

Ainapo  
Haleakala Trail Shelter  
Construction along



**STATE OF HAWAII**  
DEPARTMENT OF LAND AND NATURAL RESOURCES  
DIVISION OF FORESTRY AND WILDLIFE  
P.O. BOX 4849  
HILO, HAWAII 96720  
(808) 974-4221  
FAX (808) 974-4226

RECEIVED  
'97 SEP 15 P4:13

OFFICE OF ENVIRONMENTAL QUALITY CONTROL

September 11, 1997

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

Dear Mr. Gill:

SUBJECT: Final Environmental Assessment for Trail Shelter Construction Along the Ainapo Trail, Kapapala Forest Reserve, TMK 9-8-01, County of Hawaii

Attached are four copies of the Final Environmental Assessment with the OEQC Bulletin Publication Form in compliance with Chapter 343, HRS.

The Na Ala Hele program of the Division of Forestry and Wildlife, Department of Land and Natural Resources, has reviewed the comment letters received during the public comment period and has determined that this project will not have any significant impacts. We are therefore issuing a Finding of No Significant Impact (FONSI).

Should you require further information, please contact Rodney Oshiro at 974-4221 (Hilo), Division of Forestry and Wildlife, Na Ala Hele.

Sincerely,

A handwritten signature in cursive script that reads "Jon G. Giffin".

Jon G. Giffin  
Forestry and Wildlife Manager

98

1997-09-23-H-~~FEA~~-Ainapo Trail Shelter

SEP 23 1997

FINAL

ENVIRONMENTAL ASSESSMENT

FILE COPY

FOR

TRAIL SHELTER CONSTRUCTION

ALONG THE

AINAPO TRAIL WITHIN THE KAPAPALA FOREST RESERVE

Proposing Agency: Na Ala Hele - Division of Forestry & Wildlife  
Approving Agency: Board of Land & Natural Resources

I. SCOPE

This environmental assessment will address the construction of a 16'x20' trail shelter at an old camp site located at Halewai along the ancient Ainapo Trail. The site is located at 7,750 feet near the upper limits of forest vegetation within the Kapapala Forest Reserve, TMK 9-8-01, County of Hawaii.

II. PROJECT DESCRIPTION

A. Historical Perspective

When the Kapapala Forest Reserve was set aside by executive order in 1930, the Division of Forestry inherited an old camp site consisting of 2 small, 3-sided shelters with a water tank and corral. This site provided overnight camping for parties ascending the summit of Mauna Loa from the southeast flank.

In its effort to reopen the Ainapo Road as a public access and make the Ainapo Trail more accessible to the public, Division of Forestry and Wildlife (Na Ala Hele) obtained an abstract indicating the Ainapo Trail alignment as an ancient Hawaiian trail and subsequently belonging in fee to the State of Hawaii. Following meetings and negotiations, the Division of Land Management is now in the process of turning over the road alignment to Na Ala Hele for maintenance and control (attached copy of letter to J. Gordon Cran dated June 7, 1993).

Environmental Assessment  
For Trail Shelter Construction  
Along the Ainapo Trail  
Within the Kapapala Forest Reserve  
Page 2

The proposed trail shelter will enhance hiking opportunities to the summit of Mauna Loa (Mokuaweoweo crater) by enabling hikers to rest at the 7,750-foot elevation. For overnight stays, the shelter will provide warmth and safety. Maintenance crews will also be housed in relative comfort. The Ainapo Trail will connect to the summit trail originating from the eastern slope of Mauna Loa and maintained by the Hawaii Volcanoes National Park.

Federal funding authorization under the Symms National Recreational Trail Act of 1991 was obtained in October, 1993.

B. Trail Shelter Specifications

The proposed trail shelter is 16'x20', consisting of 3 double bunk beds, table and benches, deck and a toilet (see attachments). Due to extreme weather conditions, the walls and ceiling will be insulated and the shelter will be constructed to withstand high wind conditions. A non-electric composting toilet will be installed in the cabin (see attached).

III. MAJOR IMPACTS AND ALTERNATIVE CONSIDERATIONS

Na Ala Hele anticipates no adverse impact to the environment. The proposed shelter is small and unobtrusive (earth-tone paint) and will enhance hiking opportunities in the Kau area. The site (Halewai) was historically used as a rest stop. The do-nothing option will save on manpower and material resources. There would be no enhancement, however, of the recreational opportunities.

IV. ARCHAEOLOGICAL CONSIDERATIONS

An archaeological reconnaissance of the trail shelter site was conducted by Holly McEldowney of the State Historic Preservation Division (SHPD) on March 2, 1994. The result of the inspection indicated that construction and use of the shelter is likely to have "no effect" on historic sites. However, there were concerns that any increase in the use of

Environmental Assessment  
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the Ainapo Trail would have an "adverse effect" on the trail and various measures should be undertaken. SHPD recommends:

A. Documentation of Trail

Representative sections of the trail be photographed (black and white) and kept as a permanent record and the trail alignment be plotted on aerial photographs.

B. Documentation and Plotting of Known Sites Along or Near the Trail

Any known or suspected historic sites should be plotted and described. At 6,700 feet, the trail intersects a stone wall that extends across most of Kapapala ahupua'a. Information on the stone wall should be researched and included in site descriptions.

C. Predicted Distribution of Sites

SHPD suggests a plan which would define in general terms the expected pattern of historic sites distribution along the trail route. These predictive models should be based, in part, on early historical accounts of the ascent of Mauna Loa to identify the location of campsites and water holes and travel distance of trail parties in a single day.

D. Mitigative Measures

A mitigative plan should be instituted to describe measures to be undertaken to minimize damage to the trail and adjacent historic sites. Periodic monitoring, interpretive signage and trail guides will be required.

Na Ala Hele recognizes the validity of the concerns expressed by SHPD and will be soliciting their advise and expertise in formulating a plan to address their concerns.

V. BOTANICAL CONSIDERATIONS

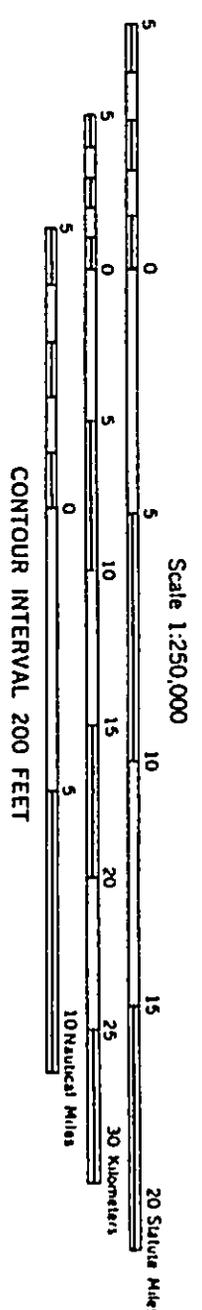
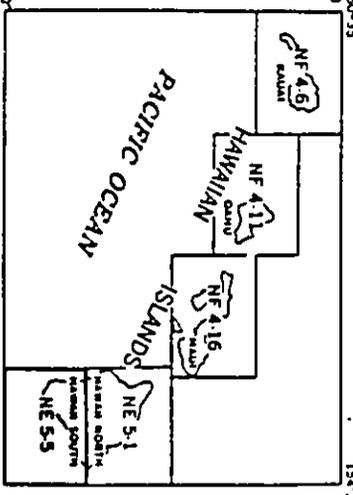
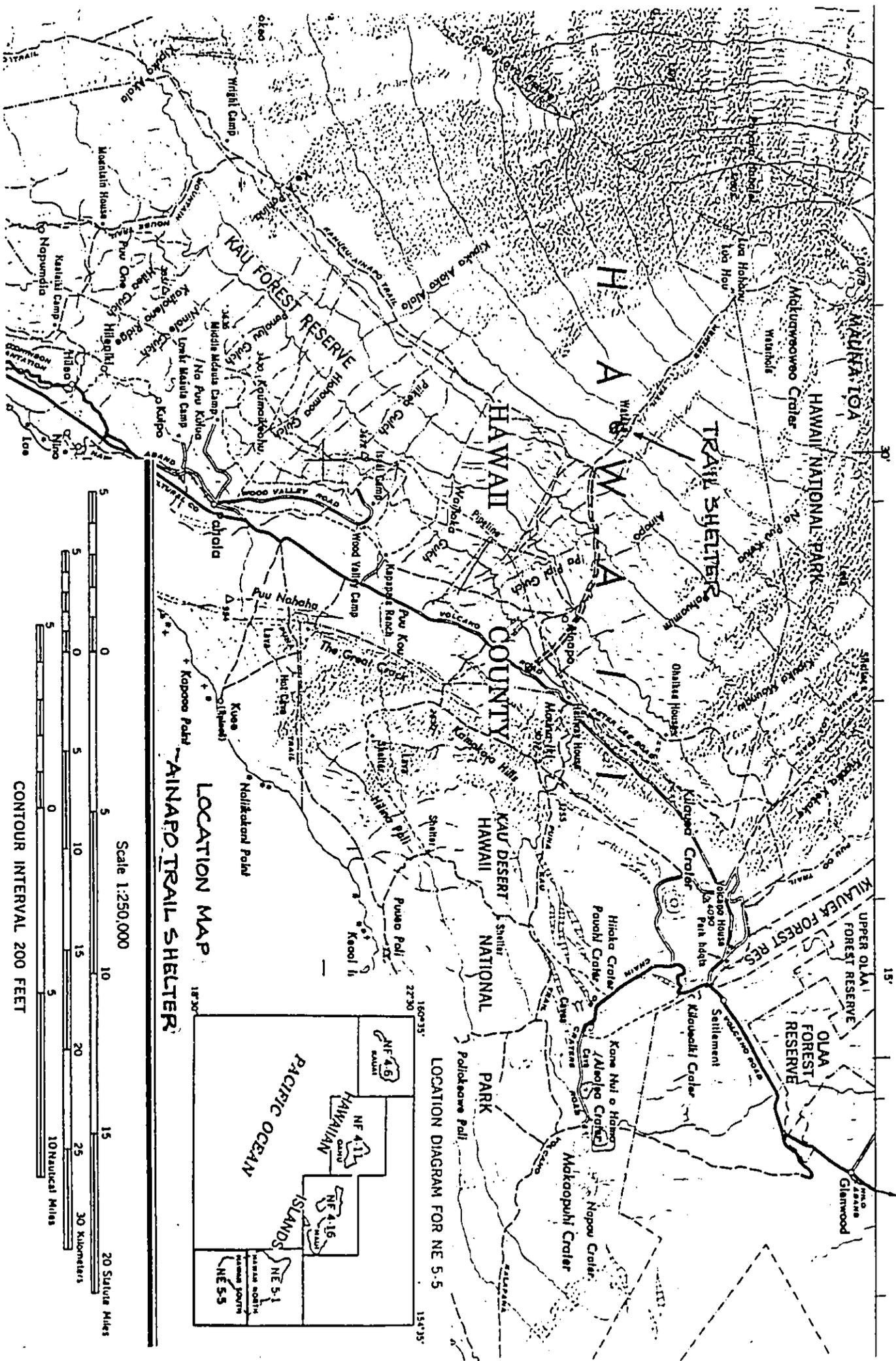
A botanical survey was conducted by Linda Pratt, Biological Science Technician of the National Biological Survey, to

Environmental Assessment  
For Trail Shelter Construction  
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Within the Kapapala Forest Reserve  
Page 4

address concerns of proposed and candidate plant species in the vicinity of the proposed trail shelter. An approximate 150 meter radius of the site was searched and no significant plants species were found. The area is the location of at least one historical collection of the listed endangered Kau silversword. Also, the Hawaiian vetch may be located along the trail. Division of Forestry and Wildlife (Na Ala Hele) recognizes that a systematic rare plant survey is a viable management tool in assessing the botanical significance of the area.

# HAWAII SOUTH

Map 9 19 51



LOCATION MAP  
AINAPO TRAIL SHELTER

JOHN WAIHEE  
GOVERNOR OF HAWAII

COPY



STATE OF HAWAII  
DEPARTMENT OF LAND AND NATURAL RESOURCES  
DIVISION OF LAND MANAGEMENT

P.O. BOX 936  
HILO, HAWAII 96721-0936

June 7, 1993

AQUACULTURE DEVELOPMENT  
PROGRAM  
AQUATIC RESOURCES  
CONSERVATION AND  
ENVIRONMENTAL AFFAIRS  
CONSERVATION AND  
RESOURCES ENFORCEMENT  
CONVEYANCES  
FORESTRY AND WILDLIFE  
LAND MANAGEMENT  
STATE PARKS  
WATER AND LAND DEVELOPMENT

Mr. J. Gordon Cran  
Kapapala Ranch  
P.O. Box 1639  
Hilo, HI 96721-1639

Dear Mr. Cran:

Subject: Ainapo Trail aka Ainapo-Menzies Trail, Traversing Tax Map  
Keys:3rd/9-8-01:03 & 04 and 3rd/9-9-01:03 Situate at Kapapala, Ka'u,  
Hawai'i  
Revocable Permit No. S-6695

Reference is made to our long-standing discussion on the Ainapo Trail aka the Ainapo-Menzies Trail.

Research conducted by our Staff Abstractors has tracked the ownership of the affected land parcels, provided a historical sketch of the trail and has cited the applicable sections of the Highways Act of 1892 and the Hawai'i Revised Statutes (copy of abstract enclosed).

We have concluded from the research that the Ainapo Trail aka the Ainapo-Menzies Trail is a public trail and shall be open for the public's use in an alignment consistent with the historical data. We will be working with the Division of Forestry and Wildlife, Na 'Ala Hele, to provide certain improvements to the trail, i.e., cattle guards, trail enhancement, etc.

Further, we shall be turning over the control and maintenance of the trail to DOFAW, Na 'Ala Hele.

Mr. J. Gordon Cran  
Kapapala Ranch  
June 3, 1993  
Page 2

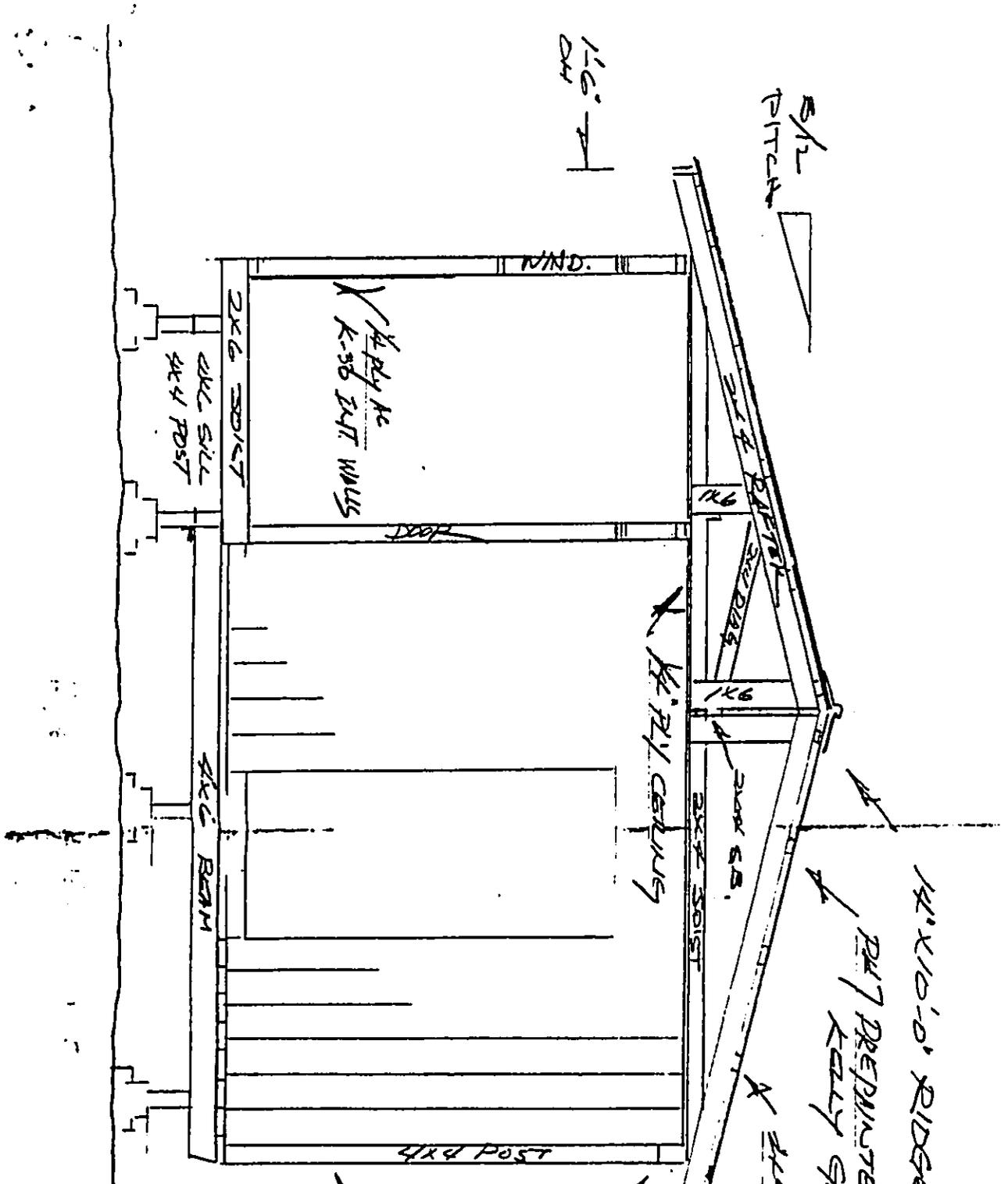
Should you wish to discuss this matter further, please call me at 933-4245.

Very truly yours,

  
Glenn Y. Taguchi  
Hawai'i District Land Agent

GYT:src  
Encls.

c: Hawai'i Land Board Member w/ attachment  
Land Management Administrator  
Charles Wakida, DOFAW  
Rodney Oshiro, Na 'Ala Hele .



14'x10' RIDGE KELLY GREEN  
 2x7 DELETED 2x6 ALUM 2x6  
 KELLY GREEN (S.B. SIDE WALL)  
 2x4 PLYNITE  
 2x10 of

2x6 FACIA  
 2x6 BEAM  
 AMERICAN CLIPS FOR RAFTERS  
 FIBER GLASS IN WALLS & CEILING

1'-6" - 2'

5/2 PITCH

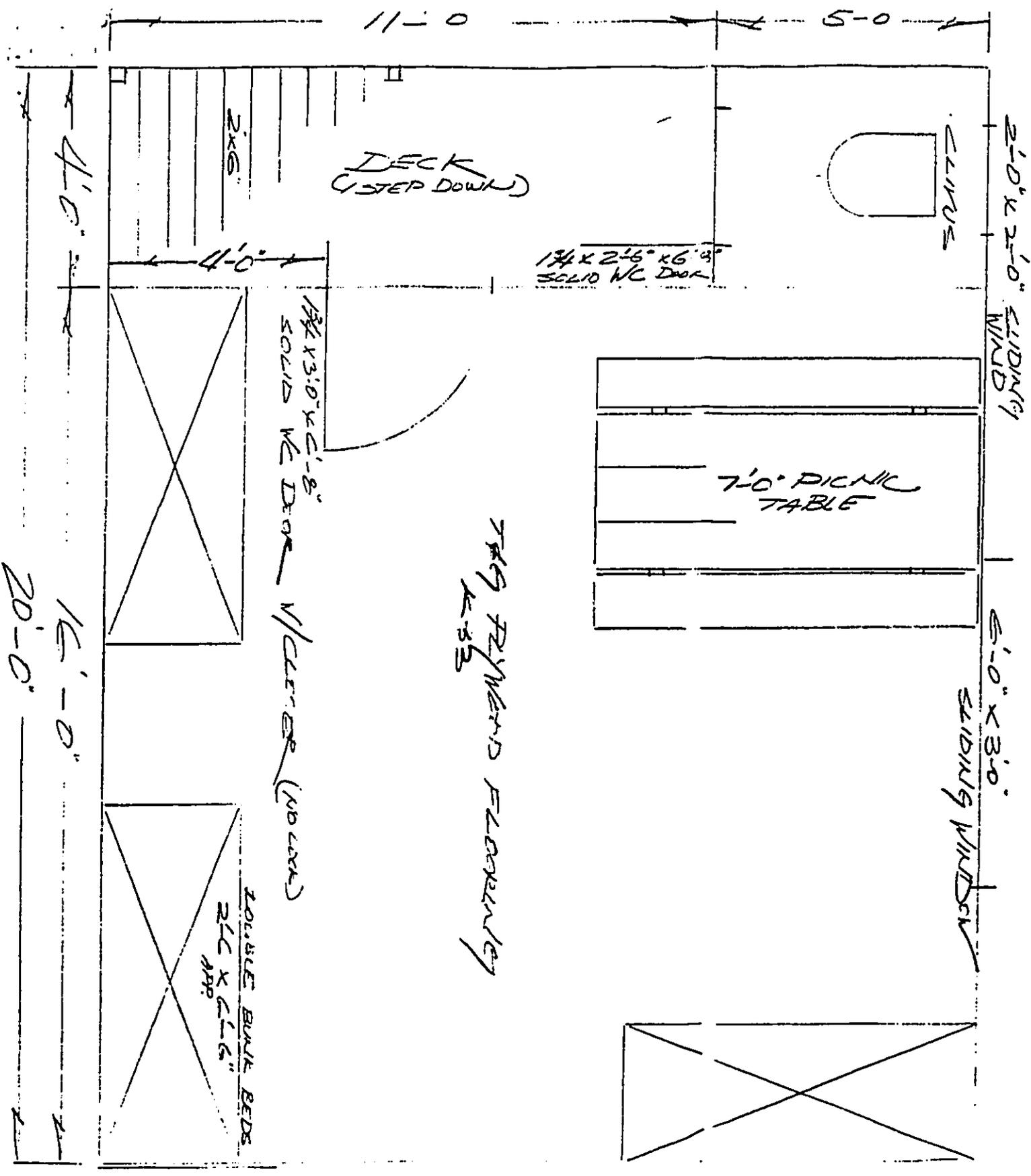
WIND.

1/4" PLY 1/2"  
 K-36 2x4 WALLS

1/4" PLY CEILING

2x6 BEAM

4x4 POST



DECK (STEP DOWN)

1 3/4 x 2 1/2 x 16' 3/8" SOLID WC DOOR

1 3/4 x 3'-0" x 6'-1" 3/4" SOLID WC DOOR

1'-0" x 3'-0" SLIDING WINDOW

7'-0" PICNIC TABLE

5'-0" x 3'-0" SLIDING WINDOW

21'0" x 6'1" 3/4" MOBILE BUNK BEDS

TRAY FIBERGLASS FLOORING 1/2" x 3/8"

4'-0"

16'-0"

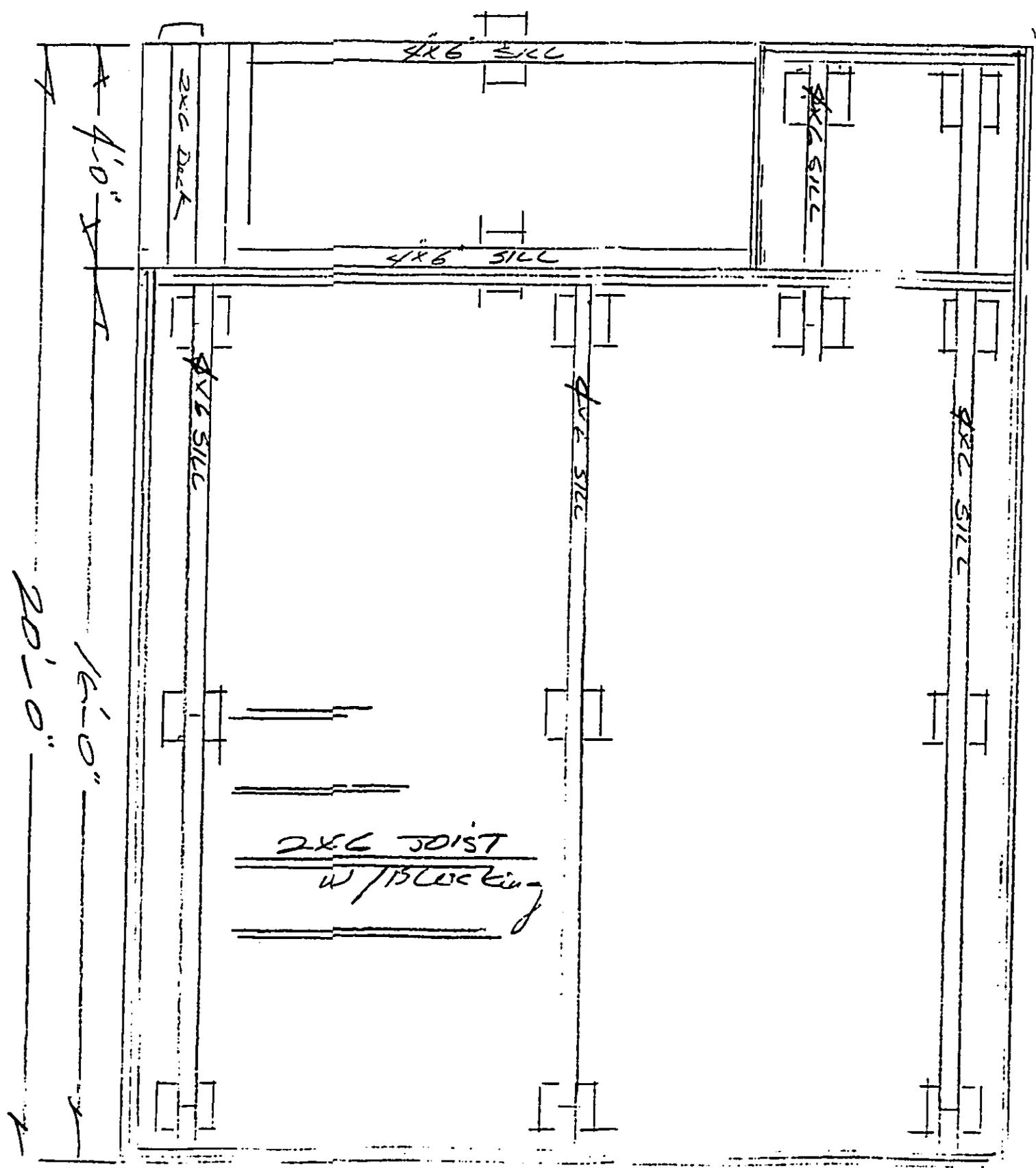
20'-0"

11-0

5-0

2'-0" x 2'-0" SLIDING WINDOW

5'-0" x 3'-0"



4'-0"

16'-0"  
20'-0"

2x6 Deck

4x6 SILL

4x6 SILL

4x6 SILL

4x6 SILL

4x6 SILL

4x6 SILL

2x6 JOIST  
w/ blocking

# COMPOSTING TOILETS

## THE ENVIRONMENTAL SOLUTION

These environmentally safe toilets require **NO SEPTIC SYSTEM**, **NO HOLDING TANK**, use **NO CHEMICALS**, and produce **NO POLLUTANTS**, while facilitating the work of nature.

Biological toilets do not break the cycle of nature, nor do they have the inconveniences of the old outhouse.

## HOW IT WORKS

Like the compost heap in the garden, the composting toilet allows human waste, toilet paper and organic material to breakdown through a natural process. **Heat, oxygen and organic material** are all that is needed to transform human waste into good fertilizing soil. Heat is generated by the compost and/or heating element. **Oxygen** is provided by the ventilation system. **Organic material** is introduced by adding peat moss and vegetable matter. The material entering the toilet is approximately **90% water content**, which is evaporated into water vapour and carried to the outside through the venting system. The remaining waste material is transformed into an inoffensive earth-like substance.

## WINTER USE

Freezing temperatures will **NOT** damage the toilet or the compost when left alone for the winter. However, in temperatures below **10°C (50°F)** the composting action will decrease. For winter use the room where the composting unit is kept should be heated. Minimum recommended temperature is **15°C (60°F)**. For extended winter use the vent pipe should also be insulated on all exposed areas from where it exits the heated area up to the diffuser.

## ODOUR FREE

The engineered air flow provides a **negative pressure** which ensures **no back draft**. The air is admitted through ventilation holes in the front. The rotation and aeration by the **BIO-DRUM** or shaft-mixers along with the addition of organic material ensures a fast, odourless, **aerobic breakdown** of the compost.

## MAINTENANCE

All "Sun-Mar" toilets need a **minimum of maintenance**. All that needs to be added is a cup of **peat moss** per person per day, plus if available some other **organic material** such as vegetable cuttings, greens and old bread. Once every third day while the toilet is in use, the compost needs to be **aeriated and mixed**. This is simply done by giving the handle a few turns (on Bio-Drum models) or by turning the shaftmixers (on the TROPIC). Composted material is removed anywhere from **1 to 4 times per year** depending on use. This residual compost is the best garden fertilizer you can get.

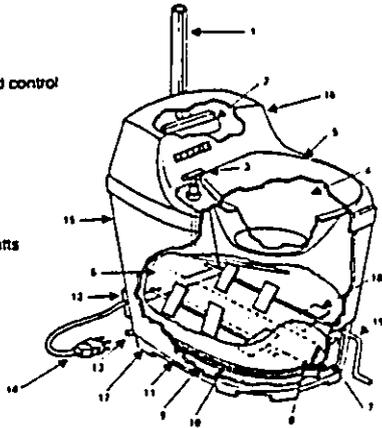
The WCM, X.L. and N.E. incorporate the revolutionary **Bio-Drum** which provides the optimum environment for biological breakdown with its **superior aeration and mixing action**, while reducing the **maintenance requirement to a minimum** by simply turning the externally mounted handle. The door on the **Bio-Drum** closes and opens automatically when the drum is rotated.

To remove compost, release the drum lock and turn the handle in a counter clockwise direction. The compost will rapidly fall into the drawer below. To empty, simply pull out the drawer (no tools and no screws).

The mixing system on the **TROPIC** model comprises a leveller to spread the compost and **2 shaftmixers** providing mixing and aeration.

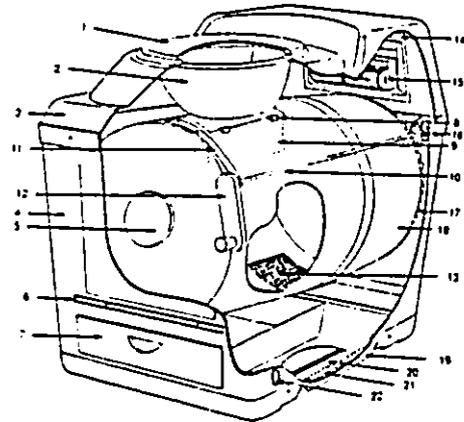
### TROPIC

1. Vent pipe 1-1/2"
2. Fan 30 Watts with speed control
3. Leveller
4. Bowl liner (removable)
5. Seal
6. Air channel
7. Inspection door
8. Air tunnel
9. Clean out chamber
10. Grate
11. Heating element 250 Watts
12. Connection box
13. Security drain
14. 3 prong electric plug
15. Main shell
16. Toilet top
17. Insulation base
18. Shaft mixers
19. Crank (removable)

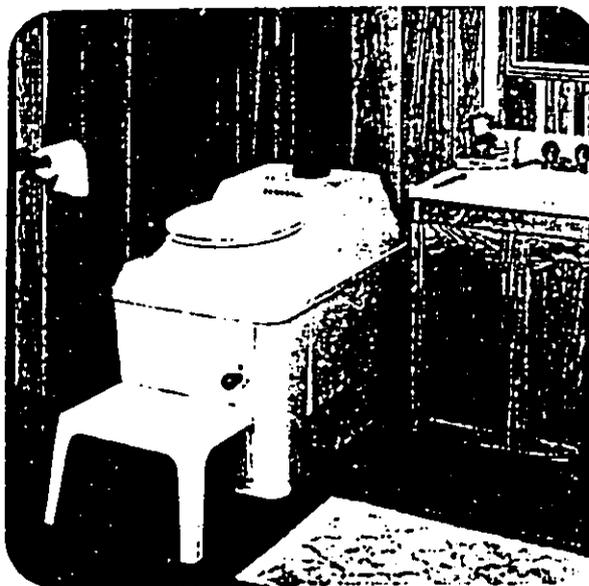


### X.L.

1. Seat
2. Bowl liner (removable)
3. Toilet top
4. Main Shell
5. Drum bearing
6. Step support
7. Compost drawer
8. Drum door hinges
9. Drum door
10. Crank shaft
11. Drum lock
12. Crank handle
13. Drum drain screen
14. Fan mounting plate
15. Fan 30 Watts with speed control
16. Crank sprocket
17. Drum sprocket (moulded into drum)
18. Drum
19. Insulation base
20. Heating element 250 Watts
21. Insulation
22. Vent hole



## MODEL DESCRIPTIONS



## Capacity Table

	Cottage Use	Residential Use
WCM (with low flush toilet)	6-8 people	3-5 people
X.L.	5-7 people	2-4 people
N.E. (non-electric)	4-6 people	1-3 people*
Tropic	2-4 people	-

\*For residential use on the N.E., we recommend the optional 12 volt fan.

### N.E. (non-electric)

The N.E. model is the perfect toilet system for those **without electricity** on islands, in the mountains, or in other remote areas.

As with all "Sun-Mar" toilets, the N.E. provides **100% recycling** back to nature while producing **no pollutants** for our environment. Using no electricity or water and requiring no septic system or chemicals, the N.E. is almost totally independent.

The tremendous aeration and mixing action of the **Bio-Drum** has enabled us to design this exceptional **non-electric system**. With the help of a 4" vent pipe and the heat from the compost, a chimney effect is created which draws air through the system similar to a wood stove. Although the lack of electricity limits the capacity of the N.E. to **1-3 people in year round use**, it is successfully used in cottages by **4-6 people**.

Due to the small evaporation capacity, the N.E. has a similar drain to the WCM and needs to be connected to a small 1' by 1' drain pit as shown on the back page. (8' of 3/4" drain pipe is supplied with unit.)

PRE CONSULTATION LIST

Lindsay Carter  
District Conservationist  
Soil Conservation Service  
154 Waiianuenue Ave., Rm. 322  
Hilo, Hawaii 96720

Mr. Robert Smith  
U.S. Department of the Interior  
Fish & Wildlife Service  
P.O. Box 50156  
300 Ala Moana Blvd.  
Honolulu, Hawaii 96850

Ms. Susan Miller  
Research Associate  
Natural Resources Defense Council  
212 Merchant St., Rm. 203  
Honolulu, Hawaii 96813

Ms. Virginia Goldstein  
Planning Director  
County of Hawaii  
25 Aupuni St., Rm. 109  
Hilo, Hawaii 96720

Sierra Club Legal Defense Fund  
212 Merchant St., Rm. 202  
Honolulu, Hawaii 96813

Native Hawaiian Legal Corporation  
1164 Bishop St., Suite 1205  
Honolulu, Hawaii 96813

Mr. Thane Pratt  
U.S. Fish and Wildlife Service  
P.O. Box 44  
Hawaii Volcanoes National Park, HI 96718

Mr. Don Hibbard  
Administrator  
State Historic Preservation Division  
DLNR  
33 South King St., 6th Floor  
Honolulu, Hawaii 96813

Mr. Glenn Taguchi  
DLNR  
Division of Land Management  
P.O. Box 936  
Hilo, Hawaii 96721-0936

Mr. Reggie David  
President  
Hawaii Audubon Society  
212 Merchant Street, Suite 320  
Honolulu, Hawaii 96813

Ms. Elizabeth Pa Martin  
President  
Native Hawaiian Advisory Council  
1088 Bishop St., Suite 1204  
Honolulu, Hawaii 96813

Mr. Keith Wallace  
E Mau Na Ala Hele  
P.O. Box 2843  
Kamuela, Hawaii 96743

Mr. J. Gordon Cran  
P.O. Box 1639  
Hilo, Hawaii 96721-1639

Mr. Tim Ohashi  
Animal Damage Control  
P.O. Box 50225  
Honolulu, Hawaii 96850

Mr. Rick Scudder  
Conservation Council for Hawaii  
1188 Bishop St., Suite 2308  
Honolulu, Hawaii 96813

Manager  
Kau Aqribusiness Co. Inc.  
P.O. Box 130  
Pahala, Hawaii 96777

Superintendent  
Hawaii Volcanoes National Park  
P.O. Box 52  
Volcano, Hawaii 96718-0052

Mr. Charlie Wakida  
District Manager  
Division of Forestry & Wildlife  
1643 Kilauea Ave.  
Hilo, Hawaii 96720

Mr. Mason Young  
DLNR  
Division of Land Management  
1151 Punchbowl St., Rm. 220  
Honolulu, Hawaii 96813

Sierra Club - Hawaii Chapter  
212 Merchant St., Rm. 201  
Honolulu, Hawaii 96813

Sierra Club  
Mokuloa Group  
Attn: Deborah Ward  
P.O. Box 1137  
Hilo, Hawaii 96721

West Hawaii Group  
Attn: Jerry Rothstein  
76-123 Royal Poinciana Street  
Kailua-Kona, Hawaii 96740

Mr. Stanley Yasuda  
P.O. Box 362  
Holualoa, Hawaii 96725

Mr. Les Wishard, Jr.  
Kona Hiking Club  
P.O. Box 1149  
Kamuela, Hawaii 96743-1149

Ms. Hannah Springer  
Kona Hawaiian Civic Club  
P.O. Box 4098  
Kailua-Kona, Hawaii 96745



IN REPLY REFER TO:

L7019 (HAVO)

United States Department of the Interior

NATIONAL PARK SERVICE  
HAWAII VOLCANOES NATIONAL PARK  
P. O. BOX 52  
HAWAII 96718-0052

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FEB 28 11 14 AM '94

FORESTRY & WILDLIFE  
HAWAII DISTRICT

February 3, 1994

Mr. Michael G. Buck  
Administrator  
Hawaii Department of Lands and Natural Resources  
Division of Forestry and Wildlife  
1151 Punchbowl Street  
Honolulu, Hawaii 96813

Dear Mr. Buck:

We are delighted to hear that the State of Hawaii is contemplating restoration of the Ainapo Trail under the Na Ala Hele Program. This project will provide an exceptional alternative to visitors from the island and mainland wishing to experience the Mauna Loa wilderness.

The Service supports the building of the trail shelter in the Kapapala Forest reserve. Due to the distance and dramatic elevation changes involved in a climb of Mauna loa, the cabin is necessary to ensure visitor safety and shelter on this long climb.

There is one point of concern. In review of the Environmental Assessment, we did not find any reference to the treatment of existing historic structures and historic scene of the camp. We strongly recommend that the proposed work is reviewed by a State Historic Preservation officer to ensure that the historic scene has been considered and that the work is in compliance with Section 106 of the National Historic Preservation Act.

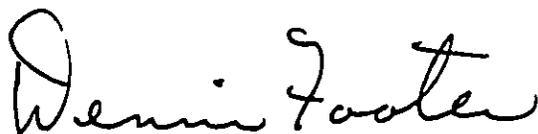
We do wish to be notified as actual work on the trail begins to ensure we are prepared to provide for the visitors as they enter the park at the higher elevations of the trail. We anticipate the need to coordinate with you on trail improvements and signing as it enters the park and connects with park's Mauna Loa trail system. We also see a need to prepare information packages on the trail for visitors intending to make the climb.

The park has a requirement that any visitor utilizing the backcountry of the park overnight obtain a backcountry permit. This is a management system that assists us in assessing the impact on the wilderness area, avoids over crowding at specific overnight shelters as well as serving as a valuable tool if search or rescue becomes necessary. It will be necessary to develop a system that ensures that visitors using the Ainapo trail to the summit of Mauna Loa are aware of the permit requirement.

We appreciate this opportunity for early comment on this project and be assured that we will assist you in anyway we can to bring this to a reality.

If you have any questions or need further information, please contact Chief Ranger Jim Martin or Backcountry Ranger Faelyn Jardine at (808) 956-7311.

Sincerely

A handwritten signature in cursive script that reads "Dennis Footer". The signature is fluid and somewhat stylized, with the first letter 'D' being particularly large and prominent.

Dennis Footer  
Acting Superintendent

cc:  
Pacific Area Director

JOHN WAIHEE  
GOVERNOR OF HAWAII



STATE OF HAWAII  
DEPARTMENT OF LAND AND NATURAL RESOURCES  
DIVISION OF FORESTRY AND WILDLIFE  
1151 PUNCHBOWL STREET  
HONOLULU, HAWAII 96813

March 18, 1994

Mr. Dennis Footer, Acting Superintendent  
U.S. Department of the Interior  
National Park Service  
Hawaii Volcanoes National Park  
P.O. Box 52  
Hawaii National Park, HI 96718-0052

Dear Mr. Footer:

SUBJECT: Environment Assessment for Trail Shelter Along  
Trail, Kapapala Forest Reserve

An archaeological reconnaissance was conducted on March 2, 1994 by Holly McEldowney of the State Historic Preservation Division. Her report is attached in form of a letter to me from Don Hibbard, Administrator of the Historic Preservation Division. We are also aware of the need for a mitigation plan for the Ainapo Trail and will be soliciting their assistance in developing a management plan to address their concerns.

The State recognizes the need for a permit system to facilitate the use of the trail shelter and to assess impact on the trail and surrounding areas. Coordination with your agency is needed for trail users intending to hike beyond Mokuaweoweo Crater.

We anticipate an informal agreement with your agency in the near future to address your concerns and enable a worthwhile experience for the hiking public.

Sincerely,

A handwritten signature in cursive script, appearing to read "M. G. Buck".

MICHAEL G. BUCK  
Administrator

Attachment

KEITH W. AHUE, CHAIRPERSON  
BOARD OF LAND AND NATURAL RESOURCES

DEPUTIES

JOHN P. KEPPELER, II  
DONAL L. HANAIKE

AQUACULTURE DEVELOPMENT  
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CONVEYANCES  
FORESTRY AND WILDLIFE  
HISTORIC PRESERVATION  
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STATE PARKS  
WATER AND LAND DEVELOPMENT

JOHN WAIHEE  
GOVERNOR OF HAWAII

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FORESTRY AND WILDLIFE  
HAWAII DISTRICT  
STATE OF HAWAII  
DEPARTMENT OF LAND AND NATURAL RESOURCES

STATE HISTORIC PRESERVATION DIVISION  
33 SOUTH KING STREET, 8TH FLOOR  
HONOLULU, HAWAII 96813

March 10, 1994

KEITH AITUE, CHAIRPERSON  
BOARD OF LAND AND NATURAL RESOURCE

DEPUTIES

JOHN P. KEPPELER II  
DONA L. HANAIKE

AQUACULTURE DEVELOPMENT  
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CONVEYANCES

FORESTRY AND WILDLIFE  
HISTORIC PRESERVATION

DIVISION  
LAND MANAGEMENT

STATE PARKS  
WATER AND LAND DEVELOPMENT

Memorandum:

LOG NO: 11092 ✓  
DOC NO: 9403HM02

To: Michael G. Buck, Administrator  
Division of Forestry and Wildlife

From: Don Hibbard, Administrator  
Historic Preservation Division 

Subject: Historic Preservation Compliance (Section 6E, H.R.S) - Construction  
of Trail Shelter Along Ainapo Trail, Kapapala Forest Reserve (Na Ala  
Hele)  
Kapapala, Kau, Hawaii Island  
TMK: 9-8-00: 04

Thank you for the opportunity to inspect the location of the proposed trail shelter along the Ainapo Trail and to follow much of the Ainapo trail by helicopter. As stated in our review of the draft Environmental Assessment for the shelter (Memo. Hibbard to Buck, 2/15/94), the Ainapo Trail is on the National Register of Historic Places (State Inventory No. 50-10-50-5501) and, because the current trail appears to follow the preferred prehistoric route to the summit of Mauna Loa, we feel the probability of sites along the trail is relatively high. We were therefore concerned that construction of the shelter and increased use of the trail, particularly once the shelter is established, could have an "adverse effect" on the trail itself and on possible historic sites near the trail. As a result of the inspection, we can now concur that construction and use of the shelter is likely to have "no effect" on historic sites. However, we are still concerned that any increase in the use of the Ainapo Trail could have an "adverse effect" on the trail and that measures should be taken to mitigate these potential effects. The results of our inspection are described below as are our recommendations for a mitigation plan for the Ainapo Trail.

The field inspection was conducted on March 2, 1994 by our staff member, Holly McEldowney, who was accompanied by Rodney Oshiro, Trail and Access Specialist for Hawaii Island. The inspection lasted approximately 3 and a half hours and began with an aerial reconnaissance of the Ainapo trail from an elevation of 7,500 ft to 13,000 ft. The remaining time was spent inspecting, on foot, the area chosen for the shelter, the

immediately surrounding area and those sections of the Ainapo trail running immediately up and down slope of the shelter site.

The proposed shelter site lies at an elevation of 7,750 ft and about 100 ft southeast of the Ainapo trail. The ground surface is composed of exposed pahoehoe outcrops interspersed with pockets of soil which are generally shallow, averaging about 20 cm thick. The relatively flat area chosen for the shelter (16 by 20 ft) had been cleared of vegetation, most low shrubs and ground cover, and the corners of the proposed shelter staked. There was no evidence of past human use in the cleared area or in the immediate vicinity. Also there was no evidence of buried material in those soil pockets that had been cut by recent slope wash. The only indication of past use in this area is a redwood water tank, a small shelter abutting the tank, some glass and iron debris near the shelter and remnants of a wire corral probably used to keep pack animals overnight. The water tank, located 50 ft. south of the proposed shelter site, is in disrepair and the open-air shelter consists primarily of a corrugated iron roof and a wooden platform. A stone and concrete fire hearth lies adjacent to the shelter. Remnants of the wire corral lie approximately 100 ft east of the Ainapo Trail. Although the age of these features has yet to be determined, we do not expect them to be of much significance. Most of the debris associated with them appears to be modern (tin cans, glass and plastic) and it is apparently still being used intermittently. Until their age can be determined, however, we ask that the tank and shelter remain essentially intact so that they can be photo-documented before they are dismantled. No lava tubes or overhangs were found in the vicinity, either from the air or on foot, which could have been used as shelter during the early historic or prehistoric periods.

From the helicopter, the current alignment of the Ainapo Trail appears to be clearly defined, in a good state of preservation and of uniform width (50 to 75 cm wide) where it crosses aa flows. Its course primarily follows a series of aa flows which probably reflects trail modifications made by Julian Monsarrat in 1913 which essentially turned the trail into a bridle path<sup>1</sup>. Prepared aa surfaces are generally easier for pack animals to use because they can find their footing more easily than on the uneven and often smooth pahoehoe surfaces. On the aa flows, the trail appears to have been defined primarily by clearing loose stone from the route and by repeated usage. No formalized curbstones were noted although informal alignments of piled stone do occur along some segments, most of which were probably formed as the trail was cleared. In some instances, both the pahoehoe and aa, cracks or depressions were filled and retaining walls built to stabilize the fill. The trail route over the pahoehoe is less clear but is marked by intermittent *ahu* and discoloration of the pahoehoe surface caused by use wear. At lower elevations, pahoehoe sections of the route can be difficult to follow because the wear marks and *ahu* are obscured by

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<sup>1</sup> See Apple, R. A. Mountain Trails: The Ainapo and Mauna Loa. Manuscript prepared by the National Park Service, July 1973:3

shrubs and low statute trees and slope wash has eroded portions of the trail or covered it with soil.

To mitigate potential "adverse effects" to this significant historic trail, we feel that a management plan should be prepared before the trail is open to public use. This would be particularly important if any Federal funds will be used to maintain the trail. The plan should adequately characterize and document the route and attributes of the current trail; describe any known sites along the trail; define areas where the probability of sites is relatively high; and discuss what measures will be taken to minimize damage to the trail and near-by sites when the trail is being prepared for public access and when it is being used. The following are some suggestions on how these goals could be accomplished.

1. Documentation of the Trail. As portions of the trail will, inevitably, be disturbed as it is being used and maintained, we suggest that representative sections of the trail be photographed in black and white as a permanent record. This would include those sections that cross pahoehoe and aa flows and any modifications such as alignments, retaining walls, *ahu* and fill. The current route should also be plotted on aerial photographs.
2. Documentation and Plotting of Know Sites Along or Near the Trail. Any known or suspected historic sites along the trail should be plotted and described in the plan. At least two sites were visible during the helicopter fly-over. At an elevation of about 11,000 ft., two stone wall enclosures could be seen near the trail and, at 6,700 ft., the trail intersects a stone wall that extends across most of Kapapala *ahupua'a*. Information on when and why this wall was constructed, probably for ranch purposes, should be researched and included in the site descriptions. A series of lava tubes lie west of the trail at elevations from 9,000 ft. to 10,000 ft. should be inspected for evidence of past use before the plan is prepared.
3. Predicted Distribution of Sites. As it would be impossible to identify all the historic sites along the current trail and any past routes without a major survey effort, the plan should define, in general terms, the expected pattern of site distribution along these routes. These predictive models should be based, in part, on early historic accounts of the ascent of Mauna Loa. Careful examination and comparison of these accounts could help identify where campsites and important water holes were more likely to be located as well as how far the parties were likely to travel in a single day. An important part of this model would be determining the route of the trail before 1913, particularly where there are indications that the prehistoric trails differed. Variations in vegetation, types and ages of lava flows and elevation should also be used to help predict where site could be. In the future, this framework will help identify which areas are more sensitive to increased access by the public.

Michael G. Buck  
Page 4

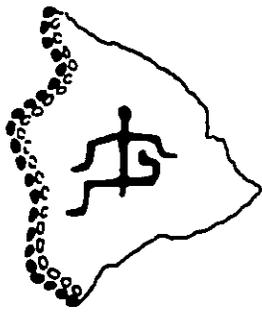
4. **Mitigation Measures.** The mitigation plan should describe what measures will be taken to minimize damage to the trail and nearby sites. This should include descriptions of how the trail will be prepared for public use and periodically maintained without substantially altering the trail. Once the trail is open, nearby sites should be monitored periodically to see if any are being visited by trail users and damaged. Mitigation measures could also include interpretation efforts and trail guides that stress historic preservation concerns.

As we have already discussed with Rodney Oshiro, our staff can offer further assistance in the collection of some of this information and can advise on the preparation of the management plan. Any information gathered would help upgrade our site inventory for the upper elevation areas. Our staff members, Marc Smith and Pat McCoy, could probably spend one or two days assessing and documenting portions of the trail and searching for additional sites along the trail route.

If you have any questions please call Holly McEldowney in Honolulu (587-0008) or Marc Smith at our Hilo office (933-4346).

HM:jt

cc. Christina B. Meller, Na Ala Hele Program Manager  
✓ Rodney Oshiro, Trail and Access Specialist, Hawaii Island



**E MAU  
NA ALA HELE**

P.O. BOX 6384  
KAMUELA, HAWAII 96743

RECEIVED

'94 FEB -8 P2:51

FORESTRY DIVISION  
STATE OF HAWAII

February 6, 1994

Michael G. Buck, Administrator  
State of Hawai'i  
Division of Forestry and Wildlife  
1151 Punchbowl Street  
Honolulu, Hawai'i 96813

Subject: Comments on Trail Shelter At Kapapala Forest Reserve

Dear Mr. Buck,

I applaud the efforts of the Division of Forestry and Wildlife to re-open the public access to and along the Ainapo Trail, and to build the trail shelter in the Kapapala Forest reserve.

My suggestions are of a technical nature and are not meant to detract from the goal of building the cabin:

1. Use concrete footing piers that have metal straps embedded in the concrete. These straps should be nailed to the 4x4 posts.
2. Post saddles could be used to also provide more positive connection between the posts, sills and beams.
3. And metal straps could be used to connect sills, beams, wall framing, and rafters.

The net effect of these positive connections is to help hold the structure together in times of high wind and severe earthquakes (see enclosure). The relative few connectors required will not significantly increase the cost of constructing this shelter.

Thank you,

Keith Wallis  
Board of Directors

enclosure

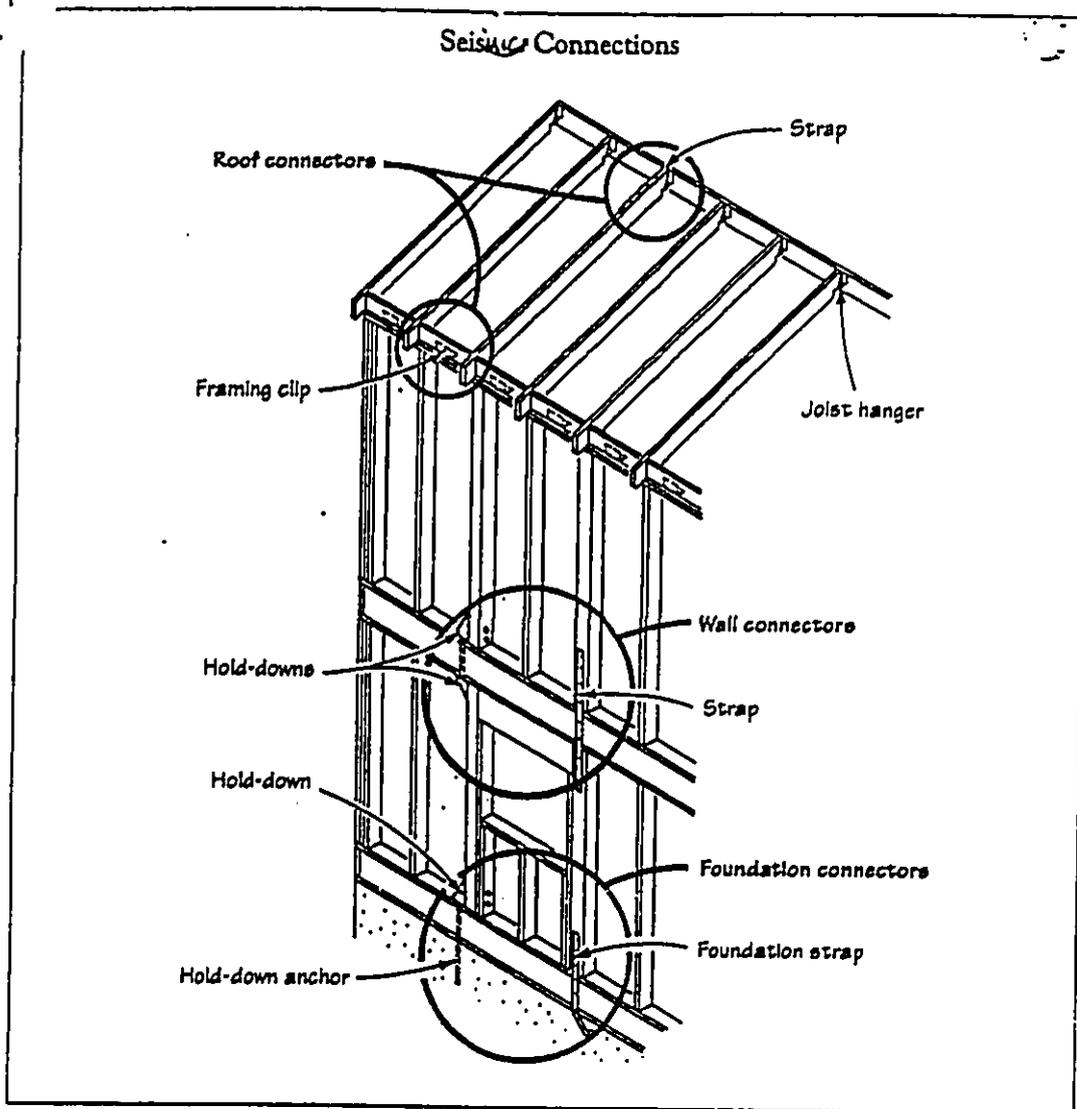
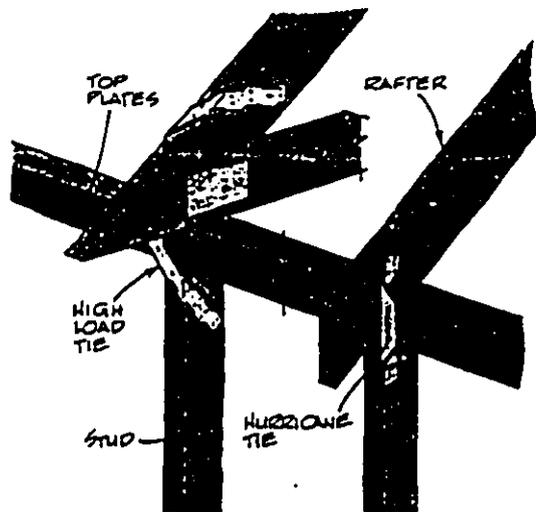


Figure 1. On a new two-story house on the West Coast, a variety of metal connectors are used to tie the structure together and strengthen weak connections against earthquake uplift.



Hurricane anchors, like these from Simpson Strong Tie, can help prevent your roof from blowing off in high winds. The left design is rated to withstand 985 pounds of upward lift, the other only a third as much.



NA ALA HELE  
Hawaii Trail & Access System

March 7, 1994

Mr. Keith Wallis, Board of Directors  
E Mau Na Ala Hele  
P.O. Box 6384  
Kamuela, HI 96743

Dear Mr. Wallis:

SUBJECT: Environmental Assessment for Trail Shelter  
Along Ainapo Trail, Kapapala Forest Reserve

Your suggestions to reinforce the shelter to withstand high winds and earthquakes will be incorporated in the construction plans. There was prior understanding by staff of the need to windproof and insulate the shelter but they were not indicated in the drawing specifications.

Thank you for your interest in this matter.

Sincerely,

MICHAEL G. BUCK  
Administrator

J. GORDON CRAN

P.O. BOX 1639  
HILO, HAWAII 96721-1639

KAPAPALA RANCH  
KA'U, HAWAII

February 28, 1994

Mr. Michael G. Buck, Administrator  
Division of Forestry and Wildlife  
Department of Land & Natural Resources  
1151 Punchbowl Street  
Honolulu, Hawaii 96813

Dear Mr. Buck:

Subject: Request for Pre Assessment Consultation on the Preparation of an  
Environmental Assessment for a Trail Shelter in Kapapala Forest  
Reserve - Ainapo Trail

The proposed construction of a new building at Halewai, Ainapo, is a good  
addition for use of the Ainapo Trail.

I do not see any environmental problems; however, there will be an increase  
in the use of the trail and people will build fires. With this in mind, I  
would recommend a site outside that would be constructed for fires. I assume  
a water tank would be installed.

The other need would be a small enclosure for horses or mules of about  
20' x 20' or 20' x 30'.

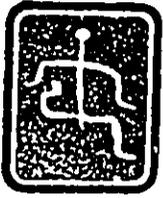
Thank you for the opportunity to comment on this project.

Sincerely,

*Jordan Cran*

J. GORDON CRAN  
KAPAPALA RANCH

RECEIVED  
MARCH 2 11:07  
STATE OF HAWAII  
DEPARTMENT OF LAND & NATURAL RESOURCES



**NA ALA HELE**  
Hawai'i Trail & Access System

March 7, 1994

Mr. J. Gordon Cran, Manager  
Kapapala Ranch  
P.O. Box 1639  
Hilo, HI 96721-1639

Dear Mr. Cran:

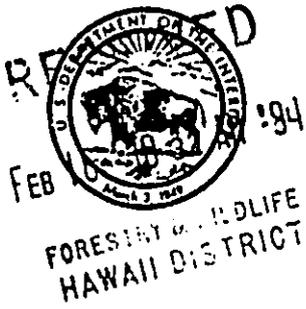
SUBJECT: Environmental Assessment for Trail Shelter  
Along Ainapo Trail, Kapapala Forest Reserve

Thank you for responding to our request. The Division of Forestry and Wildlife (Na Ala Hele) is concerned about the occurrence of wildfires and will discourage the use of open fires in and around the trail shelter.

Historically, animals were used to ascend the heights of Mauna Loa. At this time, we are focusing on a small trail shelter to provide comfort and safety to hikers and do not anticipate the construction of an enclosure for mules or horses.

Sincerely,

MICHAEL G. BUCK  
Administrator



United States Department of the Interior

NATIONAL BIOLOGICAL SURVEY

Hawaii Field Station

P.O. Box 44

Hawaii National Park, HI 96718

Phone: (808) 967-7396

FAX: (808) 967-8568

RECEIVED

'94 FEB 10 P3:30

FORESTRY AND WILDLIFE  
STATE OF HAWAII

February 8, 1994

*WMP*

Mr. Michael G. Buck  
Division of Forestry and Wildlife  
1151 Punchbowl Street  
Honolulu, HI 96813

Dear Mike,

Thanks for the opportunity to review the environmental assessment for the trail shelter proposed for Ainapo Trail. I should first say that I was delighted to read that DLNR intends to open the Ainapo Trail. This should make a rewarding, though exhausting, hike, and I look forward to trying it myself someday. It would seem doubtful that hikers using the trail or shelter would directly affect wildlife; at least there seems to be little problem caused by hikers on Mauna Loa Trail in the park.

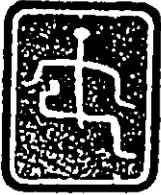
I discussed the shelter, trail and access road with Paul Banko. Though neither nene nor seabirds are known to regularly use the areas accessed by the trail, it may be that they do so, for the area has not been extensively surveyed. These birds do use similar habitat in Hawaii Volcanoes National Park.

The main concern here would be dogs off the leash and mongooses, rats and cats attracted to food at the cabin. Every effort should be made to prohibit dogs along the road and trail. Uncontrolled dogs could be a hazard to Nene, especially below 8000 ft. elevation, and possibly to seabirds, above 8,000 ft. Problems with predators could be largely eliminated by informing the public and by providing adequate garbage storage and collection. I would suggest also that predators be controlled by trapping and poisoning (using registered toxicants) around the shelter and along the trail.

Finally, plans for preventing and controlling fires along the access road should be seriously considered. Outdoor cooking at the shelter should also be prohibited, or outdoor facilities should be designed so that fire cannot spread.

Sincerely yours,

Thane K. Pratt  
Wildlife Biologist



**NA ALA HELE**  
Hawaii Trail & Access System

March 7, 1994

Mr. Thane K. Pratt, Wildlife Biologist  
National Biological Survey  
Hawaii Field Station  
P.O. Box 44  
Hawaii National Park, HI 96818

Dear Mr. Pratt:

**SUBJECT: Environmental Assessment for Trail Shelter**  
**Along Ainapo Trail, Kapapala Forest Reserve**

The State intends to improve the road to Kapapala Forest Reserve and open it as a public access to encourage all forest resource users. Hunting of feral pigs, with dogs will be allowed as is the present practice.

The State will encourage "pack in, pack out" philosophy to reduce the maintenance requirements. However, garbage receptacles will be provided and periodic maintenance will be made to minimize the predator problem. Predator control efforts by trapping and poisoning may be carried out by our wildlife counterpart.

Fire hazard elimination and control are one of the major concerns of the Division of Forestry and Wildlife. An outdoor cooking pit is not planned as it may impact on trees (for fuel) in the surrounding areas. Trail users carrying portable burners will be encouraged to use them in the veranda area of the shelter.

Sincerely,

MICHAEL G. BUCK  
Administrator



United States Department of the Interior



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

RECEIVED  
FEB 28 11 14 AM '94  
FOREST AND WILDLIFE  
HAWAII DISTRICT  
In reply refer to: AA

FEB 22 1994

Michael G. Buck  
Hawaii Department of Land and Natural Resources  
Division of Forestry and Wildlife  
1151 Punchbowl Street  
Honolulu, HI 96813

RECEIVED  
'94 FEB 24 P 3:38  
FOREST AND WILDLIFE  
STATE OF HAWAII

Dear Mr. Buck:

This is in reply to your request for input on the proposed trail shelter along Ainapo Trail in Kapapala Forest Reserve. There are at least four species of proposed or candidate plants within the general area of the trail and proposed building site, Clermontia lindseyana, Nothocestrum breviflorum, Pleomele hawaiiensis, and Vigna o-wahuensis. For this reason, we recommend that a State Botanist such as Carolyn Corn survey the proposed trail and construction site for rare or endangered plants.

With regard to the nene (Nesochen sandvicensis), the use or construction of a hiking trail and shelter should not have a significant impact, due to the low number of people using the area at one time.

Thank you for allowing us to comment early in the development of this project.

Sincerely,

Robert P. Smith  
Field Supervisor  
Pacific Islands Office



**NA ALA HELE**  
Hawaii Trail & Access System

March 28, 1994

Mr. Robert P. Smith, Field Supervisor  
U.S. Fish and Wildlife Service  
Pacific Islands Office  
P.O. Box 50167  
Honolulu, HI 96850

Dear Mr. Smith:

**SUBJECT: Environmental Assessment for Trail Shelter**  
**Along Ainapo Trail, Kapapala Forest Reserve**

A botanical survey of the proposed trail shelter site was conducted by Linda Pratt, Biological Science Technician of the National Biological Survey. A copy of her report is attached. The survey area was confined to the site and surrounding areas. A botanical survey along the entire trail may be conducted by the Division of Forestry and Wildlife at a later date for general management purposes.

For clarification, the environmental assessment is for the construction of a trail shelter along the historic Ainapo Trail. We will not be constructing a new trail or alignment which may impact on the flora and historic sites.

Thank you for your interest in this matter.

Sincerely,

MICHAEL G. BUCK  
Administrator

Attachment



IN REPLY REFER TO:

United States Department of the Interior

NATIONAL PARK SERVICE  
HAWAII VOLCANOES NATIONAL PARK  
P. O. BOX 52  
HAWAII 96718-0052

RECEIVED

MAR 28 7 38 AM '94

FORESTRY & WILDLIFE  
HAWAII DISTRICT

COPY

March 24, 1994

Rodney Oshiro  
Division of Forestry and Wildlife  
P. O. Box 4849  
Hilo, Hawaii 96720

Dear Rodney,

Enclosed is my trip report and a checklist of vascular plants seen during our visit to the Ainapo Trail shelter site in Kapapala Forest Reserve on Monday. I tried to give a description of the vegetation, a summary of the species composition, and some information on potential rare plants in the area. I hope this helps the Division of Forestry and Wildlife and Na Ala Hele in the re-establishment of the Ainapo Trail for hiking. I am looking forward to someday hiking the trail and botanizing the area more thoroughly.

Aloha,

*Linda*  
Linda W. Pratt  
Biological Science Technician

Enclosure

AINAPO TRAIL SHELTER SITE  
TRIP REPORT

Linda W. Pratt, NBS/Hawaii Volcanoes National Park

On March 21, 1994, accompanied by Rodney Oshiro of the Hawaii State Division of Forestry and Wildlife, I spent approximately two hours examining the vegetation of the Ainapo Trail shelter site at 7,750 ft elevation within the Kapapala Forest Reserve.

The vegetation in this area is composed of scattered, low-stature 'ohi'a trees (mostly *Metrosideros polymorpha* var. *polymorpha*) and a dense shrub layer dominated by pukiawe (*Styphelia tameiameia*). Other common shrubs are 'ohelo (*Vaccinium reticulatum*), pilo (*Coprosma montana*), and kukaenene (*C. ernodeoides*). Native grasses and sedges, particularly *Carex macloviana* and *Gahnia gahniiformis*, are scattered among the shrubs. Patches of the endemic bunchgrass *Deschampsia nubigena* are common. The most common alien grass is velvet grass (*Holcus lanatus*); this species is abundant at the disturbed water tank site but only occasionally seen elsewhere. The non-native gosmore, a rosette-forming herb, is widespread but covers little area. All other non-native plants noted (grasses and herbs) appear to be occasional to uncommon in abundance. Ferns are not common here; most often seen are two species of 'ekaha (*Elaphoglossum wawrae* and *E. paleaceum*) epiphytic at the base of trees and wawae 'iole (*Lycopodium venustum*), which sprawls beneath shrubs and trees. Terrestrial mosses (particularly *Rhacomitrium lanuginosum*) are common, and fruticose lichens, such as *Cladina skottsbergii* are occasionally seen. The most notable native plant seen is the native strawberry (*Fragaria chiloensis* subsp. *sandwicensis*). This plant is rare on the island of Hawai'i, but more common on Maui. Fewer than 10 of these small herbs were seen beneath trees east of the shelter site. The substrate of the shelter site is pahoehoe with ash pockets of variable depth. Patches of bare soil and rock outcroppings occur throughout the area. 'A'a flows exist to the north and east.

A checklist of vascular plants seen in the immediate vicinity of the shelter site is appended. In summary, a total of 33 species was noted: 16 endemic, 9 indigenous, and 8 alien. Seven fern species were seen; all of these are native (3 endemic and 4 indigenous). Twenty-six flowering plant species were counted: 15 dicots and 11 monocots. Among the dicots, 9 species are endemic, 2 indigenous, and 4 species are alien or non-native. The monocots (grasses, sedges, and rushes) include 4 endemic, 3 indigenous, and only 4 alien species.

An attempt was made to search the shelter site and immediate surrounding area for the presence of any listed, proposed, or candidate endangered plant species. An area with a radius of approximately 150 m was carefully searched and no endangered species were found during this brief visit. However, this site is the location of at least one historical collection of the listed endangered Ka'u silversword. On Dec. 25, 1942, G. O. Fagerlund and A. L. Mitchell collected a sterile specimen of silversword (#261) at the "water tank area, 7,750 ft, Ainapo Trail, on gravelly lava 200 ft west of the shelter growing under a larger specimen" (Fagerlund and Mitchell, collection field notes). Even earlier, forester

L. W. Bryan noted silverswords growing "near Halewai, about 7,700 ft elevation within the Kapapala Forest Reserve" (Bryan 1974).

Other listed, proposed, and candidate endangered plants may be in the general area of the Ainapo shelter, as they are known from nearby sites. The proposed endangered fern Asplenium fragile var. insulare was found at 6,200 feet elevation in Kapapala Forest Reserve (Cuddihy et al. 1983) and in Hawaii Volcanoes National Park at 6,250 feet elevation (HAVO herbarium). Both of these sightings were in moist lava tube openings. The proposed endangered lau kahi (Plantago hawaiiensis) occurs in Hawaii Volcanoes National Park at 7,000 ft elevation within vegetation very similar to that at the Ainapo shelter site. Silene hawaiiensis, another proposed endangered species, is also known from Hawaii Volcanoes at 6,600 ft elevation. These rare plants should be suspected from the Ainapo Trail area.

Additionally, makou (Ranunculus hawaiiensis), a category 2 candidate endangered species, is known from Kapapala Forest Reserve at 6,100 feet elevation (Cuddihy et al. 1983), and may range to higher elevations. Less likely at the shelter site is the proposed endangered 'oha wai (Clermontia lindseyana), found in koa/'ohi'a forests between 5,150 and 5,900 feet elevation in the Kapapala and Ka'u Forest Reserves (Cuddihy et al. 1983). Also possible along the Ainapo Trail is Hawaii's first listed endangered plant species, the Hawaiian vetch (Vicia menziesii). This vine was first collected in 1794 by Archibald Menzies during his ascent of Mauna Loa (Menzies 1920). Menzies was likely on the Ainapo Trail when he collected the vetch at the upper edge of the forest vegetation.

Feral animals are threats to native vegetation (including any remaining rare plants) in the Ainapo shelter area. Fresh goat and/or sheep droppings are abundant near the shelter site, and a number of plant species show signs of being browsed. Many clumps of the native grass Deschampsia nubigena and the sedge Carex macloviana have been recently cropped. The endemic na'ena'e shrubs are relatively uncommon and show browse damage. The non-native velvet grass also appears to have been grazed. Areas of bare soil that appear to have been dug up by feral pigs are common. The native bracken fern (Pteridium decompositum), known to be a favorite food of feral pigs at high elevations, is very rare in the area, found only on 'a'a and rocky outcroppings.

This area of the Ainapo Trail supports predominantly native vegetation and, at least historically, provided habitat for endangered plant species. Systematic rare plant surveys of this area and adjacent portions of the Kapapala Forest Reserve would be highly desirable.

#### Literature Cited or Used for Nomenclature

Bryan, L. W. 1974. Letter to Bryan Harry, Superintendent Hawaii Volcanoes National Park. July 18, 1974. From L. W. Bryan collection, B. P. Bishop Museum.

Cuddihy, L. W., J. A. Davis, and S. J. Anderson. 1983. A survey of portions of Kapapala and Ka'u Forest Reserves, Island of Hawaii. Endangered Plant Species Program, Division of Forestry and Wildlife, DLNR. Unpublished report.

- Fagarlund, G. O. and A. L. Mitchell. Unpublished. Collection notes on file at Research Division, Hawaii Volcanoes National Park.
- Menzies, A. 1920. Hawaii Nei - 128 Years Ago. W. F. Wilson (Ed.). Privately published. Honolulu, T. H. 199 p.
- Wagner, W. L., D. R. Herbst, and S. H. Sohmer. 1990. Manual of the Flowering Plants of Hawai'i. Bishop Museum Special Publication 83. University of Hawaii Press and Bishop Museum Press.
- Wagner, W. H. Jr. and F. R. Wagner. Unpublished. Revised checklist of Hawaiian Pteridophytes. July 1992.

# CORRECTION

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

Fagarlund, G. O. and A. L. Mitchell. Unpublished. Collection notes on file at Research Division, Hawaii Volcanoes National Park.

Menzies, A. 1920. Hawaii Nei - 128 Years Ago. W. F. Wilson (Ed.). Privately published. Honolulu, T. H. 199 p.

Wagner, W. L., D. R. Herbst, and S. H. Sohmer. 1990. Manual of the Flowering Plants of Hawai'i. Bishop Museum Special Publication 83. University of Hawaii Press and Bishop Museum Press.

Wagner, W. H. Jr. and F. R. Wagner. Unpublished. Revised checklist of Hawaiian Pteridophytes. July 1992.

AINAPO TRAIL SHELTER SITE  
VASCULAR PLANT CHECKLIST

	<u>Status</u>	<u>Abundance</u>
<u>FERNS AND FERN ALLIES</u>		
ADIANTACEAE - MAIDENHAIR FERN FAMILY		
<u>Pellaea ternifolia</u> (Cav.) Link Kalamoho lau li'i	I	U
DENNSTAEDTIACEAE		
<u>Pteridium decompositum</u> Gaud. Syn: <u>Pteridium aquilinum</u> var. <u>decompositum</u> Kilau, bracken fern	E	R
DRYOPTERIDACEAE - WOOD FERN FAMILY		
DRYOPTERIDOIDEAE		
<u>Dryopteris wallichiana</u> (Spreng.) Hyl. Lau kahi	I	U
LOMARIOPSIDOIDEAE		
<u>Elaphoglossum paleaceum</u> (Hook. & Grev.) Sledge Syn: <u>Elaphoglossum hirtum</u> var. <u>micans</u> 'Ekaha	I	U
<u>Elaphoglossum wawrae</u> (Luer) C. Chr. 'Ekaha	E	O
LYCOPODIACEAE - CLUB MOSS FAMILY		
<u>Lycopodium venustum</u> Gaud. Wawae 'iole	I	O
POLYPODIACEAE - POLYPODY FERN FAMILY		
<u>Polypodium pellucidum</u> Kaulf. 'Ae	E	U
<u>FLOWERING PLANTS- DICOTYLEDONS</u>		
ASTERACEAE (COMPOSITAE)		
SUNFLOWER FAMILY		
<u>Dubautia ciliolata</u> (DC) D. Keck subsp. <u>ciliolata</u> Na'ena'e	E	O
<u>Gnaphalium japonicum</u> Thunb. Japanese cudweed	A	O
<u>Gnaphalium sandwicense</u> (Gaud.) 'Ena'ena	E	R
<u>Hypochoeris radicata</u> L. Gosmore, hairy cat's ear	A	C
<u>Tetramolopium humile</u> var. <u>humile</u> No common name	E	R

AINAPO TRAIL SHELTER SITE  
VASCULAR PLANT CHECKLIST

	<u>Status</u>	<u>Abundance</u>
CARYOPHYLLACEAE - PINK FAMILY		
<u>Cerastium fontanum</u> Baumg. Syn: <u>Cerastium vulgatum</u> Common mouse-ear chickweed	A	R
EPACRIDACEAE - EPACRIS FAMILY		
<u>Styphelia tameiameia</u> (Cham. & Schlechtend.) F. v. Muell. Pukiawe	I	A
ERICACEAE - HEATH FAMILY		
<u>Vaccinium reticulatum</u> Sm. Syn: <u>Vaccinium peleanum</u> 'Ohelo	E	C
GERANIACEAE - GERANIUM FAMILY		
<u>Geranium cuneatum</u> Hook. subsp. <u>hypoleucum</u> (A. Gray) Carlq. & Bissing Nohoanu, hinahina	E	O
MYRTACEAE - MYRTLE FAMILY		
<u>Metrosideros polymorpha</u> Gaud. var. <u>glaberrima</u> (H. Lev.) St. John 'Ohi'a lehua	E	O
<u>Metrosideros polymorpha</u> Gaud. var. <u>polymorpha</u> 'Ohi'a lehua	E	A
POLYGONACEAE - BUCKWHEAT FAMILY		
<u>Rumex acetosella</u> L. Sheep sorrel	A	O
ROSACEAE - ROSE FAMILY		
<u>Fragaria chiloensis</u> (L.) Duchesne subsp. <u>sandwicensis</u> (Decne.) Staudt 'Ohelo papa, strawberry	I	R
RUBIACEAE - COFFEE FAMILY		
<u>Coprosma ernodeoides</u> A. Gray Kukaenene	E	C
<u>Coprosma montana</u> Hillebr. Pilo	E	C

AINAPO TRAIL SHELTER SITE  
VASCULAR PLANT CHECKLIST

	<u>Status</u>	<u>Abundance</u>
<u>FLOWERING PLANTS - MONOCOTYLEDONS</u>		
<u>CYPERACEAE - SEDGE FAMILY</u>		
<u>Carex macloviana</u> Dum. d'Urv. subsp. <u>subfusca</u> (W. Boott) T. Koyama No common name	I	O
<u>Carex</u> sp. Unknown sedge, not fertile	I-E	O
<u>Gahnia gahniiformis</u> (Gaud.) A. Heller Syn: <u>Machaerina gahniaeformis</u> No common name	I	C
<u>JUNCACEAE - RUSH FAMILY</u>		
<u>Juncus</u> sp. Unknown rush, possibly <u>Juncus effusus</u>	A	R
<u>Luzula hawaiiensis</u> Buchenau No common name	E	O
<u>POACEAE (GRAMINEAE) - GRASS FAMILY</u>		
<u>Agrostis sandwicensis</u> Hillebr. No common name	E	U
<u>Anthoxanthum odoratum</u> L. Sweet vernalgrass	A	U
<u>Deschampsia nubigena</u> Hillebr. Syn: <u>Deschampsia australis</u> No common name	E	C
<u>Eragrostis brownei</u> (Kunth) Nees ex Steud. Sheepgrass	A	U
<u>Holcus lanatus</u> L. Common velvet grass	A	O
<u>Trisetum glomeratum</u> (Kunth) Trin. Pili uka, mountain pili	E	O

Nomenclature of flowering plants follows W. L. Wagner, D. R. Herbst, and S. H. Sohmer, 1990, Manual of the Flowering Plants of Hawai'i, Bishop Museum Special Publication 83, University of Hawaii Press and Bishop Museum Press. Scientific names of ferns and fern allies are from W. H. Wagner, Jr. and F. R. Wagner, Revised Checklist of Hawaiian Pteridophytes, July 1992, Unpublished.

Abbreviations Used in Checklist

Status: E = Endemic, unique to the Hawaiian Islands  
I = Indigenous, native to the Hawaiian Islands and other lands  
A = Alien, introduced, not native to the Hawaiian Islands

Abundance: A = Abundant, C = Common, O = Occasional, U = Uncommon,  
R = Rare, one or few individuals seen

JOHN WAIHEE  
GOVERNOR



BRUCE S. ANDERSON, Ph.D.  
INTERIM DIRECTOR

STATE OF HAWAII  
OFFICE OF ENVIRONMENTAL QUALITY CONTROL

220 SOUTH KING STREET  
FOURTH FLOOR  
HONOLULU, HAWAII 96813  
TELEPHONE (808) 586-4185  
FACSIMILE (808) 586-2452

May 6, 1994

Mr. Keith Ahue, Chairperson  
Board of Land and Natural Resources  
P. O. Box 621  
Honolulu, Hawaii 96809

Attention: Mr. Rodney Oshiro

Dear Mr. Ahue:

Subject: Draft Environmental Assessment for the Halewai  
Trail Shelter Construction along the Ainapo Trail

Thank you for the opportunity to review and comment on the subject project. We have the following comment.

Please describe any impacts that the project may have on the following:

- 1) Water resources; and
- 2) fauna.

If you have any questions, please call Mr. Jeyan Thirugnanam at 586-4185.

Sincerely,

  
BY BRUCE S. ANDERSON, Ph.D.  
Interim Director

BSA/JT:kk



NA ALA HELE  
Hawaii Trail & Access System

94 MAY 17 1994  
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May 17, 1994

Dr. Bruce Anderson, Ph.D.  
Interim Director  
OEQC  
220 South King Street  
Fourth Floor  
Honolulu, HI 96813

Dear Dr. Anderson,

SUBJECT: Draft Environment Assessment for the Halewai Trail Shelter Construction Along the Ainapo Trail.

The Kapapala Forest Reserve was set aside in 1930 to control runoff and flooding, unlike the adjoining Kau Forest Reserve and most other reserves which were generally established for watershed purposes. The Pakoa and Maunaanu waterholes are fed by surface runoff and are not utilized for domestic or agricultural use. Kapapala Ranch is serviced by a well system located in Wood Valley below the Kau Forest Reserve.

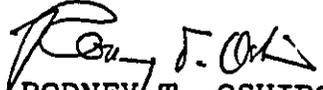
The proposed shelter will be equipped with a "Sun-Mar" composting toilet capable of servicing 4-6 persons a day. Using a small solar panel and requiring no septic system or chemicals, the toilet is almost totally independent. Due to its small evaporation capacity, however, the unit will be connected to a 1 foot by 1 foot drain pit. Infiltration into the ground will be minimal and we expect no impact to the water resource system.

A Hawaii Forest Bird Survey conducted within the Kapapala Forest Reserve in 1979 confirms our own sighting of Amakihi (Hemignathus virens), Apapane (Himatione sanguinea) and Iiwi (Vestiaria coccinea) at the proposed construction site. These native bird populations will be disturbed during the construction period with noise from a generator and the periodic flights of a helicopter. However, these disturbances will be temporary and the avifaunal population will not be adversely affected. Other sightings in the area include mouflon and goats.

Dr. Bruce Anderson, Ph.D  
May 17, 1994  
Page 2

Hopefully, the above explanations will satisfactorily address your concerns on the (1) water resources and (2) fauna reference to the above subject matter. If further information is needed, please contact me again.

Sincerely,

  
RODNEY T. OSHIRO  
Na Ala Hele