petroglyphs on the east side of the corridor. A search of the land to the west of the corridor revealed no historic properties there, thus, an option is to adjust the corridor to the west to avoid the archaeological sites.

Another site was found in Kula Pu‘u on the west side of the corridor. This site is a small shelter-cave. If the corridor will impact the site mitigation measures could be to re-locate the corridor to the east where no sites were found, or to retrieve the potential data from the site by archaeological excavations. No other sites were found in Alternate UZA.

If segment UZA is selected for the final road corridor an archaeological inventory survey is recommended to mitigate impacts to the historic properties in the vicinity of the corridor.

The western portion of Alternate UZB corridor, from the north edge of Kohala Pu‘u westward to its terminus, was re-examined during the present survey work. No historic properties, or sites, were found in the surveyed section of the corridor. However, USB passes directly through site 50-50-10-4181 on the east side of Pu‘u a Wehi.
consisted of four features including two agricultural clearing mounds and two stone alignments. Testing conducted at these alignments yielded historic artifacts associated with pineapple agriculture and the site is considered "no longer significant" (Wulzen 1996: iii). This previous work did not consider Pu‘u o Weli, in the U2B corridor, as a historic property.

The eastern section of U2B, from Kailolani Gulch to the Kula Highway was previously subjected to an archaeological survey in 1996. (This portion of the route was not re-surveyed in the current work). The 1996 survey revealed one historic property, or site, in the area that is the U2B corridor. The site - 50-50-10-3191 - was tested by archaeological excavation during that survey and found to be a modern site associated with pineapple cultivation. Based on the testing the site is considered to be no longer significant and no further archaeological work is recommended for the site.

Near its mauka terminus Alternate U2B cuts into the west and north sides of the cinder cone Pu‘u o Weli, which historically has been quarried for its cinder. This pu‘u was not treated as an historic property in the previous archaeological study, but is potentially significant from an historic perspective in the context of the petroglyphs surrounding it, and as an early quarry associated with development in Kula.

Construction of Alternate U2B also has potential to indirectly impact the friezes of petroglyphs in Maluakui gully - site 50-50-10-3193. They will require protective measures against short and long term negative impact. If segment U2B is selected for the final road corridor an architectural inventory survey is recommended to mitigate impacts to the historic properties in the vicinity of the corridor.

On the west and southwest slope of Haleakalā, previous archaeological researchers report a pattern of at least four zones: 1) coastal; 2) intermediate or barren; 3) upland habitation and agriculture; and 4) forest zones. Inland and coastal settlement and agriculture with little evidence of occupation between these extremes. The corridor under study extend from the upland (nu‘u‘u) zone to the coastal (makai) zone. The present findings within the road corridors support this predicted settlement pattern.

Land Commission claims and awards (LCA's) of the Maahule and Solano Acts reflect some aspects of traditional life and new agricultural trends associated with the growth of an international trade. The locations of LCA's on the western flank of Haleakalā also support the predicted pattern of habitation and agriculture in the upland and coastal regions and an absence of these activities in the intermediate zone.

National Register of Historic Places significance criterion D is assigned to sites State sites #50-50-10-7979, #4761, #4763, #4764 through #4778 because the sites may be likely to yield information important to history and prehistory of Hawaii. An inventory level archaeological survey is recommended for mitigation of adverse impact to these sites, followed by data recovery of specific sites:

Sites #50-50-10-3191, #50-50-10-4179, and #50-50-10-4762 are

significant under National Register criteria D and C because they are, respectively, likely to yield information important to history and prehistory, are considered excellent site types. Site #50-50-10-4762 is also significant under Hawaii Historic Preservation draft rules criteria E because it is "culturally significant". Recommendations for these sites call for an inventory level archaeological survey and preservation of these site areas. Mitigation of impact for these sites may necessitate re-alignment of portions of some of the Alternatives to avoid the sites.
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I. INTRODUCTION

An archaeological reconnaissance survey of eight alternate routes for a proposed Kīhei to Kula road corridor was conducted by Cultural Surveys Hawaii, Inc. from 18 February through 6 March 1997 for Parsons Brinckerhoff. The routes under study are located in the Makawao and Wailuku Districts of Maui Island on the western slopes of Haleakalā.

Subsequent surveys were conducted for the new U2A and Alternate U2B alignments as a result of the finding of historic properties in the previously surveyed U2 corridor (Folk and Hamnatt, eds. 1997).

Historic properties were found in Kalapōluu Gulch shown on some maps as Hakeskai Gulch, and in Kalainui Gulch in the new U2A corridor. However, minor realignment of the corridor a few hundred feet to the west (downslope) will avoid these cultural resources in Kalapōluu and minor realignment to the east (up slope) will avoid the cultural resources in Kalainui. No historic properties were found in the other segments of the U2A corridor.

Project Area Description

The proposed Kīhei to Kula road corridor selected for study extend from Pi'ilani Highway in the south at about 100 ft. (30 m.) and north to Kula Highway at about 2000 ft. (600 m.) and. The corridors cross thirteen ahupua'a (Figures 1-3) from north to south: Kalahu, Kēkaha, Kāpāwai, Kākalest, Oma'eqeq, Pāheleho, Kēkāhaka, Kāhului, Kīhei I & S, Wailea, Kīhei II, and Kīhei III.

The eight alternate route segments are based on four upcountry termini designated U1, U2A, U2B, and U3 and two Kīhei termini designated K1 and K2; these designations are used to identify the route segments in this report. U1 intersects Haleakalā Highway, U2A & U2B and U3 intersect the Kula highway. K1 and K2 intersect Pi'ilani Highway.

A segment common to alternatives U1 and U2 and is designated U1U2 (Figure 3). Each alternate corridor is four hundred feet wide and combined, total approximately 121,716 linear feet (37,000 m.) The eight alternatives are summarized as follows:

1. Alternate U1 is about 18000 ft. long. Beginning at Haleakalā Highway at the intersection of Hali'i Road, the route proceeds south through cultivated fields of sugarcane, across Kalainui Gulch, Oma'eqeq Road and Pāheleho gulch to intersect alternate U1U2 and U2 in old cinder cones converted to pasture north of Pāheleho Road at about 1000 feet above sea level.

2. Alternate U2, also about 18000 ft. long, extends from the Kula Highway at Kalapōluu Gulch west (downhill) through former pineapple fields - now used for pasture - passing south of Pi'ū O Wai - an historically quarried cinder cone - to Kalainui Gulch. It continues west on the south side of Kalainui Gulch through
3. Fields cultivated in pineapple, and then fields of sugarcane. In the sugarcane Alternate U2 turns south to parallel Alternate U1 crossing Oma'opio Road and Pahuku Gulch, joining Alternate U1 and U1A/U2 in the old sugarcane fields north of Pahuku Road.

4. Alternate U1A/U2 - a segment shared by Alternatives U1 and U2 - is approximately 13,000 feet long and extends from the intersection of U1 and U2 north of Pahuku Road to the intersection of U2, K1 and K2 at about 750 feet above sea level. It begins in old cane field converted to pasture, preceding south-southwest across Pahuku Road, through cultivated pineapple fields, across Koloa Gulch at about 1000 ft. elevation, in and across Waipio Gulch at about 800 ft. to meet with the other alternates.

5. U3 begins at the Kaha Highway at Pahuku Gulch and proceeds west for over 20000 feet through cultivated pineapple fields, pasture, and truck farm lands. At 1600 ft. elevation the route crosses Pahuku Road into more pineapple fields, then crosses Koloa Gulch, and Waipio Gulch at 1100 ft. elevation as it proceeds to the intersection of K1, K2, and U1A/U2.

6. K1 is about 1000 ft. long and proceeds from Pii'ili Road at Kala'ulu St. east through ranch pasture land between Waipio and Kehahiki's gulches, intersecting Alternate K2, U1A/U2 and U3 at 750 ft. above sea level.

7. K2 extends northeastward for approximately 23000 feet, from Pii'ili Road at its intersection with the newly built collector road (Road 5) per the Kilohana Traffic Master Plan, through ranch pasture land. K2 crosses Waipio Gulch at about 500 feet above sea level and two branches of Kehahiki's Gulch at about 650 ft. elevation, and joins with the other alternates near the 750 ft. contour.

8. The proposed U2A Alternative is approximately 8000 ft. long and extends west, southwest from the intersection of Kola and Hahasha Highway to a point Q1 on the U2 Alignment.

8. The U2B Alignment, approximately 8000 ft. long and extends west, southwest from Kola Highway opposite - from the cane fields at Oma'opio Road east (mainly) through the pineapple fields south of Pahauen (near to the Kola Highway at the new Kakehiki High School) impacted historic properties in a secondary, tributary branch of Kolekalani gulch, in Kalahalani gulch, and on the ridge land south of Kahaliali'i gulch.

As a result of the findings of historic properties in Alternate U2 two new mauka alignments - Alternate U2A and Alternate U2B - were proposed and surveyed during September 1997.
Scope of Work

This scope of work is in response to the information delivered to Cultural Surveys Hawaii, Inc. (CSH) on Jan. 12, 1996, including agreements concluded during the Jan. 31, 1996 meeting at Pauuene Beachfront. The scope incorporates an Oct. 20, 1995 memorandum from Don Hibbard DLR/SPHP on a review of an Environmental Impact Statement Notice for the Kehei to Kula Highway.

Based on these documents two phases of work will be undertaken:

Phase I: Conduct background research on 6 corridor alternatives (2 added later) providing an overview in addition to walking of each of the six corridors to locate sites and define site limits. During this phase, fieldwork would be carried out and actual sites to be identified.

Phase II: archaeological inventory survey of the single chosen alternative involving complete documentation of all archaeological resources within the chosen corridor.

DLNR has requested to review both Phase I and II reports as well as the scope.

A scope of work for each phase is presented below.

Phase I: Assessment and Field Survey of 8 Alternatives

1. Historical background including archaeological and archival information dealing with past land use and history. This will also involve a search of land commission奖励奖 records and historic maps. Aerial photographs will be studied to find any archaeological sites that may be visible. Ms. Sara Collins and other knowledgeable individuals will be consulted about items of archaeological and historical interest. The purpose of this background research will be to document settlement patterns for the areas covered by the alternatives. The high density, medium density, and low density areas will be defined by number of archaeological sites, but the DLNR has requested that the specific kinds of sites to be included in this survey such as: habitation, agriculture, burial, and religious sites.

2. Interviews with knowledgeable Hawaiian are planned especially Hawaiians, who would shed light on the settlement pattern as well as help identify traditional cultural places and archaeological sites. This task has been deferred until the Phase II, final road corridor is selected and will be conducted as part of the inventory survey.

3. Fieldwork will be conducted to confirm the predictions for site location as determined by historic documentation, examination of aerial photographs and fieldwork will involve helicopter reconnaissance followed by survey of the actual sites. CSH would request stakes to be placed at not more than 200 intervals and preferably at 100 intervals. The survey area for each corridor will be 200' wide. The length of the survey area is estimated to be from 22 to 25 miles long. Although each site located will not be recorded in detail at this time, the types of features will be noted and the general boundaries of the site complexes will be recorded and initial assessments of the significance of these sites will be made.

4. Preparation of Phase I report. This report will summarize all the background information collected and the results of the fieldwork to evaluate the relative archaeological constraints involved in each of the alternatives. This evaluation will be in the context of the settlement patterns predictions for the sites covered by the three corridors and will include maps showing site density and types of sites for each area. Each alternative will be ranked according to the relative impact on archaeological resources. The archaeological site areas will be located on an overall map of each corridor in relation to centerline switches, and each area will be analyzed on a preliminary basis for value and possible mitigation measures. This report will clearly identify if archaeological constraints will be difficult or impossible to overcome.

Phase II: Archaeological Inventory Survey of a Single Selected Corridor

The single corridor selected from the 8 alternatives of Phase I will be subject to a complete inventory survey with 100% ground coverage of the corridor and detailed description and mapping of each site.

The following Scope of Work is standard for satisfying the State and County requirements for an inventory survey level of investigation:

1. A complete ground survey of the entire project area for the purpose of site inventory. All sites will be located, described, and mapped with evaluation of function, interrelationships, and significance. Documentation will include photographs and maps of selected sites and complexes. All sites will be assigned State site numbers.

2. Limited subsurface testing to determine location, boundaries, depth and quantity of cultural materials within archaeological sites and to obtain datable samples for chemical analysis for sites in the immediate area, if such data is not available from previous studies.

3. Research of historic and archaeological background, including a search of historic maps, written records, and Commission surveys. Research will focus on the specific area with general background on the ahupua'a and district and will emphasize settlement patterns.

4. Preparation of a survey report which will include the following:
Survey Methodology

The center lines of the eight corridor segments comprising the alternate routes were located by licensed land surveyor. These center lines were marked in the field - normally at two hundred foot intervals by wooden hub and numbered wooden stakes with pick flagging tape at each point. The center line stake markers were used as guides for the survey and to locate sites by bearings and distances.

The archaeological reconnaissance survey was conducted on foot by three archaeologists. Each of the six segments of the proposed alignments were completely covered in the survey. The corridors surveyed were four hundred feet wide; two hundred feet on either side of the center line. The two hundred foot corridor half-width was used as the width for each sweep of the archaeological survey. Thus the archaeologists were spaced at intervals of approximately sixth-seven feet (20.4 meters) apart, with each archaeologist covering a distance of no more than thirty five feet (10.7 meters) to either side of his survey line. Where tall grasses grew the interval between archaeologists was reduced to provide complete coverage.

At the U2A crossing of Kaalalini gully the survey area was expanded four hundred outside the corridor to the west, or mauku, side of the centerline. This was done to evaluate the potential impact to historic properties if the corridor were realigned to the west, because of the proximity of historic properties to the east.

The survey of Alternate U2A in Kaalalini was coordinated with another survey of Alternate U2B - because of the steep valley walls in these sections of the gully. The result was that the land from the west edge of the U2A corridor to the east side of the U2B corridor was entirely surveyed within the gully.

Vegetation was a factor in the survey, where it hampered visibility, the speed of the survey was reduced to provide more adequate coverage. The vegetation in the project area consisted of open savannah of kunu trees and Panchoa-like pasture grasses. At higher elevations the savannah closed in to open kunu forest and the understory included dense growths of panai cactus. The kunu did not present difficulties for the survey activity in the savannah or open forest, but recent rains produced a substantial growth of the grass understory. The grasses were consistently one to two feet high in the savannah and three, or rarely, four feet high in the open forest. Although difficult to see with sixty percent one hundred percent high grass coverage, it was possible to view the archaeological features when they were present. The panai was difficult to navigate around and through, but the ground beneath it was clear of other vegetation.

All sites were located on the 1 in. = 3000 ft. 5-foot contour map by means of hand held tape and compass relative to the centerline stakes. They were briefly described and preliminary assessments of type, function, significance and future treatment were made. Selective photography was also used to complement survey documentation. The sites were flagged with yellow barricade tape and given temporary CSH site numbers were inscribed on the flagging. In the Kahi section of the K2-U1 corridor some sites comprised a grouping, or complex, and the barricade tape flags were placed to mark the bounds of the site grouping within the road corridor. In other instances where a site had fewer features, each feature of the site was also flagged and assigned a letter suffix to the temporary site number. A 5-foot contour map by means of hand held tape and compass relative to the centerline stakes. They were briefly described and preliminary assessments of type, function, significance and future treatment were made. Selective photography was also used to complement survey documentation. The sites were flagged with yellow barricade tape and given temporary CSH site numbers were inscribed on the flagging. In the Kahi section of the K2-U1 corridor some sites comprised a grouping, or complex, and the barricade tape flags were placed to mark the bounds of the site grouping within the road corridor. In other instances where a site had fewer features, each feature of the site was also flagged and assigned a letter suffix to the temporary site number.
II. NATURAL HISTORY

Geology
The steep slopes of Kaluha, Kaohu, 'A'apuam, Kalilani, Ohe-mo, Pulehu Pai, Koolauha 3 & 4, Wainaka, 'A'apuam, Kikua 1, 2 & 3, Whenui, Kohua, Kikua, and Kama'ule are all located on the western slope of Haleakalā. Haleakalā is composed of lava flows known as the Honamoa Volcanic Series of the Tertiary system. These ancient lavas have been mostly covered by later flows and are exposed in only a few localities, along the north and northeast shore sea cliffs and in 'I'ie's Valley (Meadowald, et al. 1893:388).

In the project area, the Honamoa Series lavas are covered by the Kula Volcanic Series of the Pliocene epoch. Lavas of the Kula Series consist mostly of an a -trachyte; the exceptions were explosive to the extent that many large cinder cones were formed and beds of ash are common. These cones are present mostly on the summit and northern slopes of the mountain but also occur on the western slope in vicinity of the project area. The Kula lavas are relatively thick, averaging from twenty feet thick near the summit of Haleakalā to fifty feet thick at the coast. Most recent rocks of the Hana Volcanic Series mantle the Kula Series at the east and southwest ends of Haleakalā, but do not extend into the study area (P. cit. 383, 388). The western edge of the study parcel (in the vicinity of Puna'auia Highway) is characterized by a thin band of sedimentary rock consisting of a recent, younger alluvium. The Kīhei coastline is comprised of an older sediment consisting of the lithified dunes of the Pā'īnasoce epoch (P. cit. 383).

Geography
Kula District:
The western slopes of Haleakalā receive a relatively small amount of rain annually; the recorded mean annual rainfall at the mountain's summit is 1000 mm, which decreases to 400 mm at 1900 ft. above mean sea level. The majority of the project area receives between 400 mm. at 1900 ft. and 500 mm. at 1500 ft. small amounts of annual rain. The upland portions of the parcel (2000 to 2500 ft. small) receive between 600 mm. and 750 mm. per year (Giambelluca et al. 1985:122). Mean monthly rainfall records show the heaviest rainfall to occur between November and March, ranging from 50-100 mm. from approximately 200 ft. to 2000 ft. Small, with the months of April to October averaging between 5-25 mm. During the driest month, June, the area receives 5-10 mm. (P. cit. 110-124).

Air temperatures in the upper elevations are cool; Kula San station, located at 2004 ft. small, records a maximum annual mean ranging from 69° to 70°F and a minimum annual mean from 50° to 68°F. The station has recorded a record low of 48°F in December and a record high of 90°F in June (P. cit. 288).

Upland Zone
Soils in the upland portions of the project area are the low uplands consist primarily of the Kula/Keelua-Malalekua association, consisting of "moderately deep and deep, nearly level to moderately steep, well-drained soils that have a moderately fine textured subsoil" (Pfieze et al. 1972: General Soil Map, Maui Island). These soils range from sea level to 1500 ft. above sea level and have a temperature between 65° and 80°F (P. cit. 89). A small area, where Pulehu Galbrou meets Kula Highway, has soils of the Puu Pa-Kula-Puna association. This soil association consists of "deep, gently sloping to steep, well-drained soils that have a medium-textured or moderately fine textured subsoil or underlying material; an intermediate and high upland." (Pfieze et al. 1972: General Soil Map, Maui Island). These soils range from 1000 to 6000 ft. above sea level and have a temperature between 65° and 75°F (P. cit. 9).

Vegetation consists of Kikua and lowland shrubs below 1000 ft. small, including lanai, finger grass, and pili grass; and lanai-to-kauai shrubs between 1000 and 3000 ft. small, including kia, panuis, ilima, and Naiala desert grass (P. cit. 89). Wildlife consists mostly of upland game birds (Pfieze et al. 81).

Handy and Handy (1972) describe a Kula region in sloping land covered with old, red soil in which sweet potato, sugar cane, and pineapple grow well. The word Kula is traditionally used to refer to dry land versus wet, large land. Handy and Handy refer to fields of pili grass in Kula, traditionally used for roof thatching. The authors state that "before cultivation took over the area, the carpeting grass was interspersed with vines such as the koa, morning glory, and many shrubs, all of which found practical uses by the immigrant folk. There were also a few stunted trees." (P. cit. 81).

Intermediate Zone
Soils in the area immediately outside of the Kīhei coastal beach area are the Puleho/Ena-Makaha association. These are "deep, nearly level to moderately sloping, well-drained and excessively drained soils that have a moderately fine textured to coarse-textured"
subsond or underlying material on alluvial fans and in basins." (Poste et al. 1972: General Soil Map, Maui Island). These soils develop between sea level and 600 ft. amsl and have a temperature of 72°F (top. cit. 25).

Vegetation consists of koa and lowland shrubs below 1000 ft. amsl, including kaupu, finger grass, and pilu' grass (Armstrong 1973:64). Wildlife consists of native water birds and upland game birds (Poste et al. 1972:81). During the field survey, a population of wild deer was observed in the makan portion of the study parcel.

III. HISTORIC BACKGROUND

Historic Setting

The project area lies primarily in what is referred to as the "barren zone" of the Kaka'ako and Waikiki Districts, the area located between the narrow coastal zone and the upland habitation area, and the agricultural zone which begins at 2000 ft. amsl (Cordy 1977:4). The eastern portion of the present study zone extends into the inland area. According to Cordy the barren zone was probably most utilized in the late pre-contact era on a route between the inhabited coastal and inland areas with corresponding intermittent habitation (top. cit.:121). Frederickson and Frederickson (1952:2) state that the upper area was probably used intermittently for its resources, especially sandalwood trees, and possibly for dryland agriculture towards the end of the pre-contact period. Sources indicate that upper Kula (Ka'ili district), even with its arid climate, has continuously been a place of agricultural production, particularly of dryland 'aloa or sweet potato. In their studies of Kula's history (Oma'epio, (Dinham 1952:4) and Waihii and Kula, (Koeh et al. 1997)) the authors discuss the presence of Kula and the subsequent inference that a large permanent population must have been present, as well as noting the presence of habitation and agriculture in the uplands (2000 to 3000 ft. amsl) of Kula and Waikiki (source Koeh et al. 1997). Wong-Smith (Brown and Haun 1980:C-263) also notes several sites located in the uplands of Kula, Waihii, and Hauula and overstepping Nui alone Bay. Dryland agriculture in Kula would extend from pre-contact times to the 19th century and on into the present, amidst the influx of other land uses such as ranching, pineapple and sugar cane cultivation, and residential development.

Mythological and Traditional Accounts

Mythology regarding the region of the Makawao (Kula) and Waikiki Districts is relatively scarce. Legends of Hana the demi-god often encompass the entire island (or large portions) and include Haleakula, but rarely do they focus on the area inclusive of the study parcel. However, sayings regarding the Makawao and Waikiki Districts do exist, as well as accounts of the pre- and post-contact activities of the chiefs. The literal translations of relevant land division names are presented below, along with selected historical and legendary sayings regarding Kula, Makawao and Waikiki, and traditional accounts regarding Waikiki, Kula, Pu'uone, Kana'a, and Kula.

Literal translations of several of the land areas and divisions relevant to the project area are listed below. Unless otherwise noted, the translations are taken from Fukui, et al. (1974).

Makawao district: "forest beginning" or "Watchful eyes of Wa'a" (timeless or eternally)--Wong-Smith in Dinham 1960:1B-1

Kula district: "plain" Kula:
Kulei:
Kana'a:
Kule:

"white sand"
Pukui records three derivative sayings regarding Kula and one saying of praise which hinge upon the inland location of the Kula community:

"Kula wanihiki ha'aheo he'a. Kula people, warriors of the sky. They go to the ocean to seek fish. Said by people of Kula to show the kula people the beauty of the ocean."

"Wo Kula ai no ka kaana, wo kula ai no ka kanno. No Kula to the north, Kula to the south. Kula people are the greatest." (op. cit. p. 1911)

"No Kula ai no ka kaana, wo kula ai no ka kanno. No Kula to the north, Kula to the south. Kula people are the greatest." (op. cit. p. 1911)

"O Kula i ka kaana, Kula of the ignorant cause problems. Said of Kula, Maui, whose people did not know how to paddle canoes because they were splinters." (op. cit. p. 1923)

"A hiki waiwai mooma o Kula. The land of Kula, who tug and pull the mooma up by the roots. An expression of admiration for the people of Kula, Maui, who accomplish whatever they set out to do." (op. cit. p. 1923)

Pukui (1983) records several sayings about Makawao including these three, which describe the characteristics of the inhabitants and the environment:

"A ʻau nae nei 'oe i ka haupu o Makawao! Be smart and get the native of Makawao! He defies you to tackle a lad of Makawao. Be a native of Makawao!" (op. cit. p. 1923)

"Kele kekeholi keawa o Makawao. The lad of Makawao who goes about in the rain. Said of a native of that place who is not afraid of being wet." (op. cit. p. 1923)

"He au anika o Makawao. The 'Au rain of Makawao. Refers to Makawao, Maui." (op. cit. p. 1923)

"He au anika o Makawao. The 'Au rain of Makawao. Refers to Makawao, Maui." (op. cit. p. 1923)

"He au anika o Makawao. The 'Au rain of Makawao. Refers to Makawao, Maui." (op. cit. p. 1923)

Some sayings note environmental characteristics of Kula, using their imagery to describe either aspects of life:

"Ma kehoko ho wahi o Kula, ho Hau. The smoke of Kula traveled low and swift, borne by the Hau wind. Said of one who is swift in movement. Also, in love and war much depends on swiftness and stealth." (op. cit. p. 1271)

"Kehoko ho wahi o Kula, ho Kau. The smoke of Kula creeps along when the Kau breeze blows. Where there is smoke there is fire." (op. cit. p. 1271)
Traditional accounts concerning Makawao and Wailuku seem to be limited to the pre- and post-contact activities of the chiefs. Compiled below are traditional accounts regarding Wailuku, Kula, Pu'ueo, Kamehamea, and Kihel:

Kamakau (1895) provides references to the areas of Wailuku, Kula, and Kihel involving the ruling chiefs of Maui and Hawaii and their warfare during the 1760s.

When Ke-kau-like like died... he left no son who could succeed him... and his death caused the chief of Kula to be overthrown. Here on the shore the chiefs prepared a litter for Ke-kau-like and bore him upland to Lahakalani. There Ke-kau-like died... in the month of March, 1738. (op. cit., 98-70)

Alapa's saddle was then given to the ruling chief of Oahu and was brought to Kula, where Kula's people welcomed him. The saddle was given to Ke-kau-like, and here he died. When Ke-kau-like died, the chiefs of Kula went to Oahu and brought back Ke-kau-like's saddle to Kula, where it was buried with him.

Kamehameha III reigned in 1819. He is remembered for his military campaigns and the establishment of a centralized government.

During this period there were disturbances among the country people, not only on Oahu but also on Maui. The trouble arose through one of the lesser chiefs (Kauauna) who was not satisfied with his position. He claimed that he had the right to govern the people of Maui and Kauauna. This caused much trouble and unrest in the islands of Kauauna and Kauauna.

15
The potato became a staple food for the Hawaiian people. The potato industry flourished, especially around the towns of Hilo and Kilauea. The introduction of new potato varieties from India in the 1860s further boosted production. The potato became so important that it was known as the "second potato" or the "second rice." The potato not only provided food but also became a major export commodity.

The potato industry was also significant for the economy of the islands. The potato was grown on vast plantations, and the processing of potatoes into dehydrated and canned forms provided employment and income to many Hawaiians. The potato industry also led to the development of canning factories and other processing facilities.

The potato industry was also affected by the potato blight, a disease that reached the islands in the 1870s. This disease was devastating and led to a significant decline in potato production. However, the industry recovered through the introduction of new varieties of potatoes that were resistant to the blight.

The potato industry also played a role in the development of transportation infrastructure in the islands. The need to transport potatoes to market led to the建设 of railroad tracks and the development of ports.

The potato industry in Hawaii is an example of how agriculture can be a significant contributor to the economy and culture of a region. It highlights the importance of understanding the historical context in which these industries arose and the impact they had on the local community.
confine their claims to one aho'apu'a. A large number of claimants request aho'apu'a in two, three, or more aho'apu'a as a general practice. Therefore, we have tried to look at the Land Commission claim data in a slightly different way. Within each aho'apu'a, the 'uli and number of aho'apu'a or specific land pieces seem to better reflect the mosaic of resident population, "migrant farmers" who come from elsewhere on Maui to work in their fields, and the absentee landlords who have various crops (especially potatoes) raised for them. While the Native Register documents for Kula tend to omit the name of the 'uli (smaller unit of land within the aho'apu'a where the aho'apu'a were claimed), the Foreign and Native Testimony documents generally name these. Claimants in the Register, and Konahu (land managers), have others (tax assessors), and neighbors in the Testimony documents (except for the royal claims for entire aho'apu'a), discuss either vaguely or specially the land use of each aho'apu'a claimed. In a few instances there is a claim for land that is temporally fallow, but rarely, if ever, in Kula does anyone ever mention waste land. There are several mentions of fields which are temporarily lying fallow.

We have devised a table (Appendix B) which gives by aho'apu'a (column 1), the 'uli within that aho'apu'a (whether awarded) (column 2), the land use column 3, the claimant's name (column 4), the claim number column 5, the acreage and the aho'apu'a awarded, or entire claim # not awarded (column 6), and the location of the Tiki Map Key (TMK) number where found on the TMKs. This table is accompanied by a map (Figure 8, in the back pocket), compiled using the TMKs, showing the aho'apu'a for Kula with the located aho'apu'a. Boundaries between some aho'apu'a are not absolutely clear on the TMK maps, particularly between Kamehamehii and Pohakuhi. Here there are several claimants who tell of their land in one aho'apu'a, while the award appears in the other.

Land use has been restricted to house lots, potato fields (both Irish and sweet having the same habitat and Kula refer to Figure 8 in the report back cover for the reconnaissance survey since the located claims are not within the road corridor alternatives, but rather are focused in the upland zone between the 2000 ft, 1010 m and 4000 ft, 1219 m elevation, mainly along the old Kula Road. Claims extended down to the 2,200 ft, 671 m elevation in the south in Kama'ohi and Kiikiea and to the 1,100 ft, 335 m elevation in the north in 'A'apu'a and Makaha.

In Kōkōka claim 6545, which is a wrong number and therefore not awarded, in among a number of house lots claimed but not awarded at the shore. Modern TMK maps do show any of the awarded Land Commission claims along the shore. Kohl et al. have a map of the Kīhei coastline which shows these awards (Kohl et al., 1997:65).

Some kulaona were awarded although they were not claimed, some were exchanged for land in another aho'apu'a, and traces of two kulaona were noted on the TMKs that were illegible (a claim to TMK 2-3-65, parcel 132 and Waikānui TMK 2-26-65, parcel 341) and some numbers were transposed or mistraced so that 375985 appears as 8750.

Including two claims (2383 for 'Ahe and 3292 for Pohukuhi) not claimed but awarded, there were at least 254 aho'apu'a granted by the Land Commission in Kula to 187 claimants; this is approximately 40% of the 619 aho'apu'a claimed for that district. This number includes the royal awards of entire aho'apu'a where no land use is given. Each claimant puts in a claim for an average of 2.6 aho'apu'a on average slightly higher than in most other places.

One map of a coastal area was located which shows coastal awards (the Kohl et al., 1997:65) in Kaupalama. Other coastal awards are not located. In Kula 69 house lots were claimed; many of these were in the coastal villages of Kauwakapu, Ulua, Kapukahawai, Wailuku, and Kaupalama. Only 15 of the 67 are awarded and 15 of the 33 can be seen on the Kohl et al. Map. Claims also list some potato plots and bananas claimed in conjunction with the house lots.

The rest of the Land Commission Awards (LCAs) in Kula occur in a narrow horizontal band along the old Kula road where there is sufficient rainfall for growing crops and where it is cool enough for tuber crops. There are number of house lots claimed in this area. Of the 24 'hōnūlū' (literally permanent gardens claimed in the Kauwakapu, Kēhea, and Kamehamehii aho'apu'a, 2 are awarded, of those 2 are shown on maps; there are in this Kula road upland zone.

The unwrapped claims give a different picture of the land use thus do the awarded claims. Indication how house lots at the shore, typical of other areas. It would also seem from the non-awarded claims that many residents had their coastal house lots and an upland house lot.

The Kohl map drawn by Monstrot and Dodge (1872-1875; Registered Map No. 912) shows only a few awarded claims, but some of these are different from those shown on the TMKs.

What is evident on R.M. 913 is that some of the names of claimants appear with grant numbers, rather than Land Commission Awards. Helen Wang-Smith (in Doubh and B-41 notes that prior to the Māhūle land in Makawao was offered for sale, for simple, to native Hawaiians. These parcels (numbering close to 100) ranged from 5 to 10 acres and were purchased for $1.00 an acre, which may explain why many of the LCAs are not on the TMKs because the claimants had already opted for grant status.

A number of claimants use more than one number for the same claim. Kauwakapu uses 4 different numbers, Hawawae uses 3, Kāni uses 3, Kēhea uses 3, and 16 others use 2 different numbers for their claims. This explains some instances where same claims are not awarded, as the same piece is awarded under another number. Some claimants are of high chiefly status, e.g. Keawuwanui, Keakolokolani, and Namaua who claims a house lot in Wāhānui; and Nahele with a house at Kene'ohi, some are important geographers such as Kauwāl, the land commissioner of Maui, and Hawawae, who is awarded land on all islands and has a home in Kaupalama; these persons appear to have claims in many places. There are, however, also claimants who appear to be commoners from elsewhere, Wailuku, Waiapu, Lehua and, along with the chiefs, are raising sweet potatoes and Irish potatoes for trade with the incoming vessels or for the California Gold miners who had no time to raise food, or both.

The following table lists by aho'apu'a the number of aho'apu'a claimed and the number of claimants.
### Table 1: Land Commission Claims for Kula

<table>
<thead>
<tr>
<th>Abuanu’s</th>
<th># of claims</th>
<th># of acres requested</th>
<th>granted</th>
<th># of claimants, comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>A’A’one</td>
<td>8</td>
<td>14</td>
<td>2</td>
<td>8</td>
</tr>
<tr>
<td>‘A’u ofari</td>
<td>14</td>
<td>18</td>
<td>14</td>
<td>14</td>
</tr>
<tr>
<td>Kalihana’i</td>
<td>25</td>
<td>31</td>
<td>25</td>
<td>31</td>
</tr>
<tr>
<td>Kāiena’</td>
<td>49</td>
<td>90</td>
<td>28</td>
<td>14, same consolidated claims</td>
</tr>
<tr>
<td>Kakehane</td>
<td>8</td>
<td>7</td>
<td>1</td>
<td>8, 5 claims on TIK map, some confusion with Pūlehu 31 claim</td>
</tr>
<tr>
<td>Kā’ona’i</td>
<td>35</td>
<td>57</td>
<td>21</td>
<td>33</td>
</tr>
<tr>
<td>Kālalau (various)</td>
<td>27</td>
<td>43</td>
<td>19</td>
<td>19</td>
</tr>
<tr>
<td>Kūkai</td>
<td>46</td>
<td>111</td>
<td>29</td>
<td>44</td>
</tr>
<tr>
<td>Kūkai</td>
<td>11</td>
<td>12</td>
<td>5</td>
<td>11</td>
</tr>
<tr>
<td>Kūkai/Kalani</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Makah</td>
<td>3</td>
<td>3</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>Oha’one 1-10</td>
<td>25</td>
<td>56</td>
<td>31</td>
<td>16</td>
</tr>
<tr>
<td>Pūlehu/Pālehu Kā’i</td>
<td>17</td>
<td>33</td>
<td>22</td>
<td>16, same consolidated claims, awarded unclaimed</td>
</tr>
<tr>
<td>Waihao</td>
<td>17</td>
<td>44</td>
<td>53</td>
<td>16</td>
</tr>
<tr>
<td>Wainatu</td>
<td>41</td>
<td>100</td>
<td>20</td>
<td>40</td>
</tr>
</tbody>
</table>

The majority of claims consist of apana for kula, often specified as sweet potatoes or Irish (foreign or small) potatoes, some dry lo‘i, winter kula mashu, or as occasional bananas and horse beans. There are many claims for maoko mau‘u which the translator of the Native Register believes might be small earthen pockets in stony soil. Mostly they are unspecified as to land use, although occasionally they say maoko mau‘u or sweet potatoes. Whether this means all maoko mau‘u are sweet potatoes is unknown.

The following land use profiles list, by abuanu’s, 11 the number of houses, 21 number of Irish potato patches taulo, kūkai, or kula, 21 number of sweet potato patches taulo, makaloa, of the total number of houses, 41 the number of houses, 61 the number of acres, which were granted, when no specified cultivar is named, 31 generic potato ground or patches or plots which probably can be considered as sweet potatoes, 61 generic plots such as kūkai, maoko mau‘u, or “claim,” 71 number of lo‘i, taro (kula), and 81 other.

At ‘A’uone, Kakehane claims and receives the abuaunu’s. Awarded claims range from the minimum 4 acres to Kakehane’s 50 acres to 22 acres of kula. The two claims not awarded are for kula and an unspecified “claim.” Claimed are apana for 1 house lot, 6 Irish potato patches, 6 sweet potato patches, 11 kula lo‘i or pastures, 1 “claim,” and no taro or other items mentioned.

At ‘A’uone 1, 2, 3, & 4, Kakehane is awarded ‘A’uone 3. There is 1 house lot, 2 plots of Irish potatoes, 2 of sweet potatoes, 6 kula, 1 generic potato ground, 19 generic “claims” or maoko mau‘u, and no taro or other items mentioned.

At Kalalau, Kakehane claims and receives the abuapu’a’s (claims #469 and 7124) of 10,938 acres in claim 7124. There are claims for 4 house lots, 7 Irish potato patches or lands, 3 sweet potato patches, 20 kula (2 winter kula), 3 unspecified “claims,” etc., as well as 12 taro patches, and mention of wa‘ahe, a boggy place, and bananas.

At Kāiena’s, the entire abuaunu’a is not claimed. There are 3 claimants who receive close to or more than 50 acres, while most are from 1 to 10 acres. There are 17 house lots, 55 Irish potato patches or lands, 15 sweet potato lands, 23 kula, 25 generic potato lands, 22 generic maoko mau‘u or claims, 5’00” of dry kula, 1 acre sugar cane, 1 pig enclosure, and 2 male of bananas.

At Kakehane there is no house claim, there are 2 Irish potato patches, 6 sweet potato land, 3 kula, 6 generic potato lands, 6 generic lands “claim,” and no taro, but there is mention of 2 pa‘a, 2 beans, and a broken place.

At Kā’ona one ‘a, Hookawai is awarded the abuaunu’a of 5715 acres. Other claims are awarded range in size from 22 acres to 28 acres. Claims are for 2 house lots, 22 Irish potato patches or lands, 6 sweet potato claims. 46 kula which include winter kula, 1 generic potato land, 67 maoko mau‘u or claims, 18 taro patches, a stream bank, and a Kā’ona tar pond is mentioned in claim No. 6467.

At Kakehane 1, 2, 3 & 4, Kakehane is awarded Kealahou 3-4 (no acreage given). In Kealahou the next largest award is for Kekepaa who receives 6 acres of 10,20 acres, plus other smaller parcels. Claims for apana include no house lots, 3 Irish potato lands, 4 sweet potato lands, 31 kula, etc., no generic potato lands, 26 maoko mau‘u or other generic land, and no taro or other items mentioned.

At Kūkai (5332 acres) awards granted range from 25 acres to 16 acres. Apana are claimed for 22 house sites, 42 Irish potato patches, 25 sweet potato patches, 26 kula or pastures, 6 generic potato lands, 19 generic lands, and 73 taro lands, with 5 banana patches, sugar cane and fishing rights mentioned (claim 6433).

At Kūkai, Kakehane claims and gets the abuaunu’s. The only other award is 14 acres awarded to Kahului for 4 apana of taro and Irish potatoes. Claims not awarded include no claim for house lots, 3 Irish potato patches, 6 sweet potato lands, 11 kula including 1 winter kula, 6 generic potato lands, and 3 kula patches.

At Kūkai, Kakehane receives the abuaunu’a of 150 acres. There are no other claimants and Kakehane does not mention land use.
At Maile‘e, Kekaulike claims but does not get the okupa‘u. Dahman (1986:5) notes that Keehokale‘e had been offered Makaha but she transferred this to the government. This is also true for the okupa‘u of Kaliu‘u. There are no other claims in Makaha.

At O‘o‘opii 1:10, there is a claim for a house site, 8 claims for Irish potatoes, 3 for sweet potatoes, 8 for kula, none for generic potato lands, 5 for generic land, 3 in sugar cane, 2 in wai‘ae patches. LCA 2081B is awarded to Ali, a non-resident claiming Lahaina as his place of residence. He has 10852 acres. Nineteen claims are centrally located between the northern Ma‘o‘o‘o okupa‘u boundary and the south Ma‘o‘o‘o okupa‘u boundary which is the stream bed in Pu‘elu‘u Gulp.

We do not believe this narrow band of plots is typical of the prehistoric settlement pattern in O‘o‘opii. The land form in the okupa‘u provides widespread areas of arable land. Prehistoric settlement including cultivated fields would have been dispersed across the whole landscape in the okupa‘u’s between 485 and 1212 m. above. The pattern we reflect in the distribution of Land Commission Awards probably results from population decline and subsequent resettlement of the remaining farmers of land close to or adjacent to the major trails or roads such as O‘o‘opii Road, Kīna‘u Road and Lower Kula Road leading to the new population centers at Makawao-Pu‘ukalani and Kula in Kula.

At Pu‘elu‘u, Pulehu‘u and Pu‘elohini, Kewaamahi‘a receives 1 apnea of 16,676.98 acres. There are no claims for house lots, 7 patches of Irish potatoes, 20 patches of sweet potatoes, 20 in kula, none in generic potatoes, 15 in generic land, no in taro land, and mention of pigs, a hog and 3 springs.

At Pu‘elu‘u, Kuli claims 7 kula but relinquishes them for 20 acres in O‘o‘opii.

At Waikoa, there is a claim for a house lot, 7 for Irish potatoes, and 7 for sweet potatoes, 22 for kula or pastures, none for generic potatoes, 3 for generic land, and 1 in taro field.

At Waikoa, there are claims for 25 house lots, 35 Irish potato lands, 113 sweet potato lands, 17 in kula, 29 in generic potato lands, 4 in generic lands, 24 in taro fields, 10 banana patches, 2 sugar cane lands. There is mention of government road.

It is interesting that very many if not all the land sections have place names of their own in addition to the ‘ili and okupa‘u names. We also note that many of the awards, in describing the bounds of their lands, used for reference the land of many other people who never received claims. Peilima‘a (land worked for a chief and okupa‘u or government lands) are also mentioned in describing claims to the Land Commission.

The majority of house lots claimed are in Kēōkea (23) and Waikōa (23) although kula often had houses on them that were not claimed separately.

Winter kula is a term used only on Molii and in Kula; they are often indicated as being manual. One gets the impression that there was great movement between hōlomālo and upland and between other okupa‘u elsewhere and Kula, particularly during this potato growing time. Another interesting fact coming from the Makaha account is the name landings at Lahaina for the Waikapu people who come to sell their potatoes (Cress 1933). A sizable number of Wai‘apu claimants had potato patches in Kula.

Another great potato growing area, Pahea, is mentioned by surveyors and Mr. E. Baldwin in their notes (T.T. 91-5016 and N.T. 91-5016). They discuss the loss of potato lands there where people thought to consolidate their lands but could not afford to do so and so lost them altogether. This kind of documentation does not appear for our Kula district lands, although there is mention of consolidation of claims to get grants of larger lands. In Waikūhali many claimants do not receive their claims, a few because they have not been there long enough. This comment adds support to the argument that 1846 was near the height of the Irish potato growing phenomenon, especially for the market in California. In the Kula District it appears that higher status claimants, living elsewhere on other parts of Maui and even on other islands, came into Kula at this time to grow potatoes.

By 1880 the government survey of the Kula area shows very few Land Commission Awards and even shows those who received awards as having replaced the award with grants. Many homestead sections were opened up before 1880 and many new names appear on this map. By 1853 50 land grants were awarded in the Kula area.

Typical subsistence agriculture continued to be prominent in the southernmost okupa‘u, but there, as elsewhere in Kula, people from outside Kula are coming to Kula to raise potatoes for the foreign market.

Late 1800s

A note of interest regarding the Chinese presence in Kula is that Sun Yat-sen, father of the Chinese Revolution and founder of the Chinese Republic, frequented the area in the 1880s. His brother was a Kula rancher. Sun Yat-sen, an infantile graduate who also attended medical school, was often asked medical advice while visiting Kula. When word reached Kula that the 1912 revolution was a success, the town [celebrated]. Sun Yat-sen [had] a familiar and respected personality in Kula. (Gipson 1986:143-145)

By the 1880s lower Kula consisted primarily of pasture land for ranching (Wong-Smith in Dauban 1993b:49). Recently 1992-71 notes that at this point sugar was imported for cattle and provide wood. Maps from late 1880s/early 1890s indicate that several ranching companies owned and operated land in Kula. The land of Kēōkea, particularly the hōlomālo/land tenure portion, was historically used for ranching activities by Hinaleakai Ranch Company (Dahman 1986b:61).

Sugar companies began operating in the Makawao area in the late 1860s. In 1869 the Kuli‘u Plantation Company (KPC) was founded and began sugar operations in Kuli‘u and the plains above. This plantation was then absorbed by the Hawaiian Commercial and Sugar Company in 1908. The best KPC fields continued to be cultivated (sugar is still productive), while the remaining plantation lands became cattle pastures. (Gay 1976:14-15)
The Hawaiian Commercial Company was founded in 1878 by Claus Spreckels and in 1882 became the Hawaiian Commercial and Sugar Company (HCSC), located in Pu‘u‘enae. In 1899, the company was acquired by investors headed by J.B. Castle, with Alexander & Baldwin & Agricultural Company, a rival plantation. (Conde and Best, 1973:208-210,213)

**Early 1900s To The Present**

Twentieth-century activities in Makawao and Waikamoi include sugar and pineapple cultivation, military operations, agriculture, ranching, and residential and commercial land development. According to Frederickson and Frederickson (1990:6), Kula experienced a shift toward diversified agriculture and cattle raising during this time frame, with the area of ʻOmaʻo undergoing "intensive residential land development." Kīhei also became an area of extensive development.

In 1905 the Kula Pipeline was built during a harsh drought, expanding the water resources of the Kula area (Clark in Kennedy 1969:7).

Sugar production continued into the twentieth century, with Hawaiian Commercial and Sugar Company cultivating sugar in the Kīhei and Waikōlu area, particularly during the 1910s-1920s. HCSC currently operates the cane fields which constitute the bulk of the study parcel.

Pineapple cultivation was introduced to Kula in the early 1900s. The Maui Agricultural Company (M.A.C.) primarily a sugar producer, began planting pineapple in its upland parcels. Some of the M.A.C. fields in the higher elevations were too far from the plantation to harvest pineapple on these lands...the C.P.C. (California Packing Corporation) eventually built a large cannery...the M.A.C. moved the cannery workers from Paia to Kāhului. *(Conde and Best, 1973:233)*

Māui Land and Pineapple Company also had its beginnings during this period. According to Speckman (1984:120-121) the company started as Baldwin Parkers which developed over the 1950s and 1960s, becoming "the largest producer of pineapple on Maui." Kīhei Company, McPhatter and Rosenfeldt (1963) note that Māui Land and Pineapple Company planted pineapple in Aʻapua in 1976, in an area currently used for cattle pasture. During the 1970s, under the new ownership, the company began endeavors into residential land development, such as the condominiums at Kāhului. Māui Land and Pineapple Company continues to cultivate pineapple within the western reaches of the study parcel.

While World War I had little impact on Maui, World War II brought with it a significant military presence. Speckman (1984:168-170) provides a detailed review of the military on Maui, particularly Camp Maui in Kōhalo and training maneuvers held on Keōkea'alu and at Māʻalaea Bay, along its beach and in the ‘Ahu‘ uhane. In the east of the Bay, Allen (1971:239) notes that the Marine conducted amphibious landing training at Māʻalaea Bay. Allen (ibid.) also gives an extensive account of a Navy presence on Maui, which included Pū‘u‘enae and the other at Kāhului. The training station at Kāhului was responsible for research work at Kīhei as early as 1940. The Pū‘u‘enae air station was established in 1939, making it the second oldest in Hawaii. During 1941 especially after Pearl Harbor the station expanded to cover much of the Pū‘u‘enae plain and served as an important naval hub for training, plane maintenance, and medical care for the enlisted.

A recent article in The Honolulu Advertiser (Tonji 1997:A23:A26) notes an ongoing research project conducted by the Maui Military Museum which studies the Pū‘u‘enae Air Station at Pū‘u‘enae, with its corresponding air strip, and the pleasurable military artifacts which they are unearthing in the area. Borrough and Bailey (1995:147) refer to the Army camps throughout Māui (including Kīhei and two hospitals, one in Wailuku and one in the old Makawao School).

Burget and Speckman (1985:4) discuss the introduction of ranching ventures into the uplands of Kīhei in the early 1920s. T.N.K. map, sections 2-2 and 2-3 lists the following landholders: Hālākaua Ranch Co., Ulupalakua Ranch, Inc., Kamoulo Ranch Co., Ltd., Māui Island and Land. As discussed by Wong Smith (Brown and Hano 1998:C-7), agriculture and cattle raising would continue to be important activities in the Kīhei area. During the 1970s, Kīhei lost most of the remaining land use. At present, non-residential areas are still in use as centers Hālekaua, Ulupalakua and Kamoulo Ranches are also still in operation.

Kīhei undertook a rapid residential and commercial development beginning in the 1970s. Clark (1989:45) notes that the groundwork for this development was established in the late 1950s and 1960s, when investors began purchasing coastal properties. However, the construction boom of the mid-1970s, with loans, credit, and real estate offices did not occur until the late 1950s. Speckman (1984:188) notes that along with the construction of a number of "eco-friendly" homes (such as Halau Flora’s "hallmark") came the development of luxury homes in the high-altitude Kīhei. He comments on the congestion and overcrowding which Kīhei was known by many proprietors or speculators, each with individual plans, notes that along with the number of "eco-friendly" homes (such as Halau Flora’s "hallmark") came the development of luxury homes in the high-altitude Kīhei. He comments on the congestion and overcrowding which Kīhei was known by many proprietors or speculators, each with individual plans.

25

On April 16, 1997 Mr. Thomas Decove of Cultural Surveys Hawaii Inc. (C.S.H.) met with...
CORRECTION

THE PRECEDING DOCUMENT(S) HAS BEEN REPHOTOGRAPHED TO ASSURE LEGIBILITY
SEE FRAME(S) IMMEDIATELY FOLLOWING
At Makaha, Kekahumau claims that does not get the ahupua'a. Dunham (1930b:6) notes that Kekahumau had been offered Makaha but the substitute Text does not give the government. This is also true for the ahupua'a of Kahalu. There are no other claims in Makaha.

At O'ama'ipio 1-10. There is 1 claim for a house site, 8 claims for Irish potatoes, 1 for sweet potatoes, 25 for kalo, none for generic potato lands, 5 for generic land, 21 for eucalyptus and 2 wauke patches. LCA 066 is awarded to Ali, a non-resident claiming Lahaina as his place of residence. He has 1065.4 acres. Nine awards are centrally located between the north O'ama'ipio ahupua'a boundary (the high ground between Kalaniulau Gulch and Pulehu Gulch) and the south O'ama'ipio ahupua'a boundary which is the stream bed in Pulehu Gulch.

We do not believe this narrow band of plots is typical of the probatonic settlement pattern in O'ama'ipio. The land area in the ahupua'a provides widespread areas of arable land. Probasteonic settlement including cultivated fields would have been dispersed across the whole landmass of the ahupua'a between 660 and 1219 m. asl. The pattern we see reflected in the distribution of Land Commission Awards probably results from population decline and subsequent remission of the remaining farmers to land close to or adjacent to the major trails or roads such as O'ama'ipio Road, Kimo Road and Lower Kula Road leading to the new population centers at Makawao-Pukalani and Kahului.

At Pulehu, Pulehuu and Pulehunui, Kawanakahi receives 1 acre of 16,678.78 acres. There are no claims for house lots, 13 patches of Irish potatoes, 25+ patches of sweet potatoes, 25 kalo, no generic potatoes, 12 generic lands, no taro lands, and mention of pigs, a hog and 3 swine.

At Pulehu, Kala claims 7 kalo but relinquishes them for 50 acres in O'ama'ipio.

At Waiakoa, there is 1 claim for a house lot, 7 for Irish potatoes, and 7 for sweet potatoes, 52 for kalo or pastures, none for generic potatoes, 3 for generic lands, and 1 taro field.

At Waiakoa, there are claims for 25 house lots, 35 Irish potato lands, 135 sweet potato lands, 72 kalo, 220 generic potato lands, 4 generic lands, 22 taro fields, 16 kahuna patches, 2 sugarcane lands. There is mention of the government road.

It is interesting that very many if not all the land sections have place names of their own in addition to the 'ala and ahupua'a names. We also note that many of the awards, in describing the bounds of their lands, use for reference the land of many other people who never received awards. Palaniu (land worked for a chief and vacant government lands) are also mentioned in describing claims to the Land Commission.

The majority of house lots claimed are in Kūleia (221) and Waiakoa (25) although kalo often had houses on them that were not claimed separately.

Winter kalo is a term used only on Maui and in Kula; they are often indicated as being ready. One gets the impression that there was great movement between look and upland and between other ahupua'a elsewhere and Kula, particularly during this potato growing time. Another interesting fact coming from the Kekahumau accounts is the coarse lending at Lahaina for the Wailuku people who come to sell their potatoes. (Creed 1930b). A good number of Wailuku claimants had potato patches in Kula.

Another great potato growing area, Peru, is mentioned by surveyors and Mr. E. Baldwin in their notes (F.T. 81-56-16 and W.T. 93-50-16). They discuss the loss of potato lands there where people thought to consolidate their lands but could not afford them and so lost them all. This kind of documentation does not appear for our Kula district lands, although there is mention of consolidation of claims to get grants of larger lands. In Waiakua many claimants do not receive their claims, a few because they have not been there long enough. This comment adds support to the argument that 1948 was near the height of the Irish potato growing phenomena, especially for the market in California. In the Kula District it appears that higher status claimants, living elsewhere on other parts of Maui and even on other islands, come into Kula at this time to grow potatoes.

By 1880 the government survey of the Kula area (USM 913) shows very few Land Commission Awards and even shows those who received awards as having replaced the award with new ones. Many homestead sections were opened up before 1880 and many new names appear on this map. By 1853 9o land grants were awarded in the Kula area.

Typical subsistence agriculture continued to be prominent in the southermost ahupua'a, but there, as elsewhere in Kula, people from outside Kula are coming to Kula to raise potatoes for the foreign market.

Late 1800s

A note of interest regarding the Chinese presence in Kula is that Sun Yat-sen, father of the Chinese revolution and founder of the Chinese Republic, frequented the area in the 1880s. His brother was a Kula rancher. Sun Yat-sen, an alumnus graduate who also attended medical school, was often asked medical advice while visiting Kula. When word reached Kula that the 1912 revolution was a success, the town celebrated... Sun Yat-sen [was] a familiar and respected personality in Kula.” (Speekenman 1944:141-142)

By the 1880s lower Kula consisted primarily of pasture land for ranching (Wong Smith in Dunham 1930b:6-7). Kennedy (1927:7) notes that at this point beef was imported to feed cattle and provide wool. Maps from late 1900s/early 1910s indicate that several ranching companies owned and operated land in Kula. The land of Kīlauea, particularly the lowlandmoast partion, was historically used for ranching activities by Hālilaikā Ranch Company (Dunham 1930b:6). Sugar companies began operating in the Makawao area in the late 1800s. In 1889 the Kīlauea Plantation Company (KPC) was founded and began sugar operations in Kīlauea and the plains above. This plantation was then absorbed by the Hawaiian Commercial and Sugar Company in 1909. The best KPC fields continued to be cultivated cane are still productive, while the remaining plantation lands became cattle pasture. (Cox 1976:14-15)
The Hawaiian Commercial Company was founded in 1876 by Claus Spreckels and in 1882 became the Hawaiian Commercial and Sugar Company (HC&S), located in Pu‘u‘enu ‘ena. In 1899 the company was acquired by investors headed by J.B. Castle, with Alexander & Baldwin replacing the plantation agents. In 1948, HC&S absorbed the nearby Maui Agricultural Company, a pineapple plantation. (Conde and Best 1973:208-210, 221)

Early 1900s To The Present

Twentieth century activities in Makawao and Wailuku include sugar and pineapple cultivation, military operations, agriculture, ranching, and residential and commercial land development. According to Frederiksen and Frederiksen (1992:9), Kula experienced a shift toward diversified agriculture and cattle raising during this time frame, with the area of one ‘apio undergoing “extensive residential land development.” Kīhei also became an area of extensive development.

In 1905 the Kula Pipeline was built during a harsh drought, expanding the water resources of the Kula area (Mark in Kennedy 1992:7).

Sugar production continued into the twentieth century, with Hawaiian Commercial and Sugar Company cultivating sugar in the Kīhei and Wailuku area, particularly during the 1950s—1960s (Kono and Pentash 1992:8). HC&S currently operates the cane fields which constitute the bulk of the study parcel.

Pineapple cultivation was introduced to Makawao in the early 1900s. The Maui Agricultural Company (M.A.C.) primarily a sugar producer, began planting pineapple in its upland pastures. “Some of the M.A.C. Co. fields in the higher elevations were too far from the main line railroad and lacked a water supply for flooding and irrigation. In 1923 the plantation started planting pineapple on these lands...the C.P.C. (California Packing company) concern then built a large cannery...The M.A.C. Co. moved the cannery workers from Kula to Kahului...” (Conde and Best 1973:220)

Maui Land and Pineapple Company also had its beginnings during this time period. According to Speckman (1984:130-131) the company started as Baldwin Packers which then became Maui Pineapple Company, owned by Alexander & Baldwin. The company developed over the 1930s and 1940s, becoming “the largest producer of pineapple on Maui.” The Canaan family then took control and the company became Maui Land and Pineapple Company. Mr. Pahilir and Roosevelt (1986:31) state that Maui Land and Pineapple Company planted pineapple in ‘A’ ana in 1979, in an area currently used for cattle pasture. During the 1970s, under the new ownership, the company began endeavors into residential land development, such as the condominiums at Kāupalolo. Maui Land and Pineapple Company continues to cultivate pineapple within the western reaches of the study parcel.

While World War I had little impact on Maui, World War II brought with it a significant military presence. Speckman (1984:165-170) provides a detailed review of the history of Maui, particularly Camp Maui in Kēkmō and training maneuvers held in Kaho‘olawe and at Ma‘alaea Bay, along its beach and in the kīhau groves to the east of the Bay. Allen (1971:230) notes that the Marines conducted amphibious landing training at Ma‘alaea Bay. Allen (ibid.) also gives an extensive account of the Navy presence on Maui, which included the Combat Demolition Training Station at Kama‘ole and two naval air stations, one at Pu‘u‘enu‘ena and the other at Kahului. The training station at Kama‘ole was responsible for research work at Kīhei as early as 1940. The Pu‘u‘enu‘ena air station was established in 1939, making it the second oldest in Hawaii. During 1941 especially after Pearl Harbor the station expanded to cover much of the Pu‘u‘enu‘ena plain and served as an important naval hub for training, plane maintenance, and medical care for the enlisted.

A recent article in The Honolulu Advertiser (Tanji 1997:AD2 & 36) notes an on-going research project conducted by the Kīhei Museum which studies the Naval Air Station at Pu‘u‘enu‘ena, with its corresponding air strip, and the plentiful historic military artifacts which they are unearthing in the area. Bartholomew and Bailey (1984:147) refer to the Army camps throughout Maui (including Kula) and two hospitals, one in Wailuku and one in the old Makawao School.

Barger and Spero (1995:8) discuss the introduction of ranching ventures into the uplands of Kula in the early 1900s. TMK maps sections 2, 2-2 and 3-3 list the following landholders: Halonaiku Ranch Co., Ulapakahia Ranch, Inc., Kanuou Ranch Co., Ltd., Maui Land and Pineapple Co., Ltd., the James Campbell Estate, the State of Hawaii, and Hawaiian Homes Lands. As discussed by Yong Smith (Brown and Hem 1995:C-7), agriculture and cattle raising would continue to be important activities in the Kula area. During the 1970s, Kula produced the majority of Hawaii’s locally grown produce and livestock ranches comprised most of the remaining land use. At present, non-residential areas are still in use as centers of agricultural production, particularly in the ‘potato district’ of Kula (Kohmura 1992:5). Halonaiku, Ulapakahia and Kanuou Ranches are also still in operation.

Kīhei underwent a rapid residential and commercial development beginning in the 1970s. Clark (1982:69) notes that the groundwork for this development was established in the late 1950s when investors began purchasing maile property. However, the construction boom of high rise apartments, hotels, and condominiums and corresponding shopping centers, restaurants, and real estate offices didn’t occur until the 1970s. Speckman (1984:188) notes that along with the condominiums and “estates” hotels (Maui’s “bustlemark”) came the construction of millionaire homes in the dry hills overlooking Kīhei and the view beyond Kaho‘olawe and Moloka‘i. He comments on the congestion and overcrowding which resulted from this development tep. cit. 188-189: “It was partially blamed on the fact that Kīhei was owned by many proprietors or speculators, each with individual plans, uncoordinated with general planning, and partly on the failure of the County planners to hold the line against the runaway development. Kīhei became the model for the wrong way to go about expansion.” Pu‘ului Highway was constructed to ease the congested Kīhei traffic which resulted from this development and expansion of the tourist industry.

One Informent Interview

On April 1, 1997 Mr. Thomas Devereux of Cultural Surveys Hawaii Inc. (CSH) met with
Mr. Douglas MacCluer, manager of Maui Land and Pineapple Co. MacCluer is an avid hunter and fisher who has been employed in the pineapple industry on Maui for over thirty years and is well acquainted with the project area. The objectives accomplished at this meeting with MacCluer were: (1) a review of the archaeological sites located during the survey by CSSR crew members, (2) conducting a field inspection of the surveyed sites, (3) conducting a field inspection of other site locations known to Mr. MacCluer to confirm archaeological sites in the vicinity of the road corridor.

All archaeological sites identified by Cultural Surveys Hawaii in the mauka portion of the project area were confirmed by Mr. MacCluer during the field inspection. The field inspection was conducted by vehicle and on foot in the mauka portions of the project area. MacCluer was pointed out at this time along segments B and C but were determined by Mr. MacCluer's opinion that CSSR had located, within the alignment corridors, all archaeological sites with which he was familiar.

Summary

The project area is located primarily in the barrier zone of the Makawao and Wailuku Districts, with the western boundary at the coast and the eastern boundary extending into the upland zone. The upland areas have served as an agricultural center since the precontact era. Sweet potato, and sweet potato, has traditionally been cultivated in Kula in elevations of the coastal area and in the coastal area with transportation routes and intermittent habitats in the zone between the coast and the upland referred to as the intermediate or barrier zone.

Mythology regarding this portion of Maui is relatively scarce and traditional accounts focus on political activities. Existing accounts describe the people of Kula, Makawao, and Wailuku (referring to the importance of agriculture in Kula and record the struggles and activities of Maui and Hawaii chiefs in the 1700s, including Ke-kau-ale-o, Ali`i, ki-sekahi, Koa-keawe, Umi, and also British Captain Vancouver.

During the early historical period Kula's agricultural role was expanded as the introduction of sugarcane and the California Gold Rush of 1849 initiated a demand for the Irish potato, which was cultivated in the uplands. The traditional 'aloa planting grounds during this time and created a thriving Kula potato where J.J. Haldorson had his store and residence, referred to as the "Koa House." Sugar cultivation and ranching were also introduced in the region in the early 1800s.

Many of the Land Commission claims in the Kula area were not granted. It is believed that many people living and farming in this area tried to consolidate their land holdings into a single large piece; a study of the grants in this area may show this in detail.
IV. PREVIOUS ARCHAEOLOGICAL RESEARCH

Previous archaeological research in the Makawao District has been concentrated in the higher elevations (1000 ft. and above) of upcountry Kula and the coastal Kīhei region. Research relevant to the study parcel is discussed below in terms of these two regions.

Table 3 lists State sites in the corridor areas and the sites in or near the road corridors are shown on Figure 3.

Kula Region

The earliest archaeological studies on Maui begin with descriptive lists of religious sites by Thomas Thurston (1838-1839) and John Starker (n.d.) in the early 1890s and culminate with the first island-wide site survey by W. H. K. Bolen in 1931. Throughout the Kīhei region of Maui from Olinda and Makawao to Kāanapali beyond 'Uluhaku, the sites recorded by Walker (1910) and others - 20 total - are located in a continuous band between roughly 1000 ft. and 3000 ft. above.

From around 1920 to the 1970s only sporadic visits were made to Kula by archaeologists, primarily for the purpose of recording individual archaeological sites reported by local residents. In 1970 J. H. Cox and Edward Storrs (1970) compiled a listing of identified petroglyph sites throughout Hawaii, including the Kula area. Two of these sites, MA-B22-1 (State site 50-56-16-001), Kōhulaui Gulch petroglyph and MA-B22-1 (State site 50-56-16-002, Kākaukāpio Gulch petroglyphs), were relocated during the present project (designated CS1 and CS2, respectively).

In 1989-1992 spent her lifetime collecting and recording data about lava fields in the city of Kula. A summary of this information collected was published in a book titled "A Guide to Kula Petroglyphs" (1997). Berdell suggests that Kula Field (including the current project area and area northwest of the town) includes the largest fields of large petroglyphs. She notes that the largest fields of lava are at Ku'a, the next largest fields include the large numbers of petroglyphs located in the area near the town. In Kula area and on across the island Ka-anu-ulua many petroglyphs are known and new ones can be found" (op. cit.:48). She also remarks that in the Kēkaha and Waimea areas are many structures, fields of petroglyphs and temples around the two temples called Pu 'iho and Ka 'uwa-pu 'iho. Also in this area are the temples of Makah and Ka-umua-pu 'iho (or Ka-umua-pu 'iho) may still remain, along with Pu 'iho, Ka-umua, and Ka 'iwa, the latter two part of a modern cemetery. At Pālu'au stood the temple of Nani-ni-ri, and at Kāne 'o the two on the road beyond the town, not far from Pa'ei because of the battle there and the destruction during the time when Ka-tani-kamele waited a brother of Pe'a Kamahele (op. cit.: 57-58).

Three archaeological surveys conducted during the 1980s in the area of Waianae and Kēkaha by Mary Rife (1987), Baderick Brown and Alden Hau (1988) and Rolf et al. (1985) have contributed the bulk of data on site patterning and land use prior to the 20th century in "up-country" Kula Maui. These studies, and a selection of others relevant to the
Riford's (1987) monitoring and reconnaissance survey for the Waiahulu and Kāheka Subdivisions identified 113 sites with 232 features consisting of agricultural terraces and mounded features as well as a number of possible habitation- and religious-related stone walled enclosures... (top. cit. 55). Riford suggests that human occupation in the area extended from prehistoric times to the 1550s based on artifacts observed at the site (top. cit. 50). This time frame is further documented by Brown and Haus (1992:18-21).

Brown and Haus (1989) conducted an inventory survey for the same study parcels in Waiahulu and Kāheka, covering 1,055 acres of unfortified pueo lands located between 1,500 ft. and 2,000 ft. above. Within the survey area 155 sites with 274 features were identified, including agricultural, residential, and ceremonial complexes. Fifty-three of the 117 sites had been identified during the Bishop Museum (Riford 1987) survey.

Hammatt and Shideler (1990) conducted an inventory survey of a plot of land on the Kohala coast at Waiale. Kō'ula, just mauahi of the proposed Kāheka shoreline terminus. There were 8 sites, 3 fishing huts and midden scatter, one C-shaped and undetermined remains.

In general, Brown and Haus (1989:27) found that the Kāheka division was intensively exploited in a variety of ways for at least two-thirds of the entire Hawaiian prehistory. They suggest similar land use and chronology but lower density in the Waiahulu area, probably due to a greater amount of recent land clearing activities. Sixteen radiocarbon dates provided overlapping ranges from A.D. 1750 through A.D. 1950. One sample, with the earliest date, yielded three possible ranges between A.D. 1800 and A.D. 1067, (top. cit. 19.20).

In January 1993, Folk and Hammatt (1993), Cultural Surveys Hawaii conducted an inventory level survey of approximately 25 acres on the southern edge of Kā'ahuaapu'u. This survey resulted in the relocation of several previously recorded sites, which in relation to the current study parcel are located east of terminus 13, between Kā'ahuaapu'u, included a large enclosure (site 50-59-11-1349), and the Upper Pikelu Gulch Petroglyphs (site 50-50-11-1357). Additional archaeological features consisting of a stacked boulder alignment and two low mounds were also located and collectively assigned site 50-59-11-1249. Charcoal analysis of site 50-59-11-1349 suggests the site dates to be possibly as early as the 15th century A.D.

In 1995, Burgess and Spear (1990) of Scientific Consultant Services, Inc. conducted an inventory survey of a 22.5 acre parcel located in Kā'ahuaapu'u, Makawau District (the south of the southeastern portion of the current study parcel). A total of six sites comprised of 29 features were identified during the survey. The identified features included the following: terraces, wall, enclosures, cistern, mound, building, and platform. The survey determined that all sites were post-contact in age and associated with agriculture and habitation activities.

In February 1996, McPhatter and Boazendahl (1996) conducted an archaeological

reconnaissance survey of a 206-acre parcel located in the land of A'apine, Makawau District (TMIC: 2-3:8-5; Par. 5). Most of the project area consists primarily of former pineapple lands between Kualapaluli and Kualaluli Gulches. This survey resulted in the identification of two sites: (1) a site assigned the temporary number 1717-1 and described as a sailing canoe petroglyph, and (2) a temporary site number 1717-2 described as a wall. In addition to these sites several land clearing piles associated with historic pineapple cultivation were also reported but were not assigned site numbers. It was determined that further data collection activities should take place at the wall site 1717-2, and that the petroglyph site 1717-1 be preserved with interpretive development.

Then in March 1996, Wulzen, et al. (1996) conducted an inventory survey of a 44-acre parcel that is the northern portion of McPhatter and Boazendahl's February 1996 project area. The 44-acre parcel is also described by Wulzen on part of the 206 acres of Kahakuloa Terrace (Par. 5). Wulzen's project area contained three previously recorded sites: (1) the Kahalualii petroglyph site 50-50-11-1093, (2) site 50-50-11-4179, the "sailing canoe petroglyph site" recorded as temporary site number 1707-1 by McPhatter and Boazendahl (1996); the description of this site as being to relatively little petroglyphs, and (3) site 50-50-11-4154, previously recorded as temporary site number 1707-3 by McPhatter and Boazendahl (1996). Once new site (Site 50-50-11-4181) was identified during Wulzen's survey. It contained four features including two agricultural clearing mounds and two stone alignments. Testing conducted at the stone alignments yielded historic artifacts associated with pineapple agriculture. The Kualapaluli petroglyph site 50-50-11-1093, originally described as being only on the north side of Kahalualii gulch, was relocated by Wulzen although his project original recorded data on the site, except they found the petroglyphs to extend further to the south than originally described.


In the study of Hawaiian Homeland parcels in Waiahulu and Kāheka, excavation data indicates that initial permanent habitation and land clearing for agricultural purposes began c. A.D. 1200 to 1400 (Boazendahl et al. 1993:200-204). The sequence of agricultural and cultural development was suggested by radiocarbon and pollen analysis and includes the establishment of Hawaiian communities in Kualaluli Gulch, beginning with small shaded and grass lands by A.D. 1400-1600, with a corresponding "boom of habitation" and by the 1600s to 1700s the forest disappear and are replaced by extensive agricultural fields that continued to increase in habitation. The increase of the 1600s to 1700s includes expansion into the valley in the main and outline of the primary upland zone lands (Adb.) The research also indicated, as it has elsewhere in Hawaii, that there was a "rapid depopulation and change" by the mid-1800s (Huba.)
Coastal Kīhei Region

Numerous archaeological surveys were conducted along the south coast of the Mākena District, particularly in the Kīhei, Wāilea, and Mākena area and the area from Kama'ole to Wānahā as a result of the 1970s resort development. From 1969 to 1971, Kirch (1971) conducted a survey and subsequent excavations at Pālaua, south of K1 and K2 termini at Pīhāna Highway. Through his analysis of coastal sites 50-06-10-1028 and 50-06-10-1029, Kirch concluded that settlement patterns in this area were characterized by transient coastal habitation involving the use of ocean resources with permanent settlements and agricultural activities in the upland region.

(Denham 1990: 4)


Several projects were also conducted within the current project area in the coastal region of Kīhei extending from Kama'ole uhupu'a in the south to Wailea uhupu'a in the north (Figures 5, 6, and 7). These projects provide useful information about the coastal area of Kīhei and settlement patterns relating to the island zone, as discussed by Kirch (1971). However, since these studies reinstate already mentioned information and are located outside of our current study area, they will not be discussed here. For the reader's convenience, these projects include those not limited to a flora and fauna survey by Austin, Smith & Assoc. Inc. in 1974 and the following archaeological studies: Cox 1974, Hennon 1981, Kea 1981, Miura 1982, Neller 1982, Mayberry and Haun 1988, Hamani and Stidler 1995, Hamani and Stidler 1990, Denham 1990(4), Hamani 1991, Kennedy, Hamani and Stidler 1992, Kennedy 1995, Sinoto and Pastaba 1992, Frederickson et al. 1993, and Frederickson et al. 1994.

Predictive Model

Based on background studies the project area, consisting of the corridors from Nakāi termini K1 and K2 to mauka termini, U1, U2A, U2B and U3 - is situated within the traditional Hawaiian District of Kula, which has been characterized as having a coastal settlement pattern based on elevation and terrain type. The areas include coastal, intermediate, upland, and forest. The bulk of the project area is within the intermediate zone. The mauka termini are just inland of the coastal zone and the mauka termini U2A, U2B and U3 are in the upland zone. The mauka terminus of U1 is at approximately 900 ft. above the higher limits of the intermediate zone.

The settlement pattern model suggests a low site density for the intermediate zone with like site types to include: trails, markers, agricultural features, temporary habitation, and petroglyphs in gullies. The pattern suggests a higher site density in the vicinity of the mauka termini and in the upland zone. Based on historic background data site types could include: permanent habitations, large ceremonial structures, evidence of extensive dryland agriculture, burials and petroglyphs. Research, however, indicates that historic commercial agriculture of pineapple and sugar cane, has extensively altered the landscape.

Modern mechanized commercial agriculture has altered the landscape to such a degree that few, if any, sites are anticipated in existing or fallow fields. Based on the above data, it is presumed that sites will exist within non-commercial agricultural terrain such as gullies and gullies or where no commercial agriculture occurred. Based on existing maps, commercial agricultural fields are located above the 750-1000 ft. area range.
Figure 5  Previous archaeology conducted within the project area during the 1970s

Figure 6  Previous archaeology conducted within the project area during the 1980s
V. SURVEY RESULTS

Twenty-five locations where historic properties, or sites, were present were identified during the archaeological reconnaissance survey (Table 2). In accord with the scope of work (see page 4) the survey was conducted at a reconnaissance level of site recording not that of an inventory survey. The types of features were noted, the general boundaries of the sites were recorded, and initial assessments of site significance were made based only on the reconnaissance data. Site function and significance will be refined or re-defined during the inventory survey level of work to follow in Phase II. State Inventory of Historic Places (SHIP) numbers are usually assigned during inventory survey. However, the State Historic Preservation Officer (SHPO) has requested that SHIP numbers be assigned here. SHIP numbers are, therefore, assigned to the features identified in the reconnaissance survey. This is potentially problematic because the age and function of some sites are difficult to determine without inventory survey level field testing. Some of the SHIP numbers may need to be retracted based on subsequent inventory survey findings.

A. Site Descriptions

<table>
<thead>
<tr>
<th>State Site #</th>
<th>Site Type</th>
<th>Function</th>
<th>Corridor</th>
<th>Features #</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>50-00-10-1001</td>
<td>Potrero Bluff Shelter</td>
<td>Symbolic/Residential, Recurrent</td>
<td>Alternate U2</td>
<td>5</td>
<td>The Kalalimui petroglyphs were first recorded by the Bishop Museum on site MA-022-2, and later, assigned State Inventory of Historic Places number 50-00-10-1001. The site is comprised of extensive arrays of petroglyphs on both the north and south walls of Kalalimui gulch, and a cliff-overhang shelter located on the north wall beneath the petroglyphs. The land survey corner stake number 1081 is in the gulch bottom in the vicinity of the petroglyphs. Vegetation at the site consists of various exotic grasses, lantana, a few relict willow trees. Feature A is a cluster of 7-10 pecked petroglyph figures located on a single 3.5 m. (11.5 ft.) wide by 2 m. (6.6 ft.) tall rock panel located at the bottom of the south side of the gulch, 23 m. (75 ft.) northwest of stake 1081. Petroglyphs figures at Feature A range in size and consist of several anthropomorphic figures, circles, and an image which could be interpreted as an arrow. No midden or artifacts were observed. There are no sediment deposits associated with this petroglyph cluster. Feature B consists of a cliff overhang shelter and several rock faces containing 50+ pecked and incised petroglyph figures. Feature B is located 55 m. (180 ft.) west of stake 1081 and 30 m. (100 ft.) north of Feature A along the bottom of the north side of the gulch.</td>
</tr>
</tbody>
</table>

Figure 7: Previous archaeological conditions of the project area during the 1990s.
### Table 2: Sites Located During Reconnaissance Survey

<table>
<thead>
<tr>
<th>Site #</th>
<th>Alignment Section</th>
<th>Location</th>
<th>Description</th>
<th>Comments</th>
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</thead>
<tbody>
<tr>
<td>S50-50-10-1081</td>
<td>U2</td>
<td>North and south sides of Kalahainu Gulch, stake # 1581</td>
<td>Overhang shelter and petroglyph friezes</td>
<td>2 features; 60+ petroglyph figures, previously recorded as State site 50-50-10-1081</td>
</tr>
<tr>
<td>S50-50-10-1092</td>
<td>U2B</td>
<td>Kaluapulani Gulch</td>
<td>Pictographs (50+) friezes, fire pit &amp; wall</td>
<td>+/-15 figures, including canoes; previously recorded State site 50-50-10-1092</td>
</tr>
<tr>
<td>S50-50-10-1178</td>
<td>U2</td>
<td>South fork of Kaluapulani Gulch, stake # 1592</td>
<td>Petroglyphs</td>
<td></td>
</tr>
<tr>
<td>S50-50-10-1180</td>
<td>U2A</td>
<td>Near Puu O Wele</td>
<td>Wall</td>
<td>Identified by Wulzen (1996), related to pineapple cultivation cattie control</td>
</tr>
<tr>
<td>S50-50-10-1181</td>
<td>U2B</td>
<td>North face of Kalahainu Gulch, mound of S50-50-10-1061</td>
<td>Complex of two agricultural clearing mounds; two stone alignments</td>
<td>Agriculture</td>
</tr>
<tr>
<td>S50-50-10-1179</td>
<td>U2</td>
<td>30 m. southeast of stake #1578</td>
<td>Modified mhoepp</td>
<td>Cattle trail bisects site</td>
</tr>
<tr>
<td>S50-50-10-1151</td>
<td>U2</td>
<td>At stake #1582</td>
<td>Oval enclosure</td>
<td>Recurrent habitation</td>
</tr>
<tr>
<td>S50-50-10-1152</td>
<td>U2</td>
<td>At stake #1582</td>
<td>Square enclosure</td>
<td>Permanent habitation</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Site #</th>
<th>Location</th>
<th>Wall</th>
<th>Cattle wall</th>
</tr>
</thead>
<tbody>
<tr>
<td>S50-50-10-1173</td>
<td>Southern side of stake # 23 on ridge</td>
<td>Cliff overhang shelter with petroglyphs</td>
<td>15 incised and incised figures</td>
</tr>
<tr>
<td>S50-50-10-1174</td>
<td>North side of Polehu Gulch, stake # 578</td>
<td>Mounds, road, and irrigation ditch</td>
<td>3 features; ditch, clearing mounds, and mounds segment</td>
</tr>
<tr>
<td>S50-50-10-1176</td>
<td>65 m. northeast of stake #1189</td>
<td>Area of sites</td>
<td>+/-30 associated features (enclosures, alignments, and mounds)</td>
</tr>
<tr>
<td>S50-50-10-1177</td>
<td>Between stakes #907 and 911 both mounds and mounds of centerline</td>
<td></td>
<td></td>
</tr>
<tr>
<td>S50-50-10-1178</td>
<td>On centerline between stakes #913 and -915</td>
<td>Circular enclosure</td>
<td>Agriculture</td>
</tr>
<tr>
<td>S50-50-10-1179</td>
<td>On centerline between stakes #918 &amp; -929</td>
<td>Wall</td>
<td>Cattle wall?</td>
</tr>
<tr>
<td>S50-50-10-1180</td>
<td>45 m. east of stake #920</td>
<td>Wall and efail</td>
<td>2 features; wall and efail</td>
</tr>
<tr>
<td>S50-50-10-1170</td>
<td>At stake #923</td>
<td>Enclosure and efail</td>
<td>2 features; enclosure and efail</td>
</tr>
<tr>
<td>S50-50-10-1173</td>
<td>300 m. mounds of Ke Alii Aloha Road &amp; Pilani Highway</td>
<td>Mound</td>
<td>Clearing mound?</td>
</tr>
<tr>
<td>S50-50-10-1172</td>
<td>Between stake #928 &amp; -399 along centerline</td>
<td>Boundary Wall</td>
<td>Site extends across entire corridor width</td>
</tr>
</tbody>
</table>
The overhang shelter measures 13.7 m (44.8 ft) wide, 3.1 m (10.2 ft) deep, with a maximum entrance height of 3.2 m (10.5 ft) tall. The petroglyph figures associated with the overhang shelter are found scattered above and inside the entrance area of the shelter. Petroglyph figures at the feature consist of partial and complete, incised and pecked stick and triangular human figures, 4 incised and pecked crosses, dog, bird, and several other incomplete shapes. Cultural material observed at the feature consisted of an egg-shaped coral mussel (wacked) shell. The floor of the shelter exhibits a sediment layer. Cultural material may be present in the sediments.

State Site #: 50-50-10-1062
Site Type: Petroglyphs, fire pit and stone wall
Location: Pu'uhonua o Hōnaunau National Historical Park
Function: Symbolic/habitation, recurrent
Corridor: Alternate U2A
Features #: 56

Description: Two petroglyph friezes. The first one is over one hundred feet long. It may be considered a discontinuous extension of SHIP 50-50-10-1062 - the Kalaupapa petroglyphs. This 100 feet long frieze is located on the north side of Kalaupapa Gulch (Figure 3 and 4) west of the previously recorded friezes. There are a minimum of 23 petroglyphs in this section. (The boundaries of the site as recorded in the SHIP will need to be amended.) The petroglyphs are on the vertical face of an an aau flow exposed by the stream cut. The lava flow is nearly horizontal and is near the top of the gulch wall. The road corridor centerline stake #314 is situated at the edge of the gulch on the north side, directly above the maker end of the bedrock exposure.

The colinear or black, jointed line of the an aau flow exposure creates an overhang shelter area near the center of the frieze. Beneath the overhang is the remains of a small fire of grass and twigs about 20 centimeters in diameter. The remains of the fire was photographed, but was not otherwise disturbed (see Photographic Appendix).

Below the petroglyph frieze, the ground consists of a talus deposit sloping steeply down to the riverbed and is covered by tall grass, but otherwise open in fall. At the bottom of the talus slope a discontinuous stacked stone wall is present along the edge of the riverbed. The wall is probably an old cattle fence, and thus, unrelated to the petroglyphs. The bedrock exposure on the north side of the gulch is bounded on each end by a single Wililau tree and there are others on the opposite side of the gulch. A major electrical power line runs in the gulch bottom and power pole (PP) #186 is located in the riverbed directly below the site.

Another frieze of petroglyphs was discovered in the road corridor on the south wall of Kalaupapa Gulch, about 100 feet south of an unnumbered, corridor centerline stake. The stake is at the south edge of the gulch, and is about 85 feet north of centerline stake #317, thus, its number should be #316.15 (stake #316 + 15 feet see Figure 3). (Stake numbers on the Alternate U2A corridor increase from north to south.) This frieze of petroglyphs, like the other on the north side of the gulch, is located on a vertical exposure of blocky, jointed
Java of an area flow. There are a minimum of twenty-six pecked and incised anthropomorphic figures of stick and triangular types in this frieze. The exposed bedrock is approximately 150 to 200 ft. in length and ranges in height from 10 to 30 ft., forming a semi-circular niche in the south ridge of the gulch. At the back of the niche is a dry waterfall course roughly 8 ft. wide and 30 ft. High. The petroglyphs in this frieze are situated on the rock faces which are made of the waterfall at the back of the niche. These were observed marks of the waterfall although the lava exposure continues there. A re-alignment of a short section of this corridor 400 feet to make in Kahalapu’i gulch would not impact other historical properties and would avoid the two new areas of 50-50-10-1682.

At the base of the waterfall are plunge pools indicating a significant volume of water when there is a flow. The waterfall forms the confluence of the primary stream in Kahalapu’i gulch and this secondary unamed tributary stream draining Punalu’u and the ridge to the south.

Large trees of unknown classification of perhaps 60 feet in height provide the nīke with cool shade. Christmasberry trees and exotic grasses were also present. One plant observed in the sparse understory may be Namake.

State Site #: 50-50-10-4178
Site Type: Petroglyphs
Function: Symbolic
Corridor: Alternate U2
Features (#): 1

Description: 450-50-30-4178 comprises 15+ petroglyphs located on the north side of the south fork of Kahalapu’i Gulch. Previously recorded as Bishop Museum site MA-B29-1 (On and Stanwick 1988:93) the SHP site number is 50-50-10-1682. The petroglyphs consist of anthropomorphic figures and images that could be interpreted as canoe. They are located on the vertical basalt faces of an area lava flow exposed in the north wall of the gulch covering an area 6 m. (16.4 ft.) long and 3 m. (9.8 ft.) high. Vegetation at the site consists of exotic shrubs and grasses. No associated features or cultural material was observed in the area.

State Site #: 50-50-10-4180
Site Type: Enclosure
Function: Animal control
Corridor: Alternate U2
Features (#): 1

Description: Site 50-50-10-4180 (also known as site 1707-2 (McPhatter and Rosenblad 1994)) is a wall of small basalt boulders located on the steep, rocky, northern face of Kahalapu’i Gulch, marks of the Kahalapu’i Petroglyphs 450-50-10-1682/CNH). A segment of the wall about 12 m. (39.4 ft.) long, with a maximum height of 1 m. (3.3 ft.) and maximum width of 2.5 m. (8.2 ft.), was observed in the U2 corridor. The wall extends between two vertical rock faces of the gulch. The site is in poor condition with substantial collapse toward the gulch bottom. No cultural material was observed and it is unlikely that sediments in the vicinity of the wall would yield important information relative to its age or function. It is probable that the wall was used recently for control of grazing animals to keep them in the gulch and out of the pineapple fields. Some rocks on this north edge of Kahalapu’i gulch may also have been raked from the pineapple fields and dumped over the edge of the gulch. Vegetation at the site on the gulch slope consists of exotic shrubs and grasses.

State Site #: 50-50-10-4181
Site Type: Rock walls and rock piles
Function: Historic agriculture
Corridor: U2B
Features (#): 4

Description: The site is described in Walchen et al. 1990:6-9 as consisting of: (1) two "alignments forming terraces in a small scale between former pineapple fields" (features A and B, 5), and (2) two "land-clearing piles of rock, associated with pineapple cultivation," (features C and D). Features A and B were tested by archaeological excavation, the results of which indicated a recent age (mid-twentieth century) for the site.

State Site #: 50-50-10-4760
Site Type: Modified Outcrop
Function: Undetermined
Corridor: Alternate U2
Features (#): 1

Description: State site 50-50-10-4760 is a modified outcrop located on the west side of gently sloping bedrock approximately 50 m. (98 ft.) southeast of stake number -1758. The modified area is constructed of small to medium boulders and measures 4 m. (13.1 ft.) in length with a maximum height of 1.4 m. (4.6 ft.). The modified section has an uneven bedrock and cobble surface and is not well faced. A 1 1/2 inch water pipe and cattle trail run along the top of the modified outcrop, and blocks of cement are east of the outcrop along the waterline. Immediately around the site is close cropped pasture with water rough and deep mud. Willows are present at the site, and pandi grass is also present east of site 450-50-10-4760 in the adjacent property - separated by a fence line - where sites 50-50-10-4761 and 50-50-10-4762 are hunted. No cultural middens were observed at the site. Based on the observations a cultural deposit exists within the overhang shelter.
Function: Habitation, recurrent
Corridor: Alternate U2
Features: 1

Description: State site 50-50-10-4763 is an enclosure located near centerline stake 1582 on a gently sloping hill, surrounded by *papaw* cactus, tall pasture grass and oak trees that are probably a decade or more old. The enclosure, roughly oval in shape and approximately 20 m² (14.8 ft²), is comprised of small boulder boulders stacked 0.5 to 0.8 m high. The structure is in fair condition with some collapsing of the walls in the site interior. No cultural material was observed at the site, but the grass cover suggests sediments suitable for cultural material. Downstream to the east in State site 50-50-10-4763 and to the west in State site 50-50-10-4760 over the fence line in the adjacent pasture.

State Site #: 50-50-10-4762
Site Type: Enclosure
Function: Habitation, permanent
Corridor: Alternate U2
Features: 1

Description: State site 50-50-10-4762 is an enclosure located near centerline stake 1582 on a gently sloping hill, surrounded by *papaw* cactus, tall pasture grass and oak trees that are probably a decade or more old. The enclosure is roughly square in shape, approximately 39 m² (131.3 ft²), 8.4 m (27.5 ft) wide and 9.1 m (30.1 ft) deep, and composed of large boulder boulders stacked 0.5 to 0.8 m high. An apparent entrance is located in the center of the west side of the enclosure. Site 4762 is in good condition. No cultural material was observed at the site, but a cultural deposit is anticipated. The tall grass suggests that deep sediments may be present which could contain cultural material. Site 4761 is located upstream to the west and beyond 4762 is site 4760, across the fence line in the adjoining pasture.

State Site #: 50-50-10-4763
Site Type: Enclosure
Function: Animal control
Corridor: Alternate U3
Features: 1

Description: State site 50-50-10-4763 is a cattle padlock with 3 sides being barbed wire fencing and the northern side is dry masonry, stacked, boulder boulder wall. The wall is oriented *muklu* (north) along the ridge line on the south edge of Philaba gulch near center line stake number 223 approximately one thousand feet north of the Kosi Highway. The wall is 0.7 m (2.3 ft) wide and ranges in height from 0.1 to 1.8 m (2.3 to 5.8 ft) with a total length of 35 m (115 ft). The other three sides of the padlock are constructed of barbed fence wire strung between wooden posts with the south fence separating the pine fields and paddock. If the wall has always functioned as part of the enclosures it may have been related to cattle ranching. The wall then could date to the nineteenth century when ranching was even more widespread than today. Vegetation at the site consists of *papaw*, lantana, and exotic shrubs and grasses. The wall is in good condition. No cultural material was observed. Sediments are gravely, the terrace may be an old gravel bar of the stream.

State Site #: 50-50-10-4764
Site Type: Petroglyphs and overhang shelter
Function: Symbolic/habitation, recurrent
Corridor: Alternate U3
Features: 2

Description: State site 50-50-10-4764 consists of several rock faces containing a minimum of fifteen pecked and incised petroglyph figures and a cliff-overhang shelter. Located on the north wall of Philaba Gulch just muklu of center line stake number 579 and about halfway between the top and bottom of the gulch, the bedrock exposure comprising the site is the dense center of a nearly horizontal lava flow. The overhang shelter is beneath the flow's dense layer and measures 6.8 m (22.3 ft) wide and 3.5 m (11.5 ft) deep, with a maximum height of 1.7 m (5.6 ft). The petroglyph figures associated with the overhang shelter are found scattered above and inside the entrance area of the shelter. Petroglyph figures at the site consists of partial and complete, incised and pecked, stick and triangular anthropomorphic figures, animal forms that appear dog, bird, or fish-like, and several other nondescript shapes. Vegetation at the site consists of low bushes and various exotic grasses of up to eight feet in height. The site is in excellent condition. Cultural material observed at the feature consists of a large, cobble-sized, boulder core and several large wood pieces. Sediments are present in the shelter and may contain cultural deposits.

State Site #: 50-50-10-4765
Site Type: Mounds, road emb and irrigation ditch
Function: Agriculture (Sugar cane cultivation)
Corridor: Alternate U1/U2
Features: 3

Description: State site 50-50-10-4765 consists of features derived from sugar cane cultivation on this parcel of land between Philaba Road and Oma'opio Road, which has since been converted to pasture. Feature A is a historic irrigation ditch. Feature B consists of several agricultural clearing mounds, and Feature C is a small road segment. These features are located in gently sloping pasture land approximately 65 m (213 ft) northwest of center line stake number 1189. Vegetation in this section of the corridor consists of *papaw* cactus, few monkeypod trees, low bushes, and exotic grasses grown short which allowed for an unobstructed view of the ground. Feature A is an agricultural irrigation ditch. It passes through the Alternate U1/U2 corridor from *muklu* to muklu where it is primarily earthen in construction. Beyond the corridor boundaries there are remnants of muklu and small boulder boulders used in the ditch's construction. Although it is in disuse the ditch was traced to a small reservoir that is now part of a newer, active ditch system muklu of the U1/U2 road corridor, at the edge of
State Site #: 50-50-10-4766  
Site Type: Complex of C-shapes, enclosures, mounds, alignments  
Function: Agricultural/ habitation, temporary  
Corridor: Alternate X2  
Features (#): +30

Description: State site 50-50-10-4766 is a complex of +30 archaeological features that probably functioned as agricultural and habitation sites. The features include multiple C-shaped (2.3 m. diameter) and rectangular enclosures (approximately 3 features with 2.4 m. interior width), alignments, and mounds constructed of small basalt boulders. They are distributed along the top of a low, mokan mokau, or east-west oriented ridge line between centerline stakes 907 to 911. Multiple features are located on both sides of the staked center line. At the time of the survey the grass ground cover was dense and about two feet high precluding an accurate count of the features. The sites are in fair condition in land used as pasture for cattle for many years. No cultural material was observed in the sites probably because of the dense grass. The ground within the site cluster is very old as lava. This normally produces a substantial surface sediment layer. The thick growth of grass also indicates a good soil layer where archaeological deposits may be protected. The predominant tree is kahiau, however, kahiau, and occasionally iidida are also present.

State Site #: 50-50-10-4767  
Site Type: Enclosure  
Function: Agriculture  
Corridor: Alternate X2  
Features (#): 1

Description: State site 50-50-10-4767, a small, roughly circular enclosure approximately 3 m. (9.8 ft.) in diameter, is located on the north bank of a rivulet between centerline stakes 912 and 913, is constructed of small basalt overlaid stacked 1 to 3 courses high for a maximum height of 0.5 m. (1.6 ft.). Kaua and unntripped pasture grass predominate with sparse kahiau, and occasional iidida. The site is in fair condition; no cultural material was observed. The site is located to be part of a large archaeological complex, extending east and north of this single enclosure. Other features may be beyond the project area boundaries to the west also, probably joining with the features of site 50-50-10-4766. These other sites were not investigated because they are outside the project area. Sediments are almost surely present on this old lava surface, but are obscured by the grass cover. Archaeological materials may be buried in the sediments.

State Site #: 50-50-10-4768  
Site Type: Wall  
Function: Animal control  
Corridor: Alternate X2  
Features (#): 1

Description: State site 50-50-10-4768 is a meandering wall segment. The wall is located on the road centerline between centerline stakes 916 and 919. It is built along the perimeter of a natural depression in the terrain; the area may have served as a corral or pen to include or exclude animals. The wall is constructed of small to medium boulders in combination with sections of natural bedrock and in approximately 150 m. (500 ft.) long and 0.3 to 0.6 m. (1 to 2 ft.) wide, with a maximum height of approximately 1.3 m. (4.3 ft.). The depression is predominantly grass filled; surrounding areas are savannahs of kaua and unidentifed pasture grasses. The wall is in fair condition. No cultural material was observed. There may be sufficient sediment associated with the foundation of the wall in some places to establish a date of construction.

State Site #: 50-50-10-4769  
Site Type: Wall and wall  
Function: Animal control/ boundary marker  
Corridor: Alternate X2  
Features (#): 2

Description: State site 50-50-10-4769 consists of a wall segment (feature A) and an abv (feature B). These features are located approximately 45 m. (150 ft.) east of centerline stake 920 on the bank of a steep side slope. Vegetation at the site consists of kaua, kahiau, and various grasses.

Feature A is a wall segment constructed of small boulders stacked 1-4 courses high. The wall segment is approximately 0.5 m. (1.5 ft.) wide, with a maximum height of 5.2 m. (17.2 ft.). The total length of the wall feature is not known because it extends beyond the four hundred foot wide survey corridor. The feature is in fair condition. No cultural
material was observed, however, there may archaeological material associated with the wall foundation to establish a date of construction.

Feature B is an ahu feature constructed of small builders stacked 3 to 4 courses high. The site is approximately 0.9 m. (3 ft.) wide and 0.7 m. (2.3 ft.) tall. The feature is in fair condition. No cultural material was observed, however, there may archaeological material associated with the ahu foundation to establish a date of construction.

State Site #: 50-50-10-4770 Site Type: Enclosure and cairn Function: Habitation, temporary trail or boundary marker Corridor: Alternate K2 Features (#): 2

Description: State site #50-50-10-4770 consists of an enclosure (feature A) and an ahu (feature B) located at centerline stake 523 on an aa lava flow at the edge of a bapuha. The savannah persists on the aa and in the bapuha.

Feature A is a roughly circular enclosure located in gently sloping aa. It is constructed of small builders stacked 1 to 3 courses high for a wall construction height of 0.5 m. (1.6 ft.) and an average diameter 4.5 m. (14.8 ft.) The feature is in poor condition. No cultural material was observed, however, there may archaeological material associated with the wall foundation to establish a date of construction. The absence of other features in the vicinity of this structure detracts from the possibility the feature is related to agriculture. The presence of the nearby ahu, which may be a trail marker, could be used to argue for the site being a temporary habitation site. Test excavations during the inventory survey could aid in the interpretation of the site by determining if archaeological deposits are present. If present the deposits could provide material to further assess site function, and for age determination.

Feature B is an ahu feature constructed of small builders stacked 3 to 4 courses high with a maximum height of 0.6 m. (2.0 ft.) and width of 0.7 m. (2.3 ft.) The feature is in fair condition. No cultural material was observed and it is unlikely that there is archaeological material associated with the wall foundation that would be useful in establishing a date of construction.

State Site #: 50-50-10-4771 Site Type: Mound Function: Undetermined Corridor: Alternate K2 Features (#): 1

Description: State site #50-50-10-4771 is a mound located about 300 m. (980 ft.) n-wa'a of Piiha'i Highway at Ke Ali'i Anaau Road, in the midst of an area of recent, heavy building. It appears the builder/operator recognized and purposefully avoided the site while clearing the surrounding area. The building has obliterated the former landscape and other features, if present, around the mound. Thus, the context and estimated age of the mound is indeterminate. The building ground surface was inspected for archaeological remains of disturbed deposits, but no cultural material was seen. The mound is constructed of small builders stacked 3 to 5 courses high measuring 0.9 m. (3 ft.) wide with a maximum height of 0.7 m. (2.3 ft.) The site is in fair condition. No cultural material was observed. If this coridor is selected the mound should be excavated to test for archaeological material.

State Site #: 50-50-10-4772 Site Type: Wall Function: Ahupua'a boundary Corridor: Alternate K2 Features (#): 1

Description: State site #50-50-10-4772 is a dry masonry stone wall, running generally mauka/nahio, located between centerline stakes 528 and 529, along the boundary of two low flows of different ages. The wall is constructed of small and few medium builders and cobble stacked 5 to 7 courses high. Areas of bare rock were also observed along some sections of the wall which is 0.5 to 0.7 m. (1.6 to 2.3 ft.) wide and 1.4 to 1.7 m. (4.6 to 5.6 ft.) high. The total length of the wall was underestimated in the survey. It extends across the 400 ft. wide project area corridor and beyond its limits both to the east and the west. The wall is shown on the USGS topographic map as the boundary between Lahou'a and 'Ohe'e ahupua'a. This could be used to argue the wall probably dates to the late nineteenth century. The savannah persists on either side of the wall in spite of the differences in age of the two flows on either side, and panihi cactus makes an appearance at this elevation. The site is in excellent condition and appears to still be in use as a fence. No cultural material was observed. The sediments associated with the wall foundation could provide archaeological material for dating the structure especially if earlier wall structures are buried beneath the present one.

State Site #: 50-50-10-4773 Site Type: Enclosures, square (2), Enclosures, U-shaped (2) Function: Temporary military command post and rifle positions Corridor: Alternate K1 Features (#): 9

Description: State site #50-50-10-4773 consists of two complexes of enclosures. The first two enclosures are roughly square, located adjacent to a jeep road, and 0.5 m. (1.6 ft.) east of centerline stake 530. The enclosures are similar in site, being approximately 2.5 m. (8.2 ft.) square, and are constructed of small builders stacked 1 to 4 courses high with a maximum height of 0.5 m. (1.6 ft.). 'Ohe'e trees are growing in the sites, and the surrounding area is open savannah with 'Ohe'e trees and 'Ohe'e being common. The
The second set of 7 U-shaped enclosures consists of a minimum of seven U-shaped enclosures located between control lines 1119 and 1231 in level, well-covered terrain in open savanna. Signs of building are present in the area. The enclosures are uniform in construction style and size, measuring approximately 2.0 m (6.6 ft) in length and 1.5 m wide, and constructed of small boulders stacked 1 to 3 courses high. A few are nearly circular, but also have the opening on one side. Small depressions are found in the interior of each of the U-shaped features. Historic cultural material observed within the interior of the enclosures and in the general site area include live, small armament, spent shell casings, tin food containers, scrap metal and other assorted metal fragments. These features are in an area with wide spread building and abundant remains of military activities related to personal training. These activities probably took place during WWII. No pre-contact or other early historic cultural material was observed. There are sediments within these features, however, the evidence of building suggests cultural deposits are unlikely.

State Site #: 50-50-10-4774
Site Type: Wall
Function: Animal control
Corridor: Alternate U3
Features (#): 1

Description: State site 50-50-10-4774 is a dry masonry wall crossing the road corridor diagonally at control line stake 545. The wall extends along the slope contour generally north-south on the north side of Waikoa Gulch. This section of wall appears to be still in use as new burial wire fencing is used as part of the wall material where short sections of the wall have collapsed. The wall is constructed of small boulders stacked 3 to 6 courses high with a maximum of 1.3 m (4.3 ft) to 1.6 m (5.2 ft), with a maximum width of 0.8 m (2.6 ft). The wall was constructed of small boulders stacked 3 to 6 courses high with a maximum of 1.3 m (4.3 ft) to 1.6 m (5.2 ft), with a maximum width of 0.8 m (2.6 ft). The wall was constructed of small boulders stacked 3 to 6 courses high with a maximum of 1.3 m (4.3 ft) to 1.6 m (5.2 ft), with a maximum width of 0.8 m (2.6 ft). The wall was constructed of small boulders stacked 3 to 6 courses high with a maximum of 1.3 m (4.3 ft) to 1.6 m (5.2 ft), with a maximum width of 0.8 m (2.6 ft).
State Site #: 50-50-10-4077  
Site Type: Wall  
Function: Animal control/Field boundary  
Corridor: Alternate U1  
Features #: 1  

Description: State site #50-50-10-4077 is a wall located along the top edge of the north side of Kaliulii Gulch where it intersects the U1 corridor maker of Pokelaui town. The constructed portions of the wall are discontinuous sections consisting of blocky, vertical bedrock. A typical wall section has a height of over 3 m (between 3 and 4 ft) and is constructed of small to medium, slab-shaped boulders and cobble. Wood fence posts and wire fencing are currently being used to repair collapsed sections of the wall indicating its former use as a fence. The gulch is surrounded by cultivated sugarcane, but within the gulch there are various exotic grasses used for pasture and relict haiku and usually persist. No other cultural material was observed. However, there may be archaeological material associated with the wall foundation that could be used to establish a date of construction.

State Site #: 50-50-10-4078  
Site Type: Enclosure, L-shaped  
Function: Habitation, temporary  
Corridor: Alternate U1/A12  
Features #: 1  

Description: State site #50-50-10-4078 is an L-shaped enclosure located upon a flat soil surface on the southern edge of Waikapu Gulch at centerline state 1138. The L-shaped enclosure measures 1.5 m (4.8 ft) east-west by 1.5 m (4.8 ft) north-south, and is constructed of small boulders stacked 1 to 3 courses high to a maximum height of 0.5 m (1.8 ft). The open area of hinao trees and pasture grass at the site is consistent with the central project area as a whole. No cultural material was observed at the site. Grasses in the enclosure indicate some sediments there, but the site is in rocky terrain near the edge of the gulch which suggests these sediments are shallow.

State Site #: 50-50-10-4079  
Site Type: Shelter-cave  
Function: Habitation, temporary  
Corridor: Alternate U1/A2A  
Features #: 1  

Description: State site #50-50-10-4079 consists of a shelter-cave located in Kaliulii Gulch (see Figure 2 and the Photographic Appendix). The shelter-cave is excavated into a aa talus layer in the south wall of the gulch about 1.5 m (4.8 ft) above the gulch floor. The cave measures 2.1 m (7 ft) deep by 4.1 m (13 ft) long, with a ceiling height of 1.7 m (5.5 ft). Five boulders placed along the front edge of the cave floor are the only signs on the surface of human use of the site. No midden or artifacts were observed, but the shelter floor appears to be a slab of sediment that may contain intact archaeological deposits.

B. Summary of Results

Archaeological sites were recorded at twenty-five locations within the eight prehistoric alternate road segments during the reconnaissance survey. The sites fall into two general categories: 1) prehistoric sites including traditional sites in use in the early post-contact period, and 2) post-contact sites including historic and recent archaeological remains.

The prehistoric archaeological remains include simple shelter structures - which could have been used for temporary or recurrent shelter or sheltered planting areas - and three areas of extensive petroglyphs. The prehistoric habitation and agricultural sites occur in the coastal and mountainous extremes of the project area which were permanently occupied in prehistoric times. The petroglyphs occur only in the makaha sections of the corridors, in Kula.

The post-contact sites include: (1) stone walls for ranch fencing and corrals throughout the alternate corridors from Kīhei to Kula, (2) irrigation ditches, rock-clearing mounds and a road term for sugarcane cultivation occur at the edge of still active sugarcane fields at the edge of Kula, (3) and enclosures for military bivouac and troop maneuvers which occur in the middle section of the area of study.

The cave-shelter at the base of the north wall of Kaliulii Gulch - State Site 50-50-10-4079 - was probably used for temporary habitation, and it has potential to provide additional information on area history and prehistory. The site lies on, or very near, the west edge of corridor U2A where the corridor crosses Kaliulii Gulch. Its location could only be approximated because of the steep walls of the gulch. The site could be subjected to archaeological mitigation such as data recovery if necessary.

The sites will potentially be impacted because of their proximity to Alternate U2A, but they are present only in the two prominent gulches - Kaliulii and Kaliulii - and complete avoidance of the sites is possible by adjustment of the gulch crossing locations. There are no historic properties in Alternate U2A westward from Kaliulii to its intersection with Alternate U2B, nor in its combined modern termination point. Re-occupation of the U2A corridor in the east makaha within the limits of the reconnaissance as described here would not impact any historic properties.

The present reconnaissance of the Alternate U2A corridor from the north edge of Kaliulii Gulch westward to its terminus in the cane fields of Omao, did not locate any historic properties. The corridor passes through primarily cultivated fields of pineapple on the ridge. It crosses Kaliulii Gulch about six hundred feet east, or makaha, of a shelter-cave (field # CSH 183) identified in another surveyed corridor Alternate U2A, and over one thousand feet west, or makaha, of the well known Kaliulii Petroglyphs - 50-50-10-1061. We found the Kaliulii gulch walls to be nearly vertical from top to bottom in the vicinity
of the Alternate U2B and U2A crossings. Because of these conditions we inspected the entire section of the gulch from two hundred feet west, or east, of corridor U2A (where State site 50-50-10-4779 is found) to two hundred feet east, or west, of corridor U2B. We climbed the talus on both sides of the gulch to inspect all of the accessible bedrock exposures. No historic properties were observed other than 50-50-10-4779 on the west edge of U2A in either corridor, or between them, within Kalahalii gulch.

At its mouth and the proposed Alternate U2B road would entail cutting into the west and north sides of Pu‘u O Wehi, a cinder cone of Pleistocene age derived from the Kula volcanic series of Haleakalā. Our present research has not revealed a legendary history for Pu‘u O Wehi, nevertheless, it must certainly have been a prominent feature on the Kula landscape in prehistoric times. Its literal meaning, “hill of fear” (Pokai et al. 1974: 203), in the context of the petroglyphs to the north, west and south allows us to infer cultural significance. Furthermore, during the modern development of Kula the Pu‘u O Wehi cinder cone was used as a borrow pit, or quarry. Depending on the age of the quarry and its role in the development of Kula, Maui's road systems, or other formative events, the use of Pu‘u O Wehi as a quarry should also establish the pu‘u as an historic property.

Finally, the construction of Alternate U2B has the potential to indirectly impact the frozen petroglyphs in Kukupukini gulch. The area identified as field 420-50-10-1082 will require protective measures where the Alternate U2B road will cross the secondary stream west of Pu‘u O Wehi, along the south edge of Kukupukini gulch. Further work on the north side of Pu‘u O Wehi the Kukupukini petroglyphs, which are also known by the SHP # 50-50-10-1082, will potentially be impacted by construction of the U2B road. The petroglyphs are reportedly all on the north wall of Kukupukini gulch, but cutting and buttressing of the road could easily create a negative impact on these historic properties.

VI. SIGNIFICANCE OF THE HISTORIC PROPERTIES

Historic properties, or sites, are normally evaluated for significance on a preliminary basis during an archaeological inventory survey, according to broad criteria established for the National and Hawaii State Registers of Historic Places. However, the scope of work for this study asked for significance evaluation of the sites during the reconnaissance survey of the alternate Kula to Kula road corridor segments. Five criteria designations are used for site evaluation; the first four (A through E) are National Register criteria and the fifth (F) is unique to the Hawaii State Register. The meanings attached to the five criteria of significance are summarized as follows:

- **Criterion A**: is used for a site that reflects major trends or events in the history of the state or nation.
- **Criterion B**: is used for a site that is associated with the lives of persons significant in our past.
- **Criterion C**: is used for a site that is an excellent example of a site type.
- **Criterion D**: is used for a site that may be likely to yield information important in prehistory or history.
- **Criterion E**: is used for a site that has cultural significance, such as religious structures (shrines, temples), burial, or human burial locations.

The significance criteria assigned to each site is presented in Table 3, and is provided here in text.

All twenty-five sites identified during the reconnaissance survey are significant historic properties based on their potential to contain subsurface cultural deposits, and to provide comparative data on site architecture relative to site function and site distribution to settlement pattern.

Six sites meet multiple significance criteria: (1) State sites 50-50-50-1091, 50-50-10-1092, 50-50-10-4179, 50-50-10-4764 and 50-50-10-4179 are considered significant under Criteria C, D, and E, because they may be likely to yield information important in history and prehistory, they represent excellent examples of site types, and the sites have cultural significance because of the presence of the petroglyphs; (2) State sites 50-50-10-4762, 50-50-10-4779, and 50-50-10-4179 are considered significant under Criteria C and D because the sites are likely to yield information important in history and prehistory and it is an excellent example of the site type (shelter and shelter cove). The shelter-cave may yield varying types of scientific data which may include some or all of the following categories: subsurface cultural deposits, site ecology and structure function analysis, and site distribution and settlement patterns of oral land use.

The nineteen remaining sites are considered likely to yield information important to
prehistoric and historical (Criterion D)

The preferred route to maximize impact to the archaeological sites is K1, Segment C to approximately the 750 ft. anal, where Segment D veers to the NE running Poliho Road (P1) to Koolo Road (O1), and then goes to the UI terminus.

There is potential that Pu'uwai will be recognized later on as an historic site. Should this occur, Alternate USB would pose an impact to Pu'uwai, and any realignment of the maku'u portion of the corridor to the south side of the pu'au would impact other archaeological sites in the vicinity. The potential of Pu'uwai to be recognized as an historic property in the course of planning the final Kehili to Haleiwa road necessitates anticipating what significance criteria it would be assessed as follows:

1) In the context of Hawaiian history the site would probably be assigned criterion "E" for its inferred association with the frieze of the Kahanapaui Petroglyphs 50-50-10-10-10 and 50-50-10-10-10-10-10 south of Pu'uwai, and CSSH 101 and CSSH 102 west of Pu'uwai. These sites are significant under Criteria C, D, and E, of the National and State Historic Registers.

2) In the context of the quarry being recognized as having historic significance Pu'uwai, this would probably be assigned criterion A for its part in Maui's growth. Evidence of the quarrying activity is still evident in the remains of the cinder pu'au, and comparison of this and other contemporaneous cinder quarries on Maui could qualify Pu'uwai as a good example of the cinder quarry site-type. This could translate into assigning significance criterion C also.

Recognition of Pu'uwai as an historic property would not be easily mitigated because Alternate USB is designed to cut into the north side of the pu'au which would significantly alter its present condition.
<table>
<thead>
<tr>
<th>Site #</th>
<th>Location</th>
<th>Site Type</th>
<th>Function</th>
<th>Probable Age</th>
<th>Significance/Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>#50-50-10-4764</td>
<td>North side of Pukeko Gully at stake 4-578</td>
<td>Shelter/ Petroglyphs</td>
<td>Recurrent habitation/ symbol</td>
<td>P</td>
<td>C,D,E</td>
</tr>
<tr>
<td>#50-50-10-4765</td>
<td>65 m. northwest of stake 4-1183</td>
<td>Complex of mounds, road burn, and irrigation ditch</td>
<td>Agriculture</td>
<td>H</td>
<td>D</td>
</tr>
<tr>
<td>#50-50-10-4766</td>
<td>Between stake 4-957 and 911 both mounds and center of centerline</td>
<td>Complex of enclosures, alignments, mounds, C-shafts &amp; enclosures</td>
<td>Agriculture/ habitation, temporary</td>
<td>P</td>
<td>D</td>
</tr>
<tr>
<td>#50-50-10-4767</td>
<td>On centerline between stake 4-913 &amp; 4-915</td>
<td>Enclosure, circular</td>
<td>Agriculture</td>
<td>P</td>
<td>D</td>
</tr>
<tr>
<td>#50-50-10-4768</td>
<td>On centerline between stake 4-914 &amp; 4-920</td>
<td>Wall</td>
<td>Animal control</td>
<td>H</td>
<td>D</td>
</tr>
<tr>
<td>#50-50-10-4769</td>
<td>25 m. east of stake 4-920</td>
<td>Complex of wall &amp; Cairn</td>
<td>Animal control / boundary marker</td>
<td>P</td>
<td>D</td>
</tr>
<tr>
<td>#50-50-10-4770</td>
<td>At stake 4-922</td>
<td>Complex of enclosure &amp; Cairn</td>
<td>Habitation, temporary/ trail or boundary marker</td>
<td>P</td>
<td>D</td>
</tr>
<tr>
<td>#50-50-10-4771</td>
<td>300 m. mounds of Ke Alii Aloha Road &amp; Pilikani Highway</td>
<td>Mound</td>
<td>Undetermined field clearing?</td>
<td>H</td>
<td>D</td>
</tr>
<tr>
<td>#50-50-10-4772</td>
<td>Between stake 4-928 &amp; 929 along corridor centerline</td>
<td>Wall</td>
<td>Ahupua'a Boundary</td>
<td>P</td>
<td>D</td>
</tr>
</tbody>
</table>

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<table>
<thead>
<tr>
<th>Site #</th>
<th>Location</th>
<th>Site Type</th>
<th>Function</th>
<th>Probable Age</th>
<th>Significance/Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>#50-50-10-4773</td>
<td>5 m. east of stake 4-309 &amp; Both sides of centerline between stake 4-1118 &amp; 4-1259</td>
<td>Complex of enclosures</td>
<td>Military rifle practice</td>
<td>H</td>
<td>D</td>
</tr>
<tr>
<td>#50-50-10-4774</td>
<td>Between number stake 4-548 along northern side of Waiuku Gully</td>
<td>Wall</td>
<td>Animal control</td>
<td>H</td>
<td>D</td>
</tr>
<tr>
<td>#50-50-10-4775</td>
<td>On southern edge of Kului Gully between stake 4-567 &amp; 588</td>
<td>Wall</td>
<td>Animal control</td>
<td>H</td>
<td>D</td>
</tr>
<tr>
<td>#50-50-10-4776</td>
<td>East side of Kulamokai Gully between stake 4-3000 &amp; 3001</td>
<td>Midden and lithic scatter</td>
<td>Recurrent habitation</td>
<td>PH</td>
<td>D</td>
</tr>
<tr>
<td>#50-50-10-4777</td>
<td>Eastern edge of Kualalinui Gully, west of Pakalani</td>
<td>Wall</td>
<td>Animal control</td>
<td>H</td>
<td>D</td>
</tr>
<tr>
<td>#50-50-10-4778</td>
<td>Southern edge of Waiuku Gully at stake 4-1155</td>
<td>Enclosure, L-shaped</td>
<td>Habitation, temporary</td>
<td>P</td>
<td>D</td>
</tr>
<tr>
<td>#50-50-10-4779</td>
<td>West edge of corridor U2A where the corridor crosses Kulamokai Gully</td>
<td>Shelter Cave</td>
<td>Recurrent Habitation</td>
<td>P</td>
<td>C, D</td>
</tr>
</tbody>
</table>
VII. CONCLUSIONS AND RECOMMENDED TREATMENT

Conclusions

This report is intended to aid in planning the proposed Kīhei to Kula Uplands Highway. The report is not intended to satisfy County, State or Federal standards for a cultural resource inventory survey of the proposed highway.

There are twenty-five archaeological sites within the Alternate roadway alignments. All of the identified sites are evaluated as significant archaeological resources (refer to Table 3). These sites and associated features are present throughout all the proposed alignments and complete avoidance of them by road alignment is not possible (refer to Figure 3).

Traditional and historical activities affecting the project area include the following instances. Kula, traditionally an agricultural area, provided a major source of produce for Hawaii in the 1970s; the area still produces vegetables and flowers for the Hawaiian market. Hāna Ranch, Hālea Ranch, and Kēna Ranches continue to operate at this time. All of the proposed corridors pass through these ranch lands. Hawaii Commercial and Sugar Company and Maui Land and Pineapple Company, founded in the late 1800s and early 1900s, continue their operations within the study parcel. Military training use of specific lands within the project area is evidenced by five armed installations present at and around sites 5050-10-4773. The route Alternate X1 and K2 will tie into Pūlani Highway, originally constructed to ease the congested Kīhei traffic.

Recommended Treatment

Mitigation of impact to historic properties could be addressed by realignment of the Alternate route. If realignment to avoid sites in a particular area is not an option then mitigation at specific sites would be recommended on a preliminary basis as follows:

State sites 5050-10-4180, 4765, 4761, 4763, and 4765 through 4778, significant under National Register of Historic Places criteria D because they are likely to yield information important to history and prehistory, should be recorded as archaeological inventory survey level followed by data recovery at each site.

State site 5050-10-4762, significant under National Registers of Historic Places criteria C and D because they may be likely to yield information important to history and prehistory and are considered excellent site types, should be recorded as archaeological inventory survey level followed by preservation or data recovery.

State sites 5050-10-1061, 1062, 4718, 4719, and 4778 are significant under National Register criteria C and D because they may be likely to yield information important to history and prehistory and are considered excellent site types, and under Hawaiian Historic Preservation division administrative rules criteria E because they are culturally significant. The historic properties should be recorded as archaeological inventory survey level and ultimately preserved. Mitigation to avoid adverse impact to these sites may entail realignment of the alternate to avoid the sites.

The military site's (5050-10-4773) significance is limited to our knowledge of its
B. Summary of Results

The twenty-five archaeological sites recorded during the reconnaissance survey of the eight proposed alternate road segments fall into two general categories: 1) prehistoric sites including traditional sites in use in the early post-contact period, and 2) post-contact sites including historic and recent archaeological remains.

The prehistoric archaeological remains include simple shelter structures - which could have been used for temporary shelter or sheltered planting areas - and three areas of extensive petroglyphy. The prehistoric habitation and agricultural sites occur in the makai and interior areas of the project area which were permanently occupied in prehistoric times. The petroglyphs occur only in the makai sections of the corridor, in Kula.

The post-contact sites include: (1) stone walls for ranch fencing and corrals throughout the alternate corridors from Kīhei to Kula, (2) irrigation ditches, road-cleaning mounds and a road for sugar cane cultivation, and (3) the edge of still-active sugar cane fields at the edge of Kula, and (4) enclosures for military livestock. These occur in the middle section of the area of study.

Part of State site 50-50-10-1062 is physically within the east, or makai side of corridor U2A, adjacent to centerline state RT 14. The other part of 1062 is to the east of the corridor's eastern edge. Because of this we expanded the reconnaissance area in Kulaipalani gulch, four hundred feet to the west of the center line. No archaeological sites were found in the expanded area.

The core of Kulaipalani gulch was not impacted by the historical properties and would avoid State site 50-50-10-1062.

The cave shelter at the base of the south wall of Kaliakai gulch, State site 50-50-19-4779, was probably used for temporary habitation, and it has potential to provide additional information on the area's history and prehistory. The site lies on, or very near to, the west edge of corridor U2A where the corridor crosses Kaliakai gulch. Its location could only be approximated because of the steep walls of the gulch. The site could be subjected to archaeological mitigation such as data recovery if necessary.

About four hundred feet east, or makai, of the U2A corridor another four hundred feet wide alternative corridor - Alternate U2B - crosses Kaliakai gulch. Thus, the limit of the two corridors U2A and U2B nearly overlap here. The field we found the walls of Kaliakai gulch to be nearly vertical from top to bottom in the vicinity of the two alternative crossings. Because of these conditions we inspected the entire section of the gulch from two hundred feet east, or makai, of corridor U2A where State site 50-50-10-4779 is found to two hundred feet east, or makai, of corridor U2B. There are no historic properties other than this site in either corridor, or between them, within Kaliakai gulch.

The sites will potentially be impacted because of their proximity to Alternate U2A, but they are present only in the two prominent gulches - Kaliapalani and Kaliakai - and complete avoidance of the sites is possible by adjustment of the gulch crossing locations.

There are no historic properties in Alternate U2A westward from Kaliakai to its intersection with Alternate U2B, nor to their combined makai terminus point. Realignment of the U2A corridor to the east (makai) within the limits of the reconnaissance was not found to have any significant impact on historic properties.

During the survey of the Alternate U2B corridor, from the north edge of Kalipalani gulch westward to its terminus in the case fields of Kula pani, we did not locate any historic properties. The corridor passes through plowed cultivated fields of pineapple on the ridge. It crosses Kaliakai gulch about one hundred feet east, or makai, of a shelter cave (field site 50-50-10-4779) identified previously in corridor Alternate U2A, and over one thousand feet west, or makai, of the well-known Kaliapalani Petroglyphs - 50-50-10-

1061.

At its makai end the proposed Alternate U2B road would entail cutting into the west and north sides of Pu‘u oaiwa, a cinder cone of Pleistocene age derived from the Kula volcanic series of Haleakalā. Our present research has not revealed a legendary history for Pu‘u oaiwa, nevertheless, it must certainly have been a prominent feature on the Kula landscape in prehistoric times. Its literal meaning, "hill of feet," (Wahine’atoa et al. 1974: 305), in the context of the petroglyphs in the north, west and south allows us to infer cultural importance. Furthermore, during the modern development of Kula the Pu‘u oaiwa cinder cone was used as a borrow pit, or quarry. Depending on the age of the quarry and its role in the development of Kula, Maui’s road system, or other formative events, the use of Pu‘u oaiwa as a quarry should also establish the property as an historic property.

Finally, the construction of Alternate U2B has the potential to indirectly impact the forests of Kaliapalani gulch. The fenceline identified as State site 50-50-10-1002 in the Alternate U2A would require protective measures where the Alternate U2B road must cross the secondary stream west of Pu‘u oaiwa along the north edge of Kaliapalani gulch.

Further makai on the south side of Pu‘u oaiwa the Kaliapalani petroglyphs, which are also known by the SHIP # 50-50-10-1065, will potentially be impacted by construction of the U2B road. The petroglyphs are reportedly all on the south wall of Kalipalani gulch, but the construction could indirectly create a negative impact on these historic properties.

In summary, we urge the agencies to minimize the impact to the archaeological resources by the K1-10 Segment C to approximately the 700 ft. north, where it goes to the U1 terminus.
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APPENDIX A: PHOTOGRAPHIC APPENDIX

The photographs selected for this appendix are representative of the site types present within the project area. For this reason, photographs of every site and/or feature are not included.

Figure 19
Overview of cliff overhang shelter with petroglyphs, view to north, Site 50-50-10-1081

Figure 20
Close-up of petroglyph, single human figure with spear, pecked on north face of overhang Site 50-50-10-1081
Examples of the petroglyphs at State Site 50-50-10-1062. The 35mm camera lens cap is included to show scale.

Example of another petroglyph grouping at State Site 50-50-10-1062. Note the canoe-like petroglyph at top center of photo.

Example of petroglyph groupings at State Site 50-50-10-1062. Ruler used for scale is six inches long. Petroglyphs exhibit an unusual triangular pattern.

Close-up of canoe-like figure in petroglyph grouping shown in Figure 31.
Figure 2a
The overhang shelter at site 50-10-1060, beneath the petroglyphs.

Figure 2b
Remains of a small fire in the overhang shelter beneath the State site 50-10-1060.

Figure 4a
The niche, or alcove, at State site 50-10-1062, second panel. The petroglyph frieze is to the upper left, the plunge pool at the upper center, obscured by the underbrush. Possible monotone plants are at the lower left backed by the large boulder.

Figure 4b
Shelter-cave site State site 50-10-10-4779 in the south wall of Koahinai grotto. The front edge of the cave floor has five small boulders that level the floor of the shelter. View is to the west from near the streambed.
Figure 11: General view of State site # 50-50-10-2701, heinz. view to the northeast.

Figure 12: State site # 50-50-10-2701, heinz. view of a typical constructed pit in the structure surface at the northeast end.

Figure 13: View of State site # 50-50-10-2701, heinz. view to the southwest, showing the surface of the north end of the structure.

Figure 14: Downslope view from State site # 50-50-10-2701, heinz. view to the southwest, showing the view phase from the structure.
### Abusua's of Kula along the Potential Elieh Road Corridors with Land Commission Claims

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<th>IlAbusua, Award</th>
<th>Land Use</th>
<th>Comment</th>
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<td>Kaili</td>
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<td>Halakahale, sw Kekau, 2 aw</td>
<td>pasture of 6.5 acres, ir. potatoes not all together, 3 plantings of lr. potatoes, 1 aw Kula</td>
<td>Waimea</td>
<td>4557</td>
<td>1 ap. 4 Ahe Ap. 2&lt;br&gt;1 ap. 2.50 Ahe Ap. 4&lt;br&gt;1 ap. 1 Ahe Ap. 3&lt;br&gt;1 ap. 0.15 Ahe Ap. 1</td>
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<td>TMK 3-3-50 spana 1&lt;br&gt;2 ap. 3-3-40 spana 2</td>
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ARCHEOLOGICAL INVENTORY SURVEY OF THE PROPOSED KIHEI TO KULA ROAD CORRIDOR, KAULOA TO KA‘ONU‘ULU AHUPUA‘A
(TMK 2-05-001: por. 001, 002, 003, 009 2-05-002: por. 001, 002, 005, 015, 016 and 3-09-001: por. 016), MARAWAO AND WAILUKU DISTRICTS, ISLAND OF MAUI

by

Brian Colin, B.A.
David W. Blake, A.B.D.
Victoria S. Cook, Ph.D.
Anthony Bush, B.Ed.
and
Halton H. Harmon, Ph.D.

preparing
Parrnt, Brinkhoff, Qualls, and Douglas, Inc.

by

Cultural Surveys Hawaii, Inc.
December 2000

ABSTRACT

An archaeological inventory survey with limited subsurface testing was conducted by Cultural Surveys Hawaii’s (CSHI), Inc. for the proposed Kiihe-Upona County Highway on the island of Maui, TMK 2-05-001: por. 001, 002, 003, 009, 2-05-002: por. 001, 002, 005, 015, 016 and 3-09-001: por. 016. The road corridor extends 8.8 miles (14.1 kilometers) from the Hana Highway/Halama Road intersection, at approximately 850 feet above, to the intersection of Ka‘onu‘ulu Street and Pi‘ilani Highway at approximately 10 feet elevation. The study corridor is 200 ft (60.9 m) wide and encompasses approximately 360 acres. The proposed highway, which is on the western slopes of Haleakalā, extends from Kiihe to Ka‘onu‘ulu’s in the northeast through Kiihe, Kehelani, Pahu & Pāhoa, and Waipaku to Ka‘onu‘ulu’s in the southeast. The study corridor was identified as the preferred alternative by the State of Hawai‘i Department of Transportation among eight alternative alignments considered in the project Draft Environmental Impact Statement. CSHI conducted reconnaissance surveys of the eight alternative alignments.

The survey and testing were conducted between August 28, 2000 and October 3, 2000 by a crew that ranged from two to four archeologists. A total of seven days were spent in the field for a total of 10 person-days. Crew members included Kiihe/ulani Miller, B.A., Mary Fosnow, B.A., Lesliz rice, B.A., Thomas Deveroux, B.A., Tony Bush, B.Ed., and Ian Bennett with Brian Colin, B.A., acting as field director and Dr. Hal Harmon as the principal investigator.

A total of 175 structural and constructional features were identified. The archaeological features were organized into seventeen distinct sites that were evaluated as significant in accordance with the criteria of the National and Hawai‘i’s Register of Historic Places. These sites are associated with a variety of functions, including traditional Hawaiian temporary habitation (3712, 3713, 3745, 3525, 5039, 3034, and 5035), agriculture (3527 and 3730), symbolic art (3745, 5029, and 3039), historic agriculture (3730), animal husbandry (5039), and historic military training activities (3772, 3770, and 3771). Six of the sites (3712, 3713, 3745, 3710, 3713, and 3714) were initially recorded by Hairston researchers (Frederickson et al. 1987). Three of the sites, 3712, 3713, and 3716 were surface features in which the majority of cultural material was collected. Limited subsurface testing was conducted at six sites (3772, 3770, 3771, 5039, and 3034) to determine the presence or absence of subsurface deposits.

The results of the inventory survey reflect the broad range of land use varying from traditional Hawaiian temporary habitation and patoulage to historic military, ranching and agricultural activities. Temporary habitation sites were encountered between 45 to 109 ft. (14 to 33 m) above the portion (see project area) west of the corridor above Kiihe. A large historic military site was encountered in a cluster between 600 and 740 ft. (183 to 226 m) above Kiihe. Patoulage was encountered in both Waianae and Kaaialii Gulches. Remnants of historic sugar cane cultivation were observed and recorded in the section of the corridor between Pahu and Osuna in Waianae. Sections of cattle walls were encountered along the north side of Waianae Gulch.

Of the seventeen sites recorded, both patoulage sites (5039 and 3034) are recommended for preservation, data recovery is recommended for three temporary
habitation sites (5022, 5023, and 5024) and no further work is recommended for the military sites (3762, 3776, and 3778), the agricultural sites (3727, 3750, and 3758), the stone cairn marker (3729), the four temporary habitation surface scatters (3743, 3745, 3746 and 5024) and the cactus wall site (5025).

The two petroglyph sites (5029 and 5032), which are both recommended for preservation, are both located outside of corridor. Site 5029 is located on the north side of Kaliiolani Gulch approximately 200 ft. to the east of the study corridor centerline. Site 5031 is located on the south side of Waiakea Gulch approximately 200 ft. to the west of the study corridor centerline. Site 5032 was originally located near the center of the study corridor (15 ft. west of centerline) but the alignment was modified (moved 150 ft. to the east at Waiakea Gulch) to avoid any impact to the site.

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I. INTRODUCTION

At the request of Parsons, Brinckerhoff, Quade & Douglas Inc., Cultural Surveys Hawaii Inc. conducted an archaeological inventory survey with limited subsurface testing for the proposed Kileaua-Upcountry Maui Highway on the island of Maui. TMK 2-04-001: par. 001, 002, 003, 004, 2-04-002: par. 001, 002, 003, 014, 015, 016 and 2-08-001: par. 016.

Project Area Description

The proposed highway (Figure 1) extends 5.8 miles (9.3 kilometers) from the Hana Highway/Manoa Road intersection, at approximately 525-foot elevation, to the intersection of Kāʻahēne Street and Puʻukōki Highway at approximately the 600-foot elevation. The study corridor is 200 ft (61 m) wide, 150 ft on either side of a stacked centerline corridor chosen based on previous research (Folk et al. 1997) and encompasses approximately 300 acres. The proposed highway, which is on the western slopes of Kolekole, extends from Kalaʻau, Akihue-kia to Puʻu o Lā, Haiku Road, at Kāʻahēne Street to the southwest. The route is divided into three segments, Segments A, B and C. The segment designations are carried over from the reconnaissance survey of the area in which six different segments were analyzed.

1. Segment A is approximately 20,000 ft long. It begins at Kāʻahēne Highway at the intersection with Kāʻahēne Road, at 525 ft. The route then proceeds north through cultivated fields of sugarcane, crosses Kāʻahēne Road, to Puʻukōki Road. Segment A then continues south from Puʻukōki Road and across old road beds that have been converted to pasture. It then crosses Puʻukōki Road to the west of Puʻukōki Road at approximately 500 feet above sea level. Segment A crosses TMK 2-04-001, and 05 in addition to TMK 2-04-001, 02, 04, and 05. Segment A is owned by Alexander and Baldwin, Inc.

2. Segment B is approximately 10,000 ft long. It begins at Puʻukōki Road and extends southwest across active pineapple fields and pastureland to Puʻukōki Road at approximately 800 feet. Segment B crosses TMK 2-04-003, which is owned by Haikuola Ranch Company and leased by Maui Land & Pineapple Company, Inc.

3. Segment C is approximately 20,000 ft long and extends in a westward direction to the end of the corridor at the intersection of Puʻukōki Highway at Kāʻahēne Street at the approximate elevation of 400 ft. The segment traverses gently sloping pastures. Segment C crosses TMK 2-04-001 owned by Haikuola Ranch and TMK 2-04-002 and 2-04-003 owned by Haikuola Ranch.
The following Scope of Work is based on Title 15, subtitle 13, Chapter 270, Rules Governing Standards for Archaeological Inventory Survey and Report, was utilized for the present project:

1. A complete ground survey of the entire project area for the purpose of site inventory. All sites were located, described, and mapped with evaluation of function, interrelationships, and significance. Documentation included photographs and scale drawings of selected sites and complexes. All sites will be assigned State site numbers.

2. Limited subsurface testing to determine location, boundaries, depth and quantity of cultural materials within archaeological sites and to obtain datable samples for chronological information for sites in the immediate area, if such data is not available from previous studies.

3. Research on historic and archaeological background, included a search of historic maps, written records, Land Commission records, and Native Testimony. Research focused on the specific area with general background on the shughu'a district and will emphasize settlement patterns.

4. Preparation of a survey report which includes the following:
   a. A topographic map of the survey area showing all archaeological sites and site areas;
   b. Description of all archaeological sites with selected photographs, scale drawings, and discussions of function;
   c. Historical and archaeological background sections summarizing prehistoric and historic land use as they relate to the archaeological features;
   d. A summary of site categories and their significance in an archaeological and historic context;
   e. Recommendations based on all information generated which will specify what steps should be taken to mitigate impact of development on archaeological resources, such as data recovery (excavation) and preservation of specific areas. Recommendations will be developed in consultation with the landowner and State and County agencies.

II. NATURAL HISTORY

Geology

The project corridor traverses approximately 15.9 kilometers of the slightly dissected uplands in the traditional district of Kula on the western slope of Haleakalā Volcano, Island of Maui. Haleakalā is a shield volcano composed of pahoehoe and 'a'ā flows and associated pyroclastic materials.

Terrain in the project area is associated with the Kula Volcanic Series of the Pliocene epoch (Henderson et al. 1925). Lava of the Kula Series consist mostly of 'a'ā; eruptions were explosive to the extent that many large cinder cones were formed and beds of ash are common. These cones are present mostly on the western and northern slopes of the mountain but also occur on the western slope. One such cone, Pu'u Kahula, lies approximately one kilometer south of the central portion of the project area.

Soils of the Kauhakuli area include Kaahawa silty clay, Kahawai sandy silty clay, and Kahawai very stony silty clay loam. The northeast half of the project corridor north of Kahului Gulch. Soils of the Waianiko area include Waianiko very stony silty clay loam and Waianiko extremely stony clay banch dominate the area north of Kahului Gulch. All of these soils are well drained and developed in material weathered from basic igneous rock (Fonte et al.) through the Waianiko series differ in being influenced by volcanic ash.

Geography

The western slopes of Haleakalā are cut off from the northeast, tradewind pattern and typically receive scant rain owing to this wind shadow effect (Figure 2). The southern half of the project area receives approximately 400 mm (15 inches) of rainfall annually with the northern end of the project area receiving approximately 800 mm (20 inches) (Humlbeck et al. 1988:112). Mean monthly rainfall records show the heaviest rainfall to occur between November and March, ranging from 60-100 mm (from approximately 300 ft. to 2000 ft. small), with the months of April to October averaging between 8-25 mm. During the driest month, June, the area receives 0-10 mm. (Humlbeck et al. 1988:112).

There are no perennial streams in Kula district but flash floods of considerable volume periodically inundate the lowlands.

Typically, Kula is sunny and dry with an average temperature of 77°F with occasional variations ranging from the low 60s to the high 80s.

Vegetation consists predominately of pioneer and lowland shrubs and grasses, including lasi, finger grain, pili grass, fohn grass, hana, kia, paniolo, and natai grasses. Wildlife consists mostly of upland game birds (Fonte et al.).
Environmental Zones

Based on archaeological and ethnographic studies in the Kulua District, three land use zones consisting of: 1) coastal, 2) barren or transitional, and 3) inland have been postulated (Cordy 1977:3-8).

The coastal zone has been characterized as a quarter mile (400 m) wide band parallel to the shore. "The coastal zone is defined as the flat area near the sea with brackish marshes and the mudflats behind the coastal dunes and with associated raised dry areas." Cordy (1977:3) notes that this was a narrow area along the coast with permanent habitation, art, some fish traps, fishing shelters and burial sites. Twelve of the seventeen subzones of Kulua District (not including the subdivisions, i.e., Kula’api 1-19) appears to have never extended to the coast and had no coastal zone. Seven of these subzones traversed by the project area (Kula, Batan, Makau ‘ Oana, ‘Aku, Makau, Oahu’i, and Kula’api) have no coastal zone as they are cut off to the west (coast) by Waikoloa District.

The intermediate or barren zone (Cordy 1977 prefers the latter designation as having greater meaning for social patterns) is the dry area of flats back of the coast with less than 20 inches of annual rainfall. This zone of broad sandy grassland with gullies is about 15 kilometers (10 miles) wide in the northeastern subzone of Kulua District, and narrows down to 4 kilometers (2.5 miles) wide in the north at Kula. Cordy (1977:3-4) notes that this zone seemed to consist of bare trails and associated shelters leading to the uplands, but with some small dryland fields and associated field shelters near the shore. This zone is suggested (Cordy 1977:2) to have a very low density of sites. The entire project area lies within this barren zone.

The inland or upland field zone is stipulated to begin 8-11 kilometers (5-7 miles) inland and is characterized by brush vegetation and the occurrence of agricultural fields (Cordy 1977:3-4). The downslope edge of the inland zone is suggested (Cordy 1977:3) to approximate the 20-inch rainfall isohyet which lies close to the alignment of Kula Highway and Kulua Highway (Figure 3). This is suggested to be the approximate lower limit for large-scale aboriginal agriculture. Cordy (1977:3) notes that this zone had continuous dryland fields, permanent houses, some burials,极少 of small-moderate size, and petroglyphs in many gullies. Cordy notes that a major trail passed through these fields just seaward of today’s Kula Highway and that this is a high density site zone.

Cordy (1977:2) posits the existence of two additional zones further up slope: a forest zone and a zone above the tree-line. He notes that the historic site patterns of the forest zone are poorly known but that site density is expected to be low. The above the tree-line zone is associated with quarters, trails and shelters. The approximate boundaries of these environmental zones are shown on Figure 3.
III. HISTORIC BACKGROUND

The project area lies entirely in the intertidal zone, referred to by Hawaiians as the "kule or dryland plain zone", located between the near coastal zone and the "inland zone" which begins at approximately 2000 ft. above (Clark 1973:2). Although the field work for this project developed no data pertinent to any other area this historic background review seeks to develop data pertinent to other areas of Kula District to provide the basis for settlement pattern model discussion and indicate the types of anticipated finds in the present project area.

A. Pre-Contact Period

Our knowledge of patterns of settlement in the pre-contact period comes from mythological and historical accounts, archaeological studies, early explorer accounts and inferences drawn from patterns in the early historic period.

1. The Coastal Zone in the Pre-Contact Period

Traditional accounts related to the upland district of Kula emphasize the lack of familiarity of the Kula people with the sea. Perhaps most famous is the saying:

"Kula o wai pukaikia ha. Kula people, makers of the needle on the track of the octopus" (Pukui 1935:9111)

This proverb was used in fun of the people of Kula, Maui. The tradition is that a Kula chief who lived inland did not know what the sea was or how to catch fish. Then an adult Hawaiian would not be familiar with octopus would indeed be remarkable and the account suggests the remarkable territorial limits of the pre-contact Hawaiians of Kula District, Maui. Two other traditional sayings similarly denote the lack of maritime customs of the Kula people:

"Ma Kula no ke kau bama ma ihi.  
"Ma Kula bama he ma who are such poor paddlers."  
(Pukui 1935:1333)

and

"O Kula i ka ho he kama.  
"Kula of the ignorant canoe paddlers."  
(Pukui 1935:2742)

Pukui offers an explanation: "Said of Kula, Maui, whose people did not know how to paddles because they were inlanders." The Kula people were prevented by their inlandness.

The historical settlement survey by Kula et al. (1957:50) discusses the distribution of maritime archaeological sites (fish points and harpoon) based on Winifred Walker's 1931 survey augmented by Kula's 1991 research (Figure 9. The only "mobile" sites discussed"
Along the coast are the fish pond and two associated house at Kalopolikai settlement in coastal Waiuluhu. These studies note the “surprising lack of coastal temples” and that in fact these two coastal temples represent only 14% of the district total number of temples (Koh et al. 1997:78). The authors of this settlement survey note the common assumption that typically house would be built in and around the community settlements and that these populations were likely to be larger than we would expect based on the house data. If this pattern held true for Kualoa then a large number of house at Kalopolikai suggest that almost all settlement was concentrated there as well, rather than the main town (Koh et al. 1997:30). The authors of this settlement survey note that this pattern is anomalous not only for Hawaii in general but also surprising when compared to other western Kualoa island districts such as Huna’ula and Kalamana. Possible explanations suggested are: survey bias or early coastal development or more likely, the “extraordinary distance between habitable upcountry regions and the coast” (Koh et al. 1997:36). Other present explanations are the extraordinarily low rainfall and the propensity of flood. Coastal Kualoa receives less than 10% of rainfall a year and it is a long walk up to the 10' isohyets, which lies above 1000' elevation (Figure 2). Hånnvall and Shideler (2003:10-11) point out that in the ancient past, flooding events due to tsunami, rainfall, and heavy surf in the twentieth century and note that at a distance of 300 m from the coast in central Kualoa the elevation is typically only 1.5-2.5 m above the 10' isohytes. The “coastal town lies within the Kualoa flood plain and is remarkably prone to severe backwater flooding. Another factor discouraging coastal settlement would be “kalo” and the Kaumulu wind which swept this place (Kalopolikai) at times like a beastly tornado” (O’Brien 1991:46).

Clearly there was always a force of habitation and activity at Kalopolikai in pre-contact times with its Kalopolikai Fishpond and two houses (Kualoa and Kalalaua kiawe). Unfortunately, much of the archaeological record of coastal Kualoa district was removed by early resort development that took place before the implementation of the current historic preservation review process. As Koh et al. (1997:147) point out the development proceeded without archaeological work, and as a result little information is available, and many of the coastal Kualoa sites have been destroyed. Thus we know little about the coastal area of Kalopolikai.

Recent work near Waiuluhu’s stone church just south of Kalalaua’s Road (Papalia and Koh, in press; McDonald et al. 2000) has added greatly to our knowledge of the early Pre-contact period at Kualoa. Carbon dating and associated pollen analysis indicate direct human habitation of the Kualoa coastal environment in the period between 500 and 1000 AD. With evidence of landscape change from Dry-Mesic forest to an environment characterized by disturbance-loving species beginning in that period and complete by the time frame of 1300-1450 (McDonald et al. 2000:64).

The cultural sequence in Kualoa noticed in the Koh et al. (1997:281) settlement survey concludes there was very low instability of the coast and uplands, largely focused on exploitation of natural resources, prior to A.D. 1300. This settlement survey suggests...
that initial permanent settlement of coastal Kona may have begun during A.D. 1200-1400 and that the presence of settlement both on the shores and in the uplands seems to mark the establishment of a dual settlement pattern (habitation and upland) from the very start of permanent occupation in Kona (Kohlo et al. 1997:534). The dating for the initial permanent settlement of coastal Kona appears to be geographically extrapolated from two early dates from coastal sites in Ka`ula`ula District (Kohlo et al. 1997:188).

The few available radiocarbon dates from the general vicinity of the current project area are consistent in their rather broad, later prehistoric age determinations, most commonly post 1000 A.D. (Federicksen et al. 1990; Federicksen et al. 1994; Federicksen et al. 1999). This fits with the model that the more intensive use of the ko`a forest was a later prehistoric development that corresponded with the expansion of upland permanent habitation, ceremonial constructions, and agricultural clearing after the late 1500 A.D. (Kohlo et al. 1997:281-283). The fishponds are traditionally thought to date to the late 1600s (Kohlo et al. 1997:66).

The presence of three additional fishponds (Waikohli kea, K ...

II. The Upland Field Zone in the Pre-contact Period

as the map of notable pre-contact archaeological sites (fishponds and fishponds) of Kona District (Figure 4) clearly shows, these sites were overwhelmingly located between the 2000-foot and 4000-foot elevation contours. If, as seems likely, there is a steep correlation between kula (farmland and habitation density that "almost all settlement was concentrated there as well" (Kohlo et al. 1997:28). The location of notable archaeological sites runs remarkably closely to the 200-foot isobaths (Figure 3) running along approximately the 2000-foot elevation in the southern half of Kona District (as far north as Pu`uholo [Lea`apou]) and then dropping down to lower elevations further to the north. The distribution of notable archaeological sites would seem to suggest that prehistoric occupation in Kona was quite dispersed across this inland upland field zone with perhaps slightly lower population densities in the northwestern direction (Kupuna, "A`ouko, Kula `o Kona upounu`a" appear to have only one house amongst them).

The settlement survey by Kohlo et al. (1997:38) concludes that prior to circa A.D. 1200 the human activity was limited to intermittent exploitation of forest resources (particularly of koa). Settlement and farming were understood as beginning circa A.D. 1200-1400 and "the first large scale period of up-country permanent settlement occurred in the 1400s-1600s." Forest clearing was increasing during this period on the dryland field systems expanded. The settlement survey concluded that:

In the A.D. 1600s, even more permanent habitations appear in the archaeological record along with more medium stand koa and the larger garden enclosures. Grasslands with shrubs begin to dominate the area under agriculture, showing the expansion of lands under farming...no evidence of population decline or stabilization appears. (Kohlo et al. 1997: 282)

Some traditional Hawaiian说法s probably dating to this late pre-contact period note environmental characteristics of Kula. The multiple references to avoava probably indicates the practice of burning the land before planting new sweet potato patches.

*Uka koa i anu i Kula, ke Hau. The avoava of Kula remained low and small. burned by the Hau winds.

(Pukui, 1895:19-20)

*Koʻolau ka uka i Kula, ke Hau. The avoava of Kula ceased growing when the Hau breeze blows.

(Pukui, 1895:19-20)
Another saying, relating a story of a man from Kela and a woman from Ke'ana, emphasizes the sense of identity of the man with the agriculture/potato production of Kela.

"A ka 'oewi hau na ia a Ke'ana, a ka 'oewi ho'omewi 'umua ia a Kela."

"In the past as the king of Ke'ana, he was the 'id digging stick for the potato [plant] of Kela."

(Tuku'i, 1982:82147)

Kela was traditionally famous for its 'aloa (sweet potato) "plantations" (Handy 1910:161; Handy and Handy 1972:131,278; Sili; Kolb 1997: 25). The combination of good soil developed in volcanic ash, cool temperatures and frequent clouds to lower evapo-transpiration and bring moisture as fog drip, and rainfall distributed fairly evenly throughout the year would also have allowed for taro cultivation.

Archaeological studies in this upland field zone (Riddle 1987; Bowen 1989; Moore and Kennedy 1990) indicate high site densities, and by logical extensions high pre-contact population densities. In her study of O'au'a'o, Donham (1992:6) discusses the pressures on he'ehi and the subsequent inference that a large permanent population must have been present, as well.

The Coastal Zone in the Prehistoric Period

Relatively little archaeological research has been undertaken on the Kela sites above 4,000 feet elevation. Work at higher elevations (P. Roeder 1979; M. Roeder 1979; M. Asmat 1992) has identified primarily cave shelters, wall shelters, and caves. One of the main routes of access to Hānahānui Grotto ascended through the ohia alai of Pā'ū Kūkaha and Kailali of Kela District with a road house located just north of Pā'ū Kūkaha (Stirling 1991:202). Kāhakilei Akua'a's entrance into the summit region (Stirling 1984:234). The pre-contact utilization of one higher elevation resource, mānau wood, is suggested in one proverbial saying about the Kela people. Mānau was used for making the woden digging sticks, the most important tool of potato farming (Malo 1990:154).

"Na kekii ka ratana, na kekii a Kela."

The tubers of Kela, who dig and pull the ratana up by the root.

Pukui, 1982:2935

B. Early Historic Period

For elaboration on the subject of whaling, the Irish potato industry, the Chinese presence in Kela, ranching, and sugar cultivation the reader is referred to Helen Wong Smith's research as presented in Bowen and Haua (1989:Appendix C). A general overview is provided in the following sections along with supplemental information not covered by Wong Smith.
II. The Forest Zone in the Early Historic Period

Developments in the forest zone during the early historic period remain largely undocumented. Presumably the Halpul Trail, which ran up the middle of Waialua 'ahu'ahu'a, would have been more heavily utilized and perhaps somewhat developed to provide the major artery between the upland field zone and the halo-pupu estuary. Another major development was the establishment of ranching in the Kula region prior to the 1840s (Brown and Isaac 1852:60). While the issue of early ranching endeavors is not well documented, the Kula grass lands would have been a natural focus. Cundy (in Frederickson et al. 1954:2) notes that the majority of Kama'ale 'ahu'ahu'a's at that time, as noted in Māhele records, was government cattle range.

III. The Upland Field Zone in the Early Historic Period

The whaling industry effectively affected the Kula/Kahului area with its agricultural demands. The introduction of whaling to the Maui community brought with it an increased demand for the potatoes. As a result, after 1830 dryland agriculture in the upland field area of Kula District expanded to include the Kula potato. The California Gold Rush of 1849 intensified this demand as a California Hawai'i potato trade began in Kula. Kula became the area of highest potato production and came to be known as "the potato district" (the area between 2000 and 3000 ft. small).

James (in Kuykendall 1930:313) describes the Kula area in July 1840 in the midst of the cash cropping boom of Kula potatoes there.

"It ranges along the mountains (Halakalā) between 2000 and 3000 feet elevation, for the distance of 12 miles. The forest is but partially cleared, and the seed put into the rich virgin soil."

Potato production thrived in Kula from 1870-1880 until successful potato cultivation and production in California and Oregon reached a decline in the Hawai'i trade (Burgess and Spacer 1958:6-7). Denmark (1925:2) notes that the introduction of land clearing and cultivation associated with the Gold Rush resulted in "deforestation which adversely affected the amount of rainfall in the district, and periods of drought became more common."

Substantial forest clearing for commercial agriculture, especially potatoes and sugar cultivation, does not appear to have occurred until the mid-1800s.

While it lasted, the increase in agricultural production associated with the potato industry encouraged many Hawaiians to venture into cash-cropping (Spierman 1934:110) and attracted Chinese immigrants to Kula in the 1840s. During the subsequent 20 to 40 years the Chinese created a thriving community (Burgess and Spacer 1958:7).

Sugar cultivation was present prior to 1840, with six sugar producers operating on the slopes of Halakalā (Wong-Smith in Brown and Isaac 1852:13). In or by the 1840s plantation crops, such as sugar, grew up, with small communities with churches, stores and homes (all of which have since disappeared).

IV. Recent Further Updates in the Early Historic Period

We really have no data on this subject. It seems unlikely that the introduction of temperate cultivation ("riek" potatoes and wheat) encouraged cultivation at higher elevations but this would really have been an inland extension of the traditional upland field zone.

C. Mid-1800s (Land Occupation Claims/Awards)

According to Kamehameha III's (1852-53) Ke Koa 'ō Kamoe, the District of Kula before the Māhele. In the Māhele land division of 1848 the "Kula" (Ke Koa 'ō Kamoe) district had certain lands including Kukuku 'ahu'ahu'a and the "A'ī of Kula 1 & 2, Kuleana as "Government lands." 'A'ī pāo'o, 'A'ī pāo'o 2, Hou 'āloha 'ahu'ahu'a, and Hou 'āloha 'ahu'ahu'a, Kūkuku 'ahu'ahu'a, Kuleana 1 & 2, O'ōpau 6-11, Pi'ilu, and Wa'alae 'ahu'ahu'a. No particular pattern is suggested in these Crown and Government claims.

Certain 'A'ī received very large parcels of Kula district lands. The high chiefess, Ana Kekaha'ula (also known as Kekaha'ula wahine, she was the great granddaughter of Kamehameha and Kamao'o; one of Kamehameha's four sons "Hilena"), claims and gets the 'ahu'ahu'a of 'A'īpāo'o, Alu 3, Kuleana, Kulaheo 3 & 4, Kuleana, and Kuleana. The Kulaheo 'A'ī, Kuleana Helelaua, claimed and was awarded the entire 'ahu'ahu'a of Kulaheo, an 1740 acres (LCA 3227). The little known "A'ī" received O'ōpau 1-4. Another important portion of the land claimed, the land commissioner of Kula, recorded Alu 3 without a claim and three 'A'īpāo'o in Wa'alae.

Seemingly a relatively large number of 'A'ī claimed Kula district lands but had their claims denied. Kekaha'ula wahine claimed but didn't receive O'ōpau 1-4, Kulaheo 'A'ī, Hou 'āloha 'ahu'ahu'a claims but doesn't get Hou 'āloha, Kuleana claims but doesn't get Kuleana, Kuleana claims but doesn't get Kuleana, Kuleana, Hou 'āloha claims Kuleana and Kuleana but gets neither. Kuleana's claim is for the entire 'ahu'ahu'a of Kulaheo. Kulaheo is not awarded his claims in O'ōpau and Kuleana. Of the 1740 acres, only three, Kuleana, Kulaheo, and Kuleana, claim house lots.

Of greater interest in reconstituting patterns of land use are the commercial kula claims. In the records of the Land Commissioner (1843-1851) there were 206 claims made for the District of Kula on Maui, and almost half of these are for parcels in more than one 'ahu'ahu'a. The number of parcels claimed by each claimant varies between one and 14. Claims range from the 'A'ī in local residents and included in this range are many claims from outside the Kula District, who are raising potato crops or have ranching pastures. An article in the Polynesian newspaper for November 24, 1849 noted: "Kula, however, is full of people. Strangers from Wa'alae, Hamakua, and Lahaina are there preparing the ground and planting."
No Kalapoapa land claims lie within any of the ahupua'a traversed by the project area within a distance of approximately one kilometer of the project area. Therefore there may have been Kalapoapa claims in Wailuku District within a kilometer of the north end of the project. The closest Kalapoapa land claims in Kula District were those at Kulaopapa Village (Figure 8) discussed below.

1. The Coastal Zone in the Mid 1800s Period

At Kalapoapa in Ka'ana'u there were numerous ko'a located just southeast of the Kalapoapa 'ahu‘i and approximately a kilometer southwest of the west end of the project corridor (Table 1, Figure 8).

There appear to be five awarded Kalapoapa claims at Kalapoapa, three awarded under Ka'ana'u Akuponu's (MCA 4110, 4021, and 4319) and two awarded under Akuponu's (MCA 6279 and 7794). The estimate for the awards under Kalapoapa's (MCA 4110, 4021, and 4319) is smaller at the nearest point of this ahupua'a is understood as being approximately 3.9 kilometers to the south of Kalapoapa Village. Possibly this represents a pattern of migration to commercial centers discussed previously, where people from Kalapoapa claiming land near the Kalapoapa entrance, but in no means certain. It appears that Māhā地毯 (Table 1) report approximately a dozen koa'a at Kalapoapa near the majority unawarded, as is often the case, it is unclear whether all of the koa'a (aka'au) claimed are in the vicinity of the Kalapoapa settlement site or not. Possibly the potato patches, tao lands, and pasture mentioned are all near the settlement. Wini (1921:67) describes Kalapoapa of the eighteen districts of a place where "Dornac trees and kou trees grow beside pools of clear water, along the banks of which grows the taro and the uka". Some of these claims, however, could have been quite distant.

Hupauaha Huaheahe (the Aloha for the Maui lands of Kalaukinahele) one of Kamehameha's wives, claimed and was awarded the entire koa'a of 'Akanu'ahoe, of 5,710 acres (LCA 2327). He claimed this land from the time of Kamehameha I in 1782 (well before the Kamehameha forces conquered the island of Maui), through use of Kamehameha's wife who was from Maui. Huaheahe also claims the fish pond at Kalapoapa in another claim. His permanent place of residence was Kalapoapa.

We are unable to identify any Kalapoapa claims awarded anywhere else in coastal Kula District beside Kalapoapa. Māhā地毯 indicate a few l-o-uanawarded Kalapoapa claims at "Lai'o", which may be the Lai'o on the coast where Wainahalani and Hekene akuponu's meet, but this is uncertain.

2. The Beach Zone in the Mid 1800s Period

That no Kalapoapa land claims are known to lie within any of the ahupua'a traversed by the project area within a distance of approximately one kilometer of the project area attests to just how barren the beach zone was in the mid 1800s.

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Table 1: Kalapoapa Claims to the Land Commission in Kulaopapa Village and Vicinity

<table>
<thead>
<tr>
<th>Aloha'a</th>
<th>Waihoku'a, Award</th>
<th>Land Use</th>
<th>Claimant</th>
<th>Claim #</th>
<th>Average acre</th>
<th>Remarks</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kalapoapa</td>
<td>Ka'o'ahau</td>
<td>1.</td>
<td>Hupauaha</td>
<td>2464</td>
<td>0.25 ha</td>
<td>Minor</td>
<td></td>
</tr>
<tr>
<td>Kalapoapa</td>
<td>Ka'o'ahau</td>
<td>2.</td>
<td>Hupauaha</td>
<td>2529</td>
<td>0.25 ha</td>
<td>Minor</td>
<td></td>
</tr>
</tbody>
</table>
It is certainly possible that some of the "pasture land" claims lay in the banned zone. Pasture lands are claimed 36 times throughout the District, but it is possible some might have been more generic "alle or greased claims, translated into pasture in English.

Eight of these claims were in Pahala, one in Pāhānaha, and five in Waikoloa. Except for Ahi pasture (LCA 2611), at 3,600 feet to 3,000 feet elevation on ʻOoʻopa, most of these pasture claims were not reserved and their location in terms of zone is uncertain.

The location of the Ahi pasture suggests that many or all of the "alle" or "pasture land" claims were in feet on the upland field zone.

The Kaulu land claims in the upland field zone allow for an estimate of the width of the hale zone in the various ʻAhuilu of Kula District. The hale zone lies between the following approximate elevations at the time of the ʻAhuilu and Kaulu claims (Table 2).

Table 2: Kula Zone Elevations of Kula District (from South to North)

<table>
<thead>
<tr>
<th>ʻAhuilu</th>
<th>Approx. Elevations (in Feet)</th>
<th>Approx. Distance from Coast to top of Kula Zone (Km)</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Waiakolu</td>
<td>4000 to 2100</td>
<td>8.1</td>
<td></td>
</tr>
<tr>
<td>Keokea</td>
<td>3500 to 2000</td>
<td>11.0</td>
<td></td>
</tr>
<tr>
<td>Waikolo</td>
<td>3500 to 2300</td>
<td>12.0</td>
<td></td>
</tr>
<tr>
<td>ʻOoʻopa</td>
<td>4000 to 3000</td>
<td>13.4</td>
<td>ʻAhuilu does not quite reach the coast</td>
</tr>
<tr>
<td>ʻAhuilu</td>
<td>4000 to 2000</td>
<td>13.7</td>
<td></td>
</tr>
<tr>
<td>Alae</td>
<td>3600 to 2300</td>
<td>15</td>
<td>Seaward end of ʻAhuilu is at approx. 1000' elevation</td>
</tr>
<tr>
<td>Waikolo</td>
<td>4000 to 2100</td>
<td>14</td>
<td></td>
</tr>
<tr>
<td>Kaawhainui</td>
<td>1800 to 2500</td>
<td>16</td>
<td>Seaward end of ʻAhuilu is at approx. 1500' elevation</td>
</tr>
<tr>
<td>Pahanui</td>
<td>2000</td>
<td>17</td>
<td>Seaward end of ʻAhuilu is at approx. 1500' elevation</td>
</tr>
<tr>
<td>Pahana</td>
<td>4500 to 2400</td>
<td>17</td>
<td>No coastal zone, cut off by Waikolo District</td>
</tr>
<tr>
<td>ʻOoʻopa</td>
<td>4500 to 2000</td>
<td>16</td>
<td>No coastal zone, cut off by Waikolo District</td>
</tr>
</tbody>
</table>

Figure 5: Map showing the location of Kaulu land claims at Kālepuʻole in relation to the West End of the Project Area.
<table>
<thead>
<tr>
<th>Ahupua`a</th>
<th>Approx. Elevation (in Feet)</th>
<th>Approx. Distance From Coast to Top of Kula Zone (km)</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kalaalii</td>
<td>450 to 2200</td>
<td>10</td>
<td>No coastal zone, cut off by Wailuku District</td>
</tr>
<tr>
<td>`Apaepae</td>
<td>450 to 2200</td>
<td>16</td>
<td>No coastal zone, cut off by Wailuku District</td>
</tr>
<tr>
<td>Maka`ohu</td>
<td>450 to 7</td>
<td>17</td>
<td>No coastal zone, cut off by Wailuku District</td>
</tr>
<tr>
<td>Kealuhu</td>
<td>450 to 1970</td>
<td>-</td>
<td>Cut off by Wailuku District seaward and Kalaalii landward; less entirely in Kula zone</td>
</tr>
<tr>
<td>Kalua</td>
<td>450 to 1970</td>
<td>-</td>
<td>Cut off by Wailuku District seaward and Kalaalii landward; less entirely in Kula zone</td>
</tr>
<tr>
<td>Hii<code>a</code>ula</td>
<td>450 to ?</td>
<td>-</td>
<td>No coastal zone, cut off by Wailuku District; no data is available on the upland field zone</td>
</tr>
</tbody>
</table>

About the same time as the Kula and Ka`ahumanu estates were engaged in the District to establish ranches and plantations for sugar cane in this kula zone.

### The Upland Field Zone in the Mid 1800s Period

"`Aloha-ama`a" is used by Haole to describe that area before the various forest and mountain zones. "These grow the mean fern and here men cultivate the land" (Kulau 1976:17). It is this kind of non-Ahoana that is most particularly detailed in the land claims.

In the Kula area, unlike most other areas of the islands in general, claimants did not confine their claims to one ahupua`a or even one district. A large number of claimants requested `Aloha-ama`a in two, three, or more ahupua`a and the same claimant may also register several different claim numbers. We find "migrant farmers" who came from elsewhere on Maui (i.e. Lahaina or Waihe`e) or Kula who either came occasionally to work in their fields, or are absentee landlords having other non-`ama`a claims (Kula claims) for them. The booming viticultural trade for whales and the California gold fields may have significantly changed residential and agricultural patterns by the mid 1800s from what they had been in pre-contact times.

By the time of the Kula and Kula, the major bases of settlement and food production was along the Government Main and the Old Kula road. The vast majority of Kula land claims (i.e. 1817-1850) in the Kula District are situated along the old Kula Road between 1,500-foot elevation (in the north) and 2,000-foot elevation in the southern part of the district within a zone where there is sufficient natural rain and where it is cool enough for sugar cane. Of the land claims for the nation Kula District, by far, the greatest number are for plots of potatoes, both sweet and Irish (451 plots claimed). There are also claims for bananas and particularly in Wainaku and Upper Kula in a zone around the 2,000-foot elevation. Sugarcane is mentioned in one claim in `Omohua at about 2,000-foot elevation. There are only two claims for pig pens in the district and one in Pukohala at about 2,300-foot elevation. There are three mentions of acorns, one (unidentified) in Kalaalii, and two in `Omohua at about 3,000-foot elevation, with one of those latter being a small stream. Claims of "Kula" lands in this upland zone included pasture while other "Kula" lands in this upland field zone were used for dryland crops, such as bananas, some dryland taro, with occasional sugar cane patches, and grass lands. A few pig pens are also mentioned. In the southern area of Kula, there were the claims for two lands.

In the Kula District, Kula land claims there is special kind of claims that is claimed on where else in the islands, "`Aloha-ama`a" or "winter" Kula. While the concept of "`Aloha-ama`a" claims is not exactly clear it appears likely that these were typically lands which could be worked in the winter winter months but which did not support agriculture during the driest summer months. Twenty-one "winter fields" are claimed in Kula, Maui; one in Kalaalii, two in Kula, three in Kula, three in `Omohua, two in Pukohala, and eight in Kula; while. While many of these are unworked and cannot be located in today's maps, many of the `Aloha-ama`a claims that can be located appear to typically be on the downslope edge of the upland field zone, just seaward of present-day Kula highway. Our claim (100008) specifies that this winter field to "`Aloha"" but how far in "seaward" this claim is unclear. Only two winter Kula claims mention the type of crop grown there and these two specify Irish potatoes. Three of the claims for winter Kula (Kalaalii, Kula, and `Omohua) to 11' at about 2,600-foot elevation) are, however, associated with a bog (mala) which calls into question the assumption that these were exclusively rainy season plots.

Another unusual term, used in Kula District and a few other places on Maui, is "mala mo`o" (which the Archivist translated believed might be small pockets of plantations, probably of sweet potatoes) found throughout the upland field zone.

The Kula map drawn by Kimes and Dodge (1872-1873; Registered Map No. 1100) (Figure 1) shows only some of the awarded claims, and some differ from numbers these shown on the TNA. What is evident on this Kimes and Dodge map is that some of the names of Land Commission claimants appear with great numbers. Helen Wong-Smith (in Douch 1990:8-9) notes that prior to the Kula, land in Kula was offered for sale, five-sixths, to native Hawaiians. These parcels (measuring close to 100) were bought from 5 to 10 acres and were purchased for $1.00 an acre, and may explain why many claims are not shown on maps as was the custom those had already opted for great status. Land Grants were also purchased by Hawaiians and appear to consolidate scattered holdings, and occur particularly in the Kula cultivating area (See McGerty and Sperr 2000).
Table 3: Upland Field Zone Elevations of Selected Claims in Kula District (from South to North)

<table>
<thead>
<tr>
<th>Ahupuna's</th>
<th>Approx. Elevations (in Feet)</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kama'ole</td>
<td>2,400'-3,000'</td>
<td>39 claims with potato fields, 13 with houses, 1 with taro and 1 with bananas</td>
</tr>
<tr>
<td>Kihikini</td>
<td>2,000'-3,200'</td>
<td>32 claims with potato fields, 14 with houses, 24 with taro and 4 with bananas</td>
</tr>
<tr>
<td>Waikoki</td>
<td>2,000'-3,200'</td>
<td>35 claims with potato fields, 23 with houses, 9 with taro and 12 with bananas</td>
</tr>
<tr>
<td>Hana</td>
<td>3,000'</td>
<td>6 claims with potato fields, 1 with taro</td>
</tr>
<tr>
<td>Ka'ae'ina</td>
<td>2,000'</td>
<td>29 claims with potato fields, 1 with taro</td>
</tr>
<tr>
<td>Aina</td>
<td>2,000'</td>
<td>1 claim with potato fields, 1 with a house</td>
</tr>
<tr>
<td>Waiakua</td>
<td>2,000'-2,800'</td>
<td>6 claims with potato fields, 1 with a house</td>
</tr>
<tr>
<td>Kealakea</td>
<td>2,000'-2,300'</td>
<td>3 claims with potato fields</td>
</tr>
<tr>
<td>Honehono</td>
<td>2,100'-3,400'</td>
<td>7 claims with potato fields</td>
</tr>
<tr>
<td>Piliku</td>
<td>2,400'-3,200'</td>
<td>7 claims with potato fields</td>
</tr>
<tr>
<td>'Ona'pio</td>
<td>2,000'-3,000'</td>
<td>8 claims with potato fields, 2 with houses</td>
</tr>
<tr>
<td>Kaliakui</td>
<td>2,100'</td>
<td>7 claims with potato fields, 2 with houses, 1 with taro and 1 with bananas</td>
</tr>
<tr>
<td>'A'pio</td>
<td>2,000'</td>
<td>2 claims with potato fields, 1 with a house</td>
</tr>
<tr>
<td>Makake'ina</td>
<td>n.d.</td>
<td>No claims?</td>
</tr>
<tr>
<td>Kohola</td>
<td>n.d.</td>
<td>No claims?</td>
</tr>
<tr>
<td>Kalau</td>
<td>n.d.</td>
<td>No claims?</td>
</tr>
<tr>
<td>Hi'ilona</td>
<td>n.d.</td>
<td>No claims?</td>
</tr>
</tbody>
</table>

The settlement pattern in the upland field zone indicated on the Maunawili and Dodge map (Figure 2) and in Table 3 shows that this habitation/agricultural zone follows a relatively uniform contour as far as it can be documented. From Kama'ole in the south to Hana in the north, this zone typically begins on the down-slope side between 3,200 to 3,500 feet elevation close to the 50° rain isolates. There is really very little evidence for this zone further north, but it appears to be descending in elevation - presumably following the exact rain isolates (see Figure 2). The Maunawili and Dodge map (Figure 2) and Table 3, however, also show that this zone should not be considered as a uniform band of
habitation and agricultural activity across slope. The upland field area of three ‘ahu’a (Kemena, Kekaha and Wainiha) accounts for 60 house claims and 107 potato fields while the fourteen northern ‘ahu’a (Kanu‘u, Kekaha and Wainiha) collectively account for only seven house claims and fifty-seven potato field claims. This may in part reflect a random bias of the data, as there was clearly a good deal of activity in the upland field area of Wainiha ‘ahu’a (Figure 6) despite the few house and potato fields specifically claimed there. It still appears, however, that the upland area of the southern portion of Kula District supported a much higher density of habitation and agriculture than did the northern lands.

4. Zona Further Uplose in the Mid-1800s Period

Traditional activities in zona further uplopes probably decreased in the mid 1800s as a result of Hawaiian population decline. Cattle and goats probably made incursions in upper forests which had never been subjected to evident agriculture resulting in the increased erosion noted below. The approximate limits of the ‘ahu’a zona further uplopes can be estimated by locating the upper limit of kahana claims and noting the uplopes extent of the ‘ahu’a of Kula District (Table 4).

Table 4: Elevations of Zona Further Uplose in Kula District

<table>
<thead>
<tr>
<th>‘Ahu’u</th>
<th>Approx. Elevation (in Feet)</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kemena</td>
<td>3200-7000’</td>
<td>Ends at Pu‘u Kekaha</td>
</tr>
<tr>
<td>Kekaha</td>
<td>2300-7200’</td>
<td>Beheded by Papaanui</td>
</tr>
<tr>
<td>Wainiha</td>
<td>3200-8000’</td>
<td>Ends at Kalapana</td>
</tr>
<tr>
<td>Eheu</td>
<td>3600-6000’</td>
<td>Pitched out by Ka‘o‘o‘u and Wainiha</td>
</tr>
<tr>
<td>Kau‘au ‘ulu</td>
<td>2500-5000’</td>
<td>Beheded by Papaanui</td>
</tr>
<tr>
<td>Alae</td>
<td>3500-1050’</td>
<td>Pitched out by Ka‘o‘o‘u and Wainiha</td>
</tr>
<tr>
<td>Waikahoa</td>
<td>2500-10000’</td>
<td>To summit</td>
</tr>
<tr>
<td>Koahoula</td>
<td>3600-10000’</td>
<td>To summit</td>
</tr>
<tr>
<td>Kamalani</td>
<td>3600-7700’</td>
<td>To summit</td>
</tr>
<tr>
<td>‘A’pio</td>
<td>3300-10000’</td>
<td>To summit</td>
</tr>
</tbody>
</table>

D. Late 1800s Period

L. The Coastal Zone in the Late 1800s Period

Coastal activity remained focused at Kakeahau. Day whaling was evidently still going strong in 1852 with G. J. Harris noting with much success that try-works were erected at his Kakeahau Station.” (Tanner 1913:45) Established on his 2,450 acres at Kakeahau until 1876, closing shop when the potato industry diminished and moving to ‘Ukapalaoa (Stevens 1973:28–31). Wilson (1925:28) relates an account of acute environmental degradation in Kula circa the 1870s as follows:

In the [eighteen] nineties and later, the Kula mountains had gradually become denuded of their forests, terrestrial winter rains were washing down earth from the uplands filling with all the pands at Kakeahau,” cattle trampling down the brush and grass of the nearby fields causing sand dunes to drift, filling up the Kakeahau pond, and the daily erosion which once eroded the heated air had changed to a scouring daily situation, sweeping clouds of dust and drifting sand over the partly abandoned site of the [Kakeahau] village. So the seclusion, ruins of grass house partly covered by clothing sand, and a few weather beaten huts propped on the head top of the old upland well at the edge of the sea, with the Hali‘ian board house overlooking them and shadowy in the daily swirl of dust and flying sand, impressed on the passerby that unluckily name bestowed on the village in song and story as a reproach - Kakeahau, “the dirty place.”

This was a far cry from the Kakeahau of the eighteen-fifties in which “caneast trees and kava trees grew beside pools of clear water, along the banks of which grew the fern and the ope.”

The coastal portion of Kula, were used for ranching activities by Haleakalā Ranch Company in the late 1800s (Dunham 1990:6).
II. The Kona Zone in the Late 1800s Period

By the 1880s the kona zone consisted primarily of pasture land for ranching (Wing Smith in Duffield 1995:10-11). The Land Grants show that Hakalau Ranch Co., patented 2168 acres in Kona in 1891. Kennedy (1932:7) notes that at this point kane was imported to feed cattle and provide wood. Maps from late 1800s/early 1900s indicate that several ranching companies owned and operated land in the broad expanse of Kona land in the kona zone of Kona District.

III. The Upland Field Zone in the Late 1800s Period

Wilson (1921:40) relates that "In the late nineteenth century the Irish potato trade had become unimportant and later ceased altogether." The declining decades of the potato industry were somewhat off set by wheat. Wilson (1921:40) relates that, "during the wheat boom of the eighteen-seventies and early eighties when the upper Kona country was cropped to wheat." In the later decades of the 1800s the upland field zone was used intensively for ranching. E. D. Baldwin relates that in 1881 "There were some of the owners of WaikoloaPlantations living above the Government Road and only a few miles of sand road (Steinberg 1968:32). A major reason for abandonment was that "Waikoloa had been over run with cattle for years."

IV. Zones Further Uplands in the Late 1800s Period

While the acute environmental degradation of the 1870s Wilson related above probably affected all environmental zones, it may have been most severe on the native forest of the higher elevations. Cattle and goats probably continued to make incursions in upper forests which had never been subject to swidden or commercial agriculture.

Sugar companies began operating in the Kona area in the late 1800s. The Hawaiian Commercial and Sugar Company was founded in 1878 by Charles Spalding and in 1882 became the Hawaiian Commercial and Sugar Company (HC&S), based in Pavao. In 1899 the company was acquired by investors headed by J.B. Castle, with Alexander & Baldwin replacing the plantation agents.

E. Early 1900s To The Present

I. The Coastal Zone in the Twentieth Century Period

The Kiholo Plantation Company, located on the shores of Mahalaea Bay was chartered in 1829 by an illusory group including B. F. Dillingham, H.P. Baldwin, L.A. Thurston, J.P. Cooke and M.P. Robinson. Following poor returns, the Kiholo Plantation Company was absorbed or merged into the Hawaiian Commercial and Sugar Company in 1906 (Cooke and Beilenson 1972:230). It seems probable that the Kiholo Plantation Company sugar lands were quite similar to the Kiholo lands of the Hawaiian Commercial and Sugar Company shown on a map by H. I. Shimeraker dated 1910. This 1910 map indicates extensive sugar cane fields with some pastures lying seaward of the "Long Point" at approximately 250 feet elevation. Some of these fields went virtually to the coast. The best KPC fields continued to be cultivated cane are still productive, while the remaining plantation lands become cattle pastures. (Cone 1976:15) The upland limit of these fields corresponds closely with the modern Waikoloa-Kona District boundary, or the seaward edge of Pahukoa, Keau’o, Kailua, ‘Ana’u, Maho‘a, Heleia, Kealakekua Bay and Kona’s Ali‘i Pua'a.

While World War I had little impact on Kona, World War II brought with it a significant military presence. Speckman (1984:108) notes that the military activities at the Kona Naval Air Station also offered a new source of employment for Kona residents. Speckman (1984:108) notes that during this period the naval air station also provided a new source of employment for Kona residents.

Kiihi underwent a rapid residential and commercial development beginning in the 1970s. Clark (1981:23) notes that the ground for this development was established in the late 1850s when investors began purchasing coastal property. However, the construction boom of high rise apartments, hotels, and condominiums and accompanying shopping centers, restaurants, and real estate offices didn’t occur until the 1970s. Speckman (1984:188) notes that along with the commercialization and "classy" hotels (Maui’s "Bali-Hi") came congestion and overcrowding which resulted from this development. Though partially blamed on the fact that Kiihi was owned by many proprietors or speculators, each with individual plans synchronized with general planning, partly on the failure of the County planners to hold the line against the runaway development. Kiihi became the model for the wrong way to go about expansion. "Kiihi Highway was constructed to ease the congested Kiihi traffic which resulted from this development and expansion of the tourist industry.

II. The Kona Zone in the Twentieth Century Period

In 1992 Henry H. Baldwin received a grant for 873 acres (Grant 2167 owned by HOKU-2 5-4-21) in Kona to establish a wind farm. With pineapple, sugar, and dairy in the area, "a suitable plantation community developed at Kiihi, a few miles below Pahukoa, complete with school post office, and church, all of which has now disappeared and been replaced with sugar cane" (Bertelsen and Bailey 1951:131). Kohala Camp lay approximately 4 kilometers west of the north end of the project area at the seaward edge of Kiihi Ali‘u’s. A 1949 map of Hawaii Commercial and Sugar Company shows extensive fields extending up to the Hikumakai Ditch at approximately 1000 feet elevation extending across an expanse of Pahukoa, Keau’o, Kailua, ‘Ana’u, Maho‘a, Heleia, Kealakekua Bay and Kona’s Ali‘i Pua'a.

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Kebon, Kahum and Mahiku'ula (Apunin). Then it can be safely assumed that most of the sugar cane field infrastructure observed in the northern 60% of the project area dates between 1920 and 1930. HCEBC currently occupies the cane fields which blanket the northern third of the study parcel (Figure 7).

Pineapple cultivation was introduced to Makawao in the early 1930s. The Maui Agricultural Company (M.A.Co.), primarily a sugar producer, began planting pineapples in its upland parcels. Some of the M.A.C. fields in the higher elevations were too far from the main line railhead and lacked a water supply for flooding and irrigation. In 1933 the plantation started planting pineapples on these lands—the C.P.C. (California Packing Company) concern then built a large cannery. The M.A.C. Co. moved the cannery workers from Pukalani to Kahului." (Gaudet and Buss 1973:223)

Maui Land and Pineapple Company also had its beginnings during this time period. According to Speckman (1984:130-131) the company started as Baldwin Packers which then became Maui Pineapple Company, owned by Alexander & Baldwin. The company developed over the 1930s and 1940s, becoming "the largest producer of pineapple on Maui." The Comfort family then took control and the company became Maui Land and Pineapple Company. Maui Land and Pineapple Company continues to cultivate pineapples within the western reaches of the study parcel (Figure 7).

Buquet and Spatz (1958:6) discuss the introduction of ranching ventures into the uplands of Kula in the early 1950s. Haleakalā Ranch and Kāʻūmoʻulu Ranch continue to run cattle over a huge expanse of the "barren area" of Kula District.

Speckman (1984:188) notes that along with the Kīhei construction boom in the late twentieth century came the construction of millionaire homes in the dry hills overlooking Kīhei and the view beyond of Kīhei's bride and Moloka'i.

iii. The Upland Field Zone in the Twentieth Century Period

In 1966 the Kula Pipeline was built during a harsch drought, expanding the water resources of the Kula area (Krick in Kennedy 1992:7). Haleakalā Ranch and Kāʻūmoʻulu Ranch continue to run cattle over a huge expanse of the "upland field zone" of Kula District.

iv. Zones Further Uplands in the Twentieth Century Period

Haleakalā Ranch and Kāʻūmoʻulu Ranch continue to run cattle over a huge expanse of the "upper mountain uplands" of Kula District. During the 1970s, Kula produced the majority of Hawai'i's locally grown produce and livestock ranches comprised most of the remaining land use. At present, non-residential areas are still in use as centers of agricultural production.
IV. SUMMARY AND PREDICTIVE MODEL

The project area appears to be located entirely in valleys (dryland plains) or "barren zone" of Kula District (see Figure 2). The visibility of these terrains results in the absence of dense vegetation and the absence of any large trees or shrubs. The area has a moderate elevation above the mean sea level, ranging from 100 to 300 feet. The vegetation is primarily scrubby, with some low-growing shrubs and grasses. The area is relatively flat, with only minor variations in elevation.

Corresponding with the dryland plains, there is a high density of agricultural fields, particularly in the northern and western parts of the project area. The fields are primarily used for row crops, with some small-scale livestock farming. The fields are well-irrigated, with a network of small canals and ditches. The fields are typically divided into small plots, with each plot being owned by a single family. The fields are managed by the families themselves, with the help of hired labor during the peak growing season.

The soils in the project area are primarily loamy, with a high water-holding capacity. The soils are well-drained, with a moderate to high pH level. The soils are typically fertile, with a high organic matter content. The soils are well-suited for a variety of crops, including rice, vegetables, and fruits.

V. PREVIOUS ARCHAEOLOGICAL RESEARCH

Previous archaeological research in Kula District has been limited. A summary of the previous research is presented in Table 1 below.

<table>
<thead>
<tr>
<th>Date</th>
<th>Author</th>
<th>Method</th>
<th>Nature of Study</th>
<th>Findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>1918</td>
<td>T. Thurn</td>
<td>Island-wide</td>
<td>Stratigraphic survey</td>
<td>1 site on Maui</td>
</tr>
<tr>
<td>1939</td>
<td>J. Steck</td>
<td>Island-wide</td>
<td>Ethnographic study</td>
<td>1 site on Maui</td>
</tr>
<tr>
<td>1949</td>
<td>W. Walker</td>
<td>Entire Island</td>
<td>Historical analysis</td>
<td>1 site on Maui</td>
</tr>
<tr>
<td>1957</td>
<td>J. Cox &amp; E. Satcher</td>
<td>Area-wide</td>
<td>Ethnographic study</td>
<td>1 site on Maui</td>
</tr>
</tbody>
</table>

The results of the previous research suggest that the area has a long history of human occupation. The earliest known occupation dates back to the 1st millennium BCE, with evidence of small settlements and subsistence farming. The area was likely a hub of cultural exchange, with trade routes connecting the island with the mainland and other islands.

The area has a rich biodiversity, with a variety of plants and animals. The area is home to a number of endangered species, including the Kula Shorebird, the Kula Moa, and the Kula Dragonfly. The area is also home to a number of indigenous plants, including the Kula Shrub, the Kula Cherry, and the Kula Fern.

The area is a popular destination for tourists, with a number of hiking trails and scenic viewpoints. The area is home to a number of cultural sites, including ancient fortifications, temples, and burial sites. The area is also home to a number of historic churches and missions, including the Kula Mission and the Kula Church.
<table>
<thead>
<tr>
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<th>Author</th>
<th>Nature of Study</th>
<th>Findings</th>
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<td>1959</td>
<td>J. Kennedy</td>
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<td>1990</td>
<td>T. Duham</td>
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<td>1990</td>
<td>W. Fredericksen &amp; D. Fredericksen</td>
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<td>1990</td>
<td>W. Fredericksen &amp; D. Fredericksen</td>
<td>Coastal Rākeha</td>
<td>Survey &amp; Monitoring</td>
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<tr>
<td>1990</td>
<td>W. Fredericksen &amp; D. Fredericksen</td>
<td>Coastal Rākeha</td>
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<td>1990</td>
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<td>Reconnaissance</td>
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<td>1990</td>
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<td>Survey</td>
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<td>1990</td>
<td>J. Kennedy</td>
<td>Kama’ale, 30F elevation</td>
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</tr>
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<td>1990</td>
<td>A. Sino ico</td>
<td>Coastal Waikolu</td>
<td>Survey &amp; Testing</td>
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<td>1990</td>
<td>A. Sino ico</td>
<td>Coastal Kama’ale</td>
<td>Reconnaissance</td>
</tr>
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<td>1991</td>
<td>W. Fredericksen &amp; D. Fredericksen</td>
<td>Coastal Kama’ale</td>
<td>Subsurface Inventory Survey</td>
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<table>
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<tr>
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<th>Author</th>
<th>Kama’ale</th>
<th>Nature of Study</th>
<th>Findings</th>
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<tbody>
<tr>
<td>1991</td>
<td>W. Fredericksen &amp; D. Fredericksen</td>
<td>Coastal Kama’ale</td>
<td>Subsurface Inventory Survey</td>
<td>No significant archaeological findings (only modern trash)</td>
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<td>1991</td>
<td>J. Kennedy</td>
<td>Coastal Kama’ale</td>
<td>Reconnaissance</td>
<td>No archaeological findings</td>
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<td>1991</td>
<td>J. Kennedy &amp; M. Herkhaus</td>
<td>Coastal Kama’ale</td>
<td>Inventory survey</td>
<td>No archaeological findings</td>
</tr>
<tr>
<td>1991</td>
<td>L. Hansel &amp; J. Pantale</td>
<td>Coastal Kama’ale</td>
<td>Surface Survey</td>
<td>No archaeological findings</td>
</tr>
<tr>
<td>1992</td>
<td>H. Hammatt &amp; D. Shideler</td>
<td>Coastal Kama’ale</td>
<td>Survey &amp; Testing of M. Hammatt &amp; D. Shideler 1989 study area</td>
<td>Identified 2 probable hao fishing sites among 8 sites</td>
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<td>1992</td>
<td>J. Kennedy</td>
<td>Coastal Kama’ale</td>
<td>Inventory survey</td>
<td>Identified 4 sites including a prominent pre-contact habitation/religious site</td>
</tr>
<tr>
<td>1992</td>
<td>J. Kennedy &amp; M. Herkhaus</td>
<td>Coastal Kama’ale</td>
<td>Inventory Survey &amp; Subsurface Testing</td>
<td>Identified 4 sites all believed to be historic two military and 2 ranching</td>
</tr>
<tr>
<td>1992</td>
<td>Sino ico &amp; Pantale</td>
<td>Coastal Pilihaua</td>
<td>Inventory Survey</td>
<td>No archaeological findings other than a bridge foundation (site-1332)</td>
</tr>
<tr>
<td>1992</td>
<td>E. Sear</td>
<td>Coastal Rākeha</td>
<td>Inventory Survey</td>
<td>No archaeological findings</td>
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<tr>
<td>1993</td>
<td>W. Folk &amp; H. Hammatt</td>
<td>Oma’ipo, 2500 elevation</td>
<td>Survey &amp; Testing</td>
<td>These sites identified</td>
</tr>
<tr>
<td>1993</td>
<td>D. Fredericksen et al.</td>
<td>Coastal Waikolu</td>
<td>Inventory Survey &amp; Data</td>
<td>A rock abber excavation yielded lithic artifacts, wooden and a date of A.D. 1500 to 1800</td>
</tr>
<tr>
<td>1993</td>
<td>W. Fredericksen &amp; D. Fredericksen</td>
<td>Oma’ipo</td>
<td>Inventory Survey</td>
<td>No sites identified</td>
</tr>
<tr>
<td>Date</td>
<td>Author</td>
<td>Abapa’u’a</td>
<td>Nature of Study</td>
<td>Findings</td>
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<tr>
<td>----------</td>
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</tr>
<tr>
<td>1994</td>
<td>D. Fredericksen et al.</td>
<td>Coastal Kama’ale</td>
<td>Inventory Survey</td>
<td>2 sites were identified including a midden scatter &amp; a concrete cloughhouse foundation</td>
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<tr>
<td>1994</td>
<td>E. Fredericksen et al.</td>
<td>Kama’a’e</td>
<td>Inventory Survey</td>
<td>Radiocarbon date reported as AD 1430 to 1790</td>
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<tr>
<td>1994</td>
<td>E. Fredericksen et al.</td>
<td>Coastal Kama’ale</td>
<td>Subsurface Testing</td>
<td>Work at Site 60-50-10-262</td>
</tr>
<tr>
<td>1994</td>
<td>R. Fredericksen et al.</td>
<td>Kaua’ula, north of Pali Hwy.</td>
<td>Inventory Survey</td>
<td>21 sites were identified, some military and some pre-contact</td>
</tr>
<tr>
<td>1994</td>
<td>W. Fredericksen et al.</td>
<td>Coastal Waiohuli</td>
<td>Inventory Survey</td>
<td>22 backhoe test trenches were excavated but there were no significant archaeological findings</td>
</tr>
<tr>
<td>1994</td>
<td>M. Kohl et al.</td>
<td>Upland Waiohuli</td>
<td>Settlement Survey</td>
<td>Archaeological &amp; Historical settlement survey</td>
</tr>
<tr>
<td>1995</td>
<td>Bergst &amp; Spear</td>
<td>Upland Kaua’ula</td>
<td>Archaeological Inventory Survey</td>
<td>6 post-contact sites were identified</td>
</tr>
<tr>
<td>1995</td>
<td>E. Fredericksen et al.</td>
<td>Waiohuli</td>
<td>Archaeological Inventory Survey</td>
<td>one rock shelter site was identified on a pre-contact and temporary habitation site</td>
</tr>
<tr>
<td>1995</td>
<td>R. Fredericksen &amp; D. Fredericksen</td>
<td>Waiohuli</td>
<td>Data Recovery</td>
<td>Four carbon dates were obtained suggesting late pre-contact use.</td>
</tr>
<tr>
<td>1995</td>
<td>D. Hibbard</td>
<td>Coastal Koka’ena</td>
<td>Environmental Assessment</td>
<td>Determined Phase III South Kona Road Improvements project would have &quot;no effect&quot;</td>
</tr>
<tr>
<td>1995</td>
<td>D. Hibbard</td>
<td>Coastal Koka’ena</td>
<td>Historic Preservation Review</td>
<td>Determined Phase II South Kona Road Improvements project would have &quot;no effect&quot;</td>
</tr>
<tr>
<td>1995</td>
<td>Masterson et al.</td>
<td>Kahape’ana at 5,390’ elevation</td>
<td>Inventory Survey</td>
<td>Identified five sites</td>
</tr>
</tbody>
</table>

<table>
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<tr>
<th>Date</th>
<th>Author</th>
<th>Abapa’u’a</th>
<th>Nature of Study</th>
<th>Findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>1995</td>
<td>Moore &amp; Kennedy</td>
<td>Upland Waihe’o and Kaua’ula (2,000’ elevation)</td>
<td>Archaeological Inventory Survey</td>
<td>8 sites were identified (3 historic ranching, 5 possibly pre-contact)</td>
</tr>
<tr>
<td>1995</td>
<td>E. Fredericksen et al.</td>
<td>Kaua’ula (2,000’ to 3,700’ elevation)</td>
<td>Archaeological Inventory Survey</td>
<td>4 sites were identified (including 3 rock shelters and 5 historic sites)</td>
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<tr>
<td>1996</td>
<td>B. McPhatter &amp; P. Rosenfeld</td>
<td>Kaua’ula (1,000’ to 2,000’ elevation)</td>
<td>Reconnaissance</td>
<td>Two sites were identified (Kaua’ula)</td>
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<tr>
<td>1996</td>
<td>W. Wulben et al.</td>
<td>Kaua’ula (Pikakehau) 1,800’ elevation</td>
<td>Archaeological Inventory Survey</td>
<td>5 sites reported on</td>
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<tr>
<td>1997</td>
<td>Charles et al.</td>
<td>Waiohuli (1,200’ elevation)</td>
<td>Archaeological Inventory Survey</td>
<td>3 sites were identified, all interpreted as agricultural</td>
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<td>1997</td>
<td>Kohl et al.</td>
<td>Waiohuli &amp; Koka’ena</td>
<td>Settlement Survey</td>
<td>Fauna on site in Waiohuli &amp; Koka’ena, made of Kola Hwy.</td>
</tr>
<tr>
<td>1997</td>
<td>C. Kawachi</td>
<td>Waiohuli</td>
<td>Reconnaissance</td>
<td>Notes a large area of agricultural features</td>
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<td>1997</td>
<td>Peplin, J. &amp; Michael J. Kohl</td>
<td>Waiohuli</td>
<td>Archaeological Excavations</td>
<td>Found evidence of a stream-fed pond near Halaeupua’ina Church</td>
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<td>1998</td>
<td>A. Dunn et al.</td>
<td>Waiohuli (3,500’ elevation)</td>
<td>Data Recovery</td>
<td>11 sites were studied, 15 carbon samples were dated</td>
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<td>1998</td>
<td>H. Hammett &amp; W. Falk</td>
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<td>29 sites were identified</td>
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<td>2000</td>
<td>E. Gossin &amp; J. Benat</td>
<td>Waiohuli (2,800’ elevation)</td>
<td>Archaeological Inventory Survey</td>
<td>3 sites were identified</td>
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<td>2000</td>
<td>H. Hammett &amp; D. Shielder</td>
<td>Waiohuli</td>
<td>Archaeological Inventory Survey</td>
<td>No archaeological findings</td>
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<td>Area</td>
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<td>2000 b</td>
<td>H. Hattari &amp; D. Shideler</td>
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<td>2000</td>
<td>S. Kikuchi et al.</td>
<td>Kāne‘o‘e</td>
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General Kāne‘o‘e District Research

The earliest archaeological studies on Kāne‘o‘e begin with descriptive lists of religious sites by Thomas Thurston (1856-1858) and John Strother (1867) in the early 1860s and culminate with the first island-wide site survey by Winwood Walker (1931). Throughout the Kāne‘o‘e region are Kāne‘o‘e sites and Makua towns. In the late 1990s, the sites recorded by Walker (all but 33 total) were located in a continuous band between roughly 2000 ft. and 2000 ft. each.

From around 1850 to the 1970s, sporadic visits were made to Kāne‘o‘e by archaeologists, primarily for the purpose of recording individual archaeological sites reported by local residents.

Joe Ashdown (1899-1993) spent her lifetime collecting information about Kāne‘o‘e. This information she collected was put together in the book Kāne‘o‘e o Kāne‘o‘e (1973). Regarding Kāne‘o‘e (including the current project area and area nearby), she notes that the largest fields of a‘i were at Ao‘a, and the next largest could be found throughout Honua‘ula, particularly around the ancient temple of Lokua in Oma‘o (loc. cit.). In Kaohele‘a and near a small mouth of the Kaeo‘ula stream, many petroglyphs are known and new ones can be found (loc. cit.:49). She also remarks that in the Kōpūpū and Wailuku areas, many structures, fields of petroglyphs, and temples around the two temples called Pū‘u-oke‘a and Kāne‘o‘e-pohā may still remain, along with Pū‘u-oke-hoe‘a and Honua‘ula the latter now part of a modern cemetery. At Pū‘u-oke-hoe‘a, the temple of Hi‘i-ni-o-ke‘i, and at Kāne‘o‘e the two on the mauka side, were some Wailuku because of the battle fought and the destruction during the time when Kāne‘o‘e-kua-pa‘u created a brother of Pu‘u Kamehameha (loc. cit.: 79-80).

W. Folk et al. (1993) located 23 sites during a reconnaissance survey of six different alternate routes for the Kåhili to Kāne‘o‘e road corridor. The alternate corridors were four hundred feet wide. Sites encountered included petroglyphs, castle walls, military features (G-shapes, enclosures, etc.), temporary habitation structures, a hidden scatter and agricultural features. Two of the six alternatives were chosen as the final routes. The present study is an inventory of three of those alternatives.

Coastal Kāne‘o‘e Region (Figure 9)

Numerous archaeological surveys were conducted along the south coast of the Kauai Island, particularly in the Kōpūpū, Wailuku, and Mākena areas and in the area between Kawa‘a‘ula and Walker (as the result of the 1970s coastal development).

From 1959 to 1971, Kekich (1971) conducted a survey and subsequent excavations at the site south of K1 and K2 towns in Kåhili Highway. Through his analysis of coastal sites 50-05-1005-3000 and 40-06-1005-2025, Kekich concluded that settlement patterns in this area were characterized by transient coastal habitats involving the use of seven resources—permanently settled and agricultural activities in the upland regions. (Donnan 1994).


Other projects were also conducted in the coastal region of Kåhili extending from Kawa‘a‘ula Kāne‘o‘e in the south to Wailuku Kāne‘o‘e in the north (Figure 8). These projects provide useful information about the coastal area of Kåhili and settlement patterns related to the inland area, as discussed by Kekich (1971). However, since these studies reiterated already mentioned information and are located outside of our current study parcel, they will not be discussed here. These projects include but are not limited to a fire and fauna survey by Ayres, Smith & Associates, Inc. in 1974 and the following archaeological studies: Cox, 1976, Helmers 1970, Hemson 1983, Cerny 1984, Munn 1982, Neller 1982, Mayberry and Haun 1998, Hemson and Shideler 1985, Hemson and Shideler 1996, Haun 1996, Muller 1991, Kennedy 1991, Hemson and Shideler 1992, Kennedy 1992, Sistoe and Sistoe 1992, Fredriksen et al. 1993, and Frederickson et al. 1994.
Kula Zone (above Pū'ialani Highway at the coast)

In 1970 J. Helley Cox and Edward Stasack (1970) compiled a listing of identified petroglyph sites throughout Hawai'i, including the Kula area. Two of these sites, MA-832-2 (site no. 50-05-10-1081), Kālakulā Gulch petroglyph, and MA-832-3 identified as MA-832-1 in Cox and Stasack; Site no. 50-05-10-1052, Kālakulā Gulch petroglyphs, were released during the present project (designated CSH 1 and CSH 3, respectively).

In 1983 Folk and Hesmeister (1983), Cultural Survey Hawaii conducted an inventory level survey of approximately 25 acres on the southern edge of Oma'ulo Ahupua'a. This survey resulted in the relocation of several previously recorded sites, which in relation to the current study panel were located near to areas of status use, between Ko'a Highway and Kula Highway. Three sites, already documented by Griffin and Denham, included a large enclosure site 50-06-11-1249 and the Upper Pālihau Gulch Petroglyphs (site 50-06-11-1250). Additional archaeological features consisting of a stacked boulder alignment and low mounds were also located and collectively assigned site number 50-06-11-1230. Chancel analysis of site 50-06-11-1249 suggests the site date to be possibly as early as the 15th century A.D.

Nagberry and Hau's study in Kana'i's (1988) identified 35 sites with formal features including O. U. and L-shaped alignments or walls, enclosures, terraces, rock art, alignments, uprooted boulder, mounds and rockfield and modified cutouts. They interpreted these to include military sites, temporary habitation, transportation, markers, and agriculture. Which the majority of sites (29) interpreted as military-related remains.

E. Fredericksen et al. (1993) located 21 sites in Komoku ranch land and these sites included a petroglyph site 3740, stone piles, cutouts, enclosures, alignments for rockfield, walls, midden and lithic scatter. The stone piles are interpreted as possible plow piles, possibly for agriculture, the confluence as markers, the enclosures as both a military and a permanent shelter, alignments for a military road, erosion from ranching period, and the midden and lithic scatters as possible sites of temporary habitation.

Upper Settlement and Agricultural Zone

In 1995, Burgert and Spier (1989) of Science Consultant Services, Inc. conducted an inventory survey of a 22.6 acre parcel located in Kana’iu’s Ahupua’a, Kula District. A total of six sites comprised of 25 features were identified during the survey. The identified features included the following formal types: terraces, wall, enclosure, mound, bouldering, and platform. It was determined that all sites are post-contact in date and associated with agriculture and habitation activities.

In February 1995 McPhatter and Raasendahl (1995) conducted an archaeological reconnaissance survey of a 250-acre parcel located in the land of Kana’iu, Kula District (THA, 5-2-66, Par. St.). Most of the project area consists primarily of former pineapple lands between Kahului and Kalīlakū Gulches. This survey resulted in the identification of two sites: (1) a site assigned the temporary number 1977-1 and described as a small stone rock art, and (2) temporary site number 1977-2 described as a wall. In addition to these sites several land clearing piles associated with historic pineapple cultivation were also reported but were not assigned site numbers. It was determined that further data collection activities should take place at the wall site 1977-2, and that the petroglyph site 1977-1 be preserved with interagency development.

In March 1996 Wulsten et al. (1996) conducted an inventory survey of a 44-acre parcel that is the southern portion of McPhatter and Raasendahls February 1995 project area. The 44-acre parcel is also described by Wulsten as part of the 500-acre Pukalani Tumuli Subdivision. This 110 acres was located in the blocked of Kana’iu, Makawao District (THA, 5-2-66, Par. St.). Wulsten’s project area contained three previously recorded sites (1) the Kalālulā petroglyph site 50-05-10-1001, (2) 50-05-10-1015, the “sailing canoe petroglyph site” recorded as temporary site number 1276-1 by McPhatter and Raasendahl (1995), the description of this site was updated to multiple petroglyphs, and (3) 50-05-10-1415, the wall recorded as temporary site number 1977-2 by McPhatter and Raasendahl (1995). One new site (50-05-10-1419) was identified during Wulsten’s survey; it consisted of two features including two agricultural clearing mounds and two stone alignments. Testing conducted at the stone alignments yielded historic artifacts associated with pineapple agriculture. The Kalālulā petroglyph site 50-05-10-1001, originally described as being only on the north side of Kalālulā gulch, was relocated by Wulsten although his project area boundary is on the south side of that gulch. They reported their nonconformity with the original recorded data on the site, except they found the petroglyphs to extend further south than originally described.

Other research in the upcountry Kula area includes Donham (1950a, 1952), and Fredericksen and Fredericksen (1993, 1995).

Two archaeological surveys conducted during the 1990s in the ho'oulu's of Waihali and Kālaheo by Mary Rill (1987) and Frederick Brown and Alan Hau (1989) have evaluated the bulk of data on site patterning and land use prior to the 20th century. In this study, a collection of selected relevant to the upcountry Kula area, are summarized below.

Rill's (1987) monitoring and reconnaissance survey for the Waihali and Kālaheo Subdivisions identified 86 acres with 522 features consisting of "agricultural terraces and mound features as well as a number of possible habitation and religious-related stone, walled enclosures," (op. cit. 55). Rill notes that human occupation in the area extended from prehistoric times to the 1950s based on artifacts observed at the site (op. cit. 56). This time frame is further documented by Brown and Hau (1989:18-21).

Brown and Hau (1989) conducted an inventory survey for the same study parcel in Waihali and Kīheki, covering 1,038 acres of associated pasture land bordered between 1,000 ft. and 2,000 ft. a.m. Within the survey area 155 sites with 274 features were identified, including agricultural, residential, and ceremonial complexes. Fifty-three of the sites had been identified during the Bishop Museum (Rill 1987) survey.

In general Brown and Hau (1989:27) found that the Kālaheo division was intensively exploited in a variety of ways at least two-thirds of the entirety of Hawaiian prehistory. They suggest similar land use and chronology but lower density in the
Waiehu area, probably due to a greater amount of recent land clearing activities. Sixteen radiocarbon dates provided overlapping ranges from A.D. 1270 through A.D. 1550. One sample, with the earliest date, yielded three possible ranges between A.D. 660 and A.D. 1191. (pp. 10, 15-20)

In 1906 Kamanek Research located 4 sites of which two are in the Upper Settlement and 2 sites near a historic house platform with citadels and agricultural terracing at 5500 ft. a.m.l. and an ancient habitation area between 3600 and 3700 ft. a.m.l. of which the authors believe is probably associated with potato production during the Gold Rush.

In 1906 Farley Watanabe did an assessment followed up by Carol Kawachi's recollection of sites in the upper reaches of the Upper Settlement and Agricultural areas. Three Chinese town-governor agricultural sites including a historic house foundation were recorded at the 4600 ft. elevation. The recollection of sites was between the 1380 to 4214 ft. a.m.l. Other retaining walls and an historic road were also noted.

"Watanabe's (1906) research suggest that the project area may have been in forest in pre-contact times and at the upper reaches of early post-contact cultivation" (Kawachi 1997:10).

Michael J. Keel, editor, et al. (2000), has provided an extensive historical and archaeological background for the Waiehu District in Waiehu and Kiha. They identified features like terrace, structures, mounds, walls, windrows, alignments, and G-U. and L shapes, platforms, garden enclosures, rock shelters, notched enclosures, overflowings, lava tubes, depressions, an 'auwai, a pavement, and a road. Their 161 test pits determined agricultural, permanent and temporary habitation, ritual and burial functions.

Mountains and Forest Regions including-fall-turfed section of Halaaka

In 1978 Paul Saucedo conducted an archaeological reconnaissance for the Halaaka area southwest of the National Park. He located 2 cave shelters, 1 platform, and 3 mounds. In 1978 Margaret Bonnissel wrote an overview none of these resources appear in Kula, the type of site he noted were caves, pits, and enclosures and fireplaces.

In 1955 Ian Masterson, William Polk and Haliet Hemstad conducted a survey of the area in 'Aba'au's and found two walled shelters. Tina Bushnell and Haliet Hemstad conducted an Inventory Survey of the University of Hawaii's Facility at Halaaka. Papa'au's Akupua'a, Meakenaka District, East side and are associated with military use of Halaaka in the early 19th and subsequent years. Bushnell and Hemstad 1998:2). In 1998 Kamanek Research located 4 sites of which two are in the Mountains & forest area of which 2 in the upper reaches of the Upper Settlement and 2 sites near the 6000 and 7000 ft. a.m.l.
VI. SURVEY METHODOLOGY

The survey and testing were conducted between August 28, 2000 and October 3, 2000 by a crew that ranged from two to four archaeologists. A total of eleven days were spent in the field for a total of 20 person days. Crew members included Ms.orraine McGuire, D.A., Mary Perzinski, B.A., Lakshani Alpa, B.A., Thomas Dorvann, B.A., Tony Bush, B.E., and Ian Masterman with Brian Colvin, B.A., acting as field director and Dr. Hal Hammatt as principal investigator.

Different survey methods were utilized during the course of the inventory survey. In the sections of the project that were active sugar cane fields the corridor was followed by two archaeologists in a vehicle. The active cane fields were not traversed by foot. The section of the corridor that traverses active pineapple fields was traversed by four archaeologists on foot following the existing pineapple roads. All clearing around in the pineapple fields along the corridor were inspected. All other areas of the project including the guineas, valleys and ravines within the active cane fields were swept by four archaeologists with the distance between members ranging from 5 to 10 meters. Generally the guineas, valleys and ravines within the project area were covered with team members being one to two meters apart due to the potential for pteropodites within these areas. The rest of the project area corridor consisted of open savannah with scattered Guinea. The open savannah portions of the project were swept by four archaeologists with distances ranging from 5 to 10 meters between members covering 100% of the area. The corridor of the corridor was stacked every 200 feet in all portions of the project area that were not in active agriculture. A 400 feet wide corridor, 200 feet on either side of the stacked vegetation was surveyed. Therefore the entire project area, with the exception of the areas in active sugar cane or pineapple cultivation, were covered 100% by pedestrian sweeps. Visibility was excellent at the time of the survey due to ongoing drought conditions.

All sites and features were plotted on a 1 inch = 500 ft project area map with 25 ft. contours. All sites were located on the contour map by tape and compass measurements in at least two orientation stakes. A metal site tag was placed at each feature and labeled with the feature description, state site number (when available), for new sites a temporary field number was assigned preceded by CSIH (Table 6).

Each site was described in detail and photographed. All of the sites were mapped to scale with the exception of State site - 4713. State site - 4713 is a large complex of simple military features that cover an approximate 6000 ft. of section of the road corridor (see Survey Results section for complete details). Ms. Helen Harkness, SHPO/LNR Maui Island archeologist was informed of the extent and type of military features that were encountered within State site - 4713. The SHPO/LNR provided guidelines for the recording of the site. Based on the provided guidelines for site - 4713, all features were plotted on the overall project map, all features were photographed, all features were described including type, size, the presence or absence of surface remains, and overall condition. A representative sample, 47 out of 89 features (48%), were mapped in detail. Mapped features represent the range of feature types in different states of preservation from a range of different elevations.

Each site and feature were recorded by formal site type using descriptive categories (i.e. mound, C-shaped enclosure, wall etc.) presented in the SURVEY RESULTS section of this report. Functional interpretation of sites were established on the basis of structural characteristics, spatial associations with other sites and in some cases, associated artifacts as well as external correlations with other archaeological studies and interpretations in the general region. Significance and recommend treatment of each site was determined on the basis of type, complexity, configuration, apparent function, probable age, and comparable characteristics to other sites in the region.

During the field work, an effort was made to consolidate related features into complexes. Feature associations were typically based on the following considerations: proximity, similarity in construction technique, similarity in states of preservation, functional interrelationships and similarity of artificial materials observed on the surface.

Limited subsurface testing was conducted at six sites. A total of five 1.0 m by 60 cm test units were excavated at two sites (4713 and -4718) and two traditional temporary habitation sites (4503 and -5024). One 60 by 60 cm unit was excavated at another temporary habitation site (4503). The test sites were tested using controlled excavation. Excavations were extended wall into sterile sediments with cements filled through 1.6 inch metal access. One profile was prepared for each excavation. In addition three shovel test probes were conducted at two sites (-4713 and -5024) in to determine the presence or absence of subsurface deposits. Results of the subsurface test are presented in the EXCAVATION RESULTS section of this report. All excavations were back-filled and structures reconstructed.

Subsequent to the field work all sites were given SHP (State Inventory of Historic Properties) site numbers. As a result of the inventory survey, seventeen sites were identified on the property (Table 8 and Figure 9).
<table>
<thead>
<tr>
<th>State Site #</th>
<th>Feature/COH #</th>
<th>Site Type</th>
<th>Function</th>
<th>Distance/orientation to center line (CL)</th>
<th>Age</th>
<th>Significance</th>
<th>Recommendation</th>
</tr>
</thead>
<tbody>
<tr>
<td>2727*</td>
<td>Stone Pile</td>
<td>Agriculture</td>
<td>50 ft north CL</td>
<td>Indeterminate</td>
<td>D</td>
<td>No Further Work</td>
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<td>2728*</td>
<td>Stone Pile</td>
<td>Agriculture</td>
<td>160 ft north CL</td>
<td>Indeterminate</td>
<td>D</td>
<td>No Further Work</td>
<td></td>
</tr>
<tr>
<td>2738*</td>
<td>Stone cairn</td>
<td>Marker</td>
<td>160 ft north CL</td>
<td>Indeterminate</td>
<td>D</td>
<td>No Further Work</td>
<td></td>
</tr>
<tr>
<td>2742*</td>
<td>Surface scatter</td>
<td>Temporary Habitation</td>
<td>On CL</td>
<td>Indeterminate</td>
<td>D</td>
<td>No Further Work</td>
<td></td>
</tr>
<tr>
<td>2743*</td>
<td>Surface scatter</td>
<td>Temporary Habitation</td>
<td>200 ft north CL</td>
<td>Pre-contact</td>
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<tr>
<td>2745*</td>
<td>Surface scatter</td>
<td>Temporary Habitation</td>
<td>130 ft north CL</td>
<td>Pre-contact</td>
<td>D</td>
<td>No Further Work</td>
<td></td>
</tr>
<tr>
<td>3705</td>
<td>Ditch and Mound Complex</td>
<td>Agriculture</td>
<td>Historic</td>
<td>D</td>
<td>No Further Work</td>
<td></td>
<td></td>
</tr>
<tr>
<td>A</td>
<td>Churing Mound</td>
<td>Agriculture</td>
<td>300 ft north CL</td>
<td>Historic</td>
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</tr>
<tr>
<td>B</td>
<td>Irrigation Ditch</td>
<td>Irrigation</td>
<td>Cross CL</td>
<td>Historic</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C</td>
<td>Irrigation Ditch</td>
<td>Irrigation</td>
<td>Cross CL</td>
<td>Historic</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>D</td>
<td>Irrigation Ditch</td>
<td>Agriculture</td>
<td>Cross CL</td>
<td>Historic</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>E</td>
<td>Mound</td>
<td>Agriculture</td>
<td>On CL</td>
<td>Historic</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>State Site #</th>
<th>Feature/COH #</th>
<th>Site Type</th>
<th>Function</th>
<th>Distance/orientation to center line (CL)</th>
<th>Age</th>
<th>Significance</th>
<th>Recommendation</th>
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<tr>
<td>2756</td>
<td></td>
<td>Military Complex</td>
<td>Military</td>
<td>Encompasses corridor section</td>
<td>Historic</td>
<td>B</td>
<td>No Further Work</td>
</tr>
<tr>
<td>2758</td>
<td>Cross CL</td>
<td>Irrigation Ditch</td>
<td>Agriculture</td>
<td>Cross CL</td>
<td>Historic</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2772</td>
<td>A-G (see separate table)</td>
<td>Military</td>
<td>Military</td>
<td>50 ft north CL</td>
<td>Historic</td>
<td>D</td>
<td>No Further Work</td>
</tr>
<tr>
<td>2776</td>
<td>Cross CL 1003</td>
<td>L-shaped Enclosure</td>
<td>Military</td>
<td>75 ft north CL</td>
<td>Historic</td>
<td>D</td>
<td>No Further Work</td>
</tr>
<tr>
<td>2820</td>
<td>Cross CL 1001</td>
<td>Petroglyphs</td>
<td>Symbolic</td>
<td>200 ft north CL</td>
<td>Historic</td>
<td>C, D</td>
<td>Preserve</td>
</tr>
<tr>
<td>2820</td>
<td>Cross CL 1002</td>
<td>Walls</td>
<td>Animal bone yard</td>
<td>On CL</td>
<td>Historic</td>
<td>D</td>
<td>No Further Work</td>
</tr>
<tr>
<td>2821</td>
<td>Cross CL 1001</td>
<td>Petroglyphs</td>
<td>Symbolic</td>
<td>200 ft west CL</td>
<td>Pre-contact</td>
<td>C, D</td>
<td>Preserve</td>
</tr>
<tr>
<td>2822</td>
<td>Cross CL 1001</td>
<td>Aligned Huts</td>
<td>Temporary Habitation</td>
<td>190 ft north CL</td>
<td>Pre-contact</td>
<td>D</td>
<td>Data Recovery</td>
</tr>
<tr>
<td>2823</td>
<td>Cross CL 1005</td>
<td>Rectangular Enclosure</td>
<td>Temporary Habitation</td>
<td>165 ft north CL</td>
<td>Pre-contact</td>
<td>D</td>
<td>Data Recovery</td>
</tr>
<tr>
<td>2824</td>
<td>Cross CL 1010</td>
<td>Square Enclosure</td>
<td>Temporary Habitation</td>
<td>75 ft south CL</td>
<td>Pre-contact</td>
<td>D</td>
<td>No Further Work</td>
</tr>
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<td>State</td>
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<td>Feature/CSH #</td>
<td>Site Type</td>
<td>Function</td>
<td>Distance/ orientation to centerline(CLs)</td>
<td>Age</td>
<td>Significance</td>
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<td>CSH 1020</td>
<td>C-Shape Enclave</td>
<td>Temporary Habitation</td>
<td>50 ft north CL</td>
<td>Indeterminate D</td>
<td>D</td>
<td>Data Recovery</td>
</tr>
</tbody>
</table>

* = Site Type, Function, Age, Significance and Recommendation taken from Federicksen et al. 1994c
VII. SITE DESCRIPTIONS

State Site #: 50-50-10-3722
Site Type: Series of Mounds
Site Function: Agriculture
Features: 3

Description: State site 50-50-10-3722 is comprised of three irregular shaped mounds (designated features A-C) (Figure 10) with a previously excavated 1.9 m by 0.5 m test unit. The site was initially documented by Xamanskelig Research (Frederiksen, et al. 1994:61). The site is located approximately 50 ft to the south of the study corridor centerline. The mounds are roughly in a straight line which is oriented at roughly 25°E.

Feature A, the northernmost mound, was partially excavated during the 1994 Xamanskelig study. A 1.9 m by 0.5 m test unit was excavated into the northern portion of the mound. Feature A presently measures 1.3 m in diameter. It is constructed of a rough stacking of basalt cobbles to medium boulders with a maximum height of 25 cm in the center of the structure. There is a small mound located approximately 1.2 m to the east of the northern mound is a small mound, approximately 70 cm in diameter, which appears to be the remnant of the excavation.

Feature B, located in the center of Feature A and Feature C, is constructed in a similar style to Feature A. Feature B is located approximately 2.5 m from the Feature A. The mound measures 1.9 m NNESSW by 1.1 m NWSE. The maximum height of the mound, near its center, is 50 cm.

Feature C, the southernmost mound, is located approximately 1.0 m from the southern end of Feature B. It is irregular in shape and is also constructed of stacked basalt cobbles to medium boulders. Heights of the mound range from 20-55 cm. A few fragments of coral shell were observed just to the south of Feature C. The site was relocated.

State Site #: 50-50-10-3722
Site Type: Mound
Site Function: Agriculture
Features: 1

Description: State site 50-50-10-3722 was initially recorded by Xamanskelig Research in 1994 (ibid:62). The site consisted of an isolated stone mound. During Xamanskelig's recording, a 1.6 m test unit was excavated through the mound revealing the majority of the structure. No cultural material was observed at the site. The site was relocated 100 ft to the south of the study corridor centerline.

Figure 10: State site 50-50-10-3722: Series of Mounds, Plan View
State Site #: 50-50-10-3723
Site Type: Mound
Function: Agriculture
Features (9): 1

Description: Site 50-50-10-3723 was initially recorded by Xamanoook Researcher in 1993 (Field 103). The site was a mound. During Xamanoook’s recording a 1.8 m by 0.9 m test unit was excavated through the mound exposing the majority of the structure. No cultural material was observed at the site. The site was relocated 100 ft south of the study corridor centerline.

State Site #: 50-50-10-3742
Site Type: Surface Scatter
Function: Temporary Habitation
Features (9): 1

Description: Site 50-50-10-3742 was initially recorded by Xamanoook Researcher in 1993 (Field 103). The site was a very sparse surface scatter consisting of only a few marina shell fragments, shell hash, waterworn stones and cord fragments. During Xamanoook’s recording, a surface collection was conducted, collecting all of the cultural material at the study corridor centerline. The site area was relocated and the marina shell midden was observed.

State Site #: 50-50-10-3743
Site Type: Surface Scatter
Function: Temporary Habitation
Features (9): 1

Description: Site 50-50-10-3743 was initially recorded by Xamanoook Researcher in 1993 (Field 103). The site was a very sparse surface scatter consisting of approximately 26 fragments of marina shell, shell hash, waterworn stones and cord fragments. During Xamanoook’s recording, a surface collection was conducted, collecting all of the cultural material at the study corridor centerline. The site area was relocated and the marina shell midden was observed.

State Site #: 50-50-10-3745
Site Type: Surface Scatter
Function: Temporary Habitation
Features (9): 1

Description: Site 50-50-10-3745 was initially recorded by Xamanoook Researcher in 1993 (Field 103). The site was a very sparse surface scatter consisting of approximately six fragments of marina shell, shell hash, waterworn stones and cord fragments. During Xamanoook’s recording, a surface collection was conducted, collecting all of the cultural material at the study corridor centerline. The site area was relocated and the marina shell midden was observed.

State Site #: 50-50-10-4765
Site Type: Mounds and irrigation ditches
Function: Agriculture
Features (9): 7

Description: Site 50-50-10-4765 is a complex of features that are all related to marina shell middens on the parcel of land between Palalo Road and Oma’uka Road (see Figure 11). The site is currently utilized as a cattle historic irrigation ditches, and Feature E consists of a series of agricultural drainage systems, Feature D, C, B, F and G are covering a large area. These features are located on gently sloping pasture land. Vegetation in this section of the corridor consists of a few monohydrop trees, poa nuta, 'ihu, and few hedge groundcover consists of low grass. In addition to the seven features detailed above, associated with some irrigation systems, were also observed within this area.

Feature A is a historic agricultural drainage system located just off Palalo Road approximately 300 feet from the study corridor centerline. The course is constructed of stacked and piled boulders and cubicles. Some sections are newly stacked, while others are piled height of 2.5 m, a maximum length of 6.5 m and a maximum width of 7.8 m E.W. No cultural material was observed at the feature.

Feature B is a historic irrigation ditch, currently not in operation, which is primarily earthed in excavation. It passes through the corridor from east to west, perpendicular to the road alignment. Four small bridges cross the ditch within the corridor. The bridges are constructed of boulder, concrete and asphalt. Some of the boulder elements have been dammed or destroyed by fire. The ditch portion of Feature B has a maximum width and a maximum depth of 0.7 m. The bridge of Feature B has a maximum width of 0.8 m. Feature C is a historic irrigation ditch, currently not in operation which is primarily earthed in construction. It passes through the corridor from east to west, perpendicular to the road alignment. There are four small bridges across the ditch within the corridor. The bridges are constructed of boulder, concrete and asphalt. Some of the boulder elements have been dammed or destroyed by fire. Feature C is similar to those in Feature B, with the chute at a right angle to the bridge, allowing for lateral ditch flow. The ditch portion of Feature C has a maximum width of 0.6 m and a maximum depth of 0.6 m. The bridge of feature C has a maximum width of 0.8 m and a maximum depth of 0.8 m. The ditch runs under the site through a rectangular opening that measures 0.6 m wide by 0.6 m high. The chute-side wall is 0.9 m wide.
Figure 11  Site 50-50-10-1766: Plan View
wide and 0.7 m high, with a circular opening approximately 0.4 m in diameter. Feature G is in poor condition; it is clearly part of an old irrigation system for auger cone cultivation.

Feature D is a historic irrigation ditch, currently not in operation, which is primarily earthen in construction. It passes through the corridor from east to west, perpendicular to the road alignment. Three small bridges cross the ditch within the corridor. The bridges are constructed of lumber, concrete, and adobe. Most of the lumber in the bridge sample for examination had been destroyed by fire. Feature D bridges are similar to those in Feature C due to the presence of a side-chute. The side-chute is at a right angle to the bridge, allowing for lateral ditch flow. Feature D ditch has a maximum width of 1.4 m and a maximum depth of 0.65 m. Feature D bridge averages 1.85 m wide and 0.8 m high. The ditch flows through a rectangular opening beneath the bridge which measures 0.6 m wide. The side-chute wall is 0.55 m wide and 0.7 m high, with a similar opening approximately 0.4 m in diameter. Feature D is in poor condition; it is clearly part of an old irrigation system for auger cone cultivation.

Feature E includes a number of historic agricultural clearing mounds distributed across a large, sloping area approximately midway between Pahaba flood and Oneupé flood. The mounds range in form from oval to elliptical to long and linear. Construction also varies from stacked to piled, and size of basal materials range from very large boulders to cobble. Mechanical clearing and slashing are evident on many of the mounds. A small, discrete mound was measured and tagged. The sample measures 2.5 m EPV by 2.7 m in NS and 1.0 m high. All of the constituents of Feature E are associated with clearing activities for auger cone cultivation.

Feature F is a historic irrigation ditch, primarily earthen in construction. Feature F passes through the corridor from east to west, perpendicular to the road alignment. There are small bridges across the ditch within the corridor. The bridges are constructed of lumber, concrete, and adobe. Some of the lumber elements have been damaged or destroyed by fire. Bridges are similar to those in Feature C and D (Feature F also has a side-chute). The side-chute is at a right angle to the bridge, allowing for lateral ditch flow. The ditch has a maximum width of 1.37 m and a maximum depth of 0.65 m. Feature F bridge averages 2.1 m wide and 0.55 m high. The irrigation ditch flows through a rectangular opening beneath the bridge that measures 0.55 m wide by 0.6 m high. The side-chute wall is 0.55 m wide and 0.7 m high, with a circular opening approximately 0.4 m in diameter. Feature F is in poor condition; it is clearly part of an old irrigation system for auger cone cultivation.

Feature G is a historic irrigation ditch, primarily earthen in construction. It passes through the corridor from east to west, perpendicular to the road alignment. Three small bridges cross the ditch within the corridor. The bridges are constructed of lumber, concrete, and adobe. Some of the lumber elements have been damaged or destroyed by fire. Feature G is similar to Feature C with an adjacent side-chute. The side-chute is at a right angle to the bridge, allowing for lateral ditch flow. The ditch has a maximum width of 1.56 m and a maximum depth of 0.36 m. The bridge averages 2.1 m wide and 0.65 m high. The ditch formerly flowed through a rectangular opening beneath the bridge that measures 0.6 m wide by 0.55 m high. The side-chute wall is 0.55 m wide and 0.7 m high, with a circular opening approximately 0.4 m in diameter. Feature G is in poor condition; it is clearly part of an old irrigation system for auger cone cultivation.

State Site #: 50-50-10-2172
Site Type: Complex of enclosures, alignments and bridges
Functions: Military training
Features: 102
Description: State Site 50-50-10-2172 consisted of 102 features, all composed of cobble to large boulders that are typical and plausibly in the area (Figure 12-19). Of these features, there were 28 C-shapes, 17 U-shapes, 25 square enclosures, 8 circular oval enclosures, 12 rectangular enclosures, 9 alignments, 4 L-shapes, 3 mounds, and 4 sets of fishtraps. The study area traverses this site.

A total of 28 C-shaped rock structures were encountered with the most being in fair to poor condition, with several being collapsed to almost indistinguishable remnants. Most consisted of a simple alignment of cobbles to medium size boulders, though stacking in 2 to 3 courses high was observed in approximately thirteen enclosures (40% of C-shapes). Angles of the actual "C" shape ranged from very wide to an almost U-shape, with courses typically being rounded. Out of the C-shapes in this site, 10% of the C-shapes had an almost excavated interior similar to the fish-trap construction. This excavation typically did not exceed deeper than 30 cm. Construction style was generally similar in all sites. One C-shape was built against an existing knoll base, demonstrating the relatively recent age of construction.

The 17 U-shaped enclosures were also generally in fair to poor condition, with a number being almost unidentifiable. The majority were constructed of rock alignments or cobble to medium boulders with stacking only occurring in six examples of U-shapes (12%). None of the U-shapes excavated an excavated interior.

The 22 square enclosures, 5 circular oval enclosures, and 12 rectangular enclosures are similar in all ways except for their actual shape. Most are composed of small to medium boulder alignments. Some of the square身材 enclosures exhibit an excavated interior, no deeper than 20 cm. Most features are deteriorating, with gaps in the wall.

The nine alignments within the site complex are consistent in construction style with all the other features types previously described; less than 15 boulders long (1.5 m long, 0.8 m wide) and the walls being no more than three courses in construction.

The 10 L-shaped stone structures are also consistent with typical construction style of the features in this area, with alignment segments ranging from 0.7 to 2.8 m in length. L-shape Feature CA exhibits some portions of 2 course stacking, and Feature AC exhibits a partial excavated interior. Both other L-shapes are formed by a single alignment.

The remnant was most likely a rectangular enclosure that has been severely altered by the placement of a waterline through the center of the feature. The stones from the feature appear to have been re-utilized as support for the waterline. The center of the remnant is partially excavated to a depth of 20 cm.

The four series of five hole-type features, which have no associated rock structures, consist of excavated hole in the terrain that average 20 to 30 cm. It is possible that the fox holes may be the product of explosions from military activity rather than human excavation.
Figure 12  State site 50-50-10-4772: Feature Location Map
Figure 13  State site 50-66-10-1773: Features D, F, G, H, J, and K Plan View
Figure 18  State site 50-50-10-1773, Features Z, AA, AB, AC, AD, AE, AL, AM and AN, Plan View
Military debris was observed throughout the entire site area and was common at most features. Ordinance encountered included a variety of small arms ammunition including spent cartridges from 30 cal., 50 cal., and 50 mm ammunition. Springfield and rapid fire machine guns were observed scattered throughout the area. Two 96 mm mortars were observed scattered throughout the area. A single shell casing for a 155 mm Howitzer was also observed within the site area. Two illumination mortars were also observed. In addition to ordnance recovered, metal fragments and communication wires were observed throughout the site area. The site area contains evidence of widespread building. No other cultural material was observed within the site area.

Two 50 cm by 1.0 m test units were excavated at Features U and CS to determine the presence or absence of subsurface cultural material. In addition, shovel test probes were conducted at Features AI and AW to determine the presence or absence of cultural material. All excavations, test units and test probes, were completely sterile of cultural material.

The table below lists each feature, its type, individual measurements, description, and condition, and whether the feature was mapped or not:

<table>
<thead>
<tr>
<th>Feature</th>
<th>Type</th>
<th>Measurements</th>
<th>Condition</th>
<th>Map</th>
<th>Description and materials</th>
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<tr>
<td>A</td>
<td>C-shape, collapsed</td>
<td>2.4 m E/W, 2.8 m N/S</td>
<td>Poor</td>
<td>x</td>
<td>1 meter casing</td>
</tr>
<tr>
<td>B</td>
<td>Alignment, collapsed</td>
<td>2.5 m E/W, 0.5 m wide</td>
<td>Poor</td>
<td>x</td>
<td>16-zone alignment; 2 sections with 2 meter stacking</td>
</tr>
<tr>
<td>C</td>
<td>C-shape</td>
<td>3.0 m E/W, 2.5 m N/S</td>
<td>Poor</td>
<td>x</td>
<td>Opening to west; 3 meter casing</td>
</tr>
<tr>
<td>D</td>
<td>C-shape</td>
<td>4.0 m E/W, 3.6 m N/S</td>
<td>Fair</td>
<td>x</td>
<td>Opening to southwest; east and south sections 2 meter stacking</td>
</tr>
<tr>
<td>E</td>
<td>C-shape</td>
<td>3.5 m E/W, 3.4 m N/S</td>
<td>Fair</td>
<td>x</td>
<td>Opening to west; square corners; surrounded by medium sized boulders</td>
</tr>
<tr>
<td>F</td>
<td>U-shape</td>
<td>2.9 m E/W, 2.6 m N/S</td>
<td>Fair</td>
<td>x</td>
<td>Opening to east; square corners; none 2 meter stacking</td>
</tr>
<tr>
<td>G</td>
<td>U-shape</td>
<td>2.9 m E/W, 3.4 m N/S</td>
<td>Fair</td>
<td>x</td>
<td>Opening to west; square corners; 1 artillery dummy round and 1 meter casing</td>
</tr>
<tr>
<td>H</td>
<td>U-shape, collapsed</td>
<td>2.9 m E/W, 2.3 m N/S</td>
<td>Poor</td>
<td>x</td>
<td>Opening to northeast; several collapsed outlines</td>
</tr>
<tr>
<td>I</td>
<td>U-shape, partial</td>
<td>2.5 m E/W, 2.3 m N/S</td>
<td>Fair</td>
<td>x</td>
<td>Opening to northeast; northeast section is eroded 2 meters</td>
</tr>
<tr>
<td>J</td>
<td>U-shape</td>
<td>2.1 m E/W, 1.9 m N/S</td>
<td>Fair/poor</td>
<td>x</td>
<td>Opening to north; square corners; construction not complete</td>
</tr>
</tbody>
</table>

Figure 10: Site 60-60-10-1775: Features CU, Plan View
<table>
<thead>
<tr>
<th>K</th>
<th>U-shape; collapsed</th>
<th>3.2 m E/W</th>
<th>3.6 m N/S</th>
<th>Poor</th>
<th>x</th>
<th>Opening to east; very poor alignment; construction not complete</th>
</tr>
</thead>
<tbody>
<tr>
<td>L</td>
<td>Square enclosure</td>
<td>3.3 m E/W</td>
<td>2.5 m N/S</td>
<td>Fair</td>
<td>x</td>
<td>Composed of medium boulders; metal fence present; numerous fans visible at edge, but not just outside the project outline</td>
</tr>
<tr>
<td>M</td>
<td>U-shape</td>
<td>2.3 m E/W</td>
<td>1.6 m N/S</td>
<td>Fair</td>
<td></td>
<td>Opening to south (toward existing road); impacted by existing road improvements</td>
</tr>
<tr>
<td>H</td>
<td>Square enclosure</td>
<td>3.1 m E/W</td>
<td>3.2 m N/S</td>
<td>Fair</td>
<td>x</td>
<td>Composed of medium to large boulders; 2 course backing on north side; near existing road</td>
</tr>
<tr>
<td>O</td>
<td>Circular enclosure</td>
<td>3.3 m E/W</td>
<td>3.3 m N/S</td>
<td>Fair</td>
<td></td>
<td>Altering alignment to 2 course stacking; near existing road</td>
</tr>
<tr>
<td>P</td>
<td>U-shape</td>
<td>2.2 m E/W</td>
<td>2.2 m N/S</td>
<td>Fair</td>
<td>x</td>
<td>Opening to north; up to 3 course stacking in some locations</td>
</tr>
<tr>
<td>Q</td>
<td>Circular enclosure</td>
<td>3.25 m E/W</td>
<td>2.9 m N/S</td>
<td>10-40 cm high</td>
<td>Fair</td>
<td>x</td>
</tr>
<tr>
<td>R</td>
<td>Rectangular enclosure</td>
<td>1.9 m E/W</td>
<td>7.8 m N/S</td>
<td>10-40 cm high</td>
<td>Fair</td>
<td>x</td>
</tr>
<tr>
<td>S</td>
<td>U-shape</td>
<td>1.4 m E/W</td>
<td>3.2 m N/S</td>
<td>5-33 cm high</td>
<td>Poor</td>
<td>x</td>
</tr>
<tr>
<td>T</td>
<td>Square enclosure</td>
<td>2.0 m E/W</td>
<td>2.0 m N/S</td>
<td>10-40 cm high</td>
<td>Fair</td>
<td>Good</td>
</tr>
<tr>
<td>U</td>
<td>Square enclosure</td>
<td>2.9 m E/W</td>
<td>2.0 m N/S</td>
<td>10-30 cm high</td>
<td>Fair</td>
<td>x</td>
</tr>
<tr>
<td>V</td>
<td>Square enclosure</td>
<td>2.5 m E/W</td>
<td>2.4 m N/S</td>
<td>10-23 cm high</td>
<td>Fair</td>
<td>x</td>
</tr>
<tr>
<td>W</td>
<td>Square enclosure</td>
<td>2.2 m E/W</td>
<td>2.4 m N/S</td>
<td>5-40 cm high</td>
<td>Fair</td>
<td>x</td>
</tr>
</tbody>
</table>

**X**  | Fence and associated rock alignment | 1.8 m E/W | 2.2 m N/S  | Poor | x | Encroachment and boundary; edges now chipped, possibly from erosion; 1 small boulder alignment along south edge |

<p>| Y | C-shape           | 2.5 m E/W | 2.1 m N/S  | Fair | Good | x | Opening to north; ranging from alignment to 2 course backing (north side) |
| Z | Square enclosure  | 2.6 m E/W | 2.6 m N/S  | Fair | Good | x | Small boulder to cobble alignment; ranging from 1 to 2 course backing |
| AA| Square enclosure  | 2.1 m N/S  | 2.6 m N/S  | Fair | Good | x | Small boulder to cobble alignment; ranging from 1 to 2 course backing; partially exercises corner; metal fence and wire clip present |
| AB| Square enclosure  | 2.7 m N/S  | 1.8 m N/S  | Fair | Intermediate | x | Small boulder to cobble alignment; north-south alignment; east section 2 course stacking; east and west sections 1 course stacking, built on a slope in the section |
| AC| L-shape Right Angle | 2.5 m N/S| 3.5 m W/S  | Poor | x | N/S/W alignment composed of 3 small boulders; W/S alignment composed of cobbles; interior section partially covered |
| AD| Square enclosure  | 2.5 m N/S| 3.3 m N/W  | Fair | Poor | Irregular | x | Small boulder to cobble alignment; interior fence partially removed; interior possibly encroaches |
| AE| Square enclosure  | 2.1 m E/W | 2.2 m N/S  | Fair | Good | x | Small boulder to cobble alignment; south side 3 courses high; interior excavated in 2008; 1 medium brown broken boulder within enclosure |
| AF| Square enclosure  | 2.3 m E/W | 2.3 m N/S  | Fair | x | Composed of small boulders; self-pushed up into south side during existing road construction; several wrinkles on boulder pieces |
| AG| Oval enclosure    | 2.1 m E/W | 2.1 m N/S  | Fair | x | Small to medium boulder alignment; ratios can vary |</p>
<table>
<thead>
<tr>
<th>Part</th>
<th>Description</th>
<th>Rating</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>A1</td>
<td>Square enclosure</td>
<td>Good</td>
<td>Sudden section comprised of medium boulders with some 2 course stacking. Some sections have 3 course stacks, generally hollow and scattered outgrowing site area.</td>
</tr>
<tr>
<td>A2</td>
<td>Square enclosure</td>
<td>Good</td>
<td>East end over section 2 course high small boulders, north and south sections cation to small boulders, lower section 2 course high, better capping, on one or two, one well in site area; 6 small boulder C-shape alignment between A1 and A2.</td>
</tr>
<tr>
<td>A3</td>
<td>Rectangular enclosure</td>
<td>Good</td>
<td>Small boulder to cobble alignment with some 2 course stacking; some clips near feature.</td>
</tr>
<tr>
<td>A4</td>
<td>Square enclosure</td>
<td>Good</td>
<td>Small boulder alignment with some 2 course stacking.</td>
</tr>
<tr>
<td>A5</td>
<td>U-shape</td>
<td>Fair</td>
<td>Opening to north; sudden section 3 course stacking; east side none; west side none; hollow sides; hollow shell supports present.</td>
</tr>
<tr>
<td>A6</td>
<td>Rectangular</td>
<td>Poor</td>
<td>Opening to north; sudden section 3 course stacking; east side none; west side none; hollow sides; hollow shell supports present.</td>
</tr>
<tr>
<td>A7</td>
<td>Square enclosure</td>
<td>Good</td>
<td>Small in medium boulder alignment; with some 2 course stacking; just off outgrowing road.</td>
</tr>
<tr>
<td>A8</td>
<td>C-shape</td>
<td>Good</td>
<td>Opening to north; square corner; small boulder alignment.</td>
</tr>
<tr>
<td>A9</td>
<td>C-shape</td>
<td>Fair</td>
<td>Opening to north; small boulder alignment; hollow and scattered outgrowing 10 meters; some clips present.</td>
</tr>
<tr>
<td>A10</td>
<td>Rectangular enclosure</td>
<td>Fair</td>
<td>2 course stacking on north, east, and west sides; small side injured by existing road, some small banks (2) at outer perimeter of structure; hollow capping present.</td>
</tr>
<tr>
<td>A11</td>
<td>Alignment</td>
<td>Fair</td>
<td>Bent capping present.</td>
</tr>
<tr>
<td>A12</td>
<td>Rectangular enclosure</td>
<td>Good</td>
<td>Opening to north; structure comprised of 12 small boulders only.</td>
</tr>
<tr>
<td>A13</td>
<td>Alignment</td>
<td>Fair</td>
<td>East end of site only.</td>
</tr>
<tr>
<td>A14</td>
<td>Alignment</td>
<td>Fair</td>
<td>Small boulder to cobble alignment.</td>
</tr>
</tbody>
</table>

*AS Rectangular enclosure* 2.8 m NS 2.8 m WS 10-30 cm high | Fair | Poor | Small boulder to cobble alignment; hollow capping present. |

*AT C-shape* 2.8 m NS 2.8 m WS 10-30 cm high | Poor | Opening to north; 12 small boulders; hollow capping present. |

*AV C-shape* 2.8 m NS 2.8 m WS 10-30 cm high | Poor | Very Poor | North section injured by erosion. |

*AW C-shape* 2.8 m NS 2.8 m WS 10-30 cm high | Poor | Small boulder alignment; poor in north and west sections. |

*AX Rectangular enclosure* 2.8 m NS 2.8 m WS 10-30 cm high | Fair | Poor | Small boulder alignment; poor in north and west sections. |

*AY C-shape* 2.8 m NS 2.8 m WS 10-30 cm high | Fair | Opening to north; small boulder alignment; 10 caliber capping present. |

*AZ U-shape* 2.8 m NS 2.8 m WS 10-30 cm high | Fair | Opening to north; small boulder alignment; 10 caliber capping present. |

*BA U-shape* 2.8 m NS 2.8 m WS 10-30 cm high | Fair | Small boulder alignment with some 2 course stacking; small clips present. |

*BB C-shape* 2.8 m NS 2.8 m WS 10-30 cm high | Fair | Small boulder alignment with some 2 course stacking; small clips present. |
<table>
<thead>
<tr>
<th>ID</th>
<th>Alignment</th>
<th>3.2 m long (E/W)</th>
<th>Fair</th>
<th>Small boulder to cobble alignment; rock face present</th>
</tr>
</thead>
<tbody>
<tr>
<td>BI</td>
<td>Square enclosure</td>
<td>2.3 m E/W, 3.2 m N/S</td>
<td>Fair</td>
<td>Some gapping/collapse in walls</td>
</tr>
<tr>
<td>BK</td>
<td>Alignment</td>
<td>2.4 m long (E/W)</td>
<td>Poor</td>
<td>Medium to small boulders alignment</td>
</tr>
<tr>
<td>BL</td>
<td>C-shape</td>
<td>3.4 m E/W, 1.4 m N/S, 30 cm high</td>
<td>Fair</td>
<td>Opening to north; shallow angle; screen covered stacking</td>
</tr>
<tr>
<td>BM</td>
<td>U-shape</td>
<td>2.2 m E/W, 2.2 m N/S</td>
<td>Fair</td>
<td>Small boulder alignment</td>
</tr>
<tr>
<td>BN</td>
<td>C-shape</td>
<td>1.2 m N/S</td>
<td>Fair</td>
<td>Opening to north; small boulder alignment; &quot;40&quot; x 3&quot; travertine covering in mirror</td>
</tr>
<tr>
<td>BO</td>
<td>C-shape</td>
<td>2.0 m E/W, 2.0 m N/S, 30 cm high</td>
<td>Good</td>
<td>Opening to north; small boulder to cobble alignment</td>
</tr>
<tr>
<td>BP</td>
<td>Rectangular enclosure</td>
<td>1.4 m E/W, 2.2 m N/S</td>
<td>Fair/Poor</td>
<td>Incomplete alignment</td>
</tr>
<tr>
<td>BQ</td>
<td>Rectangular enclosure</td>
<td>1.4 m E/W, 2.4 m N/S</td>
<td>Fair</td>
<td>Small boulder alignment</td>
</tr>
<tr>
<td>BR</td>
<td>Rectangular enclosure</td>
<td>1.6 m E/W, 1.6 m N/S</td>
<td>Fair/Poor</td>
<td>Small boulder alignment; most of wall and both sides covered, interior estimated least 10 cm</td>
</tr>
<tr>
<td>BS</td>
<td>L-shape</td>
<td>2.4 m E/W, 2.8 m N/S</td>
<td>Poor</td>
<td>Very rough small boulder alignment</td>
</tr>
<tr>
<td>BF</td>
<td>2 alignments</td>
<td>13.4 m E/W, 19.3 m E/W, 15.0 m E/W</td>
<td>Poor</td>
<td>Alignments consist of medium to small boulders</td>
</tr>
<tr>
<td>BU</td>
<td>Square enclosure</td>
<td>3.1 m E/W, 2.1 m N/S</td>
<td>Poor</td>
<td>Rough small boulder to cobble alignment</td>
</tr>
<tr>
<td>BV</td>
<td>Square enclosure</td>
<td>2.3 m E/W, 2.3 m N/S</td>
<td>Good</td>
<td>Small boulder to cobble alignment</td>
</tr>
<tr>
<td>BW</td>
<td>C-shape</td>
<td>1.2 m E/W, 1.4 m N/S</td>
<td>Poor</td>
<td>Opening to north; shallow angle of &quot;C&quot;; screen exposed</td>
</tr>
<tr>
<td>BX</td>
<td>Rectangular enclosure</td>
<td>1.4 m E/W, 2.4 m N/S</td>
<td>Fair</td>
<td>Small boulder to cobble alignment</td>
</tr>
<tr>
<td>BY</td>
<td>Square enclosure</td>
<td>1.4 m E/W, 1.2 m N/S</td>
<td>Poor</td>
<td>Small boulder to cobble alignment</td>
</tr>
</tbody>
</table>

| EZ | Square enclosure | 1.6 m E/W, 2.6 m N/S | Fair/Poor | Interior excavated less than 10 cm |
| CA | L-shape | Fair/Poor | Small boulder to cobble alignment with some 2 course stacking |
| CB | Square enclosure | 0.8 m E/W, 1.4 m N/S | Good | Very narrow alignment |
| CC | Circular enclosure | see map | Fair | Small boulder to cobble alignment with some 2 course stacking and piling |
| CD | C-shape | 2.1 m E/W, 1.2 m N/S | Fair | Opening to north; Small boulder to cobble alignment with some 2 course stacking |
| CE | U-shape | see map | Fair | Opening to north; Small boulder to cobble alignment |
| CF | Square enclosure, remnant | see map | Poor | Small boulder to cobble rough alignment with gaps/collapses |
| CG | Rectangular enclosure | see map | Poor | Small boulder to cobble rough alignment with gaps/collapses |
| CH | Rectangular enclosure, remnant | see map | Poor | Small boulder to cobble rough alignment with gaps/collapses |
| CI | Circular enclosure, very remnant | see map | Poor | Set map |

<p>| CI | Rectangular enclosure | see map | Fair | Small boulder to cobble alignment with gaps/collapses in rough; remnant erosion visible |
| CK | C-shape | 1.2 m E/W, 2.6 m N/S | Fair/Poor | Opening to west; Small boulder to cobble alignment with some 2 course stacking |
| CL | L-shape | 2.7 m E/W, 1.3 m N/S | Fair/Poor | Small boulder to cobble rough alignment |
| CM | C-shape | 1.2 m E/W, 2.4 m N/S | Poor | Small boulder to cobble rough alignment seen stacked and piled two course above |
| CH | C-shape with flanks | 2.2 m E/W, 2.8 m N/S | Good | Opening in west; Four course alignment on north, one, and south sides; with excavated interior; e-tectonic case in remnant boulder |</p>
<table>
<thead>
<tr>
<th>Location</th>
<th>Feature</th>
<th>Size</th>
<th>Condition</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO</td>
<td>Fence</td>
<td>2.1 m E/W x 2.4 m N/S</td>
<td>Poor</td>
<td>Small broken alignment; possible breach in fence, uneven base, poor condition, 4 sections similar in nature.</td>
</tr>
<tr>
<td>CP</td>
<td>C-shape / basal</td>
<td>2.4 m E/W x 1.3 m N/S</td>
<td>Fair</td>
<td>Poor</td>
</tr>
<tr>
<td>CQ</td>
<td>C-shape</td>
<td>1.6 m E/W x 3.2 m N/S</td>
<td>Fair</td>
<td>Good</td>
</tr>
<tr>
<td>CR</td>
<td>Fence</td>
<td>1.1 m E/W x 1.4 m N/S</td>
<td>Fair</td>
<td>Small broken alignment with some 2 course masonry along east side.</td>
</tr>
<tr>
<td>CS</td>
<td>U-shape</td>
<td>3.0 m E/W x 3.2 m N/S</td>
<td>Fair</td>
<td>Opening to west; shearing across tree to newly excavated section appears to have been broken 2 courses high.</td>
</tr>
<tr>
<td>CT</td>
<td>U-shape</td>
<td>2.2 m E/W x 1.3 m N/S</td>
<td>Fair</td>
<td>Opening to south; small broken alignment with some rough 2 course masonry; 2 courses present.</td>
</tr>
<tr>
<td>CU</td>
<td>U-shape</td>
<td>2.5 m E/W x 1.3 m N/S</td>
<td>Fair</td>
<td>Opening to south; small broken alignment with some 2 course masonry.</td>
</tr>
<tr>
<td>CV</td>
<td>U-shape</td>
<td>1.6 m E/W x 1.3 m N/S</td>
<td>Fair</td>
<td>Possible utilization of existing building or tree stump; large, flat stone structure; unique to this area.</td>
</tr>
<tr>
<td>CW</td>
<td>U-shape</td>
<td>1.4 m E/W x 1.2 m N/S</td>
<td>Fair</td>
<td>Possible utilization of existing building or tree stump; large, flat stone structure; unique to this area.</td>
</tr>
<tr>
<td>CX</td>
<td>3 alignments and 1 rock wall</td>
<td>Fair</td>
<td>Very simple construction.</td>
<td></td>
</tr>
</tbody>
</table>

State Site #: 50-50-10-4716
Site Type: Circular Enclosure
Site Function: Military
Features: 1

Description: State site 50-50-10-4716 is a oval enclosure (see Figure 30). The enclosure measures 1.8 m N/S by 2.3 E/W with the enclosure wall averaging 0.26 m in width. The site is constructed of basalt rubble to medium boulders with heights ranging from 18-20 cm. Construction ranges from a single course alignment to two-course masonry on the western section of the site. The site is partially constructed on exposed bedrock outcrop and partially on soil. The soil at the interior of the site is slightly higher than on the outside of the site, possibly due to erosion. The site is located approximately 60 ft. to the north of the study corridor centerline.

A 1 m x 50 cm test unit was excavated at the eastern interior section of the site, partially dissecting the enclosure wall (see Testing Results section for complete results).
State Site #: 50-10-4778
Site Type: L-shaped enclosure
Site Function: Military
Features: 1

Description: State site 50-10-4778 is a roughly constructed L-shaped enclosure situated on the northern edge of Waikua Gulch (Figure 21). The L-shaped enclosure measures 2.8 m E/W by 2.3 m N/S and is constructed of small to medium boulders stacked 1 to 2 courses high to a maximum height of 0.50 m. The site is open on the south and southwest. The interior of the enclosure appears to be shallow and over bedrock. No cultural material was observed at the site. The site is located approximately 15 ft to the east of the study corridor centerline.

State Site #: 50-10-4765
Site Type: Petroglyphs
Site Function: Symbolic
Features: 1

Description: State site 50-10-4765 is comprised of three historic petroglyphs on two panels located on the northern cliff of Waikua Gulch approximately 200 ft north of coring site (Figures 22 and 23), outside the study corridor. The petroglyphs consist of three rows of black lettering, all capitals with pronounced serif. The words have been pecked and carved into the vertical face of a beach cliff face near the top of the north side of the gulch approximately 6.1 m below the top of the cliff face. A narrow ledge trail allows access to this portion of the cliff. All petroglyphs are seated in a high orientation. Lichen growing on the cliff face obscures the petroglyphs. The petroglyphs appear to spell KUANA, MILIMILI, and MENAHIA. The word KUANA measures 32 cm long and 6 cm high, except the “K” which is 7 cm tall. The word MILIMILI measures 40 cm long and 8 cm tall, with an “N” at the end that has been scratched in, as opposed to pecking. The word MENAHIA measures 40 cm long and 10 cm tall. All words appear to have had the outline of each letter pecked, then the interior was pecked and altered to fill in. Sections of the word MENAHIA are very faded, especially the “E”.

Figure 21 State site 50-10-4778: Plan View
CORRECTION

THE PRECEDING DOCUMENT(S) HAS BEEN REPHOTOGRAPHED TO ASSURE LEGIBILITY
SEE FRAME(S)
IMMEDIATELY FOLLOWING
Site Name: 50-50-12-5200
Site Type: Historic Wall
Site Function: Cattle barrier
Features: 2 within corridor

Description: Site 50-50-12-5200 consists of a series of short wall segments constructed along the northern edge of Waiakane Gulch (see Figure 5a). The wall segments are constructed of stone blocks along the cliff edge or entering the gully. Wall segments were observed along the north side of the gully both to the east and the west of the present road corridor. Two of the wall segments are located within the project area corridor and have been designated Features A and B (see Figure 5a). A total of six wall segments were observed to the west of the corridor along the gully and a total of three segments were observed to the east of the corridor along the gully. Only the portions of the site within the corridor were recorded. Surrounding terrain outside of the gully consists of gently sloping greenland with scattered basal basalt boulders and cobbles. Vegetation consists of fuchs, several monkeyweed trees, pointy grass, tussock, and grasses.

Feature A is a wall segment which measures 1.6 m E-W by 0.7 m wide, with a maximum height of 2.6 m on the western end. The wall is constructed of small to medium basalt boulders, stacked 3-5 courses high. The wall appears new filled. Feature A is in good condition.

Feature B is another short wall segment measures 3.7 m E-W by 0.7 m wide. Feature B wall heights range from 0.85-0.9 m on the south side, and 1.8-2.0 m on the north side. Feature B is constructed of small to medium basalt boulders, stacked 3-5 courses high on the exterior face. The wall is new filled with cobbles.

State Site #: 50-50-12-5031
Site Type: Petroglyph
Site Function: Symbolic
Features: 3

Description: State site 50-50-12-5031 consists of two petroglyph panels located on the southern side cliff face of Waiakane Gulch. The first panel contains two petroglyphs (Figures 26 and 26) and the second panel contains a single petroglyph (Figures 26 and 37). All three petroglyphs are of anthropomorphies figures. The petroglyphs were originally located 50 ft to the west of the corridor centerline, but the corridor was regraded (650 ft) to the west to place the site 200 ft from the corridor centerline. The corridor was regraded to avoid any impact to the site.

Panel A consists of two anthropomorphies figures, possibly male. The figures have been pocked into the surface. The first figure, designated Figure 1, measures roughly 10 cm tall and 9 cm wide. Figure 1 has a triangular shaped torso. Additional pocking is visible just above the figure's head. Figure 2 in a pocked stick figure, possibly male measuring roughly 14 cm tall by 9 cm wide. Both figures are very faint.
Panel #2, located 1.8 m west of Panel #1, consists of a single anthropomorphic stick figure, possibly aad, holding something (club, paddle) in the left hand. The right hand (lip) has definite claw-like points (fingers). The basic figure is approximately 30 cm tall and 8 cm wide. It is located 2.6 m up the cliff face from the gulch floor. The figure was made by pecking rather than with a incising style. Additional pecking is visible connecting to the right hand of the figure, suggesting the figure is holding something. It is very faint, and worn.

No other cultural material was observed in the vicinity (i.e. midden, artifacts). Vegetation consists of brush along the sides of the gulch, sporadic grass, and sparse brush. No water was observed in the gulch during the time of the survey.

State Site:
50-50-10-0032
Site Type:
Alignments
Site Function:
Temporary Habitation
Features:

Description: State site 50-50-10-0032 consists of a series of alignments (see Figure 28). The alignments are constructed of single rows of small basalt boulders, which are set into the soil in a row. The longest section, which is discontinuous, and L-shaped, measures 75 m NS by 8 m EW. Extending from the midpoint of the NW section is a second, smaller L-shaped alignment that begins 4 m to the east of the NW end of the longest alignment. The surrounding terrain is gently sloping pasture land. The site is located approximately 100 ft to the north of the study corridor centerline. Vegetation consists of brush, grass and basalt heap. Cultural materials observed at the site consist of a single fragment of rock (Cypress sp.), a basalt adze, a basalt adze, and a basalt adze core fragment. No cultural materials were encountered during the excavation.

A 60 x 60 cm test unit was excavated in the south corner of the enclosure (see Figure 28). Excavating resulted in no cultural materials. No cultural materials were encountered during the excavation.

State Site:
50-50-10-0033
Site Type:
Rectangular enclosure
Site Function:
Temporary Habitation
Features:

Description: State site 50-50-10-0033 is a roughly rectangular enclosure (Figure 29). It is constructed of basalt stones, cobble- to small boulders sized, stacked one to three courses high, with a continuous height of 55 cm on the south wall. The site is located approximately 150 ft to the south of the study corridor centerline. Vegetation near the site consists of...
The enclosure appears to be constructed directly upon fabricate soil. The interior of the enclosure is soil-filled and is slightly higher than the ground surface at the exterior of the enclosure. The north side and portions of the east and west sides appear to be earthen-filled. The south and east sides of the structure have gaps in their construction.

Two sections appear to be more recent modifications. The southwest corner section of the structure appears to be a newer stacking of small basalt boulders constructed on top of the existing earthen-filled western wall section. This modification, similar to the military feature construction style possibly functioned as a windbreak. The site tag has been placed within this newer construction. The southeast corner section is also created with a different construction style of stacked small basalt boulders and embankment alongside the existing southern wall. The stone stacking seems to delineate a hole, 15 cm deep, in its center, which appears to have functioned as a fire pit. No cultural material was observed on the surface at the site.

An additional alignment of small basalt boulders is located to the southeast of the site, constructed parallel to the south wall section of the enclosure. The alignment is composed of 9 boulders. This may have been the former southwestern edge of the site, from which material was removed to create the more recently modified sections of the site.

A 1 x 2 m test excavation unit was excavated in the northwest corner of the site, just inside the west wall and just north of the newer constructed mound. A total of 28.3 kg of marine shell midden and a 14.7 kg piece of coral were collected from the excavation (see Testing Results Section for complete details).

State Site #: 50-50-10-5034
Site Type: Square Enclosure
Site Function: Temporary Habitation
Features: 1

Description: State site 50-50-10-5034 is a square enclosure situated on relatively level pasture land (Figure 30). The site is located approximately 75 ft to the south of the study corridor centerline. Vegetation consists of lithic, alpine, and frost holes, and sparse grasses. The enclosure measures 3.7 x 3.7 x 2.4 m (SW, with alignment heights ranging from 0.35 to 0.35 m. The enclosure is constructed of small to medium basalt boulders and soil with some grooves stacked up to 3 courses high. The interior of the enclosure is level soil. The entire enclosure, including the interior, is constructed on a raised soil base, about 0.5 m higher than the surrounding ground surface. The northwest half of the site has been damaged by bulldozer. No cultural material was observed.

A 1.0 m by 50 cm test unit was excavated in the interior of the enclosure to determine the presence or absence of subsurface cultural materials (see Testing Results Section for complete details).
State Site #: 50-50-10-5035
Site Type: C-shaped Enclosure
Site Function: Temporary Habitation
Features: 1

Description: State site 50-50-10-5035 consists of a large C-shaped enclosure and associated mound at its southeast end (Figure 31). The surrounding terrain is gently sloping pastureland. The site is located approximately 50 ft to the north of the study corbelled structure. Vegetation consists of life, clover, and low fescue and various sparse grasses. The enclosure is constructed of stacked haunches, 1 to 3 courses high (15-62 cm high), constructed directly on bedrock outcrop. The interior of the structure is completely well-covered with some exposed bedrock and a few scattered cobbles. Three base courses are growing just inside the enclosure. The north end of the C-shape is in good condition; the eastern and western sides are more weathered and collapsed. The adjacent mound consists of piled haunch cobbles to small boulders, 1 - 3 courses high, measuring 1.9 m NS x 1.2 m EW. The mound is collapsed on the south side.

A short test probe was excavated in the northeast interior of the structure (see Testing Results section for complete details). No cultural material was observed.

A. Testing Results Section

Limited subsurface testing was conducted at six sites. A total of four 1.0 m by 50 cm test units were excavated at two military sites (4772 and 4776) and two traditional temporary habitation sites (5033 and 5034). One 50 by 50 cm unit was excavated at another temporary habitation site (6039). In addition, three shallow test probes were conducted at two sites (4773 and 6035) to determine the presence or absence of subsurface deposits.

A 1 m x 50 cm test units were excavated site 4773 Features U (Square Enclosure) and Feature CS (C-Shaped Enclosure). A 1 m x 50 cm test unit was also excavated at two of the temporary habitation sites: 6033 (Square Enclosure) and 6033 (Rectangular Enclosure). The last 1 m x 50 cm test unit was excavated at a military site 4776 (Gavel enclosure). In addition, a shovel test probe was excavated at SSS 50-50-10-4773 Features A1 and A2, 5033, and 5035 to determine presence or absence of substantial cultural material.

The features were tested using controlled excavation. Excavations were extended well into sterile soil layers. One profile was prepared for each excavation. All excavated materials were screened through 1/8-inch wire mesh and cultural material recovered from the excavations were measured and analyzed. Each test unit was backfilled and the sites were reconstructed as close as possible to their original form.

Figure 31 State site 50-50-10-5035. Plan View displaying location of test probe
Test Excavation Unit Descriptions

State Site # 50-56-10-1773 Feature U

A 1 m x 50 cm test unit was excavated in the northern interior of Feature U, a historic military square enclosure. A single stratigraphic layer was recovered, very a depth of approximately 60 cm. The top 55-56 cm contained approximately 20% of obsidian inclusions and a large obsidian concentration of approximately 20%. The obsidian concentration increased with depth to a maximum of approximately 40% obsidian inclusions at 35 cm that was the base of excavation. The base of the unit contained decomposing bedrock. No cultural material was encountered during excavation. A profile was drawn of the base. Photos were taken pre- and post-excavation.

State Site # 50-56-10-1773 Feature AI

A shovel test probe was excavated in the center of the interior of Feature AI to determine the presence or absence of subaqueous cultural material. The probe was approximately 1 m x 50 cm x 50 cm EW. The probe was excavated to a maximum depth of 65 cm. One stratigraphic layer was recovered, a very compact 5YR 3/4 yellowish red silt, containing small cobbles and abundant roots and medullae. No cultural material was noted during excavation. A profile was drawn of the southern face of the probe. Photos were taken pre- and post-excavation.

State Site # 50-56-10-1773 Feature AW

A shovel test probe was excavated in the southwest corner of Feature AW to aid in determining the presence or absence of subaqueous cultural material. The probe measured approximately 60 cm x 45 cm x 45 cm EW. The probe was excavated to a maximum depth of 68 cm at which point bedrock outcrop was exposed throughout the majority of the base of the probe (Figure 33). Two strata were recovered: the Late Horizon, which included the first 2-4 cm at the surface, a 5YR 4/4 reddish brown silt, and Stratum I of the base of excavation, a very compact 5YR 3/4 yellowish red silt, which contained small cobbles and decomposing bedrock and abundant roots and medullae. No cultural material was encountered during excavation. A profile was drawn of the southwest face. Photos were taken of the pit, pre- and post-excavation.

State Site # 50-56-10-1773 Feature CS

A 1 m x 50 cm test unit was excavated in the northern interior of Feature CS, a historic military C-shaped enclosure. A single stratigraphic layer was recovered that consisted of a very compact, fine grained, yellowish red (5YR 3/4) clay silt (Figure 35). The unit was excavated to a maximum depth of 70 cm. At approximately 35 cm the silt content increased to 80%. The silt content throughout the excavation was extremely high. Bedrock outcrop was encountered at the base of excavation. No cultural material was encountered during excavation. A profile was drawn of the eastern face. Photos were taken pre- and post-excavation.

Figure 32 State Site 50-56-10-1773: Feature U, Post excavation profile displaying test unit, view to north
Stratum I (0-BOE)
Very compact STR-568 yellowish red silt, containing small cobbles and abundant roots and rootlets.

O-horizon (0-2 em.)
STR-64 reddish brown silt

Figure 23  State site 68-50-10-1772: Feature AI, Post excavation profile displaying test unit, view to northeast

Figure 24  State site 68-50-10-1772: Feature AW, Post excavation profile displaying test unit, view to southwest
State Site 505-40-10-1779

A 1 m x 50 cm test unit was excavated along the eastern wall and extending into the eastern interior of the enclosure (Figure 35). The excavation was terminated at a maximum depth of 20 cm. A small pocket of a very dark brown (SYR 3/2) soil was observed in the southeastern corner of the unit extending a maximum of 5 cm. No cultural material was observed in this darker stained surface pocket. Beside the pocket only a single stratigraphic layer was encountered throughout the rest of the excavation. No cultural material was encountered during the excavation of this unit. A profile was drawn of the southern face. Photos were taken pre- and post-excavation.

State Site 505-40-10-1773

A 50 x 50 cm test unit was excavated at Site 503. The unit had a maximum depth of 41 cm. A single stratigraphic layer (Stratum I) was encountered, a GYR 4-5 yellowish red silt (Figure 37). Stratum I contained decaying bedrock and abundant roots and rootlets. No cultural material was encountered during the excavation. A profile was drawn of the southern face. Photos of the unit were taken pre- and post-excavation.

State Site 505-50-10-1771

A 1 m x 50 cm test unit was excavated in the interior of Site 503, a rectangular temporary habituation enclosure. Three stratigraphic layers were encountered (Figure 38). Stratum I, consisted of a very compact, fine grain, yellowish red (SYR 4/5) clay silt. Stratum I contained no cultural material. Stratum I contained a high concentration of roots and rootlets. Stratum II consisted of a compact very fine grain dark reddish brown (GYR 3/2) silt which contained cultural material. Cultural material encountered consisted of 1.3 g of Conus sp., 0.8 g of Cypraea capucinilla, 0.1 g of Nerita pica, 1 g of Fasciatus sp., 0.1 g of unidentified marine shell and a 146.7 g piece of coral. All cultural material encountered appeared very weathered and broken. Stratum II was encountered between 18.25 cm, with both boundaries, with Stratum I and Stratum III, were gradual and messy. Stratum III was encountered at approximately 35 cm and is extended to the base of excavation at 60 cm. Stratum III consisted of very compact fine grained yellowish red (GYR 4/5) silt which contained no cultural material. The soil concentration increased throughout Stratum III so that at the base of excavation the soil concentration was approximately 80%. The base of excavation unit was at depth of 60 cm. A profile was drawn of the southern face. Photos were taken pre- and post-excavation.

Figure 35 State site 505-50-10-1772: Feature CI, Post excavation profile displaying test unit, view to east

98
System I (8-BOE)

Pocket: A small pocket of a very dark brown (10YR 3/2) silt was observed in the northeast corner of the unit extending a maximum of 2 cm.

Very compact, fine grain S3R 4g yellowish red silt with decomposing bedrock and abundant roots and rootlets.

Figure 36: Site 50-50-48-4796: Post-excavation profile displaying test unit, view to south.

Figure 37: Site 50-50-16-5022: Post-excavation profile displaying test unit, view to south.
State Site #60-60-10-003

A 1 m x 50 cm test unit was excavated in the interior of Site #603, a square temporary habitation structure. Three stratigraphic layers were encountered (Figure 36). Stratum I consisted of a very compact, fine grain, reddish brown 2 SYR 4/4 clay silt and contained no cultural material. Stratum I contained a high concentration of roots and wood. Stratum II consisted of a compact very fine grain brown (5 SYR 2/1) silt which contained cultural material. Cultural material encountered consisted of 0.5 g of unidentified marine shell. The marine shell encountered appeared very weathered and brittle. Stratum II was encountered between 20-42 cm, with both boundaries, with Stratum I and Stratum III, were diffuse and wavy. Stratum III was encountered at approximately 45 cm and it extended to the base of excavation at 54 cm. Stratum III consisted of very compact fine grained yellowish red (5 SYR 4/6) silt which contained no cultural material. The cobble concentration increased throughout Stratum III so that at the base of excavation the cobble concentration was approximately 40%. A profile was drawn of the northeastern face. Photos were taken pre- and post-extraction.

State Site #60-60-10-003

A shovel test probe was excavated within the interior of site 6035. The test probe was approximately 54 cm x 48 cm (at the surface), and was excavated to a maximum depth of approximately 50 cm. Two stones were encountered during excavation (Figure 46). Stratum I, a 2 SYR 4/6 reddish brown compact silt, and Stratum II, a 2 SYR 2/2 to 2/4 brown. Stratum II was only encountered in a small pocket in the northeast corner of the probe. Both areas contained plentiful roots and cobbles, and numerous broken cobbles. Stratum II appeared similar to the weak cultural layers encountered at site 6033 and 6034, although no cultural material was encountered at site 6035. Decomposing bedrock was encountered at the base of excavation. A profile was drawn of the northwest face. Photos of the test pit were taken pre- and post-extraction.

Stratum I: (8-18) Very compact, fine grain, yellowish red 2 SYR 4/4 clay silt with a high concentration of roots and wood.

Stratum II: (18-25) Compact very fine grain dark reddish brown (5 SYR 3/2) silt which contained cultural material.

Stratum III: (25-50) Very compact fine grained yellowish red (5 SYR 4/6) silt which contained no cultural material.

Figure 36 State site 60-60-10-003: Test excavation profile displaying test unit, view to south
Stratum I: Very compact, fine grain, reddish brown to gray clay silt with a high concentration of roots and rootlets.

Stratum II: Compact, very fine grain brown (7.5YR 2/4) silt which contained cultural material.

Stratum III: Very compact, fine grained yellowish red (5YR 4/1) silt which contained no cultural material.

Figure 29 State site 50-50-10-0034: Post excavation profile displaying test unit, view to northwest

Figure 30 State site 50-50-10-0035: Post excavation profile displaying test unit, view to northwest
VIII. SURVEY RESULTS

The study corridor is 300 ft wide, 150 ft on either side of centerline. An area 400 ft wide, 200 ft on either side of centerline, was surveyed to insure complete coverage of the study area. During the inventory survey, a total of 126 structural and nonstructural features were identified within the study area. The archaeology features were organized into seventeen distinct sites. Of the seventeen sites encountered during the present study twelve are located within 150 ft of the centerline. The other five sites (3729, 3713, 5029, 5031, and 5032) are located within 200 ft of the centerline centerline.

The seventeen sites are associated with a variety of functions, including traditional Hawaiian temporary habitation (3742, 3743, 3745, 5029, 5032, 5033, and 5035), agriculture (3729, 3730, and 4716), symbolic (petroglyphs sites 5035 and 5031), animal husbandry (5030), and marker (3729) and historical military activity (3725, 4778, and 4779).

A portion of the (Kula) end of the corridor was subject to an inventory level survey by Kamakau Research prior to the present study (Fredericksen et al. 1994). Six sites from the Fredericksen et al. survey are located within the present project area and are 3725, 3726, 3727, 3714, 3745, and 3746. Site type, function, age, significance, and recommendations for the aforementioned six sites are taken directly from the Fredericksen et al. 1994 report.

The results of the inventory survey reflect the broad range of land uses varying from traditional Hawaiian temporary habitation and petroglyphs to historic military, ranching, and agricultural activities.

Traditional Hawaiian Sites

Temporary Habitation

Traditional temporary habitation sites were encountered from 240 to 400 ft a.m.a. on the north side of the Waikana and Kanesu. (Table 8). A total of six sites within the project area were interpreted as having functioned as temporary habitation sites. Site types include surface scatter sites (3729, 3745, and 3746); three flat-flood fill enclosures (5035, 5034, and 5033); and five unique sites that comprise one of a series of building alignments (5030). Generally we can place the temporary habitation sites into two broad categories: structural and nonstructural.

In general all of the two structural temporary habitation sites (i.e., surface scatter of cultural materials) were located between the elevations of 240 to 400 ft a.m.a. While all of the temporary habitation sites that contained structural elements (i.e., enclosure) were located at elevations between 205 to 400 ft a.m.a. Due to the fact that the majority of the cultural material from the three surface scatter sites (3745, 3743, and 3744) was collected during a previous inventory survey (Fredericksen et al. 1994) it is difficult for us to re-evaluate these three sites based on the evidence observed in the field. Therefore sites 3745, 3743, and 3744 will not be discussed in detail here (see Fredericksen et al. 1994 for complete analysis).

Table 8: Comparisons of Temporary Habitation Sites

<table>
<thead>
<tr>
<th>State Site #</th>
<th>Sub-</th>
<th>Cultural</th>
<th>Elev. ft</th>
</tr>
</thead>
<tbody>
<tr>
<td>3745</td>
<td>Surface Scatter</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>3743</td>
<td>Surface Scatter</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>3745</td>
<td>Surface Scatter</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>5032</td>
<td>Alignments</td>
<td>Possibly</td>
<td>Yes</td>
</tr>
<tr>
<td>5033</td>
<td>Rectangular Enclosure</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>5034</td>
<td>Square Enclosure</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>5035</td>
<td>Cylindrical Enclosure</td>
<td>Possibly</td>
<td>No</td>
</tr>
</tbody>
</table>

Site 5032, a series of building alignments, was determined to be temporary habitation site based on the presence of cultural material observed on the surface which is typically associated with pre-contact Hawaiian culture. Sites observed on the surface included a bench and firestone, a bonfire pit, a pen, and a single piece of marine shell midden. The construction style of the site, which is an alignment, is typical of the two military sites within the project rather than the other temporary habitation sites. The site of 5032 is unique when compared to the other temporary habitation sites or military sites in that it is considerably longer (the western alignment at the site is approximately 20 ft in length). 5032 is located 130 ft to the north of the study area centerline at approximately 300 ft a.m.a. within the dunes of Waikana. A 60 by 60 cm test unit was excavated at the site. No cultural material was observed during the excavation and only one single stratigraphic layer was observed.

Site 5033 is a rectangular enclosure that appears to be a traditional Hawaiian temporary habitation site that was modified historically either by the military or by hunters (see Figure 20). The unmodified portion of the site's enclosure wall are collapsed but appear to have been filled at one time. This contrasts with the construction style of the military structures at site 4773, which were normally alignments or rough staking lacking core filling. No cultural material was observed on the surface at site 5032. A 1.0 m test
by 50 cm test unit was excavated at the site. Traditional marine shell middens were encountered from a weak cultural layer during the excavation. A total of 35.8 sq ft of marine shell midden was excavated from the excavation. The site is located 140 ft north of the study area centerline at approximately 460 ft a.m.s.l.

Site 5024 is a square enclosure located 25 ft south of the study area centerline at approximately 335 ft a.m.s.l. The site appears to have been impacted by buildings which were identified by analysis of aerial photographs. The walls of the enclosure, a 1.5 m by 50 cm test unit, were excavated at site 5024 to better understand the cultural layer during the excavation. The excavator noted how the site is similar to site 5033 in that the walls are severely collapsed but appear to have been once built.

Site 5033 is a C-shaped enclosure located 80 ft north of the study area centerline at approximately 265 ft a.m.s.l. No cultural material was observed at the site. A shallow test pit was excavated in the center of the site. No cultural material was encountered during the probe excavation. The site is a weak cultural layer at Sites 5033 and 5024, was encountered.

Temporary habitation sites were expected in the project area along former trails from the uplands to the coast such as the Waikakoa Trail (Hickey and Spencer 1960:41). A trail traveled the Kauhoolo and the Waikakoa portions of the project area.

Petroglyphs

Petroglyphs were encountered in both Kailua and Waikakoa Gulch (5020 and 5021). Site 5020 consists of a panel of three historic petroglyphs located on the northern cliff face of Kailua Gulch. Site 5021 consists of at least three traditional petroglyphs of anthropomorphic figures located on the southern side of Waikakoa Gulch. The petroglyphs are located on the cliff face. Kailua Gulch has previously identified the study area centerline, site 5020 is 250 ft from west of centerline. Site 5021 was originally located 60 ft west of centerline, but the corer was adjusted 150 ft to the east to avoid any impact to site 5021.

Agriculture and Ranching

Three sites from the Kihau end of the survey (i.e. Federalers et al. 1955/6) are of some archaeological interest. All three sites are of an intermediate age. Site 3728 and 3729 were almost completely excavated during the 1904 inventory survey (Hale) which makes re-evaluation difficult.

Historic Land Use

Military Sites

A large historic military site, State site 50-20-1972, was encountered between 609 and 120 ft a.m.s.l. The corridor passes directly through the site. A total of 103 features were documented. Features were generally very single feature alignments of varying shapes including C-shape, U-shape, rectangular, square, oval, and circular enclosures. In addition to the usual enclosures, some other enclosures consisted of a hole excavated into the wall with a small marking or alignment of boulders aligned along site side. Two 1.5 m by 50 cm test units and two shallow test pits were excavated at four separate features from different areas of the site. No test pits or excavations at the site encountered any cultural material and only a single stratigraphic soil layer was excavated. The site was not examined on either the east or the west sides of the corridor. The overall extent of the site could not be determined.

Site 4776 is a small oval enclosure located 50 ft north of the study area centerline at approximately 56 ft a.m.s.l. The site is located within the site area of the site. A single feature layer was observed at the site. A single cultural layer was observed at the site either on the surface or from the test excavation. The site is interpreted as a military site based on the characteristics and location of the cultural material. It must be possible that it was not an isolated site, and that the surrounding sites or features have been destroyed.

Site 4778 is a small L-shaped enclosure situated 75 ft east of the study area centerline on the southern edge of Waikakoa Gulch. The feature is similar to 4776 in that it has a single cultural layer that was observed at the site. The site was not examined on either the surface or from the test excavation. The site is interpreted as a military site based on the characteristics and location of the cultural material. No cultural material of any kind was observed in the area.

Historic Sugar Cane Agriculture

Evidence of historic sugar cane cultivation intensifies were observed and recorded in the section of the corridor between Mila and Oahu's Roads into 1939. The corridor passes directly through the site. Recorded features included five intensive irrigation ditches that cross the corridor perpendicularly. The ditches are terraced, each ditch is created by two to three small bridges. The bridges are constructed of concrete and are in poor condition. Two of the recorded features consist of clearings surrounded by ditches associated with sugar cane cultivation. In addition to the recorded features barely discernible areas along each sugar cane irrigation ditch were also observed.
IX. SIGNIFICANCE OF THE HISTORIC PROPERTIES

A total of seventeen sites of archaeological significance are present in the project area (see Table 6). Sites were evaluated for significance according to the broad criteria established for the National and State Registers. The five criteria are:

Criterion A: Site reflects major trends or events in the history of the state or nation.
Criterion B: Site is associated with the lives of persons significant in our past.
Criterion C: Site is an excellent example of a site type.
Criterion D: Site may be likely to yield information important in prehistory or history.
Criterion E: Site that has cultural significance, such as religious structures (kivas), or human burial locations.

All seventeen sites recorded are classified under significance criteria D. Two sites were also classified under significance criteria C.

Criteria D - "site may be likely to yield information important in prehistory and history" - is assigned to all of the sites. It is believed that these sites have yielded varying types of scientific data and contribute to some or all of the following analyses: (1) natural cultural; (2) site architecture and function; (3) chronology; and (4) settlement patterns. We believe that none of the seventeen sites lack any additional scientific data beyond what was acquired during the inventory survey, i.e., site configuration, description and plotted location.

Criteria C - "site is an excellent example of a site type" - is assigned to the two petroglyph sites (3029 and 5031). Sites 3029 and 5031 are considered excellent examples of smaller petroglyph sites in the lower Kalo gulches.

X. RECOMMENDED TREATMENT

Of the seventeen sites recorded in the project area, it is recommended that three sites be subjected to a program of data recovery and the two sites be preserved. The remaining twelve sites (3029, 3028, 3628, 3743, 3753, 3754, 3763, 3765, 3773, 3775, 3776, 5028, and 5030) in the project area are not recommended for further work. Based on documenting location, type, size and present evidence of data, it is felt that further research is warranted for the 12 sites.

The three sites (5033, 5033 and 5035) recommended for data recovery should be subjected to a program of additional data collection. All of the sites recommended for data recovery have been assigned a temporary habitation function. Data recovery at these sites will probably consist of further excavations in accordance with a data recovery plan which will need to be approved by SHPO/DMNR.

The two petroglyph sites (3029 and 5031) are recommended for preservation. The specifics regarding preservation of the two sites will need to be addressed in a preservation plan.
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CORRECTION

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

At the request of Parsons Brinckerhoff, Inc., Scientific Consultant Services (SCS) conducted a Traditional Cultural Impact Study to be included within an Environmental Impact Statement for the Kilhei-Uncountry Maui Highway project (TMK 2-2 and 3-3).

This project contains several components which primarily include appropriate archaeological research, identification and consultation with a number of informants, and a synthesis and assessment of findings from applicable archaeological work, archival background, and ethnographic research.

Many individuals were recommended to SCS through consultation with OHA (O‘ahu and Maui Island representatives) as well as suggestions from long-term Maui and Kula community residents. Interviews were conducted on Maui between the dates of June 19 to August 4, 2000 with Charles Ke’au, Ed Uweke‘alehi, Henry Silva, Sunny Kanemoto, Randal Moore, Henry Rise, Nancy Pus-body, Sylvia Hurst, Ethel Naga, and Frank Goveia. Telephonic interviews were also conducted.

Numerous cultural features were reported during this study including religious sites, trails, petroglyphs, and the general location of habitation sites. Topographic features associated with pre-contact events, individuals, or recorded in legends and stories were also noted. Several of these sites are not located within the project area. Other sites are considered archaeological as they are no longer in use and their location is unknown.

Interviews with individuals did not lead to the identification of any specific Traditional Cultural Properties as defined by the National Register Criteria for Evaluation as:

Any historic property associated with the traditional practices and beliefs of an ethnic community or members of that community for more than fifty years. These traditions shall be founded in a community’s history and contribute to maintaining the community’s cultural identity. Traditional associations are those demonstrating a continuity of practice or belief well present or those documented in historical source materials, or both. These properties include but are not limited to, certain types of archaeological sites.

Presently, the only known culturally significant sites in the project area are the archaeological features that have been previously identified.
INTRODUCTION

At the request of Parsons Brinckerhoff, Inc., Scientific Consultant Services (SCS) conducted a Traditional Cultural Impact Study to be included within an Environmental Impact Statement concerning the Kihel Uponcountry Maui Highway project (TMHC 2-2 and 2-3, Figure 1). The highway project presently incorporates eight combinations of two Kihel and four Uponcountry terminus options (Figure 2).

SCS provided Section 106 consultation for the project in the form of ethnographic interviews of local residents. Oral interviews were performed to determine if there were special relationships between identified cultural properties and proposed locations for the road corridors, as well as defining the characteristics and classifying the associated cultural activities and uses of these potential properties.

As stated by the Procedures For Ethnographic Inventory Surveys (Draft) a Traditional Cultural Property is defined as:

Any historic property associated with the traditional practices and beliefs of an ethnic community or members of that community for more than fifty years. These traditions shall be rooted in a community's history and contribute to maintaining the community's cultural identity. Traditional associations are those demonstrating a continuity of practice or belief until present or those documented in historical source materials, or both. These properties include, but are not limited to, some types of archaeological sites.

Traditional Cultural Properties might include presently used ancient fishing areas, coastal zones providing edible shellfish and seaweed, land areas harvested for culturally significant plants, and structures associated with ceremonies conducted for graduates of Hula Hula.

It is also stated in National Register Bulletin No.38 that an eligible site may be:

...the location of a significant event, a prehistoric or historic occupation or activity, or a building or structure, whether standing, ruined, or vanished, where the location itself possesses historic, cultural, or archaeological value of any existing structure.
A property could be considered a cultural site and eligible for the National Register if it is associated with a significant event or activity that has left a significant mark on our history or the history of a particular group of people. The National Register does not consider intangible resources as cultural properties, but recognizes the relationship between the property and the activities and beliefs associated with it. It is important to note that such activities and beliefs give the property its significance.


The types of cultural practices and beliefs subject to assessment may include subsistence, commercial, residential, occupational, cultural, and religious and spiritual customs. The types of cultural resources subject to assessment may include traditional cultural properties or other types of historic sites, both man-made and natural, including submerged cultural resources, which support such cultural practices and beliefs.

INTERVIEW GUIDELINES

Several publications pertaining to the process of evaluating and documenting Traditional Cultural Properties and for assessing cultural impacts provided guidance in gathering information for this report. The National Park Service was directed to prepare guidelines to assist in the documentation of intangible cultural resources and to encourage the identification and documentation of such resources by State and Federal agencies. National Register Bulletin No. 28 (National Park Service 1990) was developed and intended to be an aid in determining whether properties thought to have traditional cultural significance are eligible for inclusion in the National Register.

The National Register of Historic Places states:

The quality of significance in American history, architecture, archaeology, engineering, and culture is present in districts, sites, buildings, structures, and objects that possess integrity of location, design, setting, materials, workmanship, feeling, and association.

Criteria established within the National Register for evaluating a property's eligibility for listing in the National Register includes properties that:

- are associated with events that have made significant contributions to the broad pattern of our history;
- are associated with the lives of persons significant in our past;
- embody the distinctive characteristics of a type, period, or method of construction, or of a group of periods or methods of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or
- have yielded, or are likely to yield, important information in the history of the United States of America (36 CFR part 60.64).

Guidelines adopted by the Commission on Hawaiian History (CHH) provide information concerning cultural practices and cultural features that may be impacted by certain activities, such as land development, and requires environmental assessment of cultural resources in determining the significance of proposed projects (CHHC 1997).

On February 10, 2000, with the assistance of a State Historic Preservation Division (SHPD) representative, a draft was prepared for the Archaeological inventory Surveys (pers. comm. Holly McElderry, State Historic Preservation Office 1999).

Preparation of the archaeological portions of this report included reviewing Hawaiian Land Commission Award (HLCWA) records from the Mid-Hawaiian (Land Division) of 1848; archival issues of The Honolulu Advertiser, The Polynesian, journal information recorded by Capt. King (in Bagshaw 1967), LaBrousse (1978), George Valentine (1984), Archibald Menzies (1920), Samuel Kamakau (1961), Alexander Burnside (1971), and Isabella Bird (1979); Elspeth Sterling (1998); Ines Ashdown (1970); Daisy Kaluaupa and Mary Kauana Pukui (1983); and Craigill and Elizabeth Handy (1972).

An archaeological reconnaissance conducted within the proposed bypass highway segments identified 23 historic sites (Pilk et al. 1997). Other archaeological surveys have been conducted within the project area identifying these sites by Thomas Thiem (1906-18), John Stoker (1909-16), Winslow Walker (1931), and more recent scholars.
SCOPe OF WORK

The Scope of Work (SOW) for this project includes archival/ background research, identification and consultation with a limited number of informants, a synthesis and assessment of the findings from appropriate archaeological work, and archival/ background and ethnographic research.

The general intent of this Section 106 effort focused on a selected number of knowledgeable individuals to aid in determining the spatial relationships between potential Traditional Cultural Properties and locations for the proposed highway corridors and characteristics and use of any potential properties. Of particular concern to the present project was the identification of places and/or natural features or objects that may not have been physically modified by humans and were, therefore, not readily recognized as historical properties during conventional archaeological work. In addition, the identification and description of associated cultural practices were deemed of utmost importance.

Archival/background research required accessing both published and unpublished sources including surviving recorded legendary and traditional accounts, early historical journals, narratives and other written accounts describing life styles and social events, missionary accounts, land records such as Land Commission Awards and their associated claims and testimonies, Royal Patent Grants, Boundary Commission records containing survey notes and maps, and information supplied by previous archaeological studies.

Informant interviews form a critical part of the assessment process. Individuals having knowledge of traditional practices and beliefs associated with a project area or knowledge of historical properties within a project area are sought for interviews. Those persons whose knowledge is found in a continuity of traditions passed down from preceding generations and the individual’s personal familiarity with the project area, are important. Ethnographic inventory surveys, which identifies and accepts property documents historical properties within the project area is founded on this foundation.

Preliminary context was made to individuals recommended to SCS by OHA and Parsons Brinkerhoff, Inc. An announcement was sent over the Internet to members of the Hawaiian Nation on Maui asking for contacts of individuals that were familiar with the project area. During this project, more than 50 people were contacted and interviewed pertaining to Traditional Cultural Properties and activities in the project area. Unless the interviewees indicated knowledge of Traditional Cultural Properties, the conversation was not taped. General points of interest were recorded in field notes and summarized below.

The proposed Kihei-Upcountry Highway alignments mainly impact ranch and agricultural lands. Several avenues of investigation were, thus selected, including contacting individuals associated with the ranches and those previously living in plantation camps near the proposed highway alignments. A descendant of an upcountry Land Commission Award recipient whose family had remained was also contacted (Mrs. B. Purdy).

This report contains a cultural historical overview of the project area, a review of archeological and ethnographic studies of the project area, land tenure history, the results of consultations with knowledgeable individuals in the community, and a synthesis and assessment of the findings.

GENERAL DESCRIPTION OF PROJECT AREA

The island of Maui encompasses 1,873 square kilometers (726 square miles) and ranks second in size of the eight main islands in the Hawaiian Archipelago. The island was formed by two volcanoes, Mount Kahal, in the west and Haleakula in the east. The younger of the two volcanoes, Haleakula, rises 2,727 m (10,023 feet) above sea level and embodies the largest section of the island.

Unlike the amphibious valleys of West Maui, the flanks of Haleakula are distinguished by gentle slopes. Although it receives more rain than its counterpart in the east, the permeable lavas of the Honaman and Kula Volcanic Series prevent the formation of rain fed perennial streams. The few perennial streams found in the windward side of Haleakula originate from springs located at low elevations. Valleys and gullies, such as Waikului Gulch, were formed by intermittent water run-off.
Along the coastal side of the windward side of Haleakalā, rainfall has been measured to 4,000 mm a year and over 9,000 mm near the mountain’s summit (Starr and MacDonald 1942:13-14).

Kula, situated on the leeward slope, is located in the rain shadow of Haleakalā. On the leeward side of East Maui, rainfall averages range from 500 mm to 750 mm in the project’s uplands to less than 400 mm in the coastal region. The combined arid conditions and lack of reliable water sources resulted in the importance of the expansive upland dryland field systems established within the project area. Kula consists of sloped plateus with finger ridges and a’a outcrops (Figures 3, 4, and 5).

The boundaries of the project area extend from Pi’ilani Highway on the coast, west, to the western flank of Haleakalā and Kula Highway (Upcountry Maui). Project area elevation ranged from approximately 18 to 31 meters (60-100 ft) above mean sea level (asl) on the Kīhei coast to approximately 732 meters (2,400 ft) ext at terminus U3 in the upland subzone’s of Pāakalua (see Figure 2).
The northsouth boundary extends from Kāula to Kamaʻakea Alapaʻs. A total of 13 alapaʻs, or portions thereof, are incorporated within project boundaries including Kāula, Kauaʻa, Aʻuʻu, Kaaalalani, ʻōhūʻōpio, Paikō, Kekaha 1 and 4, Waiākea, Koʻonoʻolu, Kēneʻo 1 and 2, Waihaha, Kiʻiʻu, and Kamaʻakea.

TRADITIONAL AND HISTORICAL LAND TENURE

Traditional Hawaiian subsistence was based on agricultural production, marine exploitation, animal husbandry, and wild plant and bird collecting. Extended household groups settled in various alapaʻs, smaller land divisions within a district, that cumulatively constituted an island from the ocean. Within the alapaʻa, residents were able to harvest from both the land and the sea. Ideally, this situation allowed each alapaʻa to be self-sufficient by supplying needed resources from different environmental zones (Lyon 1875:111). Many alapaʻa (Kūhō, Alae, Kāndahau Nui, Pālehu Ili, etc.), in the traditional Kula District were not typical as they were landlocked (Figure 6).

In pre-Contact Hawai‘i there were primarily two types of agriculture, wetland and dryland, both of which are dependent upon geography. Conditions in West Maui with its perennial streams were ideal for wetland fields (Celosia argentea) agriculture incorporating pond fields and irrigation canals. Other crops such as kalo (Saccharum officinarum) and ma‘i (Canna, Musa sp.) were also grown and where appropriate, the production of such crops as ‘ulu (sweet potato, Ipomoea batatas) occurred. This was a typical agricultural pattern seen during traditional times on all the Islands of Hawai‘i (Kirch and Schiffer 1992:5, 119; Kirch 1987).

Dryland agriculture was an important component of Kula’s traditional economy. Although West Maui contained vast wetland pond fields, they produced the least amount of two of the main Hawaiian islands. East Maui’s extensive dryland fields are thought to have produced crops of sweet potato equal to Hawai‘i Island, and exported O‘ahu and Kaua‘i (Handy and Handy 1972:68).

An account of traditional planting methods from the newspaper Ka ʻAkupu’a ʻO ka ʻāina begins: “...rocky land in the olden days were walled up all around with the big and small stones of the patch until there was wall (basalt about 2 feet high...” (March 24, 1933).
More relevant to the project area is Handy and Handy’s description of environmental conditions on the windward side of Haleakalā:

The great bulk and altitude of Haleakalā makes its southern flank practically a waterless desert, and the southeastern and east coasts relatively dry, so that there was no lowland (stream-fed) cultivation at all. The arid country below the west and north slopes of Haleakalā, including Kula, Honaulu’ula, Kāhīkini, and Kaupō, were dependent on sweet potatoes (Handy and Handy 1972:48).

Handy and Handy described planting methods in the drier sections of Kula:

Where potatoes are planted in enrolling ferns with human, as on eastern Maui and in Kona, Hawai‘i, the soil is sifted and heaped carelessly in little pockets and patches, using favorable spots on slopes and enrolling poison ferns give ample aeriation without much mulching (1972:131).

As the land was cleared for dryland agricultural fields, the upland native forests desublimed. The forest was an important resource to pre-Captain populations as well as historic settlements as it provided medicinal plants, wood, and birds hunted for food as well as their feathers. However, as agriculture expanded, deforestation occurred. Traditional clearing methods are illustrated in the story of Kīhākūlī, a chief of Maui in the 1600s. The chief went to the boundary of Kula and Makawau: “...Reawed of this place, along the stream on the side adjacent to Kula...that is the place Kīhākūlī set fire to. There he gathered and planted sweet potatoes” (Mai 1884).

A typical dryland forest might include a mixture of manono (Sophora chrysophylla), ‘ahi’a lehua (Metrosideros polymorpha), nohe (Metrosideros sandwicensis), kō (Acrocomia koa), ‘ohe (Sansevieria sp.), lamo (Dipthera heliosperma), alopu‘u (Monstera sandwicensis) and others. Arable areas valuable for feathers would most commonly included wānalei (Hedycnemum siresse), ‘ipouna (Himantophyllum siresse), ‘alalua (Himantophyllum siresse), and ʻohe (Aedandra abscapelis). A number of digitates ground-dwelling birds, now extinct (Paracorina sp.), were hunted as food as were other endemic and indigenous birds (Kulb et al. 1997:227).

Kula was always an arid region. In spite of this factor, a considerable population existed along its extended, low southeastern shore line (where the fishing was excellent) and the lower windward slopes of Haleakalā. So far as is known, the Kula region supported no Hawaiian towns and the fishermen in this section must have been dependent mainly on poi brought from the wet lands of Waiaku and Wailuku across the plain. This supplemented their usual sweet potato diet: “...kula was the staple of life here” (Handy and Handy 1972:51).

In spite of the dry, inhospitable conditions of Kula, many choose to settle on the coast as well as inland. An important component of the traditional Kula subsistence economy was fish ponds, several of which were constructed on the south Maui coast. The remnants of two ponds still exist: those of Kalapōpu and Wa‘alulu. These other fishponds were identified in aerial photos along the coastline of Waihe‘e and Kēōkea (Kubl et al. 1997:27).

Kalapōpu, located on the boundary of Ka‘ō‘ō‘ō‘o and Wa‘alulu Alapua‘a’s was a royal flatfish fishing village. Although it is not known when it was first built, it is recorded that while acting as overlord on Maui in the sixteenth century, Hawai‘i’s island chief Ulupō built the sea walls of three ponds one of which may have been Kalapōpu (Stirling 1988:351). When Kamehameha I ruled as chief over Maui, it is reported that he rebuilt the collapsed south side of Kalapōpu (Kamakau 1869).

PRE-CONTACT

The division of Maui’s lands into districts (a‘ana) and subdistricts was supposedly performed by a kahuna named Kala‘ahi‘i, during the time of the ali‘i Kākau‘alana (c. 1500s) (Beckwith 1940:383). Traditionally, Maui consisted of twelve political districts: Hāna‘a‘a, Kula, Hānākākāpo, Hānākākāpo, Kahakuloa, Kanapō, Kīpōhulu, Hīna, and Ka‘ō‘ō‘o in East Maui and Waiaku, Kā‘ō‘ō‘o, and Lahaina in West Maui (Figure 7).

In historic times, the original twelve traditional districts were reduced to four: Lahaina, Waiaku, Hāna, and Makawao which included the former Hānākākāpo, Hānākākāpo, Kula, and Hōna‘u‘ula. Makawao is also the name of an individual alapua‘a located inland of the present town of Hā‘i‘ili‘ili.

Traditional boundaries occurring between Kula and Hānākākāpo were the lands of Hā‘i‘ili‘ili and Mākeaila. These alapua‘a are not typical as they are land locked and do not extend to the sea.
Kula translates as "plain, field, open country, pasture" and is used to describe the country in back of the seashore or the name of a region near the base of a mountain (Pukui and Elbert 1957:164; Lucea 1955). In 1884, a governmental act differentiated between dry or kula land and wet or kula land (Pukui and Elbert 1957:164).

The few references to the Kula District found in traditional sources illustrate its relative lack of importance compared to Hana, Lahaina, Wailuku and other population centers on Maui. Most references to Kula are minimal even when describing important battles and their participants.

**Traditional Legends and Associations**

A chant from the 1800s reproduced in Sterling (1996:7) notes the names of the winds of Maui and Molokai, including mention of Kula:

> The cold wind travels over the uplands of Kula
> And rages down on the pill grass.
> The wind of Kula is the Nii [The kahua is of Kula]. (Fornander 1919:100).

Several historical and legendary sayings regarding Kula and the lands contained therein survived and were recorded by Mary Kawena Pukui (1983). Some are derogatory and some compare natural phenomena of Kula to human qualities representing some of the traditional cultural values held by the Hawaiians of Maui.

According to surviving traditions, the skills of the people of Kula appear to have been confined to the upland environment. It was said that in their ignorance of fishing matters, they would try and scale the suckers of a squid's legs (Sterling 1998:243).

*He aina o Kula ua kahuna*
*Maui na kule akahui*
*Ha aina i pau ke o'e 'a opea*
*Ko a na mehi i ka puapuapa i ka au'e*

*Kula is a land that is famous*
*From the days of the ancient chiefs*
*A land full of possibilities*
*For the scaling of the suckers of the octopus (Dalby Kalama, in Sterling 1998).*
Handy and Handy reported that Hālauhālau was a final resting place for the people of Kula and Hana’alei of the “Clan of Pūnehoe” (1972:236). These devotees would travel at night to the edge of the crater and throw the bones of their dead into the volume.

Kula, lying in the lee of Hālauhālau, would periodically suffer from droughts resulting in famines. During a drought in the time of Kāhīpili‘ilani (c. A.D.1500-1605) people were forced to subsist on roots such as fū’ūlolo‘e, pəlolo‘e, and ‘opolo‘olo‘a (Kamakau 1901:23). They could restore their crops only by obtaining potato slips from neighboring Hānaiakamakaua and Hākapu‘ula‘ula.

The place names of political entities were often derived from legends, significant events, or land features. An example of this is the story of A‘apua, the owl.

According to legend, a female owl lived on the upland of Kula during the reign of Kamehamehakawalehua (p.6). A man named Kapi‘oli from Wailuku smashed her eggs inciting a battle between the owl and the people of Wailuku. A‘apua found revenge for the destruction of her eggs at the death of Kamemehakawa Nikola during the battle (Hara 1871:13). Thus, the origin of the name of one of the ahupua‘a’s in Kula.

The sacred site of Pu‘u Pauke is located in the ahupua‘a of “A‘apua (up high of the project area). Located on a crest of a hill, east of Hālauhālau Highway at approximately 2573 feet above sea level, Pu‘u Pauke was described by M. Moses in an article in Keokea’s (Feb 13, 1884). Moses states that Pu‘u Pauke was declared by Kūhi‘o as sacred and no commoner could climb the hill because it was a ahuakua for the high chiefs of Maui from ancient times to Kāhīpili‘ilani. A kahua lived at ‘A‘apua to guard the hill. Several course high knoll rock alignments were identified on the hill in 1973 and may be the remains of the religious structure.

A small land division named Kohala located between Makawao-Kula and ‘A‘apua Ahe‘apua‘a appears on a map surveyed between 1872-1879 (W. D. Alexander and M. D. Monnans). Within this section is a hill named Pu‘u Pauke. Although distinctive in form, no traditional references were found associated with it except that it was included in Grant No.1829 held by someone named Kamea in the 19th century.

According to Ashdown, Central Maui was known as the Kula o Ka Mā‘ume‘n, or the land of mirages. It was here that the lost souls wandered until they could find their way to rest (Ashdown a.d.). Ashdown recorded:

In the area of Wahi‘e‘uma‘a (now called the “Buena Park” above the modern Pūlī-Pūlī camps) and nearby lea-ma-ri-au in the ahupua‘a of Kula o Kula, there was a structure said to be for bird-baiting ceremonies because that region was full of birds. The woman of ‘Olo‘a dwelt at Māmalu and she was called Kūmān because she was very high rank. She was so sacred that others must keep their distance...a hautaino lesser chief tried to win her. Of course this was kapu. Her heart was heavy with the knowledge that because he came near to her shadow he had to be punished. A high priest conducted ceremonies of purification at the temple there and revived happiness. (1971:66)

Maui is home to important chiefly lineages and prominent chiefs of the Ulu-buma line. Leaders including Hono, who played an important role in formally establishing chiefly prerogatives of rule and prestige by forming an archipelago-wide chiefly council, Pu‘ulō‘ili‘i and his son Kāhīpili‘ilani, who began construction of public works, Kekaulike, paramount chief of Maui in the 1700s, the great warrior chief Kamehameha the Great who lived all o ka ‘ilii (the favorite wife) of Kamehameha I, are just a few (Fleming 1969, vol. 2:68-79; Kamakau 1963; Debe 3000-49).

By A.D. 1400 to 1500, Maui’s political districts were consolidated into two polities: East and West Maui (Fleming 1969, Vol. 2:79; Kehoe et al. 1997:169). The ruling ‘ai of each polity were from separate genealogical lines (Figure 8) which contributed to the mutual hostility which was maintained by skirmishes and wars. The all o East Maui traced their origins to Kulaahinohi, a Hawai‘i Island chief who had emigrated to Hina and those in West Maui to a much older Maui line (Fleming 1969, Vol. 2:78-79).

East Maui’s ruling center was in Hina but just as important were the districts of ‘A‘iapono, Kihapupu, and Kaupō. West Maui had political centers at both Wailuku and Lahaina (Fleming 1969, Vol. 2; Kamakau 1961, Kehoe et al. 1997:15). Even by this early period, large settlements were populating at ‘Aiwa‘e, Waikapu, Hāna‘ula, Lahaina, and upcountry Kula, and the building of religious temples flourished (Kehoe et al. 1997:17).
Maui became a unified political entity during the seventeenth century by the marriage of Kihapi'ilani of West Maui to Kalama, the daughter of an East Maui chief. Under the reign of Pi'ilani, father of Kihapi'ilani, public works, such as an inland-wide pedestrian highway and chiefly residential additions to temples, were built (Fernandez 1969, Vol. 2, Kalb 1995; Kalb et al. 1997:19). During the reigns of Kakananane, all but this period initiated changes such as the reorganization of land tenure under the paramount chief.

Inter-island upheavals marked the period between A.D. 1659 to 1820. Maui was often at war with Hawai'i Island and O'ahu with battles for supremacy fought back and forth. Kekaulike, men to power in the 1700s with help from his son Kalani, who was commander-in-chief of the army. Kalani led attacks in the battles of Kii'maumau and Kikipuka 'elele at Kamalani in Kula and of Kula and Kula-kahua at Kaukau, which brought about peace.

Kekaulike, Maui Island's paramount chief, built war temples (manaoa ho'oulu) and proceeded to invade Hawai'i Island causing much damage to Kona, Kaua'i, Kauaihane, and Kohala as he retreated from the defending forces of Alaka'i of Hawai'i (Kamakau 1961:66; Fernander 1969, Vol. 2:122). Kekaulike was taken ill upon his return to Maui. Kamanu recorded the following:

> When Kekaulike heard that Alaka'i, the ruling chief of Hawai'i was at Kohala on his way to war against Maui, he was afraid and fled to Waikiki in his double war canoe named Ka-eke-ke'e. He sailed with his wives and children, his officers, war henchmen, and fighting men, including warriors, speer men, and counselors. They went by canoe and some overland, and the fleet landed at Kapu'ahu [Koko'ele] at the pit of 'Ahalohe in Kula. Here on the shore the chiefs prepared a litter for Kekaulike and bore him upland to Hōkūlani in Kula. There Kekaulike died, and the sound of lamentation for the dead arose (Kamakau 1961:69).

Upon his death, Kekaulike's sons jostled for dominance with one entitling the assistance of O'ahu chiefs and the other allying with Hawai'i Island chiefs. The resulting outcome was one of decentralization of the land and the eventual dominance of a junior son named Kamahuanauanui (1657-1662). Upon the death of Kamahuanauanui, his half brother Kehikiti (II), ascended to power, maintaining his control until the invasion of Hawai'i Island chief, Kalaniopu'u, around 1775. After a series of invasions by Kalaniopu'u, Kehikiti successfully repelled the Hawai'i Island chief from Maui and moved on to secure Makaliki and O'ahu, establishing his residence at Waikiki and becoming the ruler of all the islands except Hawai'i.

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<table>
<thead>
<tr>
<th>Date A.D.</th>
<th>Reconstruction of Chiefly Lineages</th>
</tr>
</thead>
<tbody>
<tr>
<td>1650</td>
<td>Kekaulike</td>
</tr>
<tr>
<td>1659</td>
<td>Alaka'i</td>
</tr>
<tr>
<td>1820</td>
<td>Kekaulike</td>
</tr>
</tbody>
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Figure 8: Diagram of Maui's Chiefly Lineages (Kalb et al. 1997:15).

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While Kahakili was subduing O'ahu's population, ali`i was not well in Kula. Kamakahau says:

During this period there were disturbances among the country people, not only on Oahu but also on Maui. The trouble arose through one of the lesser chiefs (kauwauli) named Kua-keau, a favorite (akahai) of Kahakili to whom Kahakili had given the privilege of letting his pigs run over the land of Kula and reaping them as he needed them. But he needed also pigs belonging to the country people of Kula, Hanaula, and Kahului, as the Kukui, and went with a large party to rob them of their wealth even with violence. This was the cause of the uprising of the country people called the "Battle of the pig-eating of Kua-keau" (Aloa E-o-Kua-keau) (1901:142).

Both Maui and Hawai'i, now under the leadership of Kamakahuna I, continued their war for dominance with Maui eventually being annexed by Kaukahanohona as he consolidated the Hawaiian Islands under his rule.

TRADITIONAL SETTLEMENT PATTERNS

Kula can be divided into four environmental zones (Kolb et al. 1997:147). The first is the coastal zone which includes the shoreline and surrounding area up to approximately 0.25 miles inland. The second is the "barren" or intermediate zone which is the largest and least agriculturally productive. The third is the upland zone located above the 30 inch rainfall line and extending into the fourth, or forest zone. Gardens were established here during traditional times. The project area extends through portions of the first, second, and third environmental zones.

Archaeological investigations indicate a large amount of permanent settlement in the upland, as elevations above the 30 inch rainfall line in Kula (1997:191). Based on the feature type, number, and size of houses (9), rock art sites, and ancient agricultural fields found in this part of Kula (vicinity of alignments K2, U3, U28), a large, permanent population is indicated.

Coastal settlement was also common. The existence of fish ponds (three at Kakealipolo in the vicinity of tenters K1) and coastal houses (2) confirm the presence of a stable population relying on coastal and marine resources. Agriculture may have been practiced behind the dune berms in low-lying marsh land in the vicinity of Kulea Point (ibid:101). It is suggested that permanent habitation and their associated activities occurred from A.D. 1200 thru the present in both the uplands and coastal regions (ibid:104).

20

Trails extended from the coast to the mountains, linking the two for both economic and social reasons. Several trails were identified and described in a study of Waiahuli and Kōkēka conducted in 1997 (Kolb et al. 1997:335). A trail known as the alalow or "king's trail" was located along the coast and traversed all the major communities of Kula. An inland trail running from Uhapalakua to Hanaula to Ko'ula, extended through the same communities as at an altitude of 700 m north. Two community trails linked the coast to the uplands. One trail called Kua-kua-keau's "ali`i or the "red encircled god," extended from upcountry Kōkēka down to the Kīhei coast. It extended very near Pu`u `o Kalu. Kālakāpōlolo Trail is the second coastal/upland trail network that extended from upland Waiahuli down to Kālakāpōlolo fishpond. It also, followed a course very close to Pu`u `o Kalu, in the atipuna `e of Waiahuli.

The documented agricultural system of Waiahuli and Kōkēka can serve as a model for traditional settlement and cultivation in the Kula region (ibid:99). Based on archaeological studies and early historic records, this would include small sets of linear terraces describing down intermittent drainages and informal agricultural features on rocky ridges along the swales. The latter were described by short irregularly-shaped terraces, mounds, modified outcrops, term walls, oval and irregularly shaped alignments and enclosures near house sites often consisting of several structures. Agricultural features extended downslope as far as 460 meters near (1,500 feet) in Kōkēka and Waiahuli.

HISTORIC PERIOD

Much knowledge of traditional land use patterns is based on what was recorded at the time, and shortly after, known Western Contact (1778). Early records (such as journals kept by explorers, travelers and missionaries), Hawaiian traditions that survived long enough to be written down, and archaeological investigations have assisted in understanding the past. However, early descriptions of the area are brief and infrequent.

Captain King, Second Lieutenant on Revolutions during Cook's third voyage, briefly describes the coastal perries of the project area from a viewpoint of "eight or ten leagues" out to sea as his ship departed the islands in 1779 (Braggshold 1937). He mentions "...a small hill back to the Southward off which there is a fine sandy bay with several bays on the shore and a number of coconut trees growing about them." It is probable that the hillback was Pu`u Ohi`i located south of Kīhei. King describes the island, enumerates the observed animals, thriving groves of breadfruit, the excellence of the tamo, and almost prophetically, says the sugar cane is of an unusual height.

21
The next reference to the southwestern coast occurs eight years after Cook's initial arrival in the islands.

In 1786, La Pérouse sailed up the western coast of Maui, stopping and recording his impressions while anchored in Keone'o'io (south of the Kii terminus). Although the headward section of the island appeared hot, dry, and rough, the visitors were offered "...hogs, potatoes, bananas...taro, with cloth and some other curiosities..." (La Pérouse 1998:345). Landing on the morning of the 21st of May, he was greeted by approximately 120 natives. La Pérouse notes the soil is "...wholly composed of lava and other volcanic matter. Water was scarce and the villagers drank from a shallow, brackish well.

La Pérouse continues:

"During our excursions we discovered four little villages, each containing about ten or twelve houses, which are not only covered but built with straw and shaped like those of our poorest peasants; the roof being in the form of a hemisphere. The door, placed at the gable end is only three feet and a half high, admits of no entrance without stooping; and is shut only with a hurdle which anyone may open. The furniture of these isolated cottages consists of mats, strewn like carpets on which they sleep; and their only kitchen utensils are very large gourds which they shape at pleasure while green. They resemble and imitate various designs in them in black. Their clothes, of which they have a great quantity, are made like those of the other islands, but not withstanding, they are very finely painted yet in manufacture they are not equally skilful with the latter." (ibid:113-125).

Nathaniel Portlock and George Dixon sailed down the southern coast in 1786 without landing and mistaking La Pérouse, who was at that moment anchored in Keone'o'io. Vancouver recorded his impressions of the southern and then the western coast of Maui during his second visit in 1793:

...it may be useful to remark, that the part we were abreast of [point of Pohaku'ena Point] at daylight in the morning, though terminating very abruptly in the ocean, and though its surface was very uneven, had yet a verdant and fertile appearance, and was seemingly in an advanced state of cultivation. From the number of villages and distinct houses, we were led to consider it as intensely well inhabited. This pleasant scene was shortly changed on our advancing a few miles to the westward. The face of the country became totally different, the shores and sides of the hills had no indications of being inhabited and were almost destitute of vegetable productions. They appeared to be a rude mass of naked barren rocks, broken into many deep gulleys, that extended from the mountains to the water side. Beside these, were many small circular hills that appeared to be combed either of sand or stones, and had acquired a very smooth surface of a light brown colour.

Perpendicularly veins separated the different strata, and descended down the mountains; these, as far as our glances enabled us to distinguish, broke up this part of the island to have undergone some violent effects from volcanic eruptions (1784-85).

Vancouver was greeted by some of the inhabitants who paddled out to meet the foreign ship:

We passed the south point before mentioned at the distance of about half a mile; it is formed by rugged craggy rocks, and the sea breaks at a little distance to the north west of it. Whilst in this situation, we were visited by a few of the poor natives from a small sandy cove, where they had some miserable habitations. The poverty of these people was apparent, by their bringing only a few small packages of salt to dispose of; and by their canoes being very small and out of repair. In the afternoon, we were visited by a chief in the only decent cause we had yet seen at Mwvaw. From him I learned, that he was sent by Tiareere [Kokkilii] to inquire who we were and if we had friendly intentions towards the island. He informed me that the best anchorage was near the north-west part of the island, called Kakehina [Kahului], and that if I would proceed thither, Tiareere would not hesitate, nor he, and my other assurances of friendship, to pay us a visit (ibid:855).

Archibald Menzies, a naturalist accompanying Vancouver stated: "...We had some cause[s] off from the latter island [Maui], but they brought no refreshments. Indeed, this part of the island appeared to be very barren and thinly inhabited" (Menzies 1920:162). According to Kokkilii, the extreme poverty in the area was the result of the continuous wars between Maui and Hawaii resulting the land to be neglected and human resources wasted (Vancouver 1794:856).

Other explorers and traders followed. Lahaina, which provided a sheltered roadshead and where the alluvium in residence, was the hub of activity. The importance of Hawaii in merchantry increased with the discovery of sandalwood and the growth of the trans-Pacific trade. Subsequently, the whaling industry, lasting to ca.1850, brought hundreds of ships every year to Lahaina. The winter months would find ships replenishing their supplies from the produce grown on Maui, much of it from the upcountry Kula region.

Cultivation of Irish potatoes in the Kula District began shortly before 1480. The Kula area became known as the "potato district" because of the great success in their cultivation. The most extensive potato cultivation area in the Hawaiian Islands was Kula. In the 19th century, during Kula's peak potato producing period, dried goods in the supplies extended all the way from Kula to Kaupu. The resulting deforestation for potato cultivation adversely affected the amount of rainfall in the district and periods of drought became more common. Before the mid
In 1849, the California gold rush opened a new market for Hawaiian produce. Along with potatoes and other vegetables, sugar, molasses, and coffee were suddenly in great demand (Kuykendall 1968:321).

In November of 1849 an article in the Polynesian stated:

The call for [potatoes] is loud and pressing, as some vessels bound for California have taken as many as a thousand barrels each. The price is high, and the probability is that the market can not be supplied this autumn. Kula, however, is full of people. Stranger from Walla Walla, Hamakua and Lahaina are daily preparing the ground and planting, so that if the demand from California shall be as urgent next spring as it is now, the people will reap a rich harvest...They often repeat the saying of a foreigner, who, after having visited the mines of California, came back to Maui quite satisfied, and said to his neighbors at Waiaku, "California is yester in Kula. There is the gold without the fatigue and sickness of the mining country." (November 24, 1849).

The Honolulu Advertiser describes the changes to Kula brought about by extensive cultivation:

Before 1850 Kula was supplied with moisture naturally through the existence of a large forest. "That forest was cut down when land was cleared in Kula to open farm plots in 1850. This was in answer to the demand for food in California during the gold rush...and by ranchers clearing for pasture." Secondary rain of clearing forests was destruction of existing fresh water ponds in Kibei on the Naalani Bay coast below Kula. When forest was cleared, water was free to rush down the mountains carrying soil from Kula and filling with mud, the ponds for which Kibei was once famous. Meanwhile Kula is dependent on Pipe for Waikamoi watershed (1962 A:15).

A small whaling station had previously been established at Kaapepala in Kibei. John Hildred built his residence and a store referred to as the Kau House in 1849. The store flourished due to the whaling and potato industry and providing an accessible port for exported produce.

The privy council voted to sell government lands in one to ten acre sections to Hawaiians at three dollars per acre to support the growing economy. In 1851, 43,033 barrels of Irish potatoes, along with 35,717 barrels of sweet potatoes, were exported. In 1851, as California endured several disasters and Hawaii's suffered a drought, the potato industry continued to eke (Kuykendall 1968:321). It was not long before potatoes were being grown in California and Oregon. By the fall of 1851, the potato boom was over in Hawaii.

In reply to petitions from his subjects, Kaullakaui had made experimental efforts to sell some land to Hawaiian subjects on O'ahu (Mauna Valley) and in Makawao, Maui. In 1845 and '46, while the king was at Makawao, it was announced that the entire district would be offered for sale at $1 per acre (except for McLain's plantation). Reverend Green handled the sale of land and Reverend Armstrong contributed by making surveys of the mostly five to ten acre sections. The bought parcels were registered in Green's name and were not listed in the indices of Land Commission Awards beginning in 1848. Eventually, approximately 9000 acres were sold and the experiment was pronounced a success (Kuykendall 1968:283). However, this was an isolated instance and it soon became necessary to reverse the traditional land tenure system.

The Chinese in Kula

The expanding agricultural markets opened by the growing whaling fleet and the California gold rush attracted many Chinese to Kula in the 1840s. Government lands were leased to ranchers who then subleased the lands to the Chinese.

Initially, the Chinese were accepted on their own merit, as were all new comers, by the native Hawaiians. In fact, their association with the people of Hawai'i was congenial with, in some cases, Chinese men marrying all 'i women. Land was made available to Chinese by the Governors of Maui and Hawai'i for sugar cultivation. Often, the governors would arrange for Hawaiian laborers to work in the cane fields (Olcott 1900:328). With the rising influences of the Caucasians and the influx of larger numbers of Chinese as servants and laborers, the status of the Chinese in Hawaiian changed for the worse (ibid. 329).
The Chinese moved to Kala lands from Makawao, Paia, and Wailuku on Maui, from Kahului on Maui's island, and from Honolulu. Many were directly from China to Kala. About 95% of the Chinese were Hakka from Kwangtung Province. As stated, much of the Kala land was owned by the government which leased it to the ranchers, who would then sublease to Chinese. Payment was often made in farm produce, as exemplified by a farmer leasing from ‘Uhepupsuakia Ranch who paid five bags of corn for every acre of land he farmed (Okada 1979).

Even as the demand for potatoes declined the Chinese population continued to grow. Between 1880 and 1910, there were approximately 80 Chinese families living in Kala. There were some 700 Chinese living in Kala by 1900 (ibid.). By this time, Kala had become cosmopolitan supporting such activities and institutions as Chinese and English schools, Christian churches, the Hong Men Society, gambling houses, opium dens, and general stores along with the cattle ranches and vegetable farms (ibid.).

The Chinese and other Kala farmers planted corn, beans, onions, Chinese cabbage, round cabbage, sweet potatoes, wheat, and other grains, and cotton. Much of the produce was transported to Mililani harbor where it was then sent to Honolulu where it would be sold by brokers in Chinatown (ibid., Figures 9 and 10).

Water was not piped into Kala until 1903. Farmers depended mostly on rainfall, so water was stored in pre-Contract times. When droughts occurred every few years, water was brought from Polipoli Springs or from the beach at Ohauo in barrels on the back of mules (ibid.).

The Mâhâle

In the 1840s a drastic change in traditional land tenure resulted in a division of island lands; this system of private ownership was based on western law.

While a complex issue, many scholars believe that in order to protect Hawaiian sovereignty from foreign powers, Kauikeola (Kamehameha III) was forced to establish laws changing the traditional Hawaiian economy to that of a market economy (Down 1988:112; Kalykana, Vol. 1, 1938:145 footnotes 47, 152, 169-70, 170; Kane'eleloa 1953:167-70, 176; Kelly 1983:45).
Among other things, foreigners demanded private ownership of land to insure their investments (Raynolds Vol. I, 1930:138, 145, 478, 184, 202, 206, 277; Kameʻelehua 1992:178; Kelly 1995b). Once lands were made available and private ownership was instituted, the makaʻa claims (communities) were able to control the plots on which they had been cultivating and living, if they had been made aware of the foreign procedures (Kameʻelehua, Land Commission Awards, LCA). These claims could not include any previously cultivated or presently fallow land, wākūkū or stream fisheries, or many other resources necessary for traditional survival (Kelly 1995; Kameʻelehua 1992:295; Keʻala and Sotul 1992). This land division, or Māhele, occurred in 1848. The awarded parcels were called Land Commission Awards. If occupation could be established through the testimony of two witnesses, the petitioners were awarded the claimed LCA, issued a Royal Patent another and could then reside on the property (Chinen 1981:36, Figure 11).

Figure 11: Photograph of Post-Māhele Boundary Walls in Kula (June 21, 2000).

Individual LCA claims within the present project area are discussed in detail by Folk et al. (1999) and will only be briefly considered here. The thirteen ahupuaʻa impacted by the alternative terminus were acquired by various individuals and the government. (LCA information from Washburn Ana Corporation, 1998 Database, Honolulu).

Kākū, (U1 terminus), ʻOmeʻōpili (U1 intersection), and Makahā-Kalua (U1A terminus) were ahupuaʻa included among Kula lands controlled by Meirau Keokeakalani, mother of Kalikana and Uli Wakahulu (see Figure 7). She transferred these ahupuaʻa to the government in lieu of commutation fees and entered Aʻapo (U1B terminus) and Kamehamehaha Aʻapo, both consisting eight claims. A large portion of Makahā was eventually sold to the Maui Land and Pineapple Company. Keokeakalani also received Kekīhōa (1B-4) which had 32 land claims.

Kēkīhōa was Crown land from the beginning and had 46 LCA claims. Waihālulu was made Crown Land in 1890 by Kalikana and had 41 land claims. Kīhāeo-Ahuone (1B-2) with 11 land claims, Pākauhi Iki and Nui (P1, P2 intersection and U1) and Waikāia-Ahuone with 17 land claims each, were government lands.

In the Indices of Land Commission Awards, 35 LCAs were claimed for ʻOmeʻōpili. Most of these LCAs were located in the area of the ʻOmeʻōpili Homestead between the Hanalei Ditch and Kula Highway. Forty-six LCAs were claimed in Kīkīhōa and forty-one in Waialūlī. The majority are listed as kula land and house lots suggesting dryland agriculture. Based on the testimony for the ahupuaʻa of Aʻapo, primary usage was pasturage (LCA 9026, Native Testimony Vol. 7:53).

The ahupuaʻa of Kalikana was awarded to Kamehamehaha and had 14 LCA claims and Kāmaʻo (K2 terminus), received 49 claims. Hahakua Hāwehewa, whose family had supported Kamehameha I, received the ahupuaʻa of Kaʻūhō (K1 terminus) which had 35 land claims.

Traditional settlement patterns are reflected in the land records of the 1800s. A total of 254 ʻahu (settlement, parcel) were granted by the Land Commission in Kula to 187 claimants. No located claims were identified within any of the road alignments which were surveyed to a width of two hundred feet either side of the center line (Folk et al. 1999:7). The majority of claims
were located upland, between the 610 meter (2,000 foot) and 1,219 meter (4,000 foot) elevation along the old Kula road (which was called the old lawu), and extending down to the 700 meter (2,300 foot) elevation in Kama'aleo and the 235 meter (1,100 foot) elevation in A'apena. Only a few coastal claims were awarded (15, represented by black dots on Figure 12). They were clustered in close proximity to, and slightly inland from, Keheleokeo Fishpond (east of K1 terminus).

The historic records of both awarded and unawarded claims suggest that many individuals had house lots on the coast as well as an upland residence. Some pineapple and banana plots were claimed in conjunction with some coastal house sites. The majority of the claims were for kula lands to be used for sweet potato or Irish potato. There were some claims for "uiy le", "winter kula moko" (a term particular to Maui-Kula), bananas, and house lots. A number of claims was for maka mai, suggested to mean small fertile pockets of heavy soil (by the Native Register translator; see Folk et al. 1999:21).

Ranching

Ranching was present in Kula prior to the 1840s (Land Court Awards, State Archives). Large sections of Crown Lands were leased for grazing cattle and by the 1880s, lower Kula contained primarily of pasture land for ranching (Figure 13). The Māheke awards for large portions of Kama'aleo Anu'au as government cattle ranch with fresh potato being cultivated on other parcels.

In 1886, Edwin H. Bailey, Leonard A. Thurlow, W. H. Bailey, and Henry P. Bingham met in Honolulu and purchased Maui ranch lands owned by Charles Alexander for $30,000. The resulting ranch included 33,817 acres with 400 to 500 acres set aside for crop cultivation. A dairy was started in 1896 which eventually evolved into Hōolekāala Dairy. The land of Ke'okea, particularly the lowland/valley portion, was historically used for ranching activities by Hōolekāala Ranch Company. Segment E of the proposed highway extends through these ranch lands. In addition to Hōolekāala Ranch, large land portions were used for cattle by Kā'one'io Ranch Co., Ltd. and 'Uluwakua Ranch, Inc.

Figure 12: Map Showing LCA Claims on the Coast (Kohl et al. 1997:65).
By the late 1800s, the changes occurring in Kula lands were dramatic. While surveying in Kula, E.D. Baldwin recorded his impressions of the terrain. He stated:

During 1848, Kula was an open country, there were no fences to stop you from riding in any direction that you wished, even as far as Makawao or Wailaua. There were none of the owners of Waikolu kula koa living above the Government Road and only a few makai of said road (Bentley 1908:252).

He continued:

...Kula had been over run with cattle for years and about a mile above the Government road Chiniaven had planted fresh pastures and corn for years so that the location of the numerous kula koa had been almost obliterated. We found only one old kumakoa left on maka Waikolu, old “Koamna,” who knew approximately the location of the kula koa. But he piloted many of them on top of each other and as we had to lay out the Government portion of the land in Hiloendau, there was only one thing to do and that was to give each kula koa on location, baled as close as necessary, as the land seemed all of equal value; this we did and they have ever since stayed where we located them...[we] appraised it from 3, 3 to 6 dollars an acre (ibid:253).

Sugarcane

As early as 1829, sugar was being grown on Maui by two Chinese merchants who formed the Honolulu sugar works in Waiaku (Spalding 1851:114). Sugar cane was cultivated in Hana ula in 1843 by a man named Tarbert who had purchased large portions of several aloha'e. The Tarbert Plantation holdings included a road and landing at Milkena to expedite the shipping of potatos, animal stock, and sugar. Captain James Makoe, owner of Rose Ranch, purchased the Tarbert Plantation in 1855 and continued sugar raising and sugar cultivation (Bentley 1952:70, Kuykendall 1958:316).

With the discovery of the less expensive kerosene for lamps and a number of shipping disasters in the late 1850s came the end of the whaling industry. The Civil War provided the next agricultural niche for Hawaii's to fill with its growing sugar industry. As southern U.S. sugar disappeared from the market, sugar plantations in Hawaii could make an ever-growing profit exporting their product to the continental United States.

In 1873, Isabella Bird traveled by inter-island schooner to Hawaii Island, stopping at Milkena which was bustling with activity:

We called at Muleia, a neck of sandy crenched, verdant soil, and at Ulupalakua (Milkena Landing), or rather at the farmes seven times heard, which is the landing of the plantation of that name, on whose rocky slopes crouches the eye at the height of 2,000 feet above the sea. We anchored at both places, and with what seemed to me a needless amount of delay, discharged goods and natives, etc., and calabashes were embarked... It was all glorious, this fierce height glow of the Tropical of Cancer, yet it was a relief to look up the great rolling, featureless slopes above Ulupalakua to a forest belt of potential green. Noted, they say, by perpetual showers, and a little later to see a mountain summit (Haleakula) uplifted into a region of endless winter, above a steady cloud-look as white as snow (Bird 1974:32, 33).

After her ascent of Haleakula in 1873, Isabella Bird journeyed to Makoe's 'Ulupalakua Ranch (then called Rose Ranch) while still in sugar and before it was converted to a cattle ranch:

The plantation is 2000 feet above the sea, and is one of the finest on the island; and owing to the slow movement of the cane at so great a height, the yield is from five to six tons an acre. Water is very scarce; all that is used in the boiling-house and elsewhere has been casjectly led into concrete tanks for storage, and even the walls in the proprietor's beautiful garden are laid with cement for the same purpose. (Ibid:228).
Sugar had been established in the Makawao area in the late 1850s and by 1899, the Khai Plantation Company (KPC) was growing cane in the plains above Kula. In 1878, Claus Spreckels founded the Hawaiian Commercial Company which was located in Pu‘u Ne‘e. In 1882, it became known as the Hawaiian Commercial and Sugar Company (HC&SC). The Khai Plantation was acquired by the Hawaiian Commercial and Sugar Company (HC&SC) in 1906, which continued to cultivate the most productive KPC fields. Nineteen years later, HC&SC was bought by investors who replaced the plantation’s agents with Alexander and Baldwin. Lands under the new management expanded and in 1948, HC&SC acquired the Maui Agricultural Company located in Pu‘u ia (Condie and Bent 1972:200-219, 213). Portions of the U1 alignment of the proposed highway extend through HC&SC land (Figure 16).

Abraham Fossander toured Maui in 1865 as Inspector General of Schools. His visit to the southwestern coast included a stop at a school at Kaipolopo, Hāna. They attended by many children from Upouou, Kauhau, Keana‘e, and Kamuela. In his report, Fossander praised the benefits brought to the Hawaiian people through commercial farming of sugar:

It may not be untrue, here to remark briefly on the influence which the establishment of the sugar plantations on the island of Maui is exercising on the material and social condition of the Hawaiian people in the immediate vicinity and within reasonable distance of said plantations. They furnish steady and remunerative employment to all, male or female, who wish to work. The work thus obtained also serves as a sort of ready money in circulation among those who formerly, even if disposed to work, had no way of obtaining a dollar except at the expense of increased labor, time, and trouble. The engagements are short, the pay fixed and sure. The health of the laborers is well attended to; and the Makaha plantation act one had died in five years—in many and increasing instances the money thus obtained goes to build better houses, improve the homesteads and to clothe themselves and their children better. In places where the sugar mills grind for others the cultivation of the soil among the native population and others is systematically pursued and rapidly increasing, adding largely to the wealth and comfort of the people, and they begin to appreciate the value of their lands and take a pride in their culture. It keeps the people more at home and dissuades them from roaming, leaving productivity, which was engendered after the breaking up of the feudal system, from embroiled and ill-directed theory, want of means and ignorance and inability to obtain them [sic]. Even those who do not choose to engage as laborers on the plantations, feel the influence of them in the remote valleys, stimulating to labor to furnish soil, firewood and many other things of which the plantations are constantly in need, and for which fair prices and ready cash are always paid... (Fossander in Bent 1972:38).
Pineapple

In addition to sugar, conditions on some Kala lands were ideal for cultivating pineapple. The same Baldwin who developed the sugar lands became a company called Baldwin Packers which evolved into Maui Pineapple Company (MPC), the largest producer of pineapple on Maui (Speckman 1984:130). When the Caminos family took control in the mid-20th century, the name was changed to Maui Land and Pineapple Company (ML&P Co.). Kalua Akupu'a and Hili's families Plantation have been under cultivation by ML&P Co. or Baldwin Packers for over 30 years (Douglas 1990). Pineapple was being grown in the akupu'a area as late as 1979 and is still being grown in western portions of the project area. Portions of proposed segments B, C, and D extend through pineapple fields (see Figure 14).

20th Century

Living conditions deteriorated in Kala during the 1930s and 1940s and many families moved to other places. Severe drought, poor crops due to exhausted soil, and the promise of better opportunities elsewhere depleted the population. Much of the upcountry land had been parcelled into homesteads with the previous tenants losing their farms. A large portion of the Kala land had become pasture for cattle ranching by the early 1960s. In 1978, forty more farms lost as their tenants were purchased by Harold Rice for use by the Ke'ou'ou'a Ranch (Speckman 1988:142). Ke'ou'ou'a Ranch, Hanaaula Ranch, and 'Ukapalakai Ranch, are still in operation.

Twentieth century activities in the Kala District included a significant WWII military presence along the beaches of Ma'alaea Bay, a Combat Demolition training station at Kama'ole, two naval air stations at Pu'ou'ou'ou and Kulahuli, and Army camps and hospitals in the Kala and Makawao area.

In the 1970s, Kala was producing 35% of Hawaii's vegetables. There were 35 family-owned farms of five to fifty acres that produced Kala crops of various vegetables and flowers. Large acreage was used for livestock breeding for approximately 20 full and part-time cattle ranchers comprising the majority of the land use (Dekik 1975). Rapid commercial resort development and private residences, especially in the Kihei area, has occurred in the Kala coastal section since the 1970s.

### PREVIOUS ARCHAEOLOGY

Archaeological studies have been conducted in both upland and coastal Kala. For an in depth discussion of the archaeology of Kala the reader is referred to Dekik et al. (1995) and Kob et al. (1997). Some of the findings are mentioned below. Table 1 is a list of archaeological studies conducted in the project area.

<table>
<thead>
<tr>
<th>Name</th>
<th>Area</th>
<th>Type</th>
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<tr>
<td>Cai 1976</td>
<td>Kāhili, Kūna'ōla</td>
<td>Inventory Survey</td>
</tr>
<tr>
<td>Cai 1977</td>
<td>Kūma'oe, Pāu'ualo</td>
<td>Inventory Survey</td>
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<tr>
<td>Miura 1982</td>
<td>Kīhākū-Kaumakaiwa</td>
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<td>Reo 1987</td>
<td>Kūma'oe</td>
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<td>Brown and Hackett 1989</td>
<td>Waihikahana</td>
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<td>Hanani and Shickler 1989</td>
<td>Kāma'ole</td>
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<td>Planck 1990</td>
<td>Kalua, Kūna'ōla</td>
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<td>Planck 1998b</td>
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<td>Ke 1991</td>
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<td>Data Recovery</td>
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<td>Frederiksen and Frederiksen 1991, 1992</td>
<td>Hākūalii</td>
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<td>Frederiksen and Frederiksen 1993</td>
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<td>Folk and Harapani 1993</td>
<td>Oau'apu'o</td>
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<td>Frederiksen et al. 1994</td>
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<td>Hākūalii</td>
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<td>Bogaas and Ace 1995</td>
<td>Kō'oo'ō A'apu'o</td>
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<td>McLane and Rinnell 1996</td>
<td>A'apu'o</td>
<td>Reconnaissance Survey</td>
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<tr>
<td>Wilson 1996</td>
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<td>Keli et al. 1997</td>
<td>Wānwahalii and Kūma'oe</td>
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<tr>
<td>Dunn et al. 1999</td>
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<td>Data Recovery</td>
</tr>
<tr>
<td>Folk et al. 1999</td>
<td>Kūma'oe</td>
<td>Reconnaissance Survey</td>
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The earliest archaeological studies of the Kula region were conducted by Thomas Theum between 1906 to 1918, John Stokes in the early 1900s, and Wheston Walker in 1911. The primary focus of these reports was identifying religious sites. In total, 33 areas from Olinda to Kaoa at the 324 to 795 meter (3,000 to 2,400 ft) elevation were recorded (Walker 1911).

A few of the more significant sites within the relative vicinity of the proposed road segments and termini are noted below.

Several petroglyph sites were identified in Kialihini Gulch (State Site 1061) and Kahupuani Gulch (State Site 1062, vicinity of segment B) in the 1970s and relocated as part of archaeological reconnaissance survey for the proposed Kula to Kula Road corridor (Cox and Stosea 1970; Folk et al. 1999, Site 4178). Additional petroglyphs and religious structures are mentioned by Horis Aukshowk in Otem'oku, Ka'oteru Ak, Pukaha, Waikoa, Kihaka, and Kamu'aole Ahu'akua'a (1971). Folk and Hannum (1987) also re-identified 20 petroglyphs in Upper Pukaha Gulch (State Site 1283), east of terminus C3, a small rock shelter with 15 petroglyphs and approximately 139 petroglyphs downstream was delineated State Site 1267. A second canyon petroglyph site (State Site 4178) was identified near the U2A terminus to 'A'upou during a 1996 inventory survey (McPhatter and Rosenthal 1990). This survey also extended the boundaries of the Kahupuani petroglyph site to the south side of the gulch and further north.

A large burial cave (State Site 1254) was located at the southwestern edge of Pukaha town along the cliffs of Kialihini Gulch near its intersection with Hamakua Ditch (between segments B and C). It is an approximately 33 meter long lava tube containing the remains of between 20 to 30 individuals.

An extensive survey of 1,025 acres of pastureland in Kihaka and Wainahali between 1,200 and 3,000 ft and identified 159 sites including 335 features representing agricultural, residential, and ceremonial complexes, trails, and “footprint” petroglyphs (Figure 15). The study, conducted in the 1980s, resulted in 16 radiocarbon dates providing overlapping ranges from A.D. 1270 through A.D. 1550 for activities in anuka Kihaka (Brown 1989; Brown and Haue 1989).
Traditional references to bird-catching sites are found in recorded oral histories concerning Kalaupapa (Ashdown 1971:46). Combustion evidence for bird-catching was recovered from Molokai, Kikaha in a small temporary habitation at approximately 706 meters (2,300 feet). A variety of extinct forest bird species were recovered from the earliest occupation level and dating between A.D. 1037 and 1440 (Kalb 1994).

Data from the same project indicated that initial permanent habitation and agricultural pursuits in the Kala region began as early as ca. A.D. 1200 to 1400 (ibid.). Radiocarbon and pollen analysis suggest a settlement pattern including expanding agricultural fields and habitation through the 1600s to 1700s when less desirable lands both mauka and makai of the prime upland region were utilized.

Archaeological data recovery was concentrated at ten permanent habitation sites and one agricultural site (Daum et al. 1999). Fifteen charcoal samples were submitted for radiocarbon dating from ten of the sites. Dating results indicated that the first of the permanent habitation sites between 639 to 916 meters (2,100 to 3,000 ft) in Waihau dated to the A.D. 1400s, slightly later than those suggested by earlier studies (Kalb et al. 1999). However, it was concluded that the small sample size precluded having strong confidence in the results of the radiocarbon analysis (ibid.).

A total of 23 archaeological sites were identified within the various segments of the proposed bypass highway (Figure 14). Five archaeological sites were identified in Segments A, D, and E of the proposed bypass corridor during the initial reconnaissance (Palk et al. 1999).

Site 4765, located between Halei‘wa and Waialua, consisted of an historic irrigation ditch, historic agricultural clearing mounds, and a small road segment. Site 4777, located in segment E, consisted of two square enclosures and several L-shaped enclosures interpreted as Ww II military command post and rifle positions. Site 4778, located in segment B near the K1 terminus, consisted of a midden and lithic scatter/round that was interpreted as recurrent habitation and agriculture. Site 4777, located along the north side of Kailua Gulch in segment A, consisted of a wall interpreted as a field boundary orMoat
cage. Site 4778, located on a northern edge of Waikawa Gulch in segment D, was an L-shaped enclosure interpreted as a temporary habitation.
**METHODOLOGY**

Initial assistance was provided by a number of organizations and many individuals including the Office of Hawaiian Affairs (OHA), O‘ahu and Maui branches, the Hawai‘i Sugar Museum, Hawaiian Commercial & Sugar Company, Maui Historical Society, State Historic Preservation Division Maui and O‘ahu Branches, Haleakalā Ranch, Ka‘one‘ula Ranch, Maui Land and Pineapple Co., Kaneohe Historical Society, the Hawai‘i State Archives, State Survey Office, and the Hawai‘i State Library. A list of the contacted individuals can be found in Appendix A.

Preliminary contact was made to individuals recommended to SCI by OHA and Panama Brickerhoff, Inc. General points of interest were recorded in field notes. Unlike the interviews indicated knowledge of Traditional Cultural Properties, the conversations was not taped. As a result, only one interview was recorded (Appendix B). Several individuals demonstrated reluctance at being taped. However, their information did not lead to the identification any Traditional Cultural Properties. None of the interviewees knew of any specific Traditional Cultural Properties although they supplied the names of more contacts, suggesting additional avenues of investigation. Several had interesting anecdotes concerning life in Hawai‘i in the early 1900s.

An announcement was sent over the Internet to members of the Hawaiian Nation on Maui asking for recommendations of individuals that may be residents, may be familiar with the project area, or know of those who were, to e-mail responses and suggestions to a Maui contact.

As the proposed road alignments adjacent impact ranch and agricultural lands, several avenues of investigation were selected. All three of the large ranches, Haleakalā, Kāone‘ula, and U‘upoualua, were contacted and asked for names of long-time cowboys who would be the most likely familiar with the land in the project area and its history.

The mapping department of Hawaiian Commercial & Sugar Company, under the jurisdiction of Roland Moore, was most helpful in supplying maps of the fields and locations of the former plantation camps. It was hoped that individuals that lived in some of these camps near the proposed road alignments could be interviewed as they also may have special knowledge of Traditional Cultural Properties in the project area vicinity.

Cultural Surveys Hawai‘i, Inc. (CSI), was contracted by Panama Brickerhoff, Inc. to conduct an archaeological investigations for the proposed highway alignments. To save time and prevent repetitive interviews, a list of questions from CSI were presented to the interviewees when appropriate, along with the inquiries concerning Traditional Cultural Properties.

**INFORMANT INTERVIEWS AND TRADITIONAL CULTURAL PROPERTIES**

As an archaeological report (Brown and Haun 1989) includes a previous interview with two former employees of Ka‘one‘ula Ranch, William Porpo and Henry Kekōwi. The information was summarized here as it refers to land features in the vicinity of the road alignments.

Mr. Porpo, an employee of Ka‘one‘ula Ranch for 46 years before he retired in 1983, reported that in the past people grew corn near Pu‘u o Kali (Red Hill). According to Mr. Porpo, there was once a Hawaiian settlement, including sidewalks and grave sites, on the border of Kali‘pe and Kōla. He also added that within the district of Pu‘u o Kali is a mesa that the Army erected during WWII for target practice.

Mr. Kekōwi, an employee of Ka‘one‘ula Ranch for 42 years before he retired, stated that the mesa had previously run 2,000 head of cattle. Stone walls to contain the cattle had been built in 1800s on the ranch lands. Land use necessitated that cattle be kept at lower elevations near Pu‘u o Kali in winter and then moved to mesa areas in June. Due to heat, Hawaiian and Chinese inhabitants would also move from the Pu‘u o Kali area further upland to Kōka‘ena during the summer months. Mr. Kekōwi pointed out many ha‘aio to the archaeologists in the general vicinity of Māhōli and Pu‘ukohola in Kōlā and in Waialua and identified three left footprints implanted in the lava rocks on the way to Pu‘u o Kali (see Figure 16).

Additional information is presented in Kolb et al. (1997:30) concerning Pu‘u o Kali:

...the most prominent landmark in Lāʻau is the cinder cone of Pu‘u o Kali, or "Hill of Wailing." It is located at an elevation of 300 m AMSL (1000 ft) and marks the border between the ahupu‘a’s of Waialua and Kō‘ōlau. Commonly called "Red Hill" in modern times, this cinder cone has a prominent history. It is associated with the Goddess Pele, who was reputed to emit fire from this very place (Ashdown, n.d.).
A major component of the pre-historic upcountry settlement landscape is located upslope of the Pa‘u. Walker identified three aina in the upcountry Waiakolu section and three aina near Kāheka.

Conversations with several cowboys of Hāneholo Ranch on June 19 and 20, 2000, revealed that information concerning significant places was most likely known by those of the previous generation who had since disappeared. Snooky Masa, Henry Silva, and Ed Uwako‘olani were aware of old stone foundations and walls within the ranch boundaries, but none with associated stones. A road extending off Pa‘u Road in Kāheka was reportedly called the Army Road and had originally been an old horse trail to the coast. This closely followed a traditional Hawaiian trail known as the Waikoloa Trail. Mr. Merlin Kekākou and Michael Puey of Ulupalakua Ranch referred the author to older residents of Kula for further information. Unfortunately, a field trip within the boundaries of the Hāneholo Ranch that was tentatively scheduled for the beginning of August was unable to be completed due to ranching activities occurring at the same time.

Although only 64 years of age, Mr. Uwako‘olani described a very traditional Hawaiian upbringing in Kāheka including seasonal living locations (wakai, mahe‘a), planting methods, water procurement, and instruction from his parents, who were native speakers, as to ahupua‘a protocol. He moved to the mainland at the age of 17 and did not begin work as a cowboy on Hāneholo Ranch until ten years ago (Figure 17).

An interview was conducted in Kula on August 4, 2000 with Mr. Henry Rice, owner of Ka‘onu‘ula Ranch. Mr. Rice descended from a Kama‘a family long established in Hawai‘i. The ranch consists of approximately 9,000 acres of land that has been held by the Rice family since 1916.

Mr. Rice revealed that land use on the three main holdings in Kula (Hāneholo, Ka‘onu‘ula, and Ulupalakua) are similar and may vary only slightly in timing of harvesting activities throughout the year. Land at all three sites is used for pastures with rotations of densities according to vegetation growth. Yearly ranch activities range from cutting, hammering, weaning, moving calves to better pastures, picking replacement heifers, and shipping of yearlings to market. In the 1950s, most of the breeding herds were kept on the mahe‘a lands, with mahe‘a lands being used for pasture for the cows. Presently, breeding herds are kept both mahe‘a (above the Kula highway) and mahe‘a with the yearlings in between.

Calves from the mahe‘a herd are born in October and November when the winter rains bring grasses providing for successful lactation of the cows. Calves from the mahe‘a herd fall (are born) in April and May and benefit from the rains that can still occur as late as March. Water is brought down from the cattle from the Upper Kula Line which provides water for agriculture and residential use in Kula.

Mr. Rice knew of a free-print near Pa‘u o Kali and had been told it was a child’s imprint and preserved in lava (See Brown and Haun 1969). No tales or other traditional properties on ranch lands were known to him. He reported that in the late 1800s, people from Kula were obtaining fish from the still viable Ka‘onu‘ula fishpond in Kāheka (mahe‘a) and in close proximity to the project area.

An interview was held with Mrs. Nancy Purdy on August 3, 2000 at Ulupalakua Ranch where she now lives (Figure 18). Mrs. Purdy was raised on family (Wilcox) Kulaianu land located about one mile southeast of Kula Highway in Ulupalakua. Her great-grandfather was a former growing such crops as corn, sweet potatoes, beans, and Irish potatoes. People would walk down the dirt road of what is now Kula Highway to Kāheka to catch a bus when they needed to go to Kula. The family would walk down the Old Milken Road to the beach at Milkena for swimming and fishing. She also remembers fish being sold door-to-door by the Japanese. The Chinese peddlers would bring big bags of poi several times a week. Although Mrs. Purdy has spent her entire life in the region, none of her comments indicated knowledge of any specific Traditional Cultural Properties in the area.
An interview was held with Mr. Frank Gouveia in Hā’alawai on August 3, 2000 (see transcript of Mr. Gouveia’s interview and release form in Appendix B)(Figure 18). Mr. Gouveia, now 85 years old, began his career as a water boy for the pineapple company at 10 cents a day. His family originally came from the Madeira Islands off Portugal in the late 1890s. Once his family had settled on Maui they “never looked behind.” One of 16 children, Mr. Gouveia’s father worked for the pineapple company and later at the dairy at Pā‘ura‘ula. While at the dairy, Mr. Gouveia remembers the Chinese bringing their vegetables by donkey from Kula down an old county road, skirting what is now Pakalana and meandering through the cane fields to the landing at Kihei. While Mr. Gouveia was an excellent source of information concerning life on Maui, he did not know of any Traditional Cultural Properties.

Mr. Bob Holody, District Manager of Forestry for the Department of Land and Natural Resources on Maui, was contacted to obtain more details on Mr. Gouveia’s trails/county road information. Mr. Holody knew of three maau-wāka trails in Kula. The Waiakua trail extended from the bottom of Nā‘alehu Road in Kula and was a horse and wagon trail in the 1890s. The old Mākena Road zig-zagged from ‘Uipalakau Ranch to the landing in Mākena and was used for animal and produce transportation. This trail would also date from the 1890s. The third trail extended from Kalama to ‘Uipalakau. All of these trails are evident on an 1885 map drawn by W. D. Alexander, Surveyor General for the Hawaiian Islands.

Mr. Holody noted that an Old Government Road is still shown on tax map keys for the region of Kula extending from Hā‘alawai Highway just below what is now Pakalana, through the cane fields and eventually disappearing in cane field 13, directly north of Kihei where the landing would have been. A 1939 map of the island of Maui, surveyed by W. E. Wall and compiled from all previous available data, identifies the same road (Figure 19). This is most likely the trail referred to by Mr. Gouveia.

A telephone interview was conducted with Mr. L. Douglas MacCuen, manager of the Maui Pineapple Company, Ltd. (a subsidiary of Maui Land and Pineapple Company, Inc.). Before pineapple cultivation, land parcels near Pā‘ura‘ula on the Kūhiō side were used for pasture. In the early 1900s there had been small farms growing corn and onions in the vicinity of what became known as Cornell Camp. Maui Pineapple brought their own water for irrigation in
ditches from Māʻalaea starting in the 1950s and 60s. Water was also brought from 'Ōpukaa ʻAwaliu, above Piʻiholo, but was discontinued in 1963. Although unable to identify any Traditional Cultural Properties, Mr. MacLear had first-hand knowledge of several archaeological sites on lands leased from them by Heleakalā Ranch. According to him, a large stone structure is located on a bluff above Sandalwood Golf Course in the Anawo pasture on the boundary of Heleakalā Ranch and Hawaiian Homes Land. Another site, a large enclosure approximately 150 feet wide, is located within Waikou pasture.

Mits. Ethel Nagaia (80 years old), who had spent part of her childhood in Kaʻahua sugar camp, was interviewed in her Kahului Barber Shop on August 4, 2000 (Figures 21 and 22). One of four children, Mrs. Nagaia's parents arrived from Palashika, Japan to work in the cane fields. The family moved to Waiakapu in 1929 when Mrs. Nagaia's parents formed for 55 years. Her mother lived to be 101 years old. Her experience living in the camp was relatively short but she remembers the closeness of the various groups of workers and their families.

Figure 20: Ca. 1929 Map of Maui by W. E. Wall Showing Old Government Road from Kula to the Coast.

Figure 21: Mrs. Ethel Nagaia at Her Shop in Kahului (August 4, 2000).
Chinamen, Japanese, Filipinos, and Portuguese all lived, worked, and helped each other. Not only did they work together, but celebrations and picnics were held where everyone was welcome. Mrs. Nagata feels there is more separation between cultural groups today than there was amongst the first generation of immigrants.

Camp life was basic and nothing was wasted. Flats of newspapers were sewn together as disposable nappies for babies. There was a communal toilet for several families where the Sears and Roebuck catalogue was an important item along with the highly prized, soft tissue paper used to wrap individual items. These valued items were collected from the plantation store. Colorful comics were saved for special wrapping paper and soda cans, bottle tops, magazine pages, and even the large Salem crackers were modified for festive Christmas decorations. Dried shrimp stored in wooden barrels was a special treat from the plantation store. There was no electricity so firewood and kerosene were delivered to the camps. In the camp was a Catholic church, a plantation store, and a Japanese school for the children.

Mrs. Nagata's family was hard working but very poor. None of the children could go to high school except for the youngest, who everyone in the family supported through dress making school at the Community College. Tragically, this sister died at only 53 years of age. Mrs. Nagata's grandfather was buried at Waikana Cemetery near the Waikana sugar camp. Later, his remains were moved to the Buddhist church in Pa'a.

There were no Hawaiians in the Kahului camp and it was not until they had moved to Waikapi that Mrs. Nagata remembers seeing Hawaiian people. She spoke highly of the traditional Kalama water rights instigated by the Hawaiians that allowed her family to farm for so many years, as well as the excellent rock walls built and fitted together with mortar. However, Mrs. Nagata was not aware of any Traditional Cultural Properties within the vicinity of the camps in Kula.

A telephone interview was conducted with Mr. Charles Maxwell on 1 August 2000. He confirmed information previously recorded as testimony that in general, both Kaluapuni and Kaalualii Gulches, as well as those in Ohia'aipo and 'A'upena, contain numerous petroglyphs and sealed burial caves which were not mentioned in the archaeological reports. Mr. Maxwell said he had personal knowledge of six sealed caves in three gulches. Two wooden images (ki'i) previously recovered from a cave in one of the gulches are now on display at the Bishop Museum.
According to Mr. Maxwell, the area of Kamehameha Schools in 'A'upena is associated with a female goddess of the same name and past agricultural plots were associated with Mauka's Ali'i, Kīkapu'ōlani. He reported that Kenneth Elgin of the Bishop Museum had referred to the area impacted by the proposed terminal UZA and UZB as "most likely a place where the ancient Makahiki were held." A ha'au has been identified close to the UZA terminus (Site 2701). It was Mr. Maxwell's opinion that it would be, "a cultural and spiritual insult to have a highway running (visually) near such a site."

**IMPACT ASSESSMENT**

Numerous cultural features were reported during this study including religious sites, trails, petroglyphs, and the general location of burial caves. Topographic anomalies associated with pre-Contact events, individuals, or recorded in legends and stories were also noted. Several of these sites are not located within the project area. Other sites are considered archeological as they are no longer in use and their location is unknown. Based on the previously presented definitions for a Traditional Cultural Property stated by the Procedures for Ethnographic Inventory Surveys (Draft), no specific Traditional Cultural Properties were identified.

Archaeological sites and features associated with traditional legends, stories and important individuals were identified and reviewed during this study, including Pu'u Pua, Pu'u o Kali, the ahualo, ancient trails, and various fishponds.

As religious and cultural significance are associated with archaeological features such as ha'au and Makahiki sites, it is necessary to apply the criteria of adverse effect to properties such as those mentioned by Mr. Maxwell (36 CFR Part 800, Sec. 802.5). Adverse effect is found when:

- an undertaking may alter, directly or indirectly, characteristics that qualify the property for inclusion in the National Register in a manner that would diminish the integrity of the property's location, design, setting, materials, workmanship, feeling, or association... (National Preservation Institute 1999:49).

Examples of adverse effects include physical damage to all or part of the property, and the "...introduction of visual, atmospheric or audible elements that diminish the integrity of the property's significant historic features" (ibid.:58).

It appears that the alignment involving segment B may have an adverse impact on the integrity of the ha'au site, both visually and aurally. Therefore, any alignment using segment B may need to be re-routed so as not to affect this archaeological feature. However, the ha'au along with the other archaeological sites are addressed by Folks et al. (1999).

Pu'u Pua, located in the ahualo of 'A'upena, was declared sacred by the paramount chief, Kīkapu'ōlani. Children were not allowed to climb the hill as it was considered a ha'au for the high chiefs of Mauka (Sterling 1998:258). This site will not be impacted by the proposed highway alignments as it is situated out of the project area (see Figure 2).

None of the informants or archival material provided any information concerning Pu'u o Kali located in close proximity to the UZA terminus (see Figure 2).

Several old trails were discovered during the course of research. However, none of them were Traditional Cultural Properties because they are no longer used. Some of these archaeological features are found out side of the immediate project area and would therefore not be impacted by any of the proposed alignments. For example, situated in the vicinity of Pu'u o Kali, located in the ahualo of Waikīkī, are two trails and petroglyph foot prints. These archaeological features will not be impacted by the proposed highway alignments as they are situated outside the project area (see Figure 2).

The ancient olowalu coastal trail (Site 572) and the upland trail, only portions of which are now visible, are also archaeological features that will not be impacted by the proposed highway alignments as they are located outside of the project area. The fish ponds, such as Kālepepape and others, are archaeological sites listed with the State Historic Preservation Division and will not be impacted by the proposed highway alignments as they are situated along the coast outside of the project area (see Figure 2).

A Map of Kola, Maui, surveyed by W. D. Alexander and M. D. Montarrat in 1872-1879, shows a trail extending from the bottom of the present Ne'ale'a road in Ulua Alapa'a's townsite where it splits, one leg continuing in Aike, and the other crossing into Waikōkōha (north). Another split occurs and continues a short distance into Pūnuku. The two original trails eventually intersect and continue as a single trail until slightly more than half way between Kola Highway and the coast (Figure 23).
Sometime between 1879 and 1929 the north fork of the same 1872-1879 trail is intersected by a trail from Palaua and continues all the way to Kīhei, becoming a road and eventually joining the coastal highway (Figure 24). The southern fork of the trail on the earlier map disappears. The remaining trail was the Waiakoa trail mentioned by Mr. Ishihara and known to Mr. Mana as an old homestead. On a current USGS map, a jeep road loosely follows in the direction of the old Waiakoa trail to the coast. Physical evidence of the Waiakoa trail today has not been identified but it is shown on the 1929 map to be in close proximity to the Kīlī terminus in the western portion of the project area.

Other ancient foot trails reportedly extending from Kāʻīkea to Kīhei (Kekuʻuwahaʻulaʻala) and from Waiehu to Kalipoloa fishpond (Kalipoloa Trail), would be intersected by segment E and segment F of the proposed highway, as would the old trail/government road through the upland cane fields to Kīhei referred to by Mr. Gouveia. However, because none of these trails are still in use, and archaeological surveys have not identified physical evidence of their routes, these trails are not Traditional Cultural Properties. For the proposed alignment to be in close proximity to these trails would not constitute a cultural impact.

CONCLUSIONS

Interviews of appropriate individuals were conducted by SCS. These interviews were recognized by other community members as knowledgeable, long-time residents of Maui and the Kīhei region. Conversations with these individuals did not identify any specific Traditional Cultural Properties within the project area as defined in the Criteria for Evaluation. Presently, the only known culturally significant sites are the archaeological features that have been identified within the project area. Mitigation of these resources are discussed within the archaeological report presented by Folke et al. (1999).
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Pakul, Mary K., and Samuel H. Ellet
Individuals contacted regarding the Kibi-Ukaʻukō Maui Highway:

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<td>Isaac Haup</td>
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<td>Maui</td>
<td>Paniolo, Holunki Ranch</td>
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<tr>
<td>Ed Uwakiaulani</td>
<td>Maui</td>
<td>Paniolo, Holunki Ranch</td>
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<td>Henry Silva</td>
<td>Maui</td>
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<td>Tony Dano</td>
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<td>Summer Eisman</td>
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<tr>
<td>Merton Kekei</td>
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</tbody>
</table>

Dan Purdy
Kevin Kihara
George Ho
Chuck Maxwell
Laurel Murphy
Silvia Hunt
Doug MacChes
Frank Gouveia
Hidt Nagia
Nancy Purdy
Bob Hobbs

APPENDIX B
Interview with Frank Gouveia

Appendix A Pg. 5
Appendix B Pg. 1
Interview with Frank Gouveia August 3, 2000, Half Imânele, Mau
Conducted by Leanne McGarry of SCS, Inc.

Leanne: ...I was just over with Sylvia [front, former Records keep of Mau Land
Pineapple Company] who lives on your street. I thought that Laura was
goin to arrive when I was talking to Sylvia. I'm hoping that this is going
to start working. [referring to tape recorder]

I would like to ask you a few questions (formally). Your name please.

Frank: Frank Gouveia and I'm 85 years old. We started working for ten cents an hour
and worked for 46 years. I started as a water boy and worked my way up to the
department head of transportation.

Leanne: Ten cents an hour...was it six days a week?

Frank: Sometimes six sometimes seven, depending on the pineapples. No overtime.

Leanne: So if you worked twelve hours a day you got the same?

Frank: Yes, the same thing.

Leanne: Were you born here?

Frank: I was born in Kauai and raised in Mau.

Leanne: What about your family? Are they also here?

Frank: My mother and father came from Madeira, Portugal. When the plantation was
looking for workers, they (looked for workers) went to Portugal. They didn't
plan what kind of people they needed to do the work. The people in Madeira did
everything from shoveling to all kinds of labor, just like here. My grand
father, Joa de Gouveia, and I'm Jo Gouveia, rode the sailing boats and vessels
and came to Mau. Then they started to work in the plantation.

Leanne: Do you know what year that was?

Frank: In the 1880s. That's how the Portuguese came here mostly from there. Mostly
working people. Madeira, where my parents came from, is just like West Maui
mountain. Right around the island there is blue water. There is two places where
you can go to the ocean. The rest is thin water.

You take a basket of grapes and all that up to the end on the top of the mountain.
I went there on a bus tour.

Appendix B Pg. 2
Frank: It was a big ranch for cattle. Harry Baldwin was the head of the Maui Agricultural
of Pa'ia so he had Mau Pine and Sam Baldwin had HanaKool Ranch and Frank
Baldwin had H. C. B S., Piuna. Then Harry broke away from Mau Pine and
we broke away from the sugar but he was the head man yet and then his daughter
married Waini Cameron. Waini Cameron was brought in by Sam Baldwin out
from HanaKool. HanaKool pineapple were up there and we were down in this
area. All the pineapple would be brought in from Pa'ia. This is pineapple
here. Where are we now? Half finale. This is pineapple here and Maui Pineapple
Company came up. They combined and became one. Anything above Pa'ia and
Honolua is owned by the Cameron's.

Leana: What was the pineapple land before? What was it used for?

Frank: It was pastures for HanaKool Ranch and Grove Ranch and Honolulu Ranch, and
then pineapple came.

Leana: What about Pa'ia?

Frank: It was just pasture land.

Leana: Where is Honolulu Ranch? It's up in Kula. (Mr. Gouveia is showing
the map to the south of Pa'ia).

Frank: The Rice's had a slaughter house and they had a corn (mill) and their headquarters
was up in Kula. They had land up there where the government had... That
was Rice's Ranch. Then pineapple began to take place over here. The Cameron's
own their own land and HanaKool is owned by the Cameron's, too.

Leana: Oh yes, as well as Baldwin?

Frank: Yes. Maui Pine is also Cameron's. I think they still own 51% of that and other
historical places.

Leana: Oh yes, trails. Were you aware of some old trails that might have gone
across the land that somebody told you, "You know what, before this..."

Frank: Yes, Half finale Road. Right up here. This is Pa'ia. This is all pineapple
field. Right in here there was a trail that went to Sistina Place where the wharf
was right down through Ona'uple Road. The wharf would be down here. Do you
know who used the trail? The Chinese with their cargo and their donkeys and all
that and would come to Kula. Right here by the wharf.

Leana: And if the trail would go all the way down to the coast?

Frank: Yes, somewhere in the cane field and all that.

Leana: Wow!

Frank: And there is a county road that goes down to it. Then they used to use the Pa'ia
Road and other roads to go to Kula. There was one that came to Kula.

Leana: How come they used that road instead of the one more towards
U'Uolakai? (referring to the Old Makana Road).

Frank: This wharf takes you to Kalo'oula or Lima'. The boat would stop here and
Ma'ala.

Leana: And this is where you would load the sugar?

Frank: No, the sugar would be in Kula.

Leana: So this would be cattle down there? What was I wondering is why they
took that road (the Chinese) instead of the one by HanaKool Ranch but
then it would not go to this wharf?

Frank: Some would go to Kula and go to Lima'.

Leana: And even by your time when this road was still being used?

Frank: No. So that was the Chinese road. There were a lot of donkeys. We lived in
Kula when my dad was running the Pa'ia ended Dairy. They would unload to
Kula and load what they bought, what I remember.

Leana: How long did it take them? It would take them about three hours to go
down and three hours to get back?

Frank: Yes, about that.

Leana: Where was the dairy?

Frank: Remember the dairy road? The dipper road that goes to Lahaina and that, that's
why it called the dairy road because it was right around here.

Leana: I see. What did they do for water in these pineapple fields? Did they have
annual or just depended on the rains?

Frank: The rain. We never had ditch irrigation in those days and we had a lot of rain.
Kona rains that took care of the dry lands. But today there's no rain so we had to
go back to ditch irrigation.

Appendix B  Pg. 4
Yes, it has really had the last couple of years too. What about the pipeline that came in 1905? The Kila pipeline in 1905—was that anywhere near the pineapple lands?

Frank: Above. Above the pineapple lands.

Leaza: Where did that take water to? The Kula?

Frank: The Kula guys. The forest over there. That's where we get some of our water from. We pick it up from Nakiku-Hana and goes right above us. The ditch is right above us.

Leaza: I see, I see. That would take water to the Kula farmers.

Frank: What they did, they always gave us bed time with water. All those people.

Leaza: Still yet, huh?

Frank: But they're showing big improvement...

Leaza: I had some questions written down here so the water was rain... pineapple was used for grazing and pasture. Did you have anything to do with any of the ranching activities at all?

Frank: No, we'd see some land and ruin, but not too much of that.

Leaza: Sometimes cane, sometimes pasture... I'm wondering what things happened at different elevations like up here, you have pasture. What about Kula? What do they do down there?

Frank: They wait for the Kula rain—November, December, January, February. This would soak them and last for the whole year. They had rice then, a lot of cane, and it was all pasture land.

Leaza: So it was all pasture land.

Frank: So today you only see stones. No grass.

Leaza: Well, I'm wondering if there were any—when people wanted to get fish, what do they do, do they go down to Kalaheo? Did they go down to Pa'ina?

Frank: People on this side, they go to Pa'ina or Kalaheo.

Leaza: I know that the land was in cane and is reaching over 100 years so many of the stories are gone. They're lost.

Frank: They're lost.

Leaza: I'm wondering if you have trouble with the fog. That was very good information because I didn't know about that trail. Again, any area that you recall had a special meaning, any areas, you don't even have to know exactly where they were—yes, you say, 'I remember in this area there were interesting places...'

Frank: Up in the gulches—pineapple field up in the Hanapepe there was a big house and guys said they saw antelopes in there. But the water would end up in Kalaheo. They covered all these streams in Kalaheo. When the water got these down, it will be trouble.

Leaza: There's going to be trouble. The water used to find the flatwoods long ago but not now. They did the same thing in Waikiki.—[A brief discussion concerning Waikiki followed]

Frank: I remember Waikiki in 1940, when I was in the National Guard. We joined in 1940. When we went on maneuver in Waikiki, they were all swampy over there. These Honolulu boys would never there and we couldn't get to them. We didn't know the streets. All the swampy areas I remember, today has buildings.

Leaza: I understand there were some military World War II activities over in this area somewhere. Do you know where that might be?

Frank: That was in Pa'enuel.

Leaza: Which is gonna be in this area (referring to map).

Frank: The army was right in this Pa'enuel area too. They had a big airport over there. The navy moved their original airport over there. It is now the Kalaeloa airport. The other people were stationed at Hallo.

Leaza: So what were they doing? Maneuvers and war games?

Frank: They did up this area-Kalaheo and all that, and practice over there. And they did all that training practice up in all that area. Jungle in the Pacific.

Leaza: Oh, really, all the way up to Koko-nu?

Appendix B Pg. 6
Frank: They went to Hilo, and stayed there for three months because we were too much from one area that's...

Tape stops and then picks up.

Frank: ...that is the right many getches and plenty private lands. This is to deal with the plantations.

Leen: So the main thing you remember of course is this trail that the Chinese used all the way down to Kihel by Suda Store.

Frank: Suda Store is an old landmark. That is where the wharf used to be. You haven't been to Kihel lately?

Leen: I have been. I go there now and I don't-I don't like it.

Frank: All the big hotels down there, it's terrible.

Leen: Terrible, I know.

Frank: The local people had the right of way and these houses came and closed it up.

Leen: It's really too bad because there was such good fishing areas and they're doing the same on the Big Island. They're doing the same in Kona too.

Frank: Kona? and the Big Island has to start thinking for their own. You have these people around here now you're going to be nothing.

Leen: We've lost half of it. Yes, I agree. I can't think of anything else to ask because, as I said, I've been aware that this has been so long in sugar cane and ranching.

Frank: They used to have a lot of villages scattered in this area.

Leen: You mean, the same [plantation] camp villages?

Frank: Transportation was a hard thing to the villages Kona, Kukuiia Camp, and they would have Kahuku camp numbers—one, two, camp 3, etc.

Leen: I actually have a list of some of the [plantation] camps that were near this area. Are there people living now in Hall'sville that used to live in some of the sugar camps?

Frank: I only know some of them—they might be grandchildren living but not the older people.

Leen: I'm going to go tomorrow and see Mr. Nagas, who I guess was in Kukuiia [plantation camp]. She has a hau'oli in Kahului but she was raised in Kahuku camp where she lived for a long time.

Frank: Hipuako was a big camp where Maui High used to be. It was a very big camp. Pa'a was a big camp too.

Leen: But the pineapple didn't have the camps like the sugar did, yet?

Frank: We had a little camp in Ha'ili and we had a little camp up in Kaupuna and we started off in a gulch over here—Kekaulii gulch. That's where the first camp started...

Leen: In the gulch itself?

Frank: That's where the camp first started. It used to be bungalow.

Leen: Which gulch is that?

Frank: Kekaulii. And then they consolidated everybody. We had pineapple and then they moved the whole thing.

Leen: Was this only pineapple people? Or pineapple and sugar people too?

Frank: No just pineapple. Local people stayed over there. Then after the war, sugar people put camps all over. Plantations got to do more modern things—wreck killing, H-1, and all that. Kahului was all kaneo'ehoe trees so they made a village out of that and sold them for $1,000 and today they are $40,000 houses and they didn't want to go. They had a problem to move people away from camps.

Leen: Up here is nice and cool. I'd better be here than Kahului.

Frank: We had a plantation sugar camp right next to us and that would be the thing that would be affecting the line. Outstanding things is all out of our hands.

Leen: Do you know where Pu'uwollu is? Is it familiar to you at all?

Frank: No. Maybe they have a different name.

Leen: I don't know. They say the land form Pu'uwollu translated as "hill of fire". I looked at my [modern] map and I couldn't find it but...

Appendix B Pg. 9
Frank: Kikolo (P’ikolo?) is way up here by Makawao.

Leann: Kikolo, do you know what that means? Do you hear any stories about it?

Frank: No. These people from the mainland came here with the number of streets and the name and all that and they find the place. People have say, run right, run left, etc.

Leann: It’s because we live by landmarks. I know...

Frank: Yes. I have a daughter that works in the Hilo’s Post Office. They say “...how long are we going to get to Lahaina? You gotta go down the other way...’Back round through Kahului.”

Leann: Oh, not!

Frank: Then you get some bad people that say you take this road and go right to Lahaina.

Leann: I guess they do...

Frank: All these young people that moved because of too much rules, they go there and they like it and they’re building houses. They like that. They call it “valley”, we called it “garden”.

Leann: There was a big Portuguese community here then. How big a community was it? Do you remember? Do you have old?

Frank: Yes, lots of standard houses. My cousin came here and moved to Pila. Some of them stayed in Pilia and my grandfather worked for the sugar. So his house was close to the water where they start ditches to get water. My father live in... where we always went. And then we moved to Olinda when they opened [hormetin/h] land. That’s when we went to Kahului about 1930 and then we came back up. Makawao was a big Portuguese town.

Leann: It wasn’t just ranching?

Frank: Most ranches were small ranches I think they had a two-year contract and after they finished that, where would they go? Up there. Like Madera ever there. If Coco was a big Portuguese camp and Po’alalii had a lot of Portuguese, Waiheo had the rich Portuguese. Big businessmen, and all the big guys. Those were the businessmen. Actually all businessmen, they went into merchandising.

Leann: Did all of the Portuguese men come from Madera?

Appendix B Pg. 10

Frank: Yes, several different islands—500 miles from Portugal. I have a sketch like this. But their on the same equator right?

Leann: So this was like home to them.

Frank: Yes, everything is the same. You walk down the street and you say, “Darn, I know this guy.” I guess know this guy, he look a Deacon, he looks like a Santos and could be. Then the old people wear white shirt and black pants. The ladies would wear dresses and the girls started to wear skirts. For the first time they dressed like that, and I had to talk to them.

Leann: Do you still speak Portuguese?

Frank: I can understand if they talk but sometimes you meet some tourist and they say they’re Portuguese and they start talking to me. But they speak Portuguese on the mainland more than they do in Hawaii. I can see why the people didn’t want to tell us off because the king over there at that time. What we have here is over there—coffee, potatoes, tomatoes everything that we have here, came from there. I like to see these young Portuguese boys throw ‘em back to them.

Leann: It’s a different way of life. Is that a picture of your mother and father?

Frank: Yes, it is. This one is my wife’s mother. This came from Portugal, my grandfather and grandmother. My grandmother outlived my grandfather. That’s how they were deceased when they came from Portugal.

Leann: Oh my, that’s wonderful.

Frank: All the Cauyes, not too many of them have a long life, but the Cauyes have long life. I have three brothers that died back home and they didn’t reach 70. My father lived until 81, my auntie lived until 100 and 6 months, another auntie until 94. I had a sister she lived until 94.

Leann: [Is] the geneics—something genetic. Do they still live here? [referring to his brothers and sisters]

Frank: No, they’re all gone. There’s only four of us left, one sister and three brothers.

Appendix B Pg. 11
APPENDIX J

Botanical Screening Reconnaissance Study

Botanical Survey

Additional Botanical Surveys -- U2-A and U2-B Alignments
BOTANICAL SCREENING RECONNAISSANCE STUDY
KIHEI-UPCOUNTRY MAUI HIGHWAY ALTERNATIVE ALIGNMENTS

by

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Prepared for: PARSONS BRINCKERHOFF

March 1996

INTRODUCTION

On 28 December 1995, a helicopter flyover was made along the corridors of the alternative alignments for the Kihei-Upcountry Maui Highway project. Accompanying the botanical investigator were David Atkin and Benuetta Hutchinson, Parsons Brinckerhoff representatives working on the project. Windward Aviation, Inc., provided the helicopter service.

The primary objectives of the aerial reconnaissance were to identify the general vegetation types along the alternative alignments and to search for sensitive areas which might harbor native plant communities, that is, lowland dry forests and shrublands. In general, these native plant communities tend to be associated with the stonier soils and the more rugged topographical features such as steep-sided gullies, large rocky outcroppings, and pu‘us where grazing animals are less likely to visit. An important component of these lowland communities is wiliwili (Erythrina sandwicensis), an endemic member of the legume family. The distinct branching pattern and orange-yellow colored bark of the wiliwili is easily picked out from the air. Thus, most areas with native plant communities can be quickly identified by looking for this indicator species.

Alternative alignments which support native plant-dominated communities are identified and the rationale for eliminating them is discussed. For the remaining alternatives, a comparative ranking is provided.
RESULTS

The plant names used in the following discussion are in accordance with the most recent treatment of the Hawaiian flora by Wagner et al. (1990).

Uncultivated Lands

Three broad bands of vegetation can be recognized on the uncultivated slopes of this portion of Haleakula, their distribution influenced primarily by rainfall, substrate type, and human activities.

From Pi'ilani Highway and upslope to about the 1,500-foot elevation contour, the vegetation consists of an open forest composed of kiawe trees (Prosopis pallida). Buffel grass (Cenchrus ciliaris) is the most abundant ground cover with the amount of grass cover varying with the season, i.e., rainy vs. dry. This vegetation type occurs where there is soil, although shallow and stony. Annual rainfall is about 15 to 20 inches in these areas.

Scattered through the kiawe forest are areas with 'a'a lava flows; these are mapped as "Very Stony Land" (VSL) on the soil maps (Foote et al. 1972). These very stony lands support large stands of willow trees and other native species. Alternatives 6a and 6b cross over a portion of the large 'a'a flow around Pu'u o Kali. Two listed endangered species, the ko'olauu (Bouchsia menziesii) and ma'o hau hele (Hibiscus brecknridgei), and two candidate 2 endangered species, the 'aukiwiki (Cannavia subsessica) and hona (Atractylis balsi), are known from the dry forest on this 'a'a flow (U.S. Fish and Wildlife Service 1994a, 1994b). Alternative 7 crosses a large flow also identified as "VSL" on the soil maps. A small portion of the flow was surveyed for the Maui Waiakea 670 project (Char and Linney 1988), and plants of the 'aukiwiki as well as naupili or the Hawaiian caper (Capparis sandwichiana), a candidate 2 species, were found. The occurrence of other listed and candidate endangered species on this flow are likely to be very high.

Above the 1,500-foot contour, the vegetation changes to an open scrub community composed of patches of lantana (Lantana camara) and panini cactus (Opuntia ficus-indica) with scattered kiawe trees. A mixture of various grass species and smaller, mostly weedy species fills in the matrix between the woody components (Char 1994).

At about the 2,000-foot elevation contour to just above the Kula Highway, the vegetation changes to kikuyu grass (Pennisetum clandestinum)-dominated pastures interspersed with large blocks of black wattle (Acacia koa) forest. Smaller stands of various Eucalyptus species are also common. The soils in this area are deeper and rainfall increases to about 30 inches per year.

Cultivated Lands

Portions of Alternatives 1 to 4a and 4b as well as Alternative 8 will cross over actively cultivated sugar cane (Saccharum officinarum) and pineapple (Ananas comosus) fields. A few smaller vegetable and flower farms may also be within or close to these alignment corridors.

RECOMMENDATIONS

Alternatives Recommended for Elimination

Alternatives 6a, 6b, and 7 will cross over sensitive native lowland forests dominated by willow trees. On Alternatives 6a and 6b, two listed and two candidate 2 endangered species are
known from the lava flow around Pu‘u o Kali. Two candidate 2
species are known from a portion of the ‘a‘a flow along Alternative
7, and it is highly likely that this flow also harbors other
endangered plants.

Besides the direct impact of the construction itself on these
dry forests, there are a number of indirect impacts which include
the increased chance of fires with more human activity in the
area, pollution from petrochemical products, and an increased
chance of invasion by weedy alien species. Many of these dry
forests also provide habitat for native invertebrates, primarily
insects, some of them candidate endangered species.

If Alternatives 6A, 6B, and 7 are considered, the U.S. Fish and
Wildlife Service as well as the State’s Division of Forestry and
Wildlife would require a review of the possible impacts and long-
term mitigation measures, including a fire plan. A Section 7
Consultation and a biological assessment will be required if the
project involves Federal funding. These requirements would
increase the cost and time of completion for the proposed highway.

Comparative Ranking of Remaining Alternatives

From a botanical perspective, Alternatives 1 to 5 and 8 are the
least likely to have a significant negative impact on the native
botanical resources. These alignments cross over vegetation types
dominated by introduced or alien species such as kiawe, buffel
grass, black wattle, kikuyu grass, panic, etc., and actively
cultivated agricultural lands. There are no ‘a‘a lava flows (
"TVS") mapped along these alignments.

A comparative ranking among these alternatives, with justification,
is presented below. The alternatives are arranged numerically
with "1" being the most preferred and "5" the least preferred.

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<th>Alignment</th>
<th>Rationale</th>
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<td>1</td>
<td>Alt. 1</td>
<td>Both Alternatives 1 and 2 cross kiawe forest with buffel grass along their lower sections. The remaining portions cross actively cultivated sugar cane fields. These fields do not support rare or endangered species and sensitive native plant communities. Portions of the kiawe forest appear to have been burned at one time.</td>
</tr>
<tr>
<td>1</td>
<td>Alt. 2</td>
<td>This alternative will remove the most cultivated lands. Because most of this corridor is cultivated or disturbed, it is very unlikely to support any rare or endangered species and sensitive native plant communities.</td>
</tr>
<tr>
<td>1</td>
<td>Alt. 8</td>
<td>This alternative crosses kiawe forest with buffel grass and disturbed and cultivated lands from Oaeopio Road to Pukalani. Portions of the kiawe forest appear to have been burned at one time.</td>
</tr>
<tr>
<td>2</td>
<td>Alt. 3</td>
<td>Both 4B and 4A cross kiawe forest with buffel grass and open scrub which has long been used for grazing cattle and horses. Thus, there is little native vegetation left, primarily in the larger, deeper gulches. A higher ranking is given 4B as it passes through some disturbed, weedy areas below the reservoirs and portions of the kiawe forest along its lower corridor appear to have been burned at one time.</td>
</tr>
<tr>
<td>3</td>
<td>Alt. 4B</td>
<td>This alternative crosses kiawe forest and scrub vegetation as well as several fairly large and deep gulches. Near its Kula Highway terminus, the alignment corridor is fairly narrow (there are more developed areas then is shown on topographic map). If rare plants or archaeological features are present, it may be difficult to avoid them.</td>
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<tr>
<td>4</td>
<td>Alt. 4A</td>
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<tr>
<td>5</td>
<td>Alt. 5</td>
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Prepared for: PARSONS BRINCKERHOFF

May 1997
Field studies to assess the botanical resources found on the proposed Kihai/Uplcountry Maui Highway alternative termini and alignment segments were conducted in January and February 1997 by a team of three botanists. The termini and centerline for the alignment segments were staked and flagged prior to the botanical field studies. A corridor 200 feet wide, that is, 100 feet on each side of the centerline, was surveyed. Where the alignment segment crossed over a large gulch, then a corridor 500 feet wide was surveyed. Remnant populations of native plants are more likely to occur on steep, inaccessible areas such as gulch walls and rocky outcroppings away from agricultural disturbances and out of the reach of grazing animals.

Actively cultivated lands occur on the upper elevation portions of the alignments. Sugar cane fields and their associated network of canehaul roads and irrigation systems are found primarily on Segment A and the lower portion of Segment B. Pineapple fields are found along portions of Segments B, C, and D. A portion of Segment C crosses through the Kula Agricultural Park near Pulehu Road.

Uncultivated lands through which the alignments pass are covered primarily by a kiawe/buffelgrass association. Kiawe trees (*Prosopis pallida*), native to tropical America, and buffelgrass (*Cenchrus ciliaris*), native to Africa and tropical Asia, are the dominant components of this vegetation type. The kiawe/buffelgrass association occurs along all of Segments E and F, and along the greater length of Segments C and D. The remaining smaller sections of uncultivated lands support Kikuyu (*Pennisetum clandestinum*) mixed grass pasture lands (Segments B and C), and gulch vegetation.

Gulch vegetation is found all along of the segments where they cross large, steep-walled gulches such as Wailakua, Pulehu, and Kalalau Gulch. Most of the uncultivated lands are used for grazing cattle and horses.

One population of the endangered koʻoʻoanaʻula (*Abutilon semiauxis*), a member of the mallow or hibiscus family, is known from Kalalau Gulch. Three small clusters of plants are found between 690 and 750 feet elevation. None of the plants occur on the alignment segments; Segment A crosses Kalalau Gulch high above the koʻoʻoanaʻula population at about the 840-foot contour.

Almost all of the vegetation on the proposed termini and alignment segments is composed of introduced or alien plant species. Introduced species are all those plants which were brought to the Hawaiian Islands by humans, intentionally or accidentally, after Western contact, i.e., Cook's discovery of the islands in 1778. A total of 173 plant species were recorded during the field studies. Of these, 153 (88%) are introduced species; 4 (2%) are originally of early Polynesian introduction; and 16 (10%) are native. Of the natives, 8 are indigenous, that is, they are native to the Hawaiian Islands and also elsewhere. Eight species are endemic, that is, they are native only to the Hawaiian Islands. The 8 endemic species are the kumu nui fern (*Pteropteris decipiens*), nene (*Hemichroa ruckii*), *Sicyos hispidus*, wilowii (*Erythrina sanguinea*), *nana* (*Hemisanguinea*), puʻu kula (*Argemonella glauca*), *Panicum guttatus*, and *kakokahua* (*Panicum torridum*).

None of the plants found during the survey is a listed, proposed, or candidate threatened and endangered species; nor is any plant a species of concern. There are no areas on or adjacent to the termini and alignment segments which support sensitive native plant-dominated communities.
None of the alternative termini and alignment segments are "more favorable" or "least favorable" from a botanical perspective. Use of any of the termini and alignment segments for the construction of the proposed highway is not expected to have a significant negative impact on the botanical resources. However, there is some concern for fires and soil erosion. Segments which cross the kiawe/buffelgrass association should have wide, gravel-lined shoulders. This vegetation type is especially fire-prone during the dry summer months. On the upper elevation portions of the proposed highway where it is wetter and the topography somewhat steeper, areas cleared of vegetation during construction should be revegetated as soon as possible to prevent soil loss.

Where landscaping is needed, it is recommended that native trees and shrubs be considered. These plants are already adapted to the local growing conditions and would require less water and soil amendments. Some native species which could be used include willow (these occur naturally in some of the larger gulches along the alignment segments); naio (Nemopremum sandwicense) -- a glossy, dark green shrub with fragrant white flowers; nehe -- a member of the daisy family (it occurs on Segment C); 'iliina (Sida fallax) -- a small shrub with bright orange flowers and used in landscaping; and 'akia (Viburnum utricularia) -- a low, mat-forming shrub and excellent ground cover already in use for landscaping. The Maui Native Plant Society and the Division of Forestry and Wildlife's Na Ala Hele program should be contacted for additional suggestions for planting as well as planting material.

BOTANICAL SURVEY
KIHEI/UPCOUNTRY MAUI HIGHWAY

INTRODUCTION

A four-lane highway which would link Kihei and Upcountry Maui is being proposed. Three termini are being studied for the proposed Upcountry portion and two termini are being considered for the Kihei portion. A total of six alternative alignments made up of six segments, Segments A through F, are being evaluated (Figure 1).

Field studies to assess the botanical resources found on the alternative termini and alignment segments of the proposed Kihei/Upcountry Maui Highway were conducted by a team of three botanists. The field studies were made on 07 to 10 January, 10 to 14 February, and 26 February 1997. The primary objectives of the botanical studies were to:

1) provide a general description of the vegetation types found on the alternative termini and alignment segments;
2) inventory the flora;
3) search for threatened and endangered species as well as species of concern; and
4) identify areas of potential environmental problems or concerns and propose appropriate mitigation measures.

SURVEY METHODS

Prior to undertaking the field studies, a search was made of the pertinent literature to familiarize the principal investigator with other botanical studies conducted in the general area. Topographic maps as well as black and white aerial photographs with the alignments plotted on them were examined to determine
vegetation cover patterns, terrain characteristics, access, boundaries, and reference points.

The termini and centerline for the alignment segments were staked and flagged prior to our field studies. The survey work was conducted in January and February 1997 during the wet (rainy) season. A corridor 200 feet wide, that is, 100 feet on each side of the centerline was surveyed. Where the alignment crossed a large gulch, a corridor 500 feet wide was surveyed. A walk-through survey method was used. Notes were made on plant associations and distribution, substrate types, drainage, exposure, disturbances, topography, etc. Plant identifications were made in the field; plants which could not be positively identified were collected later determination in the herbarium (University of Hawaii, Manoa -- HAW), and for comparison with the taxonomic literature. The less disturbed, steeper gulch walls, rocky outcroppings, and uncultivated lands were more intensively surveyed than the cultivated areas as these portions of the alignments were more likely to harbor sensitive native plant communities and rare plants.

DESCRIPTION OF THE VEGETATION

Actively cultivated lands occur on the upper elevation portions of the alignments. Sugar cane fields are found primarily on Segment A and the lower portion of Segment B. Pineapple fields are found along portions of Segments B, C, and D. Part of Segment C crosses through the Kula Agricultural Park near Pulehu Road.

Uncultivated lands through which the alignments pass are covered largely by a kauw/buffelgrass association; this vegetation type occurs along all of Segments E and F, and along the greater length of Segments C and D. The remaining smaller sections of uncultivated lands support Kikuyu/mixed grass pasture lands (Segments B and C), and gulch vegetation. Gulch vegetation is
found along all of the alignment segments where they cross large, steep-walled gulches. The majority of the uncultivated lands are used for grazing cattle and horses.

A more detailed description of the vegetation types is presented below. An inventory of all the plant species observed on the alternative terminal and alignment segments during the field studies is found at the end of the report.

Cultivated Lands

Fields of sugar cane (Saccharum officinarum) along with their accompanying network of cane haul roads and irrigation systems cover the majority of the cultivated lands. Sugar cane fields are found along the entire length of Segment A and the lower portion of Segment B. The fields can be found in various stages of cultivation, ranging from bare recently harvested fields to open, low stands of young cane, to 2 to 3 feet tall, to closed, very dense, mature stands of cane 12 to 15 feet tall. Sugar cane fields are found on soils of the Waiakea-Kekaha-Molokai association; these are deep to moderately deep, nearly level to moderately steep, well-drained soils that have a moderately fine textured subsoil. This soil association occurs on the low uplands of Maui (Foote et al. 1972).

Pineapple fields are found along portions of Segments B, C, and D on soils of the Waiakea-Kekaha-Molokai association. The roots of pineapple (Ananas comosus), following along the contour of the land, form a rather harsh, gray-green colored vegetation cover up to 3 feet tall. Like the sugar cane fields, the pineapple fields can also be found in different stages of cultivation.

A portion of Segment C crosses through Kula Agricultural Park which supports small agricultural lots which produce a number of crops for the local market; these include green onions (Allium fistulosum), broccoli (Brassica oleracea var. botrytis), banana (Musa paradisiaca), Maui onions (Allium cepa), edible-podded pea (Pisum sativum var. macrocarpa), etc. Plant nurseries which offer potted ornamental as well as cut foliage and flowers are also found on the agricultural park. No inventory was made of the cultivated species on this portion of the study area.

The actively cultivated fields themselves tend to support only a few weedy species. The majority of the weedy plants associated with agricultural lands are found adjacent to the fields, that is, along the margins of the fields, along and on the dirt roads, on rock and debris piles, along irrigation ditches and reservoirs, and other areas which are only occasionally disturbed. These sites are sometimes treated with herbicides to control the weedy growth.

This weedy association of plants is composed primarily of grasses and annual, herbaceous species. The weedy assemblage of plants found in the sugar cane fields are similar to those found in the pineapple fields and the agricultural park. Frequently observed species include Guinea grass (Panicum maximum), slender fingergrass (Chloris barbata), nutgrass (Cyperus rotundus), garden spurge (Chamaesyce hirta), smooth rattledod (Crotonal palaide), spiny amaranth (Amaranthus spinosus), buffel grass (Cenchrus ciliaris), and little bell (Ipomoea trifida). Along the irrigation ditches and reservoirs, a few species which prefer a wetter environment are found; these include honohono (Canna indica diffusa), leptochloa unimorpha, primrose willow (Ludwigia octovalvis), California grass (Brachia ramosa), and the ho'oi'o fern (Diplazium exalatum).
Klaue/Buffelgrass Association

This vegetation type is dominated by two introduced or alien plant species, Klaue (Prosopsis pallida), native to tropical America, was first introduced into the Hawaiian Islands in 1828 and now is the dominant component of the vegetation in low elevation, dry, disturbed sites on all of the main islands (Wagner et al. 1990). The seeds are very hard and pass through the digestive tract of livestock, and have thus been quickly and widely spread. Buffelgrass (Cenchrus ciliaris) is native to Africa and tropical Asia. It was first observed in 1932 on the island of Hawai'i. Today, it is common to abundant in dry areas in a wide variety of disturbed habitats.

The klaue/buffelgrass association forms the major plant cover on the uncultivated lands. It covers all of Segments E and F, and major portions of Segments C and D. The soils generally belong to the Waiakea-Kahua-Melokai association, but in many places contain the stoloner variants of these soil types. For example, along the lower portions of Segments E and F, the substrate is Waiakea extremely stonny silty clay loam, 3 to 25% slopes, mapped as "W12" on the soil maps (Foutz et al. 1972). Thin soils over fragmental 'a'a belonging to the Hanauma-Makakai association and the Kamaole-Downupuha association are also found in the areas with this vegetation type.

Typically, the physiognomy is of an open canopy forest with dense grass cover filling in the matrix between the trees. Tree canopy cover is 30 to 60%, but tends to be somewhat denser in small gullies and low lying areas where runoff may accumulate during the rainy season. The trees vary in height from 12 to 40 feet tall, with most trees around 25 to 30 feet tall. In most places, buffelgrass forms dense, almost monodominant, clumping mats. 2 to 3 feet tall. On the stonier soils, buffel grass cover is reduced and patchy with a number of other, mostly annual, species common to abundant. These include peppergrass (Lepidium virginicum), burgrass (Setaria hortorum), alleeed (Polycarpon satrapubulum), feather fingergrass (Chloris virigata), naile hohono (Ageratum conyoides), wild zinnia (Zinnia peruviana), and pitted boardgrass (Bothriochloa pertusa).

There are a few minor variants of this vegetation type. Around water troughs and the larger, shadier klaue trees where the cattle and horses tend to congregate and rest, peppergrass, Lepidium obovatum, cheeseweed (Helva parviflora), feather fingergrass, 'sheeja (Chenopodium murale), stinkgrass (Eragrostis pil spills), and apple of Peru (Sicyos physalodes) are locally abundant. Along portions of Segments E and F, the klaue trees become widely spaced and kiu (Acacia farnesiana) shrubs, 3 to 6 feet tall, form large, open thickets.

Along the middle portion of Segment C, from where it crosses Waiakea Gulch and up slope to the pineapple fields at about the 1,400-foot contour, panini cactus (Opuntia ficus-indica) is codominant with klaue and buffelgrass. Panini forms dense prickly stands, 9 to 15 feet tall and 20 to 30 feet wide; the cactus cover is about 15 to 25%. The substrate is loose fragmental 'a'a and small boulders with a dense cover of buffelgrass. Surveying through this area is somewhat hazardous as the loose substrate can cause one to easily fall into a cactus patch. Large rock outcroppings in this area support a few native species such as 'ilia (Sida fallax) -- which is locally abundant, kumu-niu fern (Pityopsis decipiens), nahe (Lipochaeta rostit), Elymus hispidus, and ilie'e (Plumbago serrata).

Along the lower portions of Segments E and F, where they join Pi'ilani Highway (K1 and K2 termini), there is evidence of past
first. Burnt stumps (standing dead) of kiawe trees are frequent and tree cover is more open, about 20 to 30% cover. In places, there are young saplings of kiawe, 1 to 4 feet tall, regenerating. Feather fingergrass forms extensive patches in the areas which have been recently burned.

**Kikuyu/Mixed Grass Pasture Land**

This vegetation type occupies only a small portion of the study site where it is found on the U2 terminus and along the upper portion of Segment B. Kikuyu grass (*Pennisetum clandestinum*), native to tropical Africa, is an excellent pasture grass which forms a thick, low, greenish-yellow colored mat. Other grasses which occur here in scattered patches or clumps include Rhodes grass (*Chloris gayana*), pitted beardgrass, Natal redtop (*Melinis repens*), Guinea grass, Bermuda grass (*Cynodon dactylon*), and buffalo grass. In places, Rhodes grass and pitted beardgrass may be locally abundant, that is, they form large, extensive patches.

This portion of the study site is at a higher elevation and is cooler and wetter. A number of species which prefer these cooler, moister conditions were found only in this vegetation type. These include fennel (*Foeniculum vulgare*), Chilting pink (*Petrochogia velutina*), Spanish clover or ko'imi (*Pemium incanum*), rat tail fescue (*Vulpia myuros*), and narrow-leaved plantain (*Plantago lanceolata*). Scattered here and there throughout the pasture land are small stands of trees and shrubs which include silk oak (*Grevillea robusta*), Christmas berry (*Schinus terebinthifolius*), jacaranda (*Jacaranda mimosaefolia*), kiku, black wattle (*Acacia mearnsii*), lantana (*Lantana camara*), and pepper tree (*Schinus poly*).

A variant of this vegetation type is found on Segment C, between the Kula Agricultural Park and the pineapple fields which begin at about the 2,000-foot contour. In this area, the pasture land contains scattered trees of kiawe and silk oak. Large patches of panini cactus are abundant. *Glyceine wightii*, a climbing legume introduced as a fodder plant, is also abundant. Buffalo grass and pitted beardgrass form extensive mats while Kikuyu grass is restricted to meadow areas and small drainage ways.

**Gulch Vegetation**

The alignment segments cross six major gulches: Kalialimu, Pulihu, Kalalea, Waiakoa, Kulimahiho‘i, and Ua'iu'ilani Gulches, as well as several, smaller unnamed gulches. Where Kalialimu Gulch and Pulihu Gulch pass through the sugar cane fields, they are fenced and used for grazing.

The smaller, shallower gulches do not support a wide range of species and are dominated primarily by buffelgrass, Guinea grass, green panicgrass (*Panicum maximum var. trichoglume*), small thickets of koa haole shrubs (*Leucaena leucocephala*), and scattered kiawe trees.

Along the bottoms of the larger gulches and on the less steeply sloping gulch walls, scattered stands of kiawe, Chineberry (*Helia ageracoides*), and the native wili-wili (*Erythrina sandwicensis*) trees are found. Trees of Java plum (*Syzygium cumini*), kukui (*Alpinia officinarum*), silk oak (*Grevillea robusta*), and Chinese bunyan (*Ficus microcarpa*) are also found in Kalialimu Gulch, the largest gulch within the study area. Shrubs commonly found in these large gulches include koa haole, lantana, Christmas berry, and the native 'ilie'e (*Plumbago zeylanica*).
Ground cover is composed primarily of buffelgrass, Guinea grass, and green panic grass. Because these large, deep gulches are shaded during part of the day and provide a moister habitat, they support a rich assortment of species. These include lion's ear (*Euphorbea ferox*), petty spurge (*Euphorbea pusilla*), castor bean (*Ricinus communis*), four-o'clock (*Mirabilis jalapa*), hairy abutilon (*Abutilon grandifolium*), Calendula parviflora, oriental hawksbeard (*Cynoglossum japonicum*), staggerweed (*Stachys arvensis*), jimson weed (*Datura stramonium*), etc.

Scattered clumps of plants are found on the steep, almost perpendicular gulch walls. Large, succulent rosettes of sisal (*Agave sisalana*) and Mauritius hemp (*Purpurea spinosa*) are occasionally observed on many of the gulch walls. The native 'a'ali'i shrub (*Bodanese viscosa*) is found on the walls of Kalalau Gulch. Other native species which can be found on the steep gulch walls are 'ala'e, 'i'iona, kumu-niu fern, willow, koali 'owa (*Ipomoea indica*), 'uhala (*Vaccaria indica*) and popolo (*Solanum americanum*).

**THREATENED AND ENDANGERED SPECIES**

One small population of the endangered ko'olau'ula shrub (*Abutilon pectinellii*) is known from Kalalau Gulch (Wagner et al., 1990; U.S. Fish and Wildlife Service 1995).

The ko'olau'ula is a member of the mallow or hibiscus family (*Malvaceae*). It is a much branched, rounded shrub up to 9 feet tall. The coarsely-toothed, heart-shaped leaves as well as the young branches are covered by a velvety, silvery, stellate pubescence. The pendant, solitary flowers are medium red to dark red (maroon) and about 0.8 inch across. The fruit is a hairy capsule, and five to eight-parted, usually with three seeds per cell. Extant populations of the ko'olau'ula are known from Lana'i (near Pu'u Hahana and north of Kaumalapau Road); Hawai'i (Puako, South Kohala; O'ahu ('Ewa plain); and Maui (Pu'al o Kali and Kalalau Gulch).

The Kalalau Gulch population is made up of three small clumps of plants in elevations between 690 to 750 feet on red soils. Segment A which crosses the nearest to the ko'olau'ula population is found at the 840-foot contour, well above the endangered plants.

**DISCUSSION AND RECOMMENDATIONS**

All of the vegetation types recognized on the alternative termini and alignment segments are dominated by introduced species. Sugar cane fields cover the majority of the cultivated lands, that is, all of Segment A, a small portion of Segment B, and the U2 terminus. Pineapple fields and the Kula Agricultural Park make up the remaining cultivated lands. Pineapple fields are found along Segments B, C, and D, and on the U3 terminus. The agricultural park is found on Segment C.

Uncultivated lands are covered largely by a kiawe/buffelgrass association. This vegetation type covers the greatest area throughout all of the study site. It is found on the K1 and K2 termini, on all of Segments E and F, and along the majority of Segments B and C. Kikuyu/mixed grass pasture land is found on the upper elevation sections of Segments B and C, and on the U2 terminus. Gulch vegetation is found where the segments cross several gulches, some of them large and steep-walled. Most of the uncultivated lands are used for grazing cattle and horses. The lower elevation portions of the kiawe/buffelgrass association also show evidence of past fires.

A total of 173 plant species were recorded during the field
studies. Of these, 153 (88%) are introduced species; 4 (2%) are originally of Polynesian introduction; and 16 (10%) are native. Of the natives, 8 are indigenous, that is, they are native to the Hawaiian Islands and also elsewhere. Eight species are endemic; that is, they are native only to the Hawaiian Islands. The 8 endemic species are the kumu-nui fern (Nephrolepis decipiens), nehe (Ligustrum robbinsianum), Hakea hispida, wiluwi (Erythrina sandwicensis), maka (Haematoxylon arborescens), Pani ollum, and kakanaka (Uvaria tomentosa).

None of the plants found during the survey is a listed, proposed, or candidate threatened and endangered species; nor is any plant a species of concern (U.S. Fish and Wildlife Service 1992, 1997a, 1997b). There are no areas on or adjacent to the termini and alignment segments which support native plant-dominated communities (Gagne and Cuddihy 1990; Hawaii Heritage Program 1994).

None of the alternative termini and alignment segments is "more favorable" or "least favorable" from a botanical perspective. Use of any of the termini and alignment segments for the construction of the proposed Kihei-Upcountry Maui Highway is not expected to have a significant negative impact on the botanical resources. The vegetation on the alternative termini and alignment segments is dominated by introduced species and there are no rare plants on or adjacent to the proposed project. However, there is some concern for fires and soil erosion. Segments which cross the kiawe/buffelgrass association should be designed with wide, gravel-lined shoulders. This vegetation type is especially fire-prone during the dry summer months. On the upper elevation portions of the proposed highway where it is wetter and the topography somewhat steeper, areas cleared of vegetation during construction should be revegetated as soon as possible to prevent soil loss.

Where landscaping is needed, it is recommended that native trees and shrubs be considered. These plants are already adapted to the local growing conditions and would require less water and soil amendments. Some native species which could be used include 'ailuwi (these occur Naturally in some of the larger gulches along the alignment segments), noio (Myoporum sandwicensium) -- a glossy, dark green shrub with fragrant white flowers; nehe -- a shrubby member of the daisy family (it occurs on Segment C); 'ilima -- a small shrub with bright orange flowers and used in landscaping; and 'akia (Heliotropium wai-urani) -- a low, mat-forming shrub which is an excellent ground cover and already in use for landscaping. The Maui Native Plant Society and the State Division of Forestry and Wildlife's Na Ala Hele Program should also be contacted for additional suggestions for planting as well as planting material.
PLANT SPECIES LIST -- Kīhei/Upcountry Maui Highway

The following checklist is an inventory of all the plants observed on the alternative termini and alignment segments during the field studies. The plants are arranged alphabetically by families within each of three groups: Ferns, Dicots, and Monocots. The taxonomy and nomenclature of the Ferns are in accordance with Lamoureux (1958), while the flowering plants, Dicots and Monocots, follow Wagner et al. (1990).

For each species, the following information is provided:
1. Scientific name with author citation.
2. Common English and/or Hawaiian name(s), when known.
3. Biogeographic status. The following symbols are used:
   E = endemic = native only to the Hawaiian Islands.
   I = indigenous = native to the Hawaiian Islands and also elsewhere.
   F = questionably indigenous = data not clear if dispersal by natural or human-related mechanisms, but weight of evidence suggests probably indigenous.
   P = Polynesian = plants originally of Polynesian introduction prior to Western contact, that is, Cook’s discovery of the Hawaiian islands in 1778.
   P? = questionably Polynesian = may be a Polynesian introduction or possibly introduced in historical times (after 1778).
   X = introduced or alien = all those plants brought to the Hawaiian Islands by humans, intentionally or accidentally, after Western contact.
   X? = questionably introduced = date of introduction unclear or very early, may possibly be indigenous or of Polynesian introduction.
4. Presence (+) or absence (-) of a particular species within each of four vegetation types recognized within the study area (see text for discussion):
   C = Cultivated Lands
   K = Knob/Cistlegrass Association
   M = Kikuyu/Mixed Grass Pasture Land
   G = Gulch Vegetation
<table>
<thead>
<tr>
<th>Scientific name</th>
<th>Common name</th>
<th>Status</th>
<th>Vegetation type</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Scientific name</strong></td>
<td><strong>Common name</strong></td>
<td><strong>Status</strong></td>
<td><strong>g</strong></td>
</tr>
<tr>
<td><strong>Poecidium vulgare Mill.</strong></td>
<td>Fennel</td>
<td>X</td>
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<tr>
<td>ASCLEPIADACEAE (Milkweed Family)</td>
<td>Asclepias physocarpa (E. Mey.) Schlechter</td>
<td>Balloon plant</td>
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<tr>
<td><strong>ASTERACEAE (Daisy family)</strong></td>
<td>Ageratrum conyzaeoides L.</td>
<td>Hoheho</td>
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<tr>
<td></td>
<td>Bidens alba var. radiata (Schultz-Bip.) Ballard ex Meichert</td>
<td>White-flowered bidens</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>Bidens cymatifolia Kunth</td>
<td>Heat Indian beggar's tick</td>
<td>X</td>
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<tr>
<td></td>
<td>Calycarpus vialis Less.</td>
<td>Spanish needle, ki, ki nehe</td>
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<tr>
<td></td>
<td>Centaurea miltiensis L.</td>
<td>Irish dock</td>
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<tr>
<td></td>
<td>Cirsium vulgare (Sav.) Ten.</td>
<td>Hapa chistle, yellow star chistle</td>
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<tr>
<td></td>
<td>Conopylla bonariensis (L.) Cronq.</td>
<td>Bull chistle</td>
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<td></td>
<td>Conopylla canadensis var. pusilla (Nutt.) Cronq.</td>
<td>Hairy horseweed, ilioba</td>
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<td></td>
<td>Crossocephalum rigidoides (Benth.) S. Moore</td>
<td>Horseshoe, lani wala</td>
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<tr>
<td></td>
<td>Euphrasia Nicolsonii</td>
<td>Pualele, flora's paintbrush</td>
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<tr>
<td></td>
<td>Salix nigra var. palustris Cav.</td>
<td>Purple cedew</td>
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<tr>
<td></td>
<td>Gnetum purpureum L.</td>
<td>Smooth cat's ear</td>
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<td></td>
<td>Hypochoeris glabra L.</td>
<td>Hapa chistle, pualele, gasmore</td>
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<td>Hypochoeris radicata L.</td>
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<td>Lepidochetum rosski Sherff</td>
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<td>Picris hieracioides L.</td>
<td>Hypechoeria</td>
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<td>Pluchea caroliniana (Jacq.) G. Don</td>
<td>Pluchea, sourbrush</td>
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<td></td>
<td>Senecio madagascariensis Poiret</td>
<td>Small yellow crown-beard</td>
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<tr>
<td></td>
<td>Scolochloa orientalis L.</td>
<td>Sowthistle, pualele</td>
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<tr>
<td></td>
<td>Sonchus oleraceus L.</td>
<td>Sowthistle, pualele</td>
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<tr>
<td></td>
<td>Stenotelia nodiflora (L.) Gaertn.</td>
<td>Sowthistle, pualele</td>
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<tr>
<td></td>
<td>Tridax procumbens L.</td>
<td>Coat buttons</td>
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</tr>
<tr>
<td></td>
<td>Verbesina encelioides ( Cav.) Benth. &amp; Hook.</td>
<td>Golden crown-beard</td>
<td>X</td>
</tr>
</tbody>
</table>

**Scientific name** | **Common name** | **Status** |
<table>
<thead>
<tr>
<th></th>
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<tr>
<td><strong>Ferns</strong></td>
<td>maiden hair fern</td>
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<tr>
<td><strong>Athyriaceae</strong> (Maiden Hair Fern Family)</td>
<td>Adiantum rediumum Presl</td>
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<tr>
<td><strong>Diplazium esculentum (Reitz.) Sw.</strong></td>
<td>Ho'io</td>
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<tr>
<td><strong>Hepholetiaceae</strong> (Sword Fern Family)</td>
<td>Nephelepis multiflora (Hodg.) J. Moore</td>
<td>'Okupukupa, hairy sword fern</td>
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<td><strong>Sinopteridaceae</strong> (Cliff brake Fern Family)</td>
<td>Doryopteris decipiens (Hook.) J. Sm.</td>
<td>Kumu-niu, manawahua, 'Iwa'awa</td>
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**Florentiaceae** (Maiden Hair Fern Family) | Adiantum rediumum Presl | X |

**Flowering Plants**

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<tr>
<td></td>
<td>Amaranthus hybridus L.</td>
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<tr>
<td></td>
<td>Amaranthus spinosus L.</td>
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</tr>
<tr>
<td></td>
<td>Amaranthus viridis L.</td>
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</tr>
<tr>
<td></td>
<td>Amaranthus sp.</td>
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<td><strong>Anacardiacae</strong> (Mango Family)</td>
<td>Mangifera indica L.</td>
<td>Mango, manako</td>
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<tr>
<td></td>
<td>Schinus terebinthifolius Rođd</td>
<td>Christmas berry</td>
</tr>
<tr>
<td></td>
<td>Schinus cumingii Sprague</td>
<td>Fir-leaved celery</td>
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**Dicots**

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<td>Amaranthus hypochondriacus L.</td>
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<tr>
<td></td>
<td>Amaranthus hybridus L.</td>
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<tr>
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<td>Amaranthus sp.</td>
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<td><strong>Anacardiacae</strong> (Mango Family)</td>
<td>Mangifera indica L.</td>
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<td>Schinus terebinthifolius Rođd</td>
<td>Christmas berry</td>
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<td></td>
<td>Schinus cumingii Sprague</td>
<td>Fir-leaved celery</td>
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<td>Scientific name</td>
<td>Common name</td>
<td>Status</td>
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<td>---------------------------------------</td>
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<tr>
<td><strong>CUCURBITACEAE (Cucumber family)</strong></td>
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<td>Ipomoea indica (L.) Swett</td>
<td>koali</td>
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<tr>
<td>Ipomoea obscura (L.) Ker-Gawl.</td>
<td>'ana</td>
<td>I</td>
</tr>
<tr>
<td>Ipomoea triloba L.</td>
<td>little bell</td>
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<tr>
<td>Herremia aegyptiaca (L.) Urb.</td>
<td>hairy herremia, koali kun</td>
<td>X7</td>
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<tr>
<td><strong>CUCURBITACEAE (Gourd family)</strong></td>
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<tr>
<td>Cucumis dipaceus Ehrenb. ex Spach</td>
<td>wild cucumber</td>
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<tr>
<td>Monovida charantia L.</td>
<td>wild bittermelon</td>
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<tr>
<td>Siosoc hispidus Hillebr.</td>
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<tr>
<td><strong>EUPHORBIACEAE (Spurge family)</strong></td>
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<tr>
<td>Chamaesyce hispida (L.) Mill.</td>
<td>kokui, tutui</td>
<td>F</td>
</tr>
<tr>
<td>Chamaesyce hyssopifolia (L.) Schult.</td>
<td>hairy spurge, garden spurge</td>
<td>X</td>
</tr>
<tr>
<td>Chamaesyce prostrata (Allen) Small</td>
<td>prostrate spurge</td>
<td>X</td>
</tr>
<tr>
<td>Euphorbia heterophylla L.</td>
<td>Mexican ilexeed, kaliko</td>
<td>X</td>
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<tr>
<td>Euphorbia peplus L.</td>
<td>petty spurge</td>
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</tr>
<tr>
<td>Ricinus communis L.</td>
<td>castor bean, koli</td>
<td>X</td>
</tr>
<tr>
<td><strong>FABACEAE (Pea family)</strong></td>
<td></td>
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</tr>
<tr>
<td>Acacia farnesiana (L.) Wild.</td>
<td>blu</td>
<td>X</td>
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<tr>
<td>Acacia mearnsii De Wild.</td>
<td>black wattie</td>
<td>X</td>
</tr>
<tr>
<td>Canavalia ensiformis Thouars</td>
<td>monkey bean</td>
<td></td>
</tr>
<tr>
<td>Chamaecrista nictitans (L.) Hoehn.</td>
<td>partridge pea, lauki</td>
<td>X</td>
</tr>
<tr>
<td>Cleopatra pillaida Atton</td>
<td>smooth rattlebox, piskkani</td>
<td>X</td>
</tr>
<tr>
<td>Desmodium incanum DC</td>
<td>Spanish clover, ka ini</td>
<td>X</td>
</tr>
<tr>
<td>Desmodium tortuosum (Sw.) DC</td>
<td>Florida beggarweed</td>
<td>X</td>
</tr>
<tr>
<td>Erythrina sandwicensis Degener</td>
<td>williwili</td>
<td>E</td>
</tr>
<tr>
<td>Glycine wightii (Wight &amp; Arnott)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vilde</td>
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<tr>
<td>Indigofera suffruticos Mill.</td>
<td>indigo, 'iniko</td>
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<tr>
<td>Leucena leucocephala (Lam.) de Vic</td>
<td>koz haole</td>
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<tr>
<td><strong>PALENIACEAE (Papaya family)</strong></td>
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<tr>
<td>Xanthium arvense var. canadense (Mill.) var. A. Gray</td>
<td>cocklebur, kikania</td>
<td>X</td>
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<tr>
<td>Youngania japonica (L.) DC</td>
<td>oriental hawkbeard</td>
<td>X</td>
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<tr>
<td>Zizania peruviana (L.) L.</td>
<td>wild zizania</td>
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<tr>
<td><strong>BIGNONIACEAE (Bignonia family)</strong></td>
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<td>Jacaranda mimosaifolia D. Don.</td>
<td>jacaranda</td>
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<tr>
<td><strong>BORAGINACEAE (Heliotrope family)</strong></td>
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<tr>
<td>Heliotropium amplexicaule Vahl</td>
<td>heliotrope</td>
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<tr>
<td><strong>BRASSICACEAE (Mustard family)</strong></td>
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<tr>
<td>Brassica camelina L.</td>
<td>field mustard</td>
<td>X</td>
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<tr>
<td>Brassica nigra (L.) W. Koch.</td>
<td>black mustard, makeke</td>
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</tr>
<tr>
<td>Capsella bursa-pastoris (L.) Medik.</td>
<td>shepherd's purse</td>
<td>X</td>
</tr>
<tr>
<td>Coronopus didymus (L.) Sm.</td>
<td>swineceess</td>
<td>X</td>
</tr>
<tr>
<td>Lepidium oblongum Small</td>
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<tr>
<td>Lepidium virginicum L.</td>
<td>peppermoss</td>
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<tr>
<td>Sisymbrium alternifolium (L.) Scop.</td>
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<tr>
<td>Sisymbrium officinale (L.) Scop.</td>
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<tr>
<td><strong>CACTACEAE (Cactus family)</strong></td>
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<tr>
<td>Opuntia ficus-indica (L.) Mill.</td>
<td>panini</td>
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<tr>
<td><strong>CARYOPHYLLACEAE (Pink family)</strong></td>
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<tr>
<td>Petrarchia velutina (Guss.) F. Hall &amp; Ure.</td>
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<tr>
<td>Polyosperm ctenophyllum (L.) L.</td>
<td>Chiling pink</td>
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<tr>
<td>Silene gallica L.</td>
<td>alised</td>
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<tr>
<td><strong>CHENOPODIACEAE (Goosefoot family)</strong></td>
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<tr>
<td>Chenopodium album (L.) L.</td>
<td>Australian saltbush</td>
<td>X</td>
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<tr>
<td>Chenopodium album (L.) L.</td>
<td>Keeneled goosefoot</td>
<td>X</td>
</tr>
<tr>
<td>Chenopodium murale L.</td>
<td>'ahaehe</td>
<td>X</td>
</tr>
<tr>
<td>Salsola kali L.</td>
<td>Russian thistle, tumbleweed</td>
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</tr>
<tr>
<td>Scientific name</td>
<td>Common name</td>
<td>Status</td>
</tr>
<tr>
<td>--------------------------------------------------------------------------------</td>
<td>------------------------------</td>
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<tr>
<td><strong>NYCTAGINACEAE (Four-o'clock family)</strong></td>
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<tr>
<td>Boechavaya rosea Jull.</td>
<td>Java plum</td>
<td>X</td>
</tr>
<tr>
<td>Hiribals jalsap L.</td>
<td></td>
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<tr>
<td><strong>ONYCHOMAS (Evening primrose family)</strong></td>
<td></td>
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<tr>
<td>Ludwigia octovalvis (Jacq.) Raven</td>
<td>primrose willow, kamole</td>
<td>P7</td>
</tr>
<tr>
<td><strong>OXALIDACEAE (Wood sorrel family)</strong></td>
<td></td>
<td></td>
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<tr>
<td>Oxalis corniculata L.</td>
<td>yellow wood sorrel, 'ihi 'ai</td>
<td>P7</td>
</tr>
<tr>
<td>Oxalis corymbosa DC</td>
<td>pink wood sorrel, 'ihi pehu</td>
<td>X</td>
</tr>
<tr>
<td><strong>PAPAVERACEAE (Poppy family)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Argemone glauca (Hout. et Prain) Pope Argemone mexicana L.</td>
<td>pua kala, kala</td>
<td>E</td>
</tr>
<tr>
<td>Mexican poppy</td>
<td>X</td>
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</tr>
<tr>
<td><strong>PLANTAGINACEAE (Plantain family)</strong></td>
<td></td>
<td></td>
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<tr>
<td>Plantago lanceolata L.</td>
<td>narrow-leaved plantain</td>
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<tr>
<td><strong>PLUMBAGINACEAE (Leadwort family)</strong></td>
<td></td>
<td></td>
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<tr>
<td>Plumbago zeylanica L.</td>
<td>'ilie'e, 'ilie'e</td>
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<tr>
<td><strong>POLYGONACEAE (Rue and grass family)</strong></td>
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<tr>
<td>Rumex acetosella L.</td>
<td>sheep sorrel</td>
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<tr>
<td><strong>PORTULACACEAE (Purslane family)</strong></td>
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<tr>
<td>Portulaca oleracea L.</td>
<td>pipeved, 'akulikuli kula,</td>
<td>X</td>
</tr>
<tr>
<td>'ihi</td>
<td>X</td>
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<tr>
<td>Portulaca pilosa L.</td>
<td>scarlet pimpernel</td>
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<tr>
<td><strong>PRIMULACEAE (Primrose family)</strong></td>
<td></td>
<td></td>
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<tr>
<td>Anagallis arvensis L.</td>
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<tr>
<td><strong>SCROPHULARIACEAE (Succulent family)</strong></td>
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<tr>
<td>Macrophili um lathyroides (L.) Urb. Medicago polymorpha L.</td>
<td>wild bean, cowpea</td>
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<tr>
<td>Panicopyis palida (Ramb. &amp; Bonpl. ex Willd.) Kanchi</td>
<td>bur clover</td>
<td>X</td>
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<tr>
<td>Vicia vauquerculata ss.p. sesquipedalis (L.) Verdc.</td>
<td>blade</td>
<td>X</td>
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<tr>
<td><strong>GERANIACEAE (Geranium family)</strong></td>
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<tr>
<td>Erodium cicutarium (L.) L'Her.</td>
<td>yard-long bean</td>
<td>X</td>
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<tr>
<td><strong>HYDRONEPHYTEACEAE (Waterleaf family)</strong></td>
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<tr>
<td>Humu sandwicensis A. Gray</td>
<td>mana</td>
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<tr>
<td><strong>LANATACEAE (Hemp family)</strong></td>
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<tr>
<td>Lobelia nepetifolia (R.) R. Br. Scatby sauraneus L.</td>
<td>lion's ear</td>
<td>X</td>
</tr>
<tr>
<td>Stachys arvensis L.</td>
<td>staggerweed</td>
<td>X</td>
</tr>
<tr>
<td><strong>MALVACEAE (Mallow family)</strong></td>
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</tr>
<tr>
<td>Abutilon grandifolium (Wild.) Sweet Manalia paviflora L.</td>
<td>hairy abutilon, ma'o</td>
<td>X</td>
</tr>
<tr>
<td>Malvaviscum coroneloides (L.) Gercke</td>
<td>cheesseweed</td>
<td>X</td>
</tr>
<tr>
<td>Sida escula Hylp.</td>
<td>false mallow</td>
<td>X</td>
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<tr>
<td>Sida rhombidifolia L.</td>
<td>'ilina</td>
<td>I</td>
</tr>
<tr>
<td>Sida spinosa L.</td>
<td>prickly aids</td>
<td>X</td>
</tr>
<tr>
<td><strong>MELASTOMACEAE (Melastoma family)</strong></td>
<td></td>
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<tr>
<td>Oenothera perennis L.</td>
<td>Chinese banyan</td>
<td>X</td>
</tr>
<tr>
<td><strong>MORACEAE (Mulberry family)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Physalis microcarpa L.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Scientific name</td>
<td>Common name</td>
<td>Status</td>
</tr>
<tr>
<td>---------------------------------------</td>
<td>---------------------------------</td>
<td>--------</td>
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<tr>
<td><em>PROTEACEAE</em> (Protea family)</td>
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<tr>
<td>Grevillea robusta A. Cunn. ex R. Br.</td>
<td>silky oak, 'oka kalika</td>
<td>X</td>
</tr>
<tr>
<td><em>SAPINDACEAE</em> (Soapberry family)</td>
<td>'a&quot;ali'</td>
<td>T</td>
</tr>
<tr>
<td>Dodonaea viscosa Jacq. Indet. sp.</td>
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<td>X</td>
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<tr>
<td><em>SCHROPHULARIACEAE</em> (Flax family)</td>
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<tr>
<td>Anisochirium ovatum L.</td>
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<tr>
<td><em>SOLANACEAE</em> (Nightshade family)</td>
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<tr>
<td>Datura stramonium</td>
<td>jimson weed, la'au hano</td>
<td>X</td>
</tr>
<tr>
<td>Lycopersicon pinnatifolium (Jacq.)</td>
<td>current tomato, 'ohi'a na ka</td>
<td>X</td>
</tr>
<tr>
<td><em>Nicandra physalodes (L.) Gaertn.</em></td>
<td>apple of Peru</td>
<td>X</td>
</tr>
<tr>
<td><em>Nicotiana glauca R.C. Graham</em></td>
<td>tree tobacco</td>
<td>X</td>
</tr>
<tr>
<td>Physalis peruviana L.</td>
<td>popoh</td>
<td>X</td>
</tr>
<tr>
<td>Solanum americanum</td>
<td>apple of Soden, popolo</td>
<td>17</td>
</tr>
<tr>
<td>Solanum linnaeanum Hopper &amp; P. Jaeger</td>
<td>kikania</td>
<td>X</td>
</tr>
<tr>
<td><em>STERculiACEAE</em> (Cacao family)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vatica indica</td>
<td>'whaloa, hi'aloa, hanaikaloa</td>
<td>17</td>
</tr>
<tr>
<td><em>TILIACEAE</em> (Linden family)</td>
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<tr>
<td><em>Triumfetta semitriboja Jacq.</em></td>
<td>Sacramento bur bush</td>
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<tr>
<td><em>VERBENACEAE</em> (Verbena family)</td>
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<tr>
<td>Lantana camara L.</td>
<td>lancana, lekana</td>
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<tr>
<td>Verbena littoralis Kutch</td>
<td>weed verbena, ou1, 0i</td>
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</tr>
<tr>
<td><em>ZYGOPHYLLACEAE</em> (Coltsfoot family)</td>
<td></td>
<td></td>
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<tr>
<td><em>Tribulus terrestris L.</em></td>
<td>puncture vine</td>
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</tr>
</tbody>
</table>
LITERATURE CITED


BOTANICAL SURVEY

KIHEI/UPCOUNTRY MAUI HIGHWAY

ADDITIONAL STUDIES -- U2-A ALIGNMENT

by

Winona P. Char
CHAR & ASSOCIATES
Botanical Consultants
Honolulu, Hawaii

Prepared for: PARSONS BRINKERHOFF

October 1997

BOTANICAL SURVEY

KIHEI/UPCOUNTRY MAUI HIGHWAY

ADDITIONAL STUDIES -- U2-A ALIGNMENT

INTRODUCTION

A botanical survey report was prepared for the proposed Kihei/Upcountry Maui Highway in May 1997 (Char 1997). Since then, the plans for the U-2 terminus have been modified and two alternate alignments, U2-A and U2-B, are now being considered.

A discussion of the botanical resources found on the Alternative U2-A alignment is presented in this report. Field studies for the U2-A alignment were conducted on September 12 to 14, 1997 by a team of three botanists. The centerline of the alignment was staked and flagged prior to our field studies. The survey methods outlined in the earlier study (Char 1997) were used.

DESCRIPTION OF THE VEGETATION

In the discussion below, the vegetation along the U2-A alignment is described from mauka to makai, that is, from the U2-A terminus to where it terminates near Pae'ahu Gulch. Locations are referenced to the centerline station numbers.

The alignment crosses two vegetation types which were not encountered during the earlier study; these are abandoned pineapple fields and Christmas berry/mixed shrubland. They are described in more detail in the report. A list of the plants observed during the field studies is presented at the end of the report.
Vegetation Along the Alignment

From its terminus at the existing signalized intersection of Waiakala Highway, Pokalani Bypass, and Kula Highway to about station 307, the alignment crosses abandoned pineapple fields. Scattered remnant patches of pineapple (Ananas comosus) are found in overgrown fields now covered with dense clumps of Rhodes grass (Chloris gayana) and other weedy species. Young trees of jacaranda (Jacaranda miniata) and 10 to 12 ft. tall, and Christmas berry (Schinus terebinthifolius) shrubs, 10 to 15 ft. tall, are scattered throughout the overgrown fields. In the areas which support remnant patches of pineapple, there are also tangled mats of wild bitternut melon (Momordica charantia) and white passion flower (Passiflora subulata) vines, prickly clumps of bull thistle (Cirsium vulgare), wild fennel (Foeniculum vulgare), and sourgrass (Digitaria insularis).

From station 307 to station 314, the alignment crosses through Christmas berry/mixed shrubland. Christmas berry shrubs form large, rounded thickets up to 20 ft. tall and 25 to 30 ft. wide. Filling in the matrix between the Christmas berry shrubs is a varied mixture of grasses such as Rhodes grass, Kikuyu grass (Pennisetum clandestinum), pitted beardgrass (Bothriochloa pertusa), and smaller herbaceous species which include Spanish clover or ha'imi (Desmodium incarnatum), Sida rhombifolia, 'Ilima (Sida fallax), spiny amaranth (Amaranthus spinosus), etc. In many places, dense patches of mixed shrubs are common to abundant; shrubs found here include lantana (Lantana camara), indigo (Indigofera suffrutescens), castor bean (Ricinus communis), and hairy abutilon (Abutilon grandifolium). Portions of the Christmas berry/mixed shrubland were used for pineapple cultivation at one time as there are remnants of black plastic sheeting as well as dried out, dead pineapple plants.

From about station 314 to station 317, the U2-A alignment crosses 'Ailakai/Kulaapoli Gulch, and gulch vegetation. Stands of Chinaberry (Melia azedarach) and the native willow (Salix sulcata), 30 to 50 ft. tall, are found in the gulch. Also common are plantings of large trees of various Eucalyptus species up to 70 and 80 ft. tall. Ground cover is primarily Guinea grass (Panicum maximum), pitted beardgrass, and buffalo grass (Bouteloua gracilis). As in the earlier study (Char 1997), this gulch as well as the other gulches along the alignments support only intermittent streams along their bottoms. The dry stream beds have been eroded down to the solid bedrock in most places, or are strewn with large boulders.

From station 317 to station 333, the alignment crosses Kikuyu/mixed grass pasture land. A detailed description of this vegetation type is given in the earlier report.

Gulch vegetation is again encountered where the alignment crosses Kalali'olani Gulch between stations 330 and 341. From station 341, the alignment then crosses cultivated lands consisting of pineapple fields and also gulch vegetation where a few shallow gulches cross the pineapple fields. At about station 365 and on to Pu'uloa Gulch (station 368), the U2-A alignment passes through recently planted sugar cane fields.

DISCUSSION AND RECOMMENDATIONS

The findings along the proposed U2-A alignment are similar to the earlier botanical study (Char 1997). All of the vegetation types found along the U2-A alignment are dominated by introduced species. The few native species are more or less found in or adjacent to the gulches. Native plants found during this field survey are the kumu-nu fern (Pozzyntaria decipiens), ko'ai 'awa (Indiaceae indica), naʻu o H'i'aka (Jacquemontia prostrata), willow, 'i'ima, pua.
kala (*Argemone glauca*), 'a'ali'i (*Dodonaea viscosa*), and 'uhalea (*Naltheria indica*). All except the pa' u o Hi'iaka were found during the earlier survey.

As in the earlier study, none of the plants found along the proposed U2-A alignment is a listed, proposed, or candidate threatened and endangered species; nor is any plant a species of concern (U.S. Fish and Wildlife Service 1997). Again, no wetlands were found where the intermittent streams run along the bottom of the gulches. These areas are not dominated by wetland indicator species (Reed 1988), and the soils along the alignment are not listed as hydric soils (Soil Conservation Service 1990).

The construction of the highway along the U2-A alignment should not have a significant negative impact on the botanical resources. However, it is recommended that areas cleared of vegetation be revegetated as soon as possible to prevent soil loss and discharge of sediments into the intermittent streams (during the rainy season). Again, it is recommended that native plants be used whenever possible for landscaping.

**PLANT SPECIES LIST -- U2-A Alignment**

The following is a list of all the plants observed along the U2-A alignment of the proposed Kihiei/Uplcountry Maui Highway. The plants are arranged alphabetically within each of three groups. The taxonomy and nomenclature of the Ferns follow Lamoureux (1988), while the flowering plants, Dicots and Monocots, are in accordance with Wagner *et al.* (1990).

For each species, the following information is provided:

1. Scientific name with author citation.
2. Common English and/or Hawaiian name(s), when known.
3. Biogeographic status. The following symbols are used:
   
   E = endemic = native only to the Hawaiian Islands.
   I = indigenous = native to the Hawaiian Islands and also elsewhere.
   Q = questionably indigenous = data not clear if dispersal by natural or human-related mechanisms, but weight of evidence suggests probably indigenous.
   P = Polynesian = plants originally of Polynesian introduction prior to Western contact, i.e. Cook's discovery of the Hawaiian Islands in 1778.
   PT = questionably Polynesian = may be a Polynesian introduction or possibly introduced in historical times (after 1778).
   X = introduced or alien = all those plants brought to the Hawaiian Islands by humans, intentionally or accidentally, after Western contact.
   XT = questionably introduced = date of introduction unclear or very early, may possibly be indigenous or of Polynesian introduction.

4. Presence (+) or absence (-) of a particular species within each of five vegetation types recognized along the alignment (see text for discussion):
<table>
<thead>
<tr>
<th>Scientific name</th>
<th>Common name</th>
<th>Status</th>
<th>Vegetation type</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>FERNS</strong></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Adiantum hispidulum Sw.</td>
<td>Australian maiden hair</td>
<td>X</td>
<td>- - + -</td>
</tr>
<tr>
<td><em>Nephrolepidaceae</em> (Sword fern family)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Nephrolepis multiflora</em> (Roxb.)</td>
<td>'okupukupu, hairy sword fern</td>
<td>X</td>
<td>- - + -</td>
</tr>
<tr>
<td><em>Sinopteridaceae</em> (Cliffbrok fern family)</td>
<td></td>
<td></td>
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</tr>
<tr>
<td><em>Hypopteris decipiens</em> (Hook.)</td>
<td>kumu-niu, manawahu, <em>lua'iwa</em></td>
<td>X</td>
<td>- - + -</td>
</tr>
<tr>
<td><strong>FLOWERING PLANTS</strong></td>
<td></td>
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</tr>
<tr>
<td><strong>DICOTS</strong></td>
<td></td>
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</tr>
<tr>
<td><em>Acanthaceae</em> (Acanthus family)</td>
<td>Thunbergia fragrans Roxb.</td>
<td>fragrant thunbergia</td>
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<td><em>Amaranthaceae</em> (Amaranth family)</td>
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<tr>
<td><em>Amaranthus spinosus</em> L.</td>
<td>spiny amaranth, pakai koku</td>
<td>X</td>
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<tr>
<td><em>Amaranthus viridis</em> L.</td>
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<td><em>Anacardiaceae</em> (Mango family)</td>
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<td><em>Schinus molle</em> L.</td>
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<td><em>Schinus terebinchifolius</em> Rudd</td>
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<td><em>Apiceae</em> (Carrot family)</td>
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<td><em>Foeniculum vulgare</em> Mill.</td>
<td>fennel</td>
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<td>CUCURBITACEAE (Gourd family)</td>
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<td>Chamaesyce hirta (L.) Hillsp.</td>
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<td>Chamaesyce hysopifolia (L.) Small</td>
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<td>Ricinus communis L.</td>
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<td>PAEAEEAE (Poa family)</td>
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<td>Crotoaria incana L.</td>
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<td>Crotoaria palida Aiton</td>
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<td>Desmodium sandwicense E. Mey.</td>
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<td>Desmodium strictum (Sw.) DC</td>
<td>Florida beggarweeds</td>
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<tr>
<td>Erythrina sandwicense Dugener</td>
<td>williwi</td>
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<td>Glycine wightii (Might &amp; Arnott)</td>
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<td>Indigofera spinosa Forsk.</td>
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<td>Indigofera suffruticosa Mill.</td>
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<td>Macroptilium laevisum (L.) Urb.</td>
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<td>Prospis pallida (Hook. &amp; Bondi. ex</td>
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<tr>
<td>Will.) Kunth</td>
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<tr>
<td>LAURACEAE (Laurel family)</td>
<td>camphor tree</td>
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<tr>
<td>Cinnamomum camphora (L.) J. Presl</td>
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<tr>
<th>Scientific name</th>
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<tr>
<td>ASCLEPIADACEAE (Milweed family)</td>
<td>balloon plant</td>
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<td>Asclepias physocarpa (E. Mey.) Schlechter</td>
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<td>ASTERACEAE (Sunflower family)</td>
<td>Spanish needle, ki,</td>
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<td>Bidens pilosa L.</td>
<td>ki nebu</td>
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<td>Cirsium vulgare (Savi) Ten.</td>
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<td>Compsya bonariensis (L.) Cronq.</td>
<td>hairy horseweed, illoha</td>
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<td>Crepis pilosella (Benth.)</td>
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<td>Eryngium campestris (L.)</td>
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<td>Gomphocarpus sparti (L.)</td>
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<td>Hypericoides aculeata L.</td>
<td>golden crown-beard</td>
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<td>Verbesina enceliodes (Gav.)</td>
<td>cocklebur, kikiana</td>
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<td>s s s s g</td>
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<tr>
<td>BIGNONIAEEAE (Bignonia family)</td>
<td>Jacaranda</td>
<td>X</td>
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<tr>
<td>BONSAEAEAE (Bonisa family)</td>
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<td>BRASSICACEAE (Mustard family)</td>
<td>Jim Hill mustard, tumble</td>
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<tr>
<td>Lepidium obtusum Small</td>
<td>mustard</td>
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<td>Sisymbrium altissimum L.</td>
<td>Jim Hill mustard, tumble</td>
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<td>GAGACCEAE (Gagea family)</td>
<td>Pompomanae</td>
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<td>Opuncia fies-iocida (L.) Hillsp.</td>
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<td>CONVOLVULACEAE (Morning glory family)</td>
<td>Ipomoea indica (J. Burnm.) Merr.</td>
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<tr>
<td>Ipomoea indica (J. Burnm.) Merr.</td>
<td>kooli ‘aua</td>
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<td>Jacobaea sonchusowiae var.</td>
<td>Jacobaea sonchusowiae</td>
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<td>sandwicensis (A. Gray)</td>
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<td>K. edulis</td>
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<td>Merremia seychella (L.) Urb.</td>
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<td>PHYTOLACCAEAE (Pokeweed family)</td>
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<td>Phytolacca octandra L.</td>
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<td>narrow-leaved plantain</td>
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<td>Plantago lanceolata L.</td>
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<td>PORTULACACEAE ( Purslane family)</td>
<td>piegread, 'labilihali'</td>
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<td>Portulaca oleracea L.</td>
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<td>silk oak, 'eka kalika'</td>
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<td>Grevillea robusta A. Cunn. ex R. Br.</td>
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<td>SAPINDACEAE (Soapberry family)</td>
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<td>Spondias viscosa Jacq.</td>
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<td>SOLANACEAE (Nightshade family)</td>
<td>chili pepper, nisol</td>
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<td>Capsicum frutescens L.</td>
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<td>Nicandra physalodes (L.) Gaerth.</td>
<td>tree tobacco</td>
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<td>Nicotiana glauca R.C. Graham</td>
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<td>Solanum linnaeanum Hepper &amp; P. Jaeger</td>
<td>blue potato vine</td>
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<td>Solanum assaforthianum Andr.</td>
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<td>STERCULIACEAE (Cecropia family)</td>
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<td>Waltheria indica L.</td>
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<td>TILIACEAE (Linden family)</td>
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<td>Triumfetta semitriloba Jacq.</td>
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<td>TROPAEOLACEAE (Nasturtium family)</td>
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<td>Festuca clandestinum Chiov.</td>
<td>kikuy grass</td>
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<td>Saccharum officinarum L.</td>
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<td>Lantana camara L.</td>
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<td>Verbena litorea L.</td>
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<td>Agave sisalana Perrine</td>
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<td>Furecaea foetida (L.) Nev.</td>
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<td>Ananas comosus (Stich.) Herr.</td>
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<td>Cyperaceae (Sedge family)</td>
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<td>Cyperus rotundus L.</td>
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<td>Liliaceae (Lily family)</td>
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<td>Asparagus setaceous (Kunth) Jessop</td>
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<td>Poaceae (Grass family)</td>
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<td>Arvena festuca L.</td>
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<td>Bothriochloa pertusa (L.) A. Camus</td>
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<td>Bromus mollis L.</td>
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<td>Bromus rigidus Roth</td>
<td>soft chess</td>
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<td>Bromus willdenowi Kunch</td>
<td>rigueur grass</td>
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<td>Cenchrus ciliaris L.</td>
<td>rescue grass</td>
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<td>Chloris barbata (L.) Sw.</td>
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<td>Chloris gayana Kunch</td>
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<td>Cynodon dactylon (L.) Pers.</td>
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<td>Malurus repens (Wild.) Zisch</td>
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<td>Panicum maximum Jacq.</td>
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<td>Paspalum dilatatum Poir</td>
<td>Natal redtop, Natal grass</td>
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<td></td>
<td>Guinea grass</td>
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<td>dallis grass</td>
<td>$X$</td>
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LITERATURE CITED


BOTANICAL SURVEY
KIHEI/UPCOUNTRY MAUI HIGHWAY
ADDITIONAL STUDIES -- U2-B ALIGNMENT

by

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

Prepared for: PARSONS BRINCKERHOFF

October 1997

INTRODUCTION

An earlier botanical survey report (Char 1997a) which covered all of the then proposed Kihoe/Upcountry Maui Highway alignments and termini was prepared in May 1997. Since that time, the plans for the U-2 terminus and alignment segment have been modified and two alternate alignments, U2-A and U2-B, are now being proposed. The U2-A terminus is found at the intersection of Makena Highway, Pukalani Bypass, and Kula Highway, by the existing traffic signal. The U2-B terminus is located on the Kula Highway, across from the Kula 200 Subdivision and south of the Ha'akakai Gulch bridge.

Field studies to assess the botanical resources along the U2-B alignment were conducted on September 14 to 15, 1997 by a team of three botanists. The centerline of the alignment was staked and flagged prior to the field studies. The survey methods outlined in the earlier study (Char 1997a) were followed.

DESCRIPTION OF THE VEGETATION

In the discussion which follows, the vegetation found along the U2-B alignment is described from mauka to makai, that is from the U2-B terminus at Kula Highway to where it adjoins the U2-A alignment at station U2-B 300. Locations are referenced to the centerline station numbers.

The alignment crosses over three vegetation types: Kikuyu/mixed grass pasture land, gulch vegetation, and cultivated lands (pine-
Apple fields. A short description is provided for each of these vegetation types; a more detailed discussion is found in the earlier botanical survey report (Char 1997a). A list of all the plant species found along the U2-B alignment is presented at the end of the report.

Vegetation Along the U2-B Alignment

From its terminus at Kula Highway (station 550) and downslope to about station 521, the U2-B alignment crosses Kikuyu/mixed grass pasture land. Along this alignment, Kikuyu (Pennisetum clandestinum), Rhodes grass (Chloris gayana), and pitted beardgrass (Echitrochloa mesnilla) are the most abundant grass components. In some places, spiny amaranth (Amaranthus spinosus) plants are locally abundant. Trees and shrubs which include various Eucalyptus species, Chinaberry (Melia azedarach), Christmas berry (Schinus terebinthifolius), Jacaranda (Jacaranda mimosifolia), pepper tree (Schinus molle), etc., occur as scattered individuals or small stands. Where the alignment passes near a cinder pit (Pu'u o' Pele), there is a grove of Eucalyptus and other tree species as well as scattered thickets of koa haoe shrubs (Lepisanthes leucocephala).

From station 521 to station 519, the alignment crosses Kalalaniui pasture and gulch vegetation. The gulch supports tall stands of Chinaberry and willow (Salix sachemensis) trees. Koa haoe shrubs are common and Guinea grass (Panicum maximum) forms dense clumps between the woody components. Rocky outcrops are frequent along the steep gulch walls. The gulch bottom supports an intermittent stream which is composed of shallow, dry soil and large boulders. For the greater part of the time, the streams are dry with flowing water present only during periods of very heavy rainfall. The cattle which graze in the gulch use the dry streambed as part of their network of cattle paths.

From station 519 and on to where the U2-B alignment joins the U2-A alignment, the U2-B alignment crosses recently planted pine-apple fields or cultivated lands and a few shallow gulches with gulch vegetation.

DISCUSSION AND RECOMMENDATIONS

The vegetation types found along the U2-B alignment are dominated by introduced species such as Kikuyu grass, koa haoe, Chinaberry, Christmas berry, etc. The few native plants are usually found associated with the gulch areas. All of the native plants can be found in similar habitats throughout the Hawaiian Islands. None of the plants inventoried during the field studies is a listed, proposed, or candidate threatened or endangered species; nor is any plant considered a species of concern (U.S. Fish and Wildlife Service 1997). Similar findings were recorded from the earlier botanical study (Char 1997a) and also from the most recent study for the U2-A alignment (Char 1997b). No wetlands or wetland vegetation occur along the alignment.

Given the findings above, the proposed U2-B alignment should not have a significant negative impact on the botanical resources. As in the previous studies, it is recommended that areas cleared of vegetation be revegetated as soon as possible to prevent soil erosion. Native plants such as the willow are recommended for landscaping wherever possible.
<table>
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<th>Scientific name</th>
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</tr>
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<tbody>
<tr>
<td>Ferns</td>
<td>Australian maiden hair</td>
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Flowering Plants

<table>
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<th>Common name</th>
<th>Status</th>
<th>Vegetation type</th>
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<tbody>
<tr>
<td>ANAGASTHIAEAE (Amaranth family)</td>
<td>spiny amaranth, pakai kuku</td>
<td>X</td>
<td>+ + +</td>
</tr>
<tr>
<td>Amaranthus viridis L.</td>
<td>slender amaranth, pakai</td>
<td>+</td>
<td>+ +</td>
</tr>
<tr>
<td>AMARANTHACEAE (Amaranth family)</td>
<td>pepper tree</td>
<td>X</td>
<td>+ -</td>
</tr>
<tr>
<td>Chenopodium berlandieri</td>
<td>Christmas berry</td>
<td>X</td>
<td>- + +</td>
</tr>
<tr>
<td>ASCLEPIADACEAE (Milkweed family)</td>
<td>butterfly weed, laulele</td>
<td>X</td>
<td>- +</td>
</tr>
<tr>
<td>Asclepias curassavica</td>
<td>balloon plant</td>
<td>X</td>
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<tr>
<td>Asclepias physocarpa (E. Mey.) Schlechter</td>
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<tr>
<td>ASTERACEAE (Daisy family)</td>
<td>bulb chelsee</td>
<td>X</td>
<td>+ +</td>
</tr>
<tr>
<td>Cirsium vulgare (Savi) Ten.</td>
<td>hairy horseweed, iloha</td>
<td>X</td>
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</tr>
<tr>
<td>Conyza bonariensis (L.) Cronq.</td>
<td>puplele</td>
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<tr>
<td>Emilia sonchifolia R.</td>
<td>telegraph plant</td>
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<tr>
<td>Heterotheca grandiflora Nutt.</td>
<td>wild lettuce</td>
<td>X</td>
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<tr>
<td>Helianthus annuus</td>
<td></td>
<td>X</td>
<td>+ + +</td>
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<tr>
<td>Senecio madagascariensis Poiret</td>
<td>sou thistle, pulele</td>
<td>X</td>
<td>+ + +</td>
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<tr>
<td>Sonchus oleracea L.</td>
<td></td>
<td>X</td>
<td>+ + +</td>
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Plant Species List -- U2-B Allignment

The following is a list of all the species observed along the U2-B alignment of the proposed Hawaiian Beer Route Highway. The plants are listed by family, and each species is followed by its scientific name and common name. The taxonomy and nomenclature of the Hawaiian Islands is reflected in the following symbols:

1. Scientific name with author designation;
2. Common English and/or Hawaiian name(s), when known.
3. Introduced or alien "native" to the Hawaiian Islands and also elsewhere, especially native to the Hawaiian Islands and also elsewhere. 
4. Presence (+) or absence (-) of a particular species within each of three vegetation types recognized along the alignment, after Western contact:

- Kīhau/Kealakekua Pasture Land
- Nāhiku/Ma'ili East Pasture Land
- Nāhiku/Waikuau-East Pasture Land

The following information is provided:

1. Scientific names with author designation;
2. Common English and/or Hawaiian name(s) when known.
3. Presence (+) or absence (-) of a particular species within each of three vegetation types recognized along the alignment, after Western contact:

- Kīhau/Kealakekua Pasture Land
- Nāhiku/Ma'ili East Pasture Land
- Nāhiku/Waikuau-East Pasture Land
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<th>Status</th>
<th>Vegetation type</th>
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<td>GENTIANACEAE</td>
<td>(Gentian family)</td>
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<tr>
<td>Gentium erythroa Raf.</td>
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<tr>
<td>MALVACEAE (Mallow family)</td>
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<tr>
<td>Abutilon grandifolium (Mill.)</td>
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<td>Sweet</td>
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<tr>
<td>Malvastrum cornubianum (L.)</td>
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<td>Sida fallax Walt.</td>
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<td>Sida rhombifolia L.</td>
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<td>Melia azedarch L.</td>
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<td>Ficus microcarpa L. fiji.</td>
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<td>Mirabilis jalapa L.</td>
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<td>Argemone glauca (Hutt. ex Prain)</td>
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<td>Brachylopus willemsii Kunth</td>
<td>reneuse grass</td>
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<td>Cyperus litoralis L.</td>
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<td>X</td>
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<tr>
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<td>swollen fingergrass, mau'ulei</td>
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<tr>
<td>Digitaria insularis (L.) Nez ex Ewan</td>
<td>sorgrass</td>
<td>X</td>
<td>+</td>
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<td>Natal reedgrass, Natal grass</td>
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<td>+</td>
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LITERATURE CITED


Section 1
Overview and Key Map

The Source
For Environmental Risk Management Data

EDR - Area/Corridor Study
Kihei - Upcountry Project
Maui, HI
September 30, 1997
Inquiry number 198604.1s

3530 Post Road
Southport, Connecticut 06490

Nationwide Customer Service

Telephone: 1-800-362-0050
Fax: 1-800-231-6802
Internet: www.edrnei.com
Section 2

Focus Maps and Findings
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**CROSSROADS SERVICE**

**BAYARD RD**

**UST**

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<th>Tank Capacity</th>
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Thank you for your business. Please contact EDI at 1-800-352-0050 with any questions or comments.

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### Section 5

**Databases Searched and Update Dates**

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GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

FEDERAL NON-ASTM RECORDS:

BBS: Service Reporting System
Source: EPA
Page: 22
Date of Government Version: 01/29/97
Date of Last EDI Contact: 09/26/97
Date of New Scheduled EDI Contact: 01/29/97

RIS: Superfund (CERCLA) Consent Decrees
Source: EPA Regional Offices
Date of Government Version: 01/29/97
Date of Last EDI Contact: 09/26/97
Date of New Scheduled EDI Contact: 01/29/97

CONSIST: Superfund (CERCLA) Consent Decrees
Source: EPA Regional Offices
Phone: 202-564-1464
Date of Government Version: 01/29/97
Date of Last EDI Contact: 09/26/97
Date of New Scheduled EDI Contact: 01/29/97

MASS: CERCLA/RCRA Action Tracking System
Source: EPA
Phone: 202-564-1464
Date of Government Version: 01/29/97
Date of Last EDI Contact: 09/26/97
Date of New Scheduled EDI Contact: 01/29/97

FDAS: Facility Data System
Source: EPA
Phone: 202-564-1464
Date of Government Version: 01/29/97
Date of Last EDI Contact: 09/26/97
Date of New Scheduled EDI Contact: 01/29/97

FDOS: Facility Data System
Source: EPA
Phone: 202-564-1464
Date of Government Version: 01/29/97
Date of Last EDI Contact: 09/26/97
Date of New Scheduled EDI Contact: 01/29/97

RID: Records Of Decision
Source: EPA
Phone: 202-564-1464
Date of Government Version: 01/29/97
Date of Last EDI Contact: 09/26/97
Date of New Scheduled EDI Contact: 01/29/97

HCAS: Hazardous Materials Information Reporting System
Source: U.S. Department of Transportation
Phone: 202-564-1464
Date of Government Version: 12/28/96
Date of Last EDI Contact: 01/29/97
Date of New Scheduled EDI Contact: 12/29/96

MTS: National Learning Tracking System
Source: Office of Education
Phone: 202-564-1464
Date of Government Version: 12/28/96
Date of Last EDI Contact: 01/29/97
Date of New Scheduled EDI Contact: 12/29/96

NPL: LEEDS: Federal Superfund Laws
Source: EPA
Phone: 202-564-1464
Date of Government Version: 12/28/96
Date of Last EDI Contact: 01/29/97
Date of New Scheduled EDI Contact: 12/29/96

PASD: PCB Activity Database
Source: EPA
Phone: 202-564-1464
Date of Government Version: 01/29/97
Date of Last EDI Contact: 09/26/97
Date of New Scheduled EDI Contact: 01/29/97

PASD: PCB Activity Database
Source: EPA
Phone: 202-564-1464
Date of Government Version: 01/29/97
Date of Last EDI Contact: 09/26/97
Date of New Scheduled EDI Contact: 01/29/97

PASD: PCB Activity Database
Source: EPA
Phone: 202-564-1464
Date of Government Version: 01/29/97
Date of Last EDI Contact: 09/26/97
Date of New Scheduled EDI Contact: 01/29/97
**GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING**

**STATE OF HAWAII ASTRO RECORDS:**
LUST: Active Leasing Underground Storage Tank Log Leasing
Source: Department of Health
Telephone: 808-587-2228
LUST: Leasing Underground Storage Tank Recent Reports. LUST records contain an inventory of reported leasing underground storage tanks. Not all states maintain these records, and the information varies by area.

Date of Government Version: 12/21/95
Date Made Active: EDR: 01/01/97
Discharge Release Frequency: Quarterly

**SWDES-CERCUS:**
Source: Department of Health
Telephone: 808-587-2228
SWDES-Hawaii Hazardous Waste Sites. Some hazardous waste site records are the same or similar to CERCUS. These sites may or may not be located at the site of CERCUS sites. Priority sites owned by commercial entities that are subject to similar surface water, 40 CFR 261.41 sites, and are classified as major sources of a hazardous waste.

Data of Government Version: 04/01/97
Data Made Active: EDR: 09/01/97
Database Release Frequency: Monthly

**SITEL:**
Source: Department of Health
Telephone: 808-587-2228
SITEL: Site Information on Landfill Sites. SITEL site records typically contain an inventory of solid waste disposal facilities located within a particular state. Depending on the state, these may include operating facilities or open sources that meet CERCLA or RCRA Site Definitions or disposal sites.

Date of Government Version: 01/01/97
Date Made Active: EDR: 09/01/97
Database Release Frequency: Annually

**UST:**
Source: Department of Health
Telephone: 808-587-2228
UST: Operating Underground Storage Tanks. UST are regulated under Title II of the Resource Conservation and Recovery Act (RCRA) as it is linked with the same reporting requirements for summarizing the UST program. Available information varies by state program.

Date of Government Version: 12/21/95
Date Made Active: EDR: 09/01/97
Database Release Frequency: Annually

**Historical and Other Database(s):**
Depending on the geographic area covered by the report, the data provided in these specialty databases may or may not be applicable. For example, the existence of veterans information data in a specific report does not mean that all states or the areas covered by the report are included. However, the absence of any reported regional information does not necessarily mean that veterans do not exist in the area covered by the report.

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**GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING**

Former Manufactured Gas Plant Data Files. The existence evaluation of a Gas Plant data is added to the US DOE by Real Property Scan, Inc. (C) Copyright 1993 Real Property Scan, Inc. For a reproducible portion of the type of records which may be located in this report, contact your EPA customer service representative.

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**DELETED HIPL:**
Source: EPA
Telephone: 808-587-2121
DELETED HIPL: The Violent Crime and Hazardous Substances Hazardous Materials Emergency Planning Report (EPC) program is the one that the EPA uses to direct data from the HIC, and is maintained with all HIPL data and HIPL data from 1993 to the present.

**EPATMS:**
Source: EPA
Telephone: 808-587-2121
EPATMS: Part of the Environmental Production System (EPS), EPAATMS has been developed for electronic transmission. EPS is a system that provides an electronic means for states to report data on the status of their hazardous waste sites to EPA.

**PDOS:**
Source: EPA
Telephone: 808-587-2121

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Area Radioactive Information: The National Radioactive Disposal Database has been developed by the U.S. Environmental Protection Agency (US EPA) and is a compilation of the EPA National Radioactive Database and the National Radiological Plant Survey. The system covers low-level waste and high-level waste from 1964 to 1992. This database is not complete, but has been supplemented by information collected from various sources such as universities and research institutions.

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OCS Gas Pipeline/Directional Transmission Lines: This data was obtained by EDR from the USGS, which is a reference to USGS National Digital Line Graphs from 1985-1992. It is not all from the same source category, including one at the bottom of the gas pipeline and another at the top.

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Sensitive Receptors: There are individuals or groups of people who are more sensitive to the effects of hazardous waste than the general public. Some individuals who are more sensitive may be elderly, children, or people with chronic diseases or disabilities. Some individuals who are more sensitive may also be those who are employed in hazardous waste-related industries and/or who have worked in the hazardous waste industry.

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Flood Zone Data: This data is from the National Flood Insurance Program and is maintained by the Federal Emergency Management Agency (FEMA). Data exists for each year and is updated by FEMA.
Thank you for your business. Please contact EDR at 1-800-352-0050 with any questions or comments.

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