

APR 03 1978

April 28, 1978

MEMORANDUM

TO: Honorable Hideo Murakami, Comptroller
Department of Accounting and General Services

SUBJECT: EIS - Kalaupapa Infirmary

Based upon the recommendation of the Office of Environmental Quality Control, I am pleased to accept the subject document as satisfactory fulfillment of the requirements of Chapter 343, Hawaii Revised Statutes, and the Executive Order of August 23, 1971. This environmental impact statement will be a useful tool in the process of deciding whether or not the action described therein should or should not be allowed to proceed. My acceptance of the statement is an affirmation of the adequacy of that statement under the applicable laws, and does not constitute an endorsement of the proposed action.

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


George R. Ariyoshi

cc: Mr. Richard O'Connell
✓ Environmental Quality Commission

Office of Environmental Quality Control
Office of the Governor
550 Halekiauwiia Street
Tani Office Building, Third Floor
Honolulu, Hawaii 96813

ENVIRONMENTAL IMPACT STATEMENT KALAUPAPA INFIRMARY

Urban 9

Urban Planning
Urban Design
Landscape Architecture
Research & Development

926 Bethel Street
Honolulu Hawaii 96813
Telephone (808) 533-1725

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STATE OF HAWAII
DEPARTMENT OF ACCOUNTING & GENERAL SERVICES

R E V I S E D
ENVIRONMENTAL IMPACT STATEMENT
FOR THE
PROPOSED KALAUPAPA INFIRMARY
KALAUPAPA, MOLOKAI
MOLOKAI TMK 6-1-01:01

This environmental document is submitted
pursuant to Chapter 343, HRS

Accepting Authority: Governor
State of Hawaii

Responsible Official: 
Hideo Murakami
Comptroller
Dept. of Accounting and
General Services

Prepared by: Urban 9

March 1978

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I. SUMMARY

The proposed project includes:

1. Construction of a 1-story concrete slab and masonry-walled Infirmary containing approximately 6,000 sq. ft. gross floor area
2. Demolition of a vacant wooden car-port
3. Clearing, grading and excavation
4. Construction of a sewage disposal system
5. Construction of an emergency power generator
6. Utility connections
7. Landscaping

Funds for the proposed project were appropriated under Act 68, Session Laws of Hawaii (SLH) 1971, Item E-8; Act 218 SLH 1974, Item F-4; and Act 195, SLH 1975, Item E-2 in the amounts of \$852,000.00, \$200,000.00 and \$1,100,000.00, respectively.

The proposed project would be commenced in July, 1978 and take a maximum of 18 months to be completed.

Construction of the proposed Infirmary would somewhat reduce the existing passive vacant land. However, effective site planning and landscaping would minimize the negative impact of reduction in openness.

The proposed construction would result in a very minimal increase of water run-off. Drainage improvement would be provided as required in accordance with all applicable codes and regulations.

Temporary construction noise and dust problem would be minimized by normal noise control procedures and by sprinkling of water on the ground.

The proposed development of a new sewage disposal system would have very minimal impact and would meet all necessary codes and regulations.

The construction of the Infirmary would generate significant impact on the adjacent historic buildings - Hospital, Fumigation Room and Former Out-Patient Clinic, which were built in the early 30's. The proposed Infirmary would be designed so that its bulk would not dominate the neighboring

historic buildings and the general historic settings of the Settlement. In order to insure the sensitivity of the Infirmary design, design review would be conducted by the State Historic Preservation Office as well as by the Maui (Molokai) Design Review Board.

II. PROJECT DESCRIPTION

A. Project Location

The Kalaupapa Leprosy Settlement is located in the northwest section of Kalawao County of the Island of Molokai and is identified by parcel TMK: 6-1-01: 1. The proposed location for the Kalaupapa Infirmary is within the site bounded by Damien Road, School Street and Kamehameha Street across from the existing Hospital. Exhibit I indicates the Kalaupapa Settlement and the proposed project location.

B. Statement of Objectives:

The objective of the proposed project is to continue to provide out-patient services and acute care services to patients with minor illness or injury in a new Infirmary. This new Infirmary would replace the services provided by the present one-story wooden frame hospital with 40 beds. The present hospital is about 45 years old and extensive improvements are required to meet the fire and public safety codes and regulations in order to continue to provide the present services.

C. General Description of the Action's Technical, Economic, Social and Environmental Characteristics:

The proposed Infirmary would be a one-story "L" - shaped building of approximately 140'/105' (lengths) x 40' (width) x 22' (height). The building would have approximately 6,000 gross sq. ft. of floor area and would consist of the following facilities:

In-Patient Unit

1-Bed Isolation Room with Anteroom, Bathroom & Toilet
1-Bed Room with Toilet
2-Bed Room with Toilet
2-Bed Room with Toilet
4-Bed Room with Toilet
4-Bed Room with Toilet

Dialysis Room

Bath (Communal)
Bath (Communal)

Lounge with Kitchenette

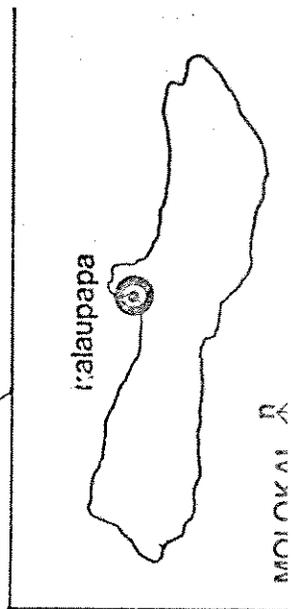
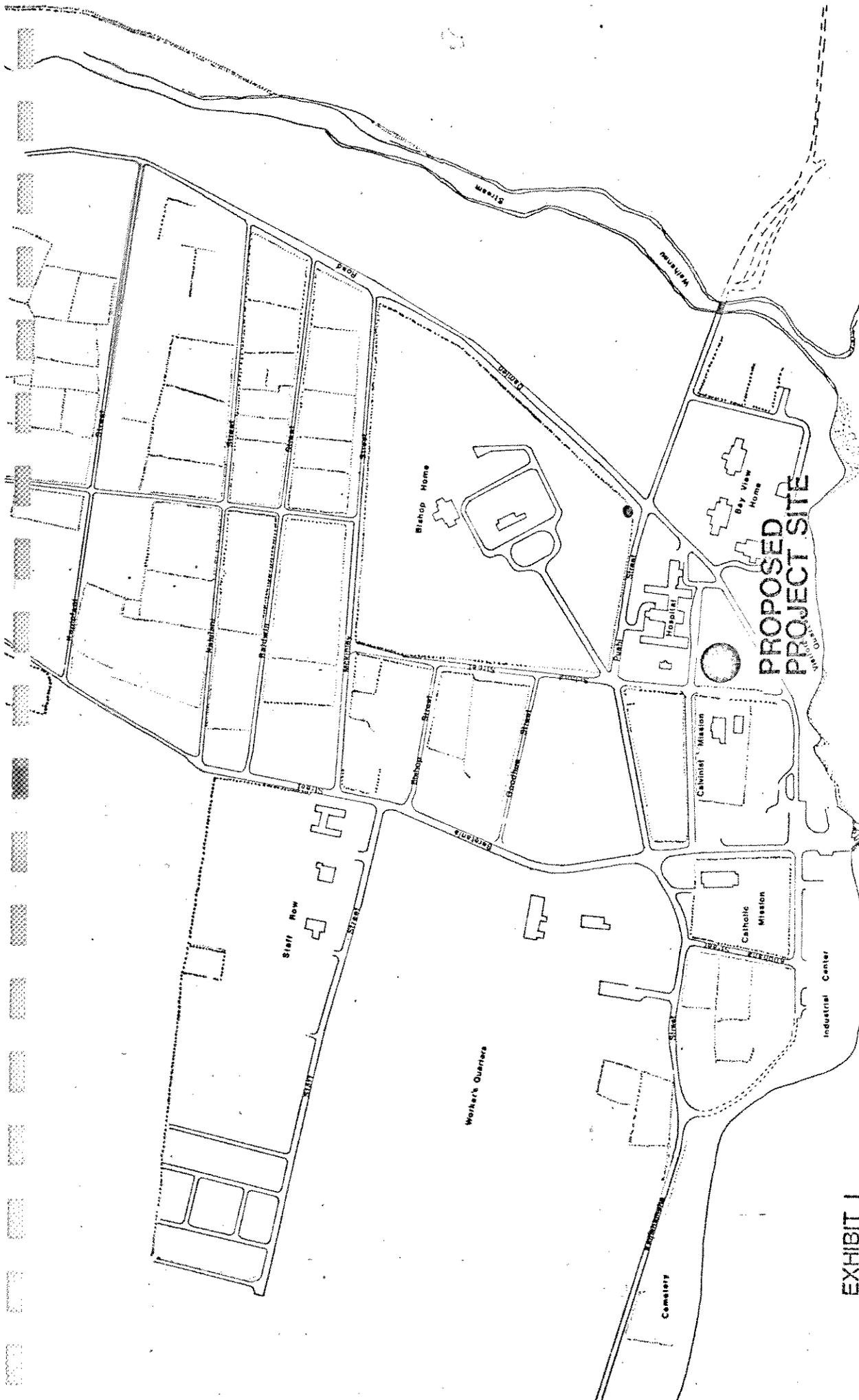


EXHIBIT I
**KALAUAPA SETTLEMENT &
 THE PROPOSED PROJECT SITE**



Office
Medical Preparation with Sink
Nurses Station with Toilets

Clean Utility
Soiled Utility
Storage

Out-Patient Unit

Waiting Lounge with Toilet
Examination Room
General Office
Medical Records
Nurses Lounge with Sink

Minor Surgery
Sub-Waiting Room
Lab
Clean-Up
Clean Workroom
Autoclave Closet
Storage
Janitor

The proposed Infirmary would be designed with the following factors considered:

1. Preserving a 50 feet high banyan tree
2. Utilizing natural ventilation rather than air-conditioner.
3. Keeping ocean view
4. Keeping the distance away from the Visitor's Quarters to avoid occasional late-night noise.
5. Harmonizing with the adjacent historic buildings - Hospital, Fumigation Room and Former Out-Patient Clinic.
6. Meeting Uniform Building Code for required separation for building with unprotected openings (non-fire rated windows).

The construction of the Infirmary would not displace any family and/or business. On the contrary, lack of the new health and medical facility would dislocate patients from Kalaupapa Settlement. The Infirmary enables the present 133 patients, who can stay in Kalaupapa as long as they desire (see page 10 for a legal background), to remain at Kalaupapa and receive

necessary health services. The new facility would afford adequate fire protection and public safety which would be jeopardized by the continuing use of the present Hospital facility.

Maintenance and operation of the Infirmary would be provided by the State of Hawaii as it is presently done for the existing Hospital. No change of personnel is anticipated.

In addition to the Infirmary, a new sewage disposal system and a new automatic emergency generator are required to service the Infirmary (Exhibit II).

The proposed sewage disposal system would have an individual cesspool of 2,400-gal. capacity. The system would be located approximately 25 ft. south-east of the lowest part of the proposed Infirmary. The proposed system would meet all necessary codes and regulations.

A new automatic emergency power generator would replace the present manual generator located 100 ft. east of the existing Hospital site next to the 2,300-volt transformer. The new automatic generator would be a diesel generator of approximately 15KW capacity. The generator room would meet all necessary codes and regulations, such as cross ventilation and acoustic treatment. Necessary fuel would be stored in a daytime tank in the generator room.

D. Use of Public Funds or Lands for the Action

Funds for the Kalaupapa Infirmary project were appropriated under Act 68, Session Laws of Hawaii (SLH) 1971, Item E8; Act 218 SLH 1974, Item F-4; and Act 195, SLH 1975, Item E-2 in the amounts of \$852,000.00, \$200,000.00 and \$1,100,000.00, respectively.

The Infirmary would be constructed in the Kalaupapa Settlement land area of which title is retained by the Hawaiian Homes Commission but of which use is administered by the Department of Health (see page 10 for a detailed discussion).

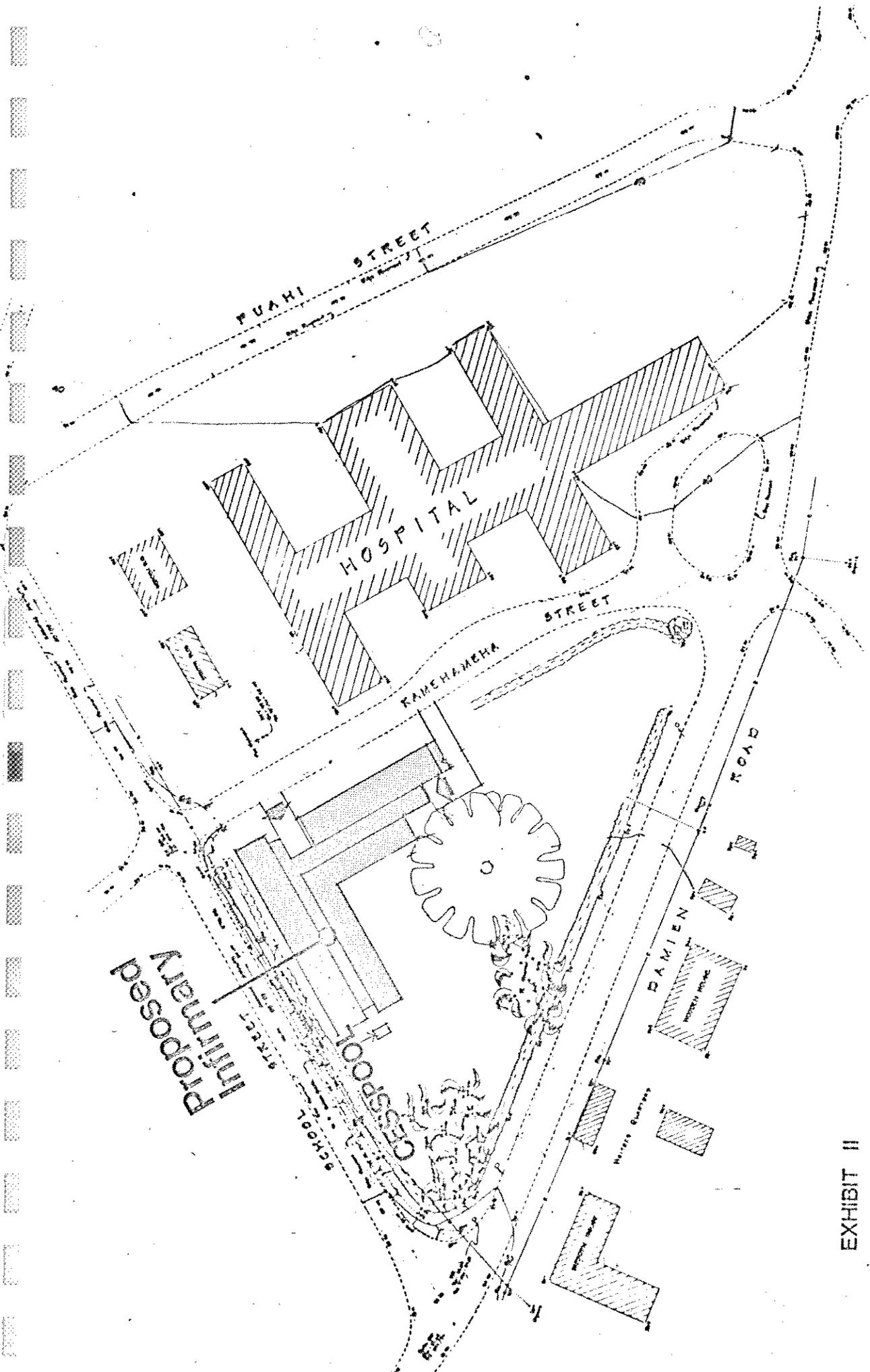


EXHIBIT II

PROPOSED SITE PLAN



E. Timing of Action

Construction of the Infirmary would be commenced in July, 1978 and take a maximum of 18 months to be completed.

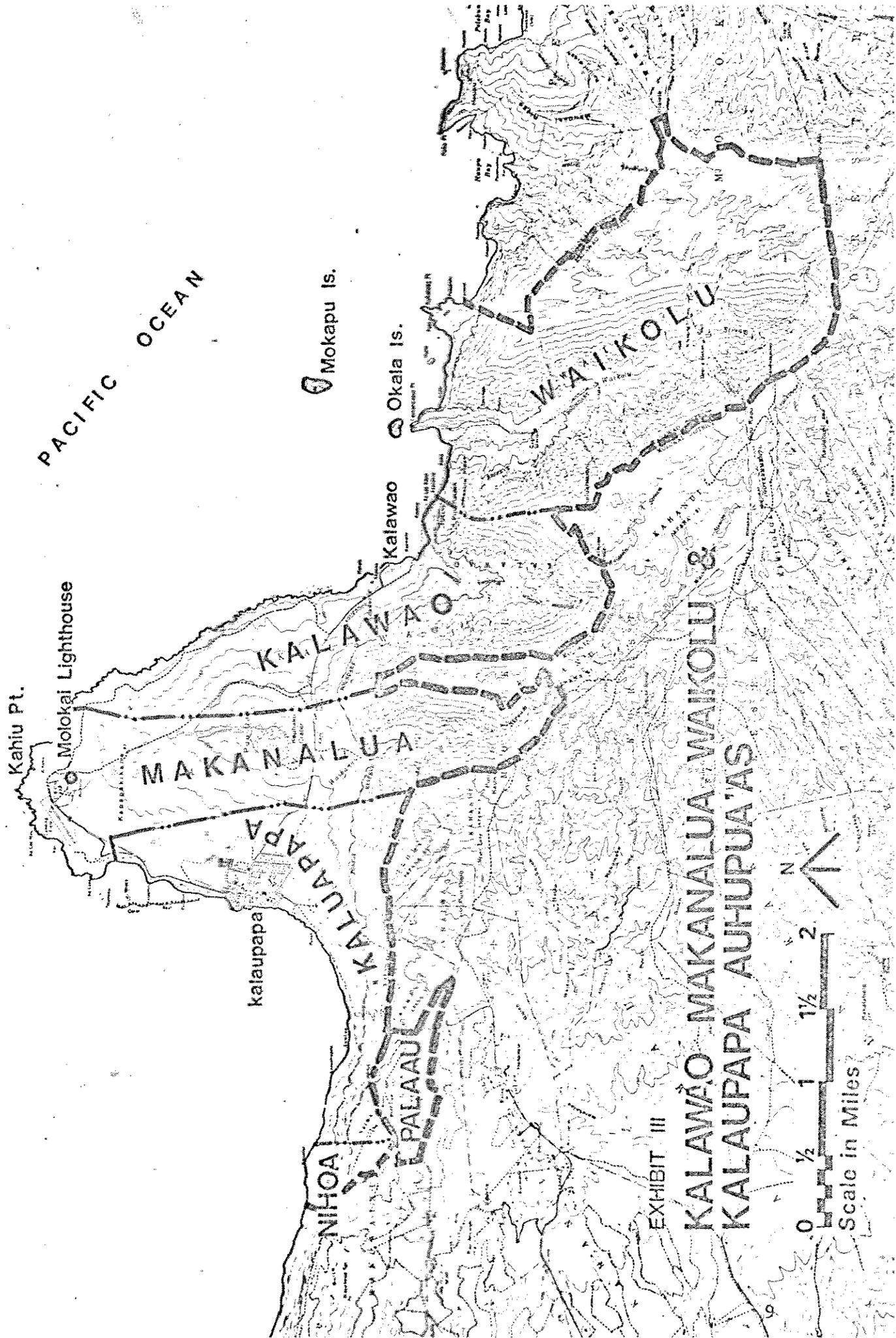
F. Historic Perspective

On January 3, 1865, when Hawaii was still an independent monarchy, an act was approved "To Prevent the Spread of Leprosy." This act specifically authorized the Minister of the Interior, acting as President of the Board of Health, to set aside government-owned lands that could serve to isolate any leprous persons, who in the opinion of the Board of Health or its agents might cause the spread of leprosy.

Chapter 33 of the law of 1870 further authorized the Board of Health, to make and promulgate any regulations necessary for the control of persons with leprosy. Such rules and regulations had the same force as a statute law of the kingdom.

The area chosen for the isolation settlement was the ahupua'a (Hawaiian land division) of Kalawao on the Island of Molokai. Kalawao along with the ahupua'a of Makanalua, Waikolu and Kalaupapa formed what the board considered to be a natural prison (see Exhibit III). During 1865 and 1866 the board acquired the houses, crops and fruit trees of the Hawaiian families living in the ahupua'a and apparently evicted the residents.

The law of 1905 (Act 39 - Law 1905) specifically established a Kalawao County as "all that portion of the Island of Molokai known as Kalaupapa, Kalawao, and Waikolu, and commonly known or designated as the Leper Settlement, shall not be or form a portion of the County of Maui, but shall be and is hereby constituted a County in itself, and as such shall have only the powers especially conferred and given by Chapter 2 of this Act and shall be known as the County of Kalawao and, except as provided in said Chapter 2, none of the provisions of this Act or any other Act relating to the Counties shall be deemed to refer to or shall be applicable to the said County of Kalawao."



PACIFIC OCEAN

Kaha Pt.

Molokai Lighthouse

kalaupapa

Mokapu Is.

Okala Is.

Kalawao

NIHOA

PALAAU

MAKANALUA

KALAUPAPA

WAIKOLU

EXHIBIT III

KALAWAO MAKANALUA WAIKOLU & KALAUPAPA AUHUPUA'AS



Scale in Miles

Chapter 2 of the same act places the County of Kalawao under the jurisdiction and control of the territorial Board of Health. This chapter further provided for a sheriff as the only county official.

Current legislation (Chapter 326, HRS, Section 24) still provides for Kalawao County to be governed by the Department of Health and states that the Director of Health may adopt rules and regulations as he may consider necessary to administer the county and all matters pertaining to leprosy. The Department of Health adopted such rules and regulations and revised them on October 20, 1969 (Chapter 27-Public Health Regulations). These regulations are still in effect today.

Leprosarium on Kalaupapa Peninsula is divided into three periods. The first may be called the Pioneer Kalawao Period which covers the time from the first landing of Lepers at the mouth of Waikolu Valley on January 6, 1866, through 1873. The second may be called the Kalawao Settlement Period which covers the time from 1873 to the year 1911 when the United States Leprosy Investigation Station closed its facilities at Kalawao. The third period may be called the Kalaupapa Settlement Period which covers the time from 1911 when the Kalawao Settlement was abandoned to the present. Presently, the community consists of 133 patient-residents, 37 non-patient employees and 3 representatives of religious orders. The only patients eligible for residence at Kalaupapa are those patients who were in residence there or at Hale Mohalu (Pearl City, Oahu) as of June 30, 1969. Therefore, these are the population that would require continuing institutional care and this population would decrease by attrition as by policy no new patients are admitted to the Kalaupapa Settlement.

The Department of Health by letter of April 8, 1976, requested that the Department of Accounting and General Services (D.A.G.S.) undertake the design and construction of the 14-Bed Kalaupapa Infirmary (see Appendix 1 for the Certificate of Need).

On April 26, 1976, D.A.G.S. determined that an E.I.S. was required for this Infirmary project. The E.I.S. preparation notice was submitted to the Environmental Quality Commission and published on its Bulletin of June 23, 1976. No one requested to be a consulted party during the 30-day period.

III. DESCRIPTION OF THE ENVIRONMENTAL SETTING

A. Physical Description and Other Environmental Factors

1. Physical Description:

Kalaupapa (means "flat leaf" in Hawaiian), as a generalized place name, includes the peninsula; the cliffs which separate the peninsula from the rest of Molokai Island; the valleys and gulches which open onto the peninsula; the shelf land of Nihoa ("firmly set") to the west and the major valley of Waikolu ("three waters") to the east (Exhibit IV).

The peninsula is a comparatively flat leaf of lava about 2.25 miles long and 2.5 miles wide, projecting out from the north coast of Molokai, and separated from what is referred to by Kalaupapa residents as "topside", by a 2,000 ft. pali. The peninsula was formed by a small shield volcano whose source is Kauhako Crater, with an elevation at its rim of about 400 ft.

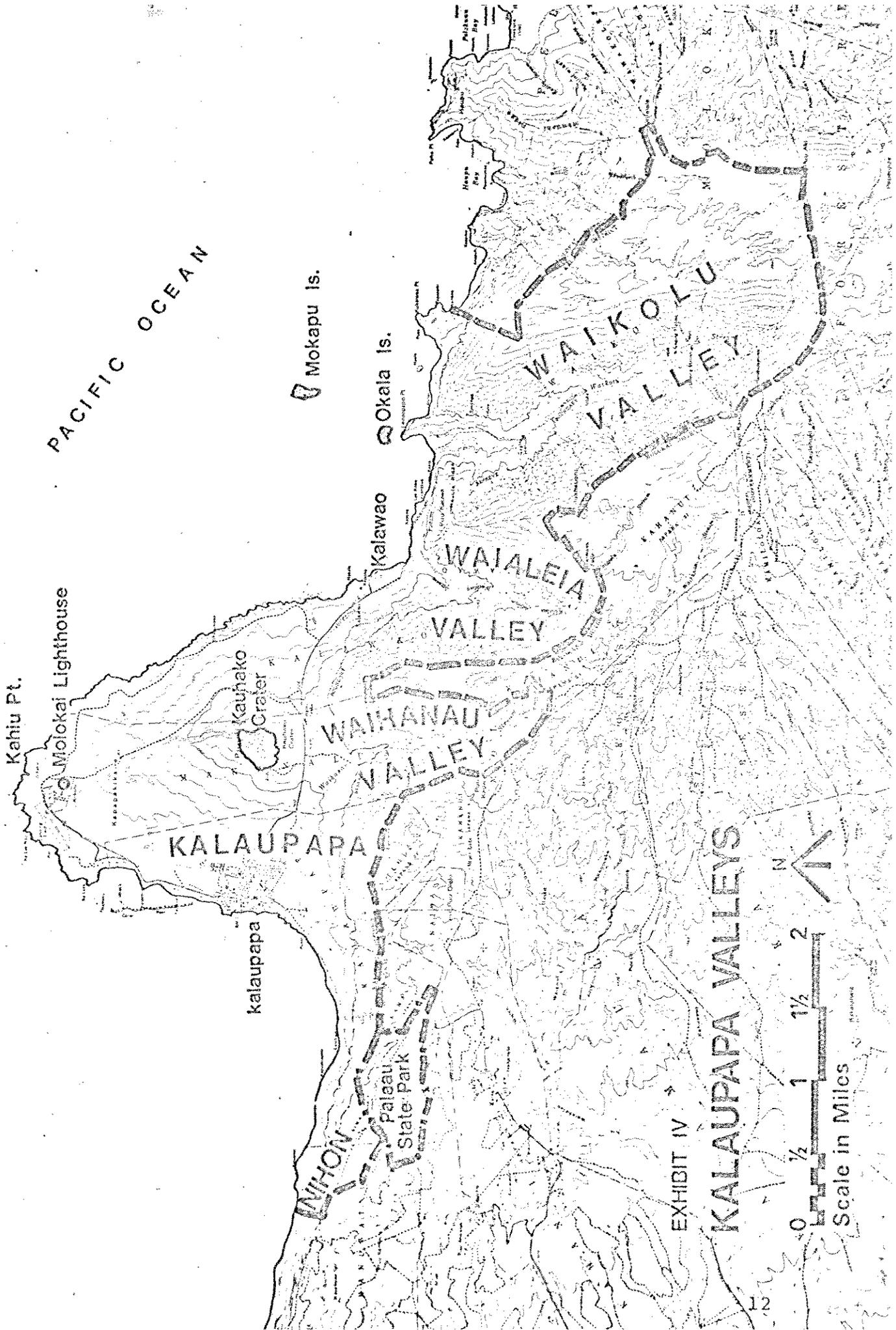
Kalaupapa is also the name of one of the five ahupua'a (Hawaiian land division). The peninsula itself contains three ahupua'a: Kalawao ("announce mountain area") on its eastern side; Makanalua ("double gift") in the middle and running from the top of the cliffs to the sea; and Kalaupapa ("flat plain") on the western side (see the previous Exhibit III on page 9).

For the purpose of preparing an Environmental Impact Statement for the Infirmary, three different scales of geographical areas are analyzed: Kalaupapa Peninsula as a regional level, the Kalaupapa Settlement of the third period of Leprosarium (described on page 10) as a district level, and the project site as the subject development area.

2. Geology and Landforms:

Kalaupapa Peninsula is a small shield volcano, 405 ft. in elevation and about two miles across at its southern base.

The Kalaupapa shield is the most recent evidence of volcanism on Molokai, occurring long after formation of the notable windward Molokai sea cliffs.



The most striking single natural feature of Kalaupapa Peninsula is the small body of water at the bottom of Kauhako Crater. It is less than one acre in surface area and has a murky greenish to yellowish brown color. But its 815-ft. depth was unknown until recent years. Such depth, especially for a water so small in surface area, results in morphological and chemical features that qualify Kauhako as one of the most unusual lakes in the world.

3. Soils:

Most of the Kalaupapa Peninsula fits into the Rockland soils group. The remainder is in the Kawaihapai soil family, which is moderately productive as grazing land. Although there has been grazing use of much of the peninsula, it is regarded as only of marginal perhaps even submarginal value. These types of soils are not suitable for commercial agriculture.

The soil series at the proposed site is Haleiwa. Detailed description for this series can be found in Appendix 2.

4. Microclimate:

Annual rainfall ranges from a minimum 17.5 to a maximum 84.0 inches and 41.7 inches of median in the Settlement. The median yearly temperature is 74°F.

The observed surface winds show that the predominant wind direction is from northeast to southeast direction. Average wind velocity ranges from 26 to 29 knots at the Kalaupapa Airfield. (It seems rather high, according to the National Weather Bureau, but there is no back up data for this windrose.

5. Tsunami and Flood Hazards

The proposed project site as well as 4 other alternative sites* considered are within the Tsunami Zone according to the potential tsunami inundation area delineated by the Hawaii Institute of Geophysics Tsunami Research Program in 1973 (see Exhibit V for the alternative sites and the tsunami zone boundary).

Only approximate boundaries of flood-prone areas are shown on this map. The map indicates that there is, on the average, about one chance in 100 that the designated areas would be inundated in any year. The map also recommends that more detailed flood information may be required for structural designs, economic studies, or formulation of land use regulations. It is suggested that such detailed information be obtained from the U.S. Geological Survey, other Federal State, local or private agencies.

Updated potential tsunami hazard analysis, obtained from Army Corps of Engineers, University of Hawaii Environmental Center and others, indicated that the 1946 tsunami had a run-up height at 28 ft. and the 1957 tsunami at 22 ft. at Kalaupapa. The 1946 tsunami was the highest in the last 31 years, and there is no evidence that any tsunami (local or distant) was higher in the last 100 years. The present hospital is at approximately 36 ft. and the lowest part of the proposed Infirmary site would be at 32 ft. elevation. It is therefore, concluded that all alternative sites are safe from tsunami hazard based on 100-year occurrence (see Chapter IX-1 for various comments on potential tsunami hazard).

* D.A.G.S. initially selected five sites and one additional site was added at a later date. When tsunami hazard was analyzed, only the initial five sites were considered. (For detailed discussion, see chapter VI on page 36).

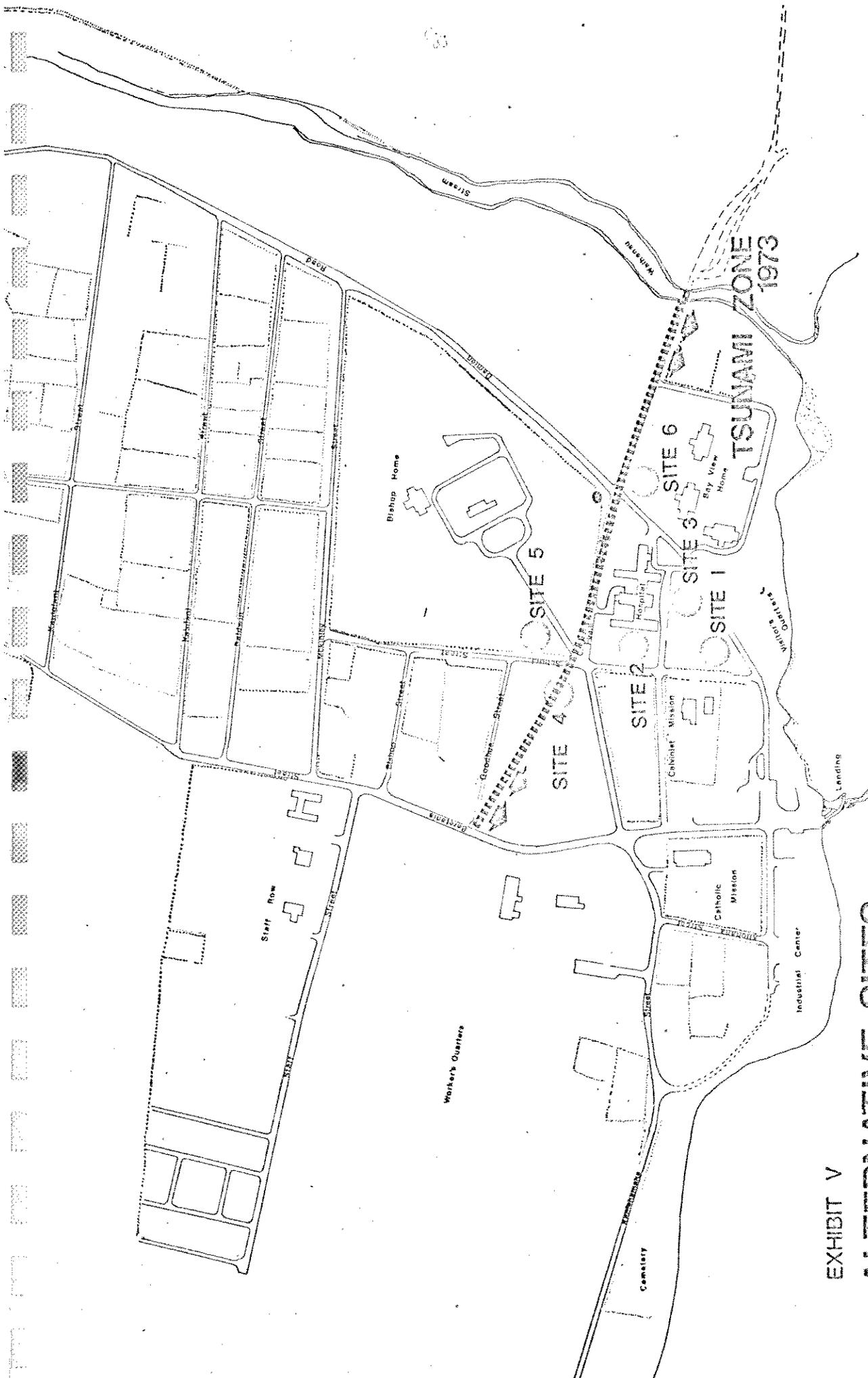


EXHIBIT V
 ALTERNATIVE SITES
 & TSUNAMI ZONE



While there is no historic evidence of flooding, Waihanau Stream, which is approximately 700 feet south of the proposed project site, appears to be the only defined watercourse in this area that could be a possible source of flood hazard.

However, analysis based on the hydrology data provided by the U.S. Army Corps of Engineers and field inspection performed on February 9, 1978 indicates that there exists no potential flood hazard by this stream for the proposed Infirmary site. Water depth calculated for the 100-year flood is approximately 13 feet. Hydraulic calculation is as follows:

1. Hydrology data provided by the Department of the Army:
 - a. 3,700 CFS 10-year frequency
 - b. 8,450 CFS 50-year frequency
 - c. 11,400 CFS 100-year frequency
2. Stream profile obtained from 1" = 100' topo map provided by the D.A.G.S. is 4.7% ±.
3. Roughness coefficient is assumed 0.035.
4. The narrowest section of the stream is 26.5' x 13' (at the location of the bridge).
5. From King's Hydraulic Handbook page 7-44.

$$K' = \frac{0.035 \times 11,400}{(26.5)^{8/3} \times (0.047)^{1/2}} = \frac{399}{1353} = 0.294$$

$$D/h = 0.50$$

$$D = \text{Water Depth} = 26.5 \times 0.50 = 13.25'$$

In addition, a crest is located between the proposed Infirmary site and Waihanau Stream. Therefore, even if the silt is built-up in the stream bed in the near future or any cause of action would create the areas in both banks inundated, the potential flood hazard to the project site is still considered nil.

B. Land Ownership and Legislative Background of Its Use

Kalaupapa ahupua'a was awarded to Kaunohua by Land Commission Award No. 645, Apana 3 in June of 1852. These lands were inherited by W.L. Moehanua who in turn conveyed them to the Minister of Interior by deed dated September 26, 1868. Consequently, the State retained ownership until the establishment of the Hawaiian Homes Act in 1920 at which time the Hawaiian Homes Commission obtained title to the Kalaupapa lands. By Section 203 of the Hawaiian Homes Act, the lands of Kalaupapa (identified as 5,000 acres, more or less) came under the control of the Hawaiian Homes Commission to be in accordance with that enabling act. The Hawaiian Homes Commission has, however, retained title only to Kalaupapa, while the Department of Health administers its use. This is due to the act approved in 1865 and subsequent legislative actions described earlier.

C. Land Use Designation and Controls

According to the State Land Use District designation, the Settlement is classified as "urban". Because no Kalawao County Zoning has been established for the area, the permitted uses in the State Urban District prevails. (See Appendix 2: Maui Planning Director's Letter). On the other hand, according to the Hawaiian Homes Lands' General Plan the Kalaupapa Settlement has been set aside in a land bank. The designation indicates that action on the land should be deferred.

"These lands shall maintain their present status within a land bank for the time being. The Department of Hawaiian Home Lands will continue management responsibilities of all lands in the land bank and any significant change in status of any of these parcels will be subject to all legal and statutory requirements. A reevaluation of the lands in the land bank as well as the entire General Plan should be made at five-year intervals."

The Hawaiian Home Land's General Plan also presents the following conclusions:

"There appears little likelihood that these lands can contribute significantly, to HHL General Plan goals of housing, agriculture or income (within the 1975-1985 planning period). Even if there were interest in homesteader residential or agricultural use, capital

investment costs to provide access, utilities and community services would be so enormously high as to be unreasonable."

The Kalaupapa Peninsula is within the Special Management Area approved by the County of Maui and therefore required to comply with the Interim Coastal Zone Management Rules and Regulations. D.A.G.S. is in the process of obtaining a Special Management Area Permit.

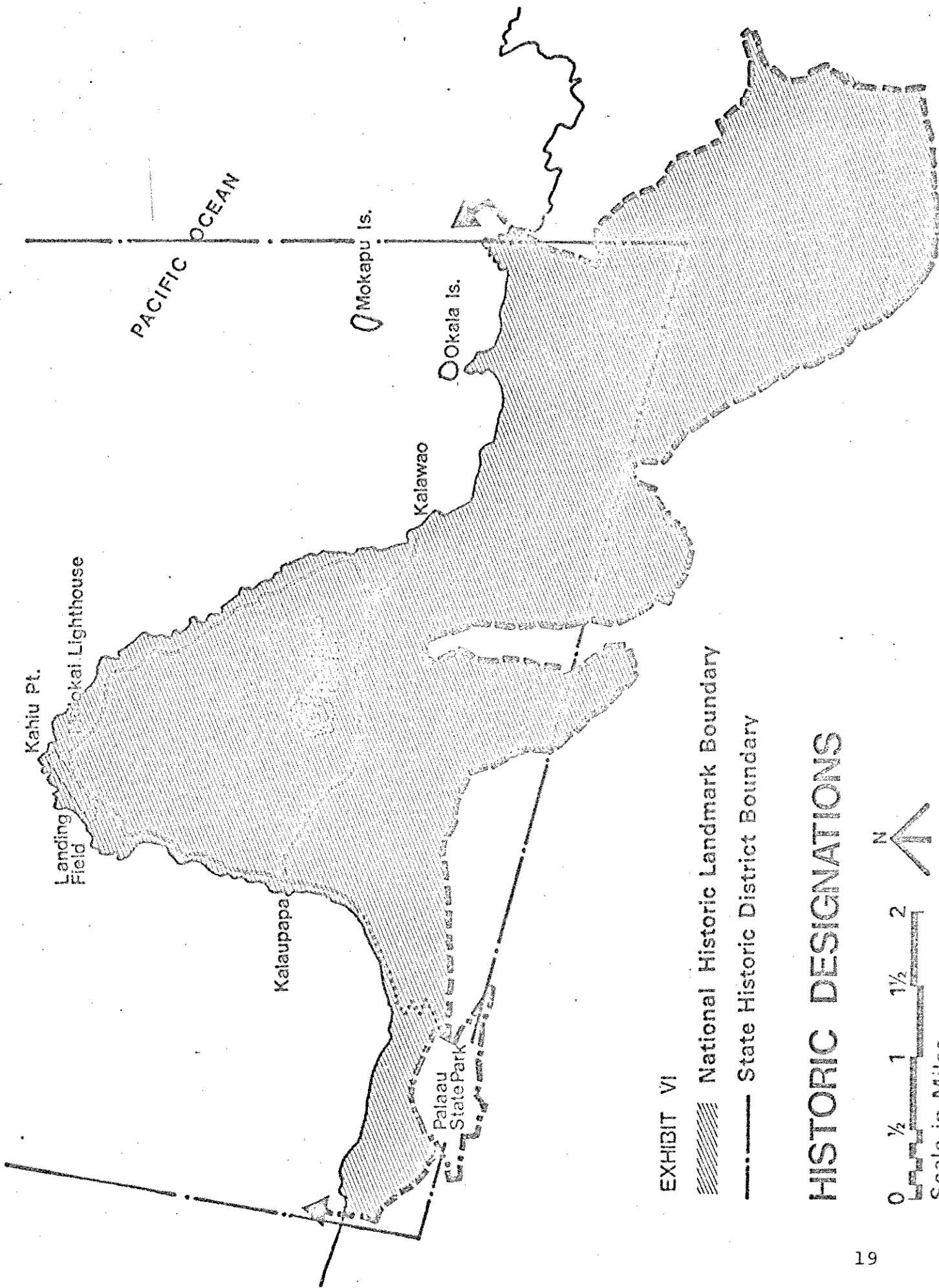
In addition, all of Kalawao County which includes the Settlement compound and offshore waters to 1,500 feet is designated as a State Historic District (October 7, 1974) and most of the same area is designated as a National Historic Landmark (January 7, 1976) (see Exhibit VI).

The Federal action placed the area's historic and archaeological sites under the regulations imposed by the National Historic Preservation Act of 1966 (Public Law 89-665). Essentially this means that no Federal money may be spent on any action that would adversely affect historic or archaeological resources, unless specific procedures as spelled out in section 106 of the act are followed. If adverse effect to these resources occur without following specified procedures, then Federal funds affected can be withdrawn. The act does not directly affect any action by the State of Hawaii so long as that action does not involve Federal funding or Federal permits.

By the State action, it is expected that the use of lands within the district would be affected by the regulations similar to those imposed by the Federal law. Specific rules and regulations are currently being formulated by the State Department of Land and Natural Resources.

D. Historic and Archaeological Factors

There is a total of about 400 structures on the peninsula and 140 structures, with perhaps 10 percent vacancy, in the Kalaupapa Settlement, including both publicly owned buildings and those privately constructed. These structures are residences, community support facilities such as offices, post office, library, churches, central kitchen, store, meat market, slaughterhouse and shops for various trades (plumbing, carpentry, painting, mechanics), blockhouses, garages and miscellaneous outbuildings.



HISTORIC DESIGNATIONS

Of these structures the following thirteen (13) buildings are specified as historic structures in the National Register of Historic Places and Exhibit VII indicates their location within the Settlement (see the Appendix 3 for the detailed building description).

Hospital: This rambling wooden structure is currently used for patients who still need to be hospitalized and as a center for all medical treatment at the settlement. It was constructed before 1939.

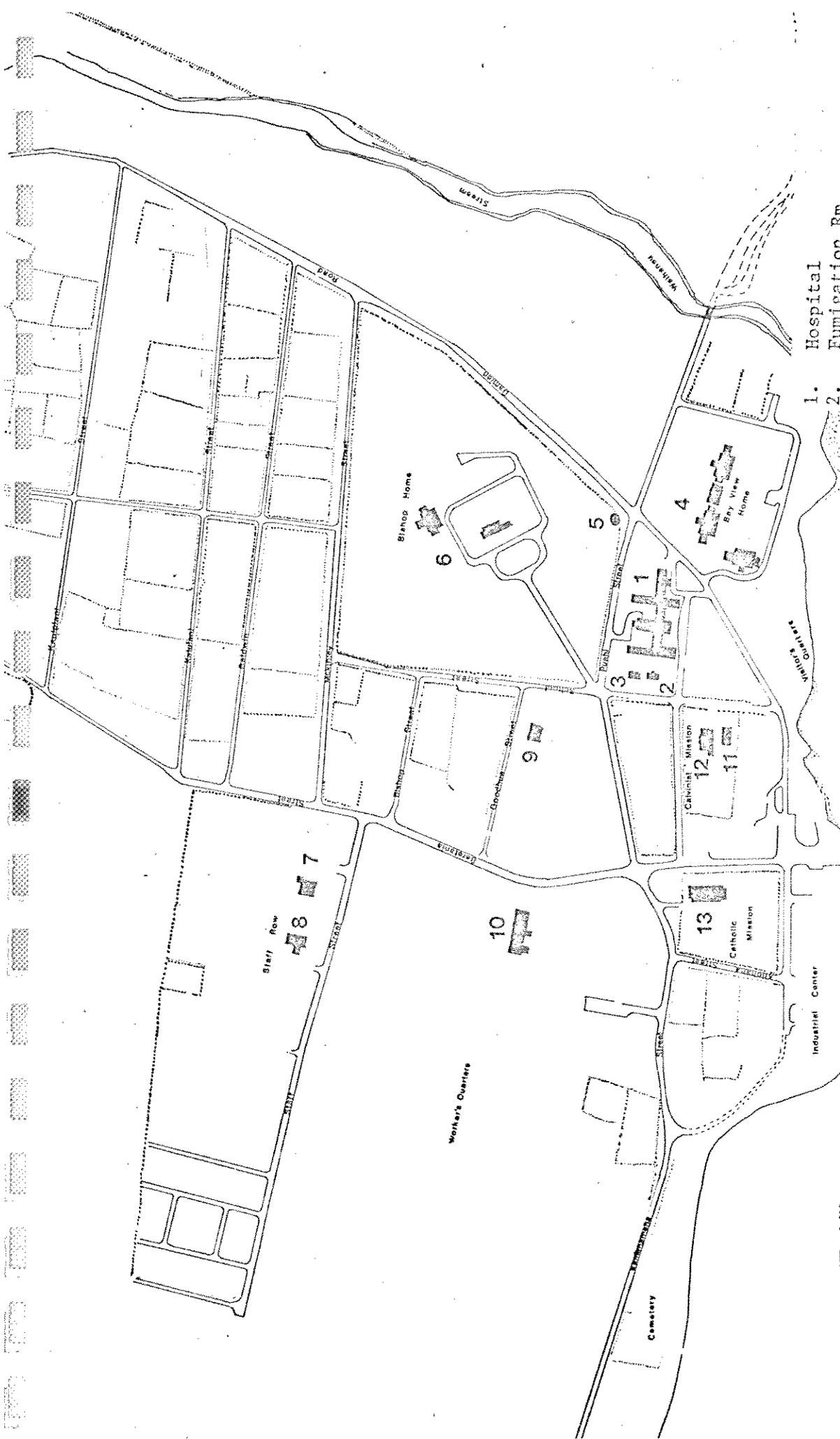
Fumigation Room: This building next to the Hospital is of historical value. The building, according to a patient, was used as a fumigation room until the 1960's. Men and women leaving the Settlement for a short period of time brought clothes there to be fumigated (to "kill the bacteria") the night before they left. Just before they left, they, too would have to be fumigated (women on the left section of the building, men on the right side of the building).

Former Out-Patient Clinic: Construction date of this building is unknown at this time, but is historically connected with the Hospital.

Bay View Home: This complex was for patients who need domiciliary care. It consists of several one-story wooden structures, all with front verandas. Most buildings are raised two feet above the grade on concrete posts, and are all oriented to each other and located in a grassy area near the ocean. They were constructed in the 1930's and except for one structure, still remain.

Damien Monument: Following Damien's death there was, in England, a wave of shock and a desire to pay some tribute. This resulted in a fund to help leprosy victims in the Empire and to provide a suitable monument. A cross of red granite and a sculptured portrait of Damien in white marble was designed by artist Edward Clifford, who had visited Damien at Kalawao in 1888. The monument still stands.

Bishop Home for Girls: The original structure was built at Kalawao in 1888. Part of the materials came from the discontinued Leprosy Branch Hospital at Kakaako, Honolulu. It was under the administration of the Board of Health, but staffed and managed locally by the Franciscan Sisters of Charity. The buildings that exist now, however, were built in about 1930, at Kalaupapa. They house the nuns who work with the patients in the Kalaupapa Settlement. All original 1888 buildings at Kalawao are gone.



1. Hospital
2. Fumigation Rm
3. Former Out-Patient Clinic
4. Bay View Home
5. Damien Monument
6. Bishop Home for Girls
7. Former Doctor's House
8. Administrator's Home
9. Goodhue Street Residence
10. Paschaol Community Hall
11. Protestant Church
12. Kanaana Hou Church
13. St. Francis Church

EXHIBIT VII
**HISTORIC STRUCTURES
 IN KALAUPAPA SETTLEMENT**



The Former Doctor's House: This is one of two remaining important structures that were part of "Staff Row", a group of houses used by the colony's employees. It is now used as the staff dining hall and its construction date is not known.

The Administrator's Home: This home, the second structure in "Staff Row", is currently being used as residence. No known construction date.

Goodhue Street Residence: A fairly preservable example of a type of architecture which is dying out in Hawaiian Islands. This structure was built around 1931.

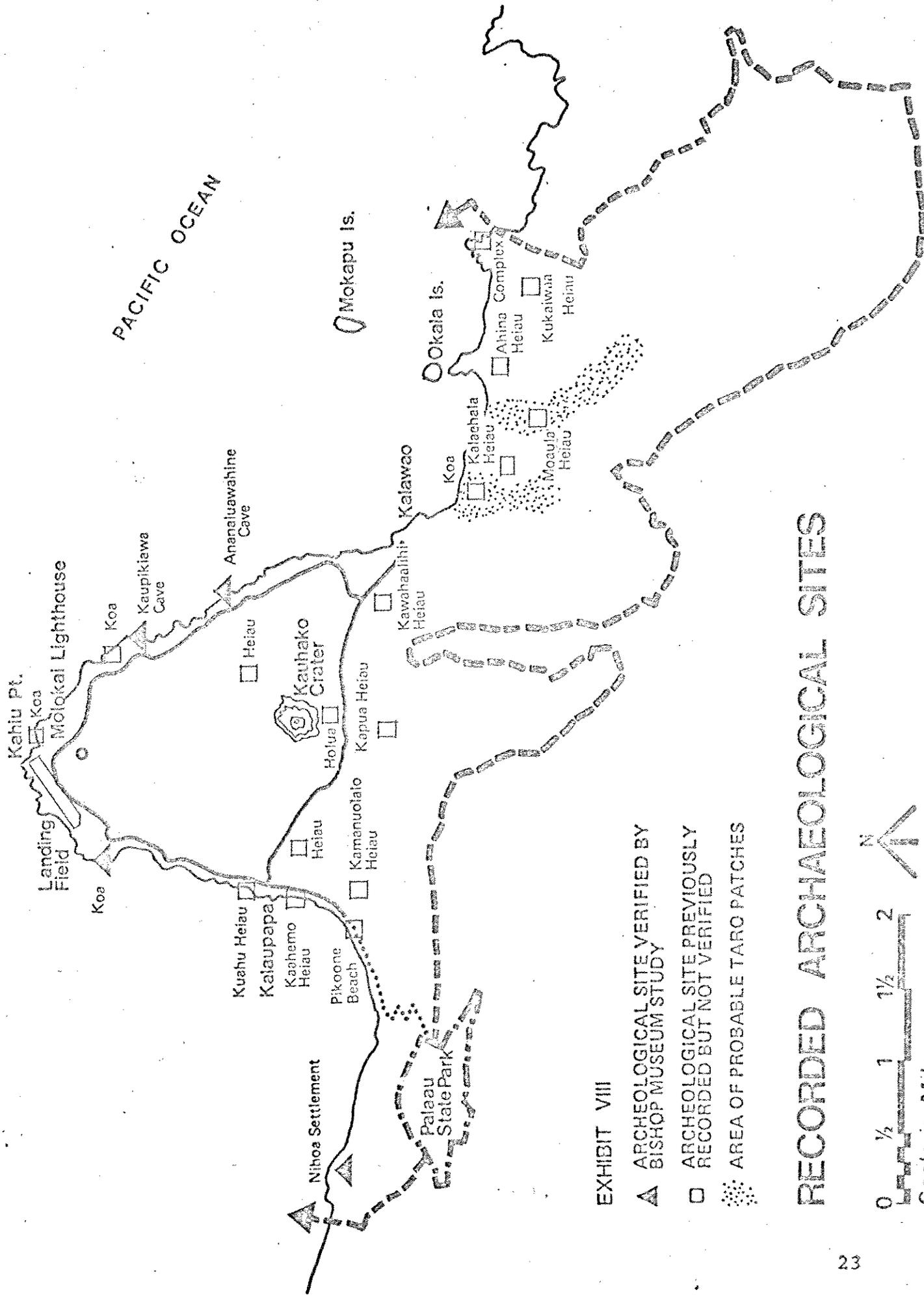
Paschaol Community Hall: This structure is a large 1-1/2 story building used for community meetings and as a movie theater. Construction date is unknown.

Protestant Church Building: In Hawaii's early missionary period, a stone church was built at Kalaupapa. It was completed in 1839, and replaced in 1847 by a larger stone building about 70 by 78 feet. This second structure collapsed and was rebuilt in 1853. Part of this rebuilt structure was blown down in an 1882 storm. The standing portion was then used as a jail and then a storehouse, its current use.

Kanaana Hou Church: (New Canaan Church). A branch of Siloama's Church was built in Kalaupapa in 1878 and enlarged in 1890. The present church building was built in 1915.

St. Francis Church: Father Damien built a small wooden church at Kalaupapa in 1874 and helped in its reconstruction in 1881. That structure burned in 1906 and the existing St. Francis Church was completed in 1908. It is a fairly large church of reinforced concrete in the Italian Gothic style, consisting of a nave about 40 by 80 ft., a full porch, a large sacristy and a high square campanile on the southeast corner.

In addition to being placed on the Hawaii and National Registers of Historic Places, the Kalaupapa Peninsula is known to have some Hawaiian heiaus and burial sites (see Exhibit VIII). Specifically, the proposed project site is believed to be a Hawaiian burial site. In order to determine the presence or absence of archaeological or historical remains an archaeological survey was conducted between October 17 and 23, 1977.



Thirteen (13) test pits were excavated (Exhibit IX). Due to the disturbed and mixed nature of the deposits on the west side of the survey, little of scientific value would result from an archaeological excavation in that area. Findings of Pit #12, however, indicates that the area may have been a site of historic building which was destroyed by fire. Therefore, it is recommended that no further work be done on the area other than between test pits between #3 and #12. This particular area should be the subject of further archaeological investigations before any construction activities take place (see Appendix 4 for a detailed report). This recommendation would be carried out and the findings would be supplemented at a later date.

E. Flora and Fauna

The entire peninsula contains a large percentage of introduced plants. Most widespread are keawe, lantana, haole koa, christmas berry, and guava. There are also numerous species of introduced grasses and other small plants. Kalaupapa Settlement itself is a carefully tended, landscaped community with landscape plantings and small areas devoted to fruit and vegetables typical of many small communities throughout the State.

One 50 ft. high banyan tree of 6 ft. in trunk diameter and 80 ft. spread is in the center of the project site. Twenty-one (21) coconut trees of 31 ft. average height are scattered around the project site, also. A part of the Kamehameha Street boundary of the project site has a 4-ft. high mock orange hedge and the Damien Road boundary has a 6-ft. high hibiscus hedge (see Exhibit X). All but three coconut trees would be preserved by the proposed construction. No endangered species exist in the project site.

Animal life on Kalaupapa peninsula consists almost entirely of introduced animals, except perhaps for some lower life forms. Beef cattle graze over most of the peninsula, axis deer which have been planted on topside Molokai are seen occasionally, and wild goats inhabit the base of the Pali. In addition, mongoose and rats are quite common.

Several species of introduced birds are present, both in the Settlement and in the surrounding open areas. The most common are the mourning dove, wild pigeon, barred dove and Hawaiian shorteared owl.

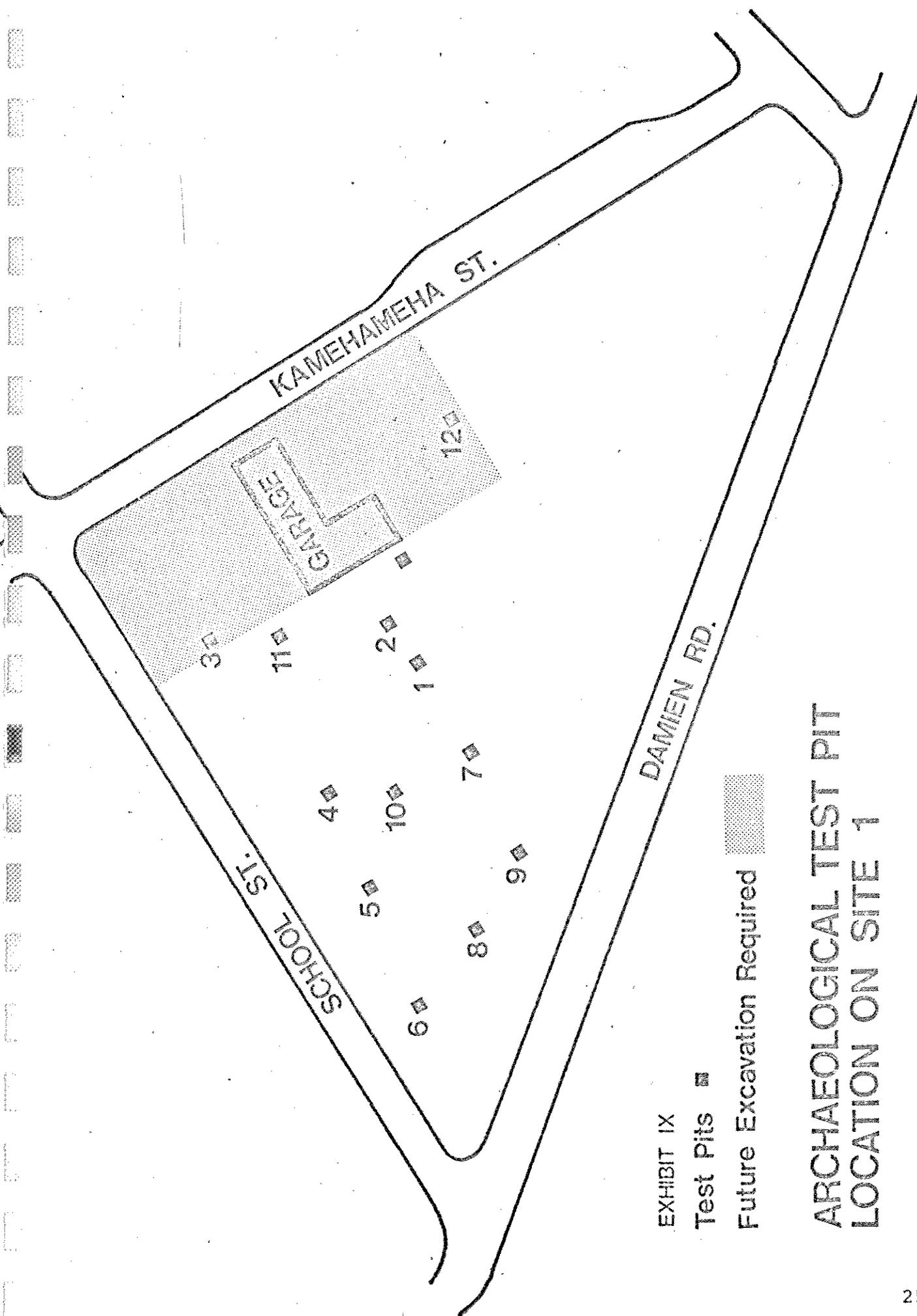


EXHIBIT IX

Test Pits ■

Future Excavation Required ■

**ARCHAEOLOGICAL TEST PIT
LOCATION ON SITE 1**



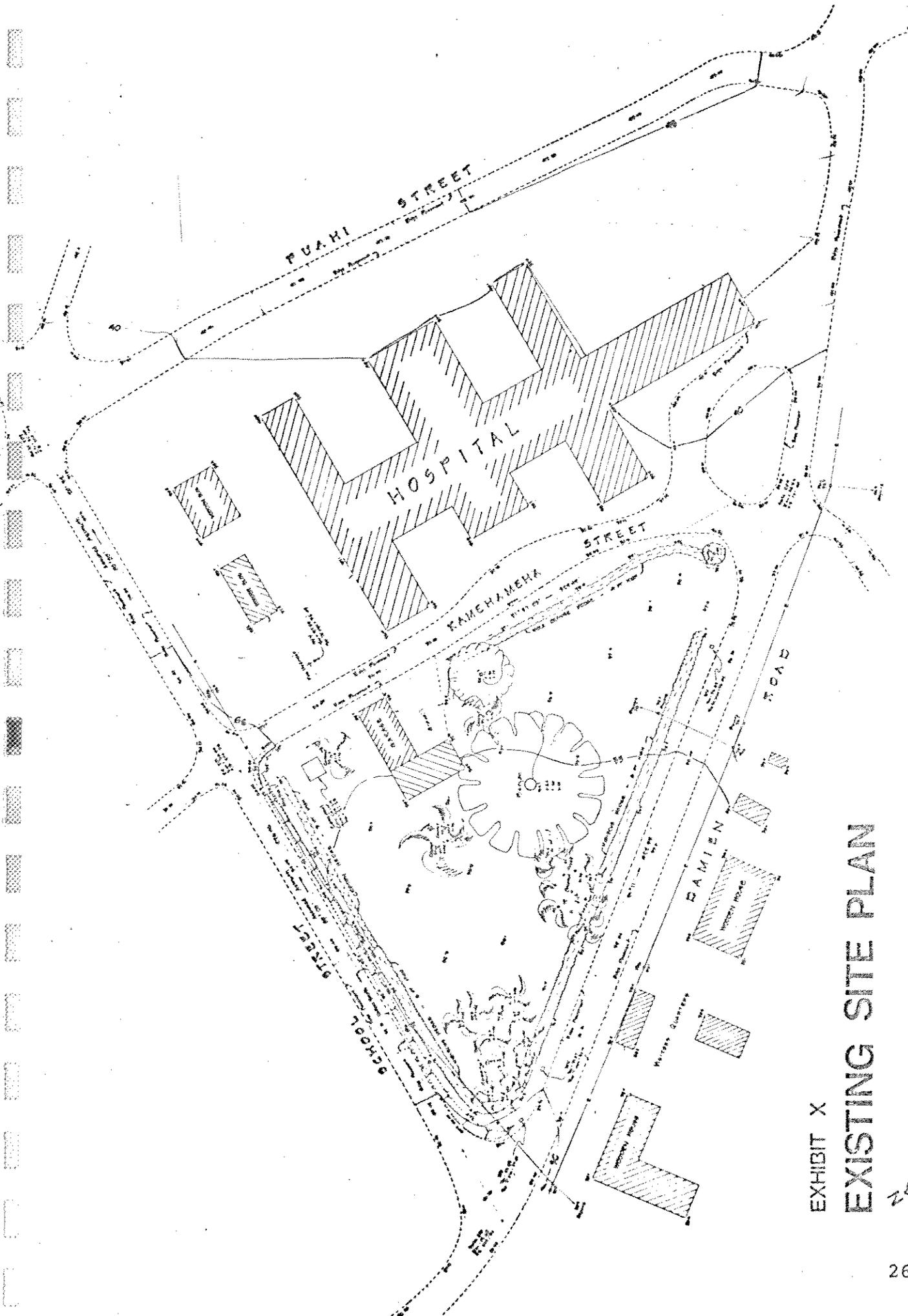


EXHIBIT X
 EXISTING SITE PLAN



F. Support Facilities:

1. Transportation:

Access to Kalaupapa and all of Kalawao County is provided by four different modes of transportation: mule, airplane, boat, and walking.

The mule train is managed by a private tour company. It comes down the switchback trail originating just outside the Palaau State Park and ending on the outskirts of the Settlement.

Royal Hawaiian Air Service has 4 regular passenger flights daily to and from Kaaanapali with Kalaupapa as a "flag stop." Brandt Airlines regularly flies in twice daily from Honolulu for mail, newspaper and perishable goods. Charter planes are also available.

The barge service, usually in July and September, is only for supplies and equipment. Occasionally, however, small sailing craft anchor off the Kalaupapa wharf area and come in by small boat.

There are essentially two routes for walking into Kalawao. The switchback mule trail from near Palaau Park takes about 45 minutes to 1 hour to descent. A much longer, rougher, poorly marked route, descends from the top of Waikolu Valley. Occasionally, upper Waikolu Valley is entered through the Waikolu water tunnel, but a vehicle is generally used for such access.

A permit from the Department of Health is required for all visitors entering Kalawao County regardless of mode of transportation.

The main transportation modes within the Settlement are mainly walking and automobiles. Kamehameha Street with irregular width of paved area is the main street leading from the Air Field to the Settlement. Kamehameha Street is branched out into Puahi Street and Damien Street (see the previous Exhibit I on page 4). The project location is served directly by Damien and School Street running mauka-makai.

2. Electricity and Telephone:

Electricity and telephone lines into and the distribution systems with Kalaupapa have been provided by local utility companies, but the State Department of Health is responsible for maintenance within the Settlement.

3. Water:

The water system is operated by the State Department of Health. The storage facilities include a 150,000 gallon redwood reservoir and a 40,000-gallon reservoir that are connected in parallel with a 750,000-gallon steel tank by a 4-inch pipeline. A 6-inch pipeline conveys the water from these storage facilities to the Kalaupapa Settlement community.

The present total consumption from the Kalaupapa system is estimated to be 216,000 gallons per day (gal/d), or an average per capita consumption of about 850 gal/d. This consumption includes domestic uses, irrigation uses for gardening and truck crops, and an undeterminant amount of overflow from the system's storage tanks diverted for random pasture irrigation.

Water quality, however, has not been the best, probably due to the age of the disinfecting equipment of the water filtration system. In order to correct this situation, Department of Health has submitted a \$50,000 capital improvement project to the 1978 legislature. This \$50,000 request is contained in the Governor's supplemental budget request.

4. Sewer:

Sewage disposal is handled by individual cesspools and maintained by the Department of Health. There have been no special sewer problems reported.

5. Solid Waste:

Solid waste is presently removed by the Department of Health and dumped as landfill at the east end of the Settlement. Contaminated waste is burned at the landfill site.

6. Police and Fire:

Kalaupapa has a police department staffed by patients who "maintains order" and processes driver licenses and vehicle registration through Maui County.

Fire protection is provided by volunteer fire fighters.

7. Medical Services:

Kalaupapa residents have a variety of medical services available to them at no cost.

The staff provides routine outpatient medical and nursing services. Around-the-clock nursing services are available at Kalaupapa Hospital and at Hale Mohalu, Pearl City, Oahu. For conditions requiring hospitalization, patients are sent to Honolulu hospitals (usually Queen's or St. Francis). Medicare premiums and additional medical costs for Kalaupapa-patients requiring care other than those available at the Settlement are paid by the Leprosy Program.

The program provides dental services once a month by a visit from dentist assigned by the Department of Health. Some Kalaupapa residents, however, choose to have their dental work done by Honolulu dentists at their own expense, including transportation.

8. Education Facility:

There is no educational facility in Kalaupapa.

9. Religious Facility:

Religious services at Kalaupapa are provided by three churches; Catholic, Protestant, and Mormon. The Catholic priest and the Protestant minister both reside at Kalaupapa. Mormon services are provided by a patient who is also a Mormon Elder. The Catholic Church has the largest congregation. (St. Philomena's Catholic Church and Siloama Protestant Church in Kalawao are only used for special occasions.)

10. Shopping Facility:

Basic goods and materials are barged in from Honolulu only twice a year in July and September. Seas are too rough at other times of the year for a landing. Perishables are flown in by Brandt Air daily.

Patients who do not take their meals at the dining rooms operated by the State are given 15-dollar credit per week to buy their food. Food and other goods are purchased at a store operated by the State. Goods are sold at cost but prices are probably slightly higher than Honolulu. This store is for patients only and is closed to non-patient civil service workers and visitors.

11. Entertainment:

For entertainment, there is a patient-owned bar which is open to anyone and full length movies are shown twice a week at Paschaol Community Hall. Entertainment groups also come to Kalaupapa occasionally and perform at the Paschaol Hall. The patients can come and go from the Settlement as they please and periodically go to Honolulu for entertainment.

12. Visitor Facility:

Visitors to Kalaupapa are required to register with the administration office and are not allowed to wander around unescorted. Moreover, visitation is kept at a minimum to minimize disturbance to the residents and they do not stay overnight unless official business or with special permission from the Department of Health. There are 12-bed lodging facilities available for overnight guests of residents. Most necessities including food should be purchased outside the Settlement and brought in for use during the visit.

G. Socio-Economic Aspects

Of the current 133 residents, 12 are employed by the State in civil service positions and about another 15 are provided employment as patient employees for mostly maintenance work. There are 73 retired patient employees living in Kalaupapa who draw monthly pensions. There is also one retired Federal employee who previously worked in the post office. The 49 civil service workers provide the necessary administrative, medical and physical support to operate the administration office, hospital, dietary service, maintenance and repair shops and library.

1. Age and Racial Characteristics:

The median age of the patient group is 58.6 years, in comparison with the 1972 estimated median age of 25 years for Hawaii residents. Males comprise about 50.2 percent of Hawaii's 1972 population and about 65 percent of the Kalaupapa population.

Over half (56 percent) of the population is of Hawaiian or part-Hawaiian ancestry, in contrast to the estimated 22 percent for all of Hawaii in 1972.

Marital Status: While 64.2 percent of adult males and 63.7 percent of adult females in Hawaii's 1972 population were estimated to be married and living with their spouses, only 45.6 percent of Kalaupapa-eligible population are married. Patient records also show that 121 have been married at least once and that of these 83 have been divorced or separated at least once.

2. Leprosy Associated Characteristics:

The age when the disease was first diagnosed ranged from 6 to 60 with a median of 20.4. The number of years they had active leprosy varies from 1 to 55 years, with a median of 19.2 years. Most of the Kalaupapa population were teenagers or young adults when leprosy was diagnosed and they were forced to become institutionalized, away from family, friends and the communities in which they grew up.

The number of years individuals have lived at Kalaupapa varies from 8 to over 50 with a median of 33.5 years. About 79 percent live independently in cottages, and about 11 percent are in Bay View Home which provides boarding house and minimal services for the partially handicapped, and for single men who either prefer living in a boarding house or are waiting for assignment to a cottage. About 10 percent are longterm residents in a nursing facility either at Kalaupapa or Hale Mohalu. Thus, most of the Kalaupapa population is self-sufficient, has adequate housing, medical services, and most other essential community services.

Eighty percent of the Kalaupapa population, however, is disabled to some degree, or blind, and there is a strong relationship between disability and age. Of the population under 50 years of age, 20 out of 54 are able-bodied whereas only 8 out of the 95 age 50 and over are able-bodied.

3. Education Level:

During a recent attitudinal survey 24 patients were queried about the number of school years they had completed. The range was from 1 to 14 and the average was 7.9. The youngest age group interviewed (41-50 years) had the highest average number of school years completed - 9.4. This compares with the median of 12 years of school completed for Hawaii 1972 residents.

4. Employment:

Approximately 84 percent are employed by or are receiving a pension from the Hawaii State Government. Detailed information is not available on other types and sources of income, but there are some very small local private enterprises such as auto repair shops and welders. The majority of those employed work at minimal hourly wages but become eligible for pensions on the completion of 20 years of work. The "patient employee" program has been developed over the years to supplement the civil service work force, to provide work therapy, to stimulate independence and self-esteem, and to offer patients the same stabilizing work-retirement opportunities available to others in the outside community. The hourly wage varies with the type of work. In 1974, the average monthly wage was \$134.93, while the average monthly pension was \$194.80.

IV. THE RELATIONSHIP OF THE PROPOSED ACTION TO LAND USE PLANS,
POLICIES AND CONTROLS FOR THE AFFECTED AREA.

The proposed project does not conflict with either the Hawaiian Home Land General Plan or the State Urban Land Use Designation policy.

The project would comply with the Shoreline Management Rules and Regulations of the County of Maui.

The proposed project does not conflict with the Federal National Historic Preservation Act.

V. ANY PROBABLE IMPACT OF THE PROPOSED ACTION ON THE ENVIRONMENT

A. Open Space

Construction of the proposed Infirmary would reduce the existing open space area.

However, the reduction of the open space would not result in reduction of outdoor recreational space due to the fact that the space is passive vacant land. Although the openness would be somewhat eliminated, effective site planning and landscaping would minimize the negative impact.

B. Water Run-Off and Drainage

There is no water run-off data available for the Settlement and no drainage problem is reported. The proposed construction would result in a very minimal increase of water run-off. Drainage improvement would be provided as required in accordance with all applicable codes and regulations.

C. Grading

Due to the relatively flat topography, grading would be minimal.

D. Noise and Dust Pollution

Construction work would create temporary noise and dust pollutions.

E. Sewage

No significant impact is anticipated by the construction of a new sewage disposal system.

F. Solid Waste

No change in the present practice is anticipated by the development of Infirmary. Construction waste would be removed from the job site to the existing landfill by the contractor during the course of construction.

G. Electricity

No significant impact on the power system is anticipated by the new Infirmary. Electricity line of the proposed Infirmary would be connected to the existing pole along School Street. The existing wooden poles may have to be replaced. However, the development of a new automatic emergency power generator would yield a significant positive impact on the emergency power use. There has not been any emergency crisis by power failure, because no surgery is performed at the hospital. However, the future use of dialysis machines by the hospital patient would be affected if the present manual emergency generator delays power generation. Therefore, the new automatic generator must be developed to prevent a possible delay of power generation.

H. Public Safety

The proposed project would not jeopardize public safety during and after construction. The proposed facility would greatly improve public safety of the patients.

I. Historic Buildings

The construction of the Infirmary would generate significant impact on the adjacent historic buildings and on the general historic environment. One of the complex and controversial issues confronting the design profession and preservationists is the design relationship of new architecture in both old and historic setting. Designing a structure that not only meets the needs of the facility but also relates in detail and spirit to its environment is a challenge that entails a multitude of considerations and constraints.

Three historic buildings -- Hospital (Building #282), Fumigation Room (Building #283) and Former Out-Patient Clinic (Building #7) on the lot across from the project site were built in the early 30's. These are wood frame buildings of single wall construction. The Hospital's foundation consists of concrete footings and wood posts and most of it is camouflaged by a latticework skirting. The foundation of the Fumigation Room consists of a thick concrete slab.

The proposed Infirmary would be designed so that its bulk would not dominate the neighboring historic buildings and the general historic settings of the Settlement. In order to insure the sensitivity of the Infirmary design, design review would be conducted by the State Historic Preservation Office as well as by the Maui (Molokai) Design Review Board.

J. Social Impact

The proposed construction would have significant impacts both on the patient residents and construction crews during the construction. The construction would be the first major construction implemented in the center of the Settlement in recent history. (The last major construction was around 1961 of the Administration Building.) Although residents are well informed of the proposed Infirmary prior to the implementation,* the actual construction activity of long period (a maximum of 18 mos.) by outside crew members could be a stimulant.

At the same time, the Infirmary construction would significantly affect the construction crews. Working in an isolated area with dormitory-like lodging and meals is not a common experience the construction crews would have.

It is estimated that on a normal work day, there will be approximately 12-15 construction workers at the jobsite and for a short duration at the peak of construction, about 25 construction workers will be employed. The Settlement has available 12 beds for the workers. Additional beds are available at the visitors' quarters if they are vacant. The General Contractor will probably utilize the permanent quarters and the subcontractors may need to set up temporary tents for overnight accommodations or fly in their men on a daily basis. Meals will be provided by the Hospital staff mess hall.

*On December 6, 1977, the Department of Health held a public hearing at the Settlement's Paschoal Hall with the staff, residents and patients to discuss the site and schedule for the construction of the infirmary. In addition, on February 9, 1978, the Department of Health held a meeting again at Kalaupapa to discuss the schematic plans with emphasis on the floor plan and appearance of the building. Both meetings were very constructive and the patients are looking forward for the construction to begin.

Normally, construction workers will fly in early Monday morning to report to work and depart on Friday evening or early Saturday morning. It will be too costly (air fares and lost travel time) and strenuous to commute daily on a small aircraft for an extended period of time.

For a long term impact, the development of Infirmary would assure the patients of medical and nursing cares in a modern treatment facility. This would also significantly affect the patient's "home" life in Kalaupapa by being able to obtain the necessary care in most situations without leaving Kalaupapa. Residents would be assured of the State's concern of their welfare by the Infirmary construction.

VI. ALTERNATIVES TO THE PROPOSED ACTION

Two (2) alternatives were considered to the proposed project. One is to repair and improve the existing hospital and continue to use it. The existing hospital requires the following improvements to meet the present health and fire safety codes and regulations:

1. Relocation and/or replacement of walls and ceiling with gypsum board.
2. Repairs to roof and floors.
3. Repairs and/or replacement of plumbing and electrical systems.
4. Installation of sprinklers in attic, living areas and beneath floors.
5. Smoke detection system at strategic locations.
6. Other miscellaneous work.

However, future codes and regulations and/or high maintenance and operational costs would probably necessitate the eventual construction of a new facility. In addition, it is doubtful that the eventual modification of the exterior of the building including roof-line would be possible while the building is recorded as historically significant in the State and National Registers of Historic Places.

A second alternative considered to the project is selecting a different site. D.A.G.S. initially has selected five sites and one additional site was selected at a later date (see the previous Exhibit V on page 15).

Brief description of 6 alternative sites are as follows:

Site #1

1. It is close to the existing Hospital and Bay View Home.
2. It would have less noise and dust impacts to the neighboring residents during the construction due to the prevailing north-south wind direction.

3. It has an ocean view and the 50-ft. high banyan tree and coconut groves would provide pleasing design effects.
4. It is close to Visitor's Quarters and visitors who stay overnight sometimes generate disturbing late night noise.

Site #2

1. It is close to the existing Hospital and Bay View Home.
2. It would give direct noise and dust problems to the abutting hospital patients during the construction.
3. Its lot area is not large enough for the proposed Infirmary.
4. It is in the same site of two historical buildings - the Fumigation Room and the Former Out-Patient Clinic.

Site #3

1. It is close to the existing Hospital and Bay View Home.
2. It would have less noise and dust impacts to the neighboring residents during the construction due to the prevailing north-south wind direction.
3. Its narrow lot size limits the flexibility of building design.

Site #4

1. It is farther removed from the existing Hospital and Bay View Home.
2. It is in the same site of a historical building - Goodhue Street Residence.

Site #5

1. It is farther removed from the existing Hospital and Bay View Home.
2. Its rocky slope would require extensive grading and foundation engineering.
3. Its "undisturbed" condition would require an intensive archaeological survey.

Site #6

1. It would give direct noise and dust problems to the Bay View Home residents during the construction.
2. It might have foundation problems since the 8-ft. fill was not an engineered fill.

The patients consented to the selection of the Site #1, the proposed project site. The reasons for selecting the proposed site out of six sites are as follows:

1. Proximity to the Bay View Home where most of disabled out-patients live.
2. Proximity to the existing hospital.
3. Prevailing wind direction.
4. Existing Banyan tree and coconut groves.
5. Ocean view.
6. No historic buildings on the site.
7. Flat topography

A great portion of out-patients the Infirmary would service are those living in the Bay View Home. They are usually infirm and some are blind or have some other physical impairment. For these patients traveling even a regular city block distance is considerably painful and confusing. Therefore, the hospital administration and the patients recommend that the new Infirmary should be as close as possible to the Bay View Home.

Due to the limited budget, the proposed Infirmary of 14-beds would not sufficiently accommodate extra facilities, such as therapy room, general supply room and pharmacy room. Therefore, the hospital administration staff strongly feel that at least a part of the present hospital should be used as a support facility to the new Infirmary. In order to do that, the new Infirmary should be built close to the existing hospital.

Prevailing wind of northeast toward ocean would create considerably more dust and noise problems to the existing hospital patients and Bay View Home residents, if other site is selected.

Existing banyan tree and coconut groves of the proposed site would be a great asset to the Infirmary design. The trees would also provide pleasant shade to the resident patients of the new Infirmary.

Only the proposed site yields a view of the ocean and Infirmary building design would include this added aesthetic value.

Although the proposed site is close to the historic buildings such as Hospital, Fumigation Room, Former Out-Patient Clinic and Bay View Home, but these buildings would not be replaced by the proposed construction.

On the other hand, Site #2 is proposed where Fumigation Room and Former Out-Patient Clinic buildings are and Site #4 where Goodhue Street Residence is. (The State Historic Preservation Officer recommended a further research on this building before a decision is made regarding its retention or removal. See Chapter XI-3).

Flat topography of the proposed site requires a minimal grading while other sites may require considerable grading and excavation of rocks.

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

Inherent in any proposed action is a trade-off between short-term gains at the expense of long-term losses and vice-versa.

The construction of the Infirmary is no exception. The proposed development commit the site to its best use -- hospital use. The short-term benefit associated with it is the provision of needed medical and health services in the Settlement.

The development of the Infirmary on the site represents a commitment of this land for that use. It therefore forecloses the option of setting aside the area for the permanent preservation of open space. However, a great amount of additional open space is preserved in the Kalaupapa Peninsula for the potential use of future generations as they see fit.

In addition, in the future when the social, economic and political atmosphere dictates a change in the use of the Settlement area for something other than leprosarium and the Infirmary facility ceases its function, the relationship between the facility and the new use would be changed.

It is possible in the future that the Settlement area would become some type of park. By HR 12012, 93rd Congress 1st Session and HR 11180, 94th Congress 1st Session (Dec. 1975), U.S. Congress authorized and financed a study to determine the feasibility of establishing a unit of the National Park System at Kalaupapa. In addition, during the 94th Congress 1st Session House Joint Resolution 220 authorized the Secretary of the Interior to acquire all lands in Kalawao County and formulate a plan for preservation of the area's scenic and historic resources.

Near the end of the 2nd Session of the 94th Congress, a study was authorized as part of Public Law 94-518 to investigate the feasibility of establishing Kalaupapa as a National Historical Park.

The State of Hawaii also expressed great interest in preservation of resources at Kalaupapa. In 1975 the State Legislature passed 11 resolutions regarding studies for Kalaupapa. Some were directed toward State Historical Park Status and some requested studies to analyze possible national

historical park status such as the present Hospital, Calvinist Mission, Bay View Home (Building #2 and 3), etc., which would probably be preserved in the future and opened to the public for viewing.

Therefore, a consideration is given to the possible future use of the Infirmary when the Settlement is closed. When the Settlement area would become a park, it would probably require a visitor center. In order not to interfere with any possible future park-oriented development, a smaller corner lot would be appropriate for the Infirmary. In addition, the Infirmary would be easily converted to some sort of a visitor center with magnificent Banyan tree and coconut groves in its courtyard overlooking the landing area. This would be also easily accessible from historically significant buildings, such as the present hospital, Calvinist Mission, Bay View Home buildings which would probably be preserved in the future and open to the public for viewing.

IX. IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

The commitment of resources required to accomplish the project includes labor, energy, and material which is irretrievable. The land which would be disturbed could be irretrievable. The labor and materials expended during the maintenance of the project will also be irretrievable.

However, the proposed action would destroy no significant improvement and displace no people since the site is presently vacant.

X. ORGANIZATIONS CONSULTED

A. Federal Agencies

1. Department of the Army, Corps of Engineers
2. National Park Service
3. Department of Commerce, National Weather Service,
Water and Land Development Division

B. State Agencies

1. Department of Health
2. Department of Land and Natural Resources
3. State Historic Preservation Office
4. Office of Environmental Quality Control
5. University of Hawaii, Environmental Center

C. County Agencies (Maui)

1. Planning Department

XI. REPRODUCTION OF COMMENTS AND RESPONSES MADE DURING THE CONSULTATION PROCESS

List of Comments

		<u>Comment Date</u>
A.	<u>On Tsunami Hazards</u>	
1.	Dept. of the Army, Engineering Division	10/7/77
2.	University of Hawaii, Environmental Center	10/4/77
3.	U. S. Dept. of Commerce, Environmental Research Lab	10/14/77
4.	Dept. of the Army, Corps of Engineers	10/19/77
5.	University of Hawaii, Environmental Center	11/4/77
B.	<u>On Land Use Designation</u>	
	County of Maui, Planning Department	10/4/77
C.	<u>On Historic Buildings</u>	
1.	Dept. of Land and Natural Resources, Preservation Office	8/23/77

XI-1

Opinions on Tsunami Hazards in Kalaupapa,
October 7 - November 4, 1977



PODED-PF

DEPARTMENT OF THE ARMY
U. S. ARMY ENGINEER DISTRICT, HONOLULU
BLDG. 230, FT. SHAFTER
Hawaii 96858

7 October 1977

Mrs. Duk Hee Murabayashi
Urban 9
926 Bethel Street
Honolulu, Hawaii 96813

Dear Mrs. Murabayashi:

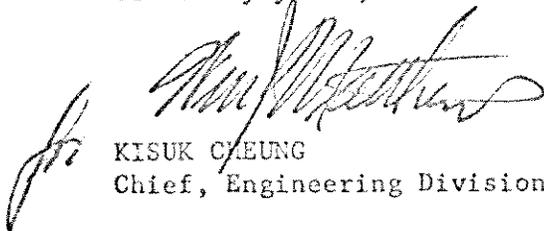
We have examined the sites for the proposed Kalaupapa Infirmary on Molokai for possible tsunami and flood hazards as requested in your letter of 22 September 1977 and have the following comments:

a. The sites are not subject to tsunami hazards having a 100-year recurrence interval. Based upon a recently completed tsunami frequency study by our office, the 100-year tsunami elevation in the vicinity of sites being studied is approximately 27 feet (msl datum), and the lowest site you are considering is at elevation 32 feet.

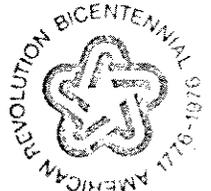
b. Waihanau Stream, which is approximately 700 feet south of the sites being studied, appears to be the only defined watercourse in this area that could be a possible source of flood hazard. We could find no historic evidence of flooding from Waihanau Stream. No flood hazard studies have been completed. A discharge frequency analysis indicates peak discharges of 3,700, 8,450, and 11,400 c. f. s. for the 10, 50, and 100-year floods, respectively.

Since the facility being studied is State owned, our authorities allow us to provide further planning services if required. If additional information is needed, please contact Mr. John Pelowski in our Flood Plain Management Section at 438-2883. Your topo map is inclosed as requested.

Sincerely yours,


KISUK CHEUNG
Chief, Engineering Division

1 Incl
As stated





University of Hawaii at Manoa

Environmental Center
Crawford 317 • 2550 Campus Road
Honolulu, Hawaii 96822
Telephone (808) 948-7361

Office of the Director

October 4, 1977

SR: 0014

Mr. Hideo Murakami, Director
Department of Accounting
and General Services
State Capitol
Honolulu, Hawaii 96813

Dear Mr. Murakami:

TSUNAMI HAZARD AT PROPOSED SITES FOR KALAUPAPA INFIRMARY, MOLOKAI

Introduction

The tsunami research group at the Hawaii Institute of Geophysics was asked by Urban 9, consultants to DAGS in planning for a new infirmary at Kalaupapa, Molokai, to advise on the tsunami hazard at proposed sites for the infirmary. The staff member of that group most familiar with the historic record to tsunamis in Hawaii and with tsunami zoning proposals is out of state. Hence, the Urban 9 request was brought to my attention. I have been and continue to be involved with historic and frequency studies of tsunamis and with past schemes and proposals for tsunami hazard zoning.

When management criteria for the natural hazards have been officially adopted, I believe that it is the responsibility of the proposers of developments, permitting agencies, and their consultants to apply the criteria to proposed developments. At present, however, the only tsunami hazard zoning that has been officially adopted is that establishing the evacuation zone for tsunami warnings. The prohibition of construction within all of this zone would, however, be over-protective. More pertinent, I believe, to the evaluation of the tsunami hazard at the proposed sites for the infirmary will be the methods used in the establishment of the coastal high hazard zone under the Federal Flood Insurance Program. Unfortunately these methods have not as yet been officially approved, or even completely developed. Hence, it appears appropriate that the University should provide much more guidance to the estimation of tsunami hazards, than would otherwise be the case.

In anticipation that a request will be made by DAGS, as discussed with you and with George Yuen, Director of Health, I am, providing the information desired by Urban 9, and sending a copy to Urban 9. Because the information provided represents my personal opinions, I am sending copies of this report to a number of persons who have expert judgement at least equivalent to mine on specific parts of the means of estimation I have used with, a request that they advise you of any contrary opinions or suggested alternative estimates.

Coastal high hazard zone criteria

In the Federal Flood Insurance Program the criterion for establishing the flood hazard zone is the 100-year flood, that is the flood is expectable, on the average, to occur once a century, or 0.01 times per year. It is proposed that the criterion for the coastal high hazard zone in Hawaii be the 100-year tsunami inundation zone. There are very few recorded inundation distances for historic tsunamis, but many more records of the runup heights of historic tsunamis especially in the last 31 years. From the runup heights, inundation distances may be estimated. The runup height of a tsunami varies greatly from place to place. Hence the estimation of 100-year tsunami runups must be site specific.

Since the historic record is inadequate to establish the frequency distribution of tsunami runup except at perhaps these sites, the distribution for most sites must be based on runup records of the historic tsunamis at other sites and analytic methods that permit inter-site adjustments of runup information and estimation of runup heights based on source strength, characteristics, and location.

The means of estimation of runup height-frequency distributions that will most probably be used for the most part are those that have been proposed by the Waterways Experiment Station (WES) of the Corps of Engineers in a report as yet available only in draft (Houston, J.R., R.D. Carver, and D.G. Marbele, Tsunami Wave-Elevation Frequency of Occurrence for the Hawaiian Islands). Their method is based on the Hawaii Institute of Geophysics finding (Cox, D.C., Tsunami height-frequency relationship at Hilo, Hawaii Institute of Geophysics, 1964) that, at Hilo, the runup heights of the major tsunamis have approximately linearly correlated with the frequency of their occurrence or exceedance. This finding may be generalized in the expression:

$$H_s = -b_s - a_s \log_{10} F \quad (1)$$

where H_s = runup height at site s in feet above mean sea level

F = frequency of occurrence of tsunami with runup height equal to or greater than H_s

a_s and b_s = site-specific coefficients.

The runup heights, H_s , are to be taken as applicable 200 feet inland from the shoreline unless there is evidence that, at a site, the measurements of historic tsunami runups applied elsewhere.

To estimate runup heights at other distances from the shoreline and to estimate inundation distances, the method that will most probably be used is proposed by the Look Laboratory, University of Hawaii (Wybro, P.G., On the determination of tsunami inundation and forces for the State of Hawaii, Look Laboratory Technical Report 40, 1976).

Distant tsunamis

Runup height-frequency distributions for distant tsunamis have been estimated for Hawaiian coastal sites generally by WES. In their analysis WES considered the 16 highest tsunamis in the period of record of 140 years and applied a regression analysis to the estimated runup heights of those ten tsunamis that were highest at each site. The results have been reported in the draft report by Houston et al. (op. cit.) in the form of plots of the coefficients a_s and b_s in equ. (1) by site. The coastal site pertinent to the Kalaupapa infirmary problem is Molokai site 18 on the west coast of Kalawao peninsula.

Substituting the values of the coefficients for site 18 in equ. (1):

$$H = -46 - 35 \log_{10} F$$

$$= 35 \log I - 46$$

where I = average recurrence interval in years.

This runup height-frequency distribution for distant tsunamis is plotted in an attached figure.

Substituting $F = 0.01$ or $I = 100$, the 100-year distant tsunami runup height at site 18 is:

$$H = 35 (2) - 46 = 24 \text{ feet msl.}$$

It should be remembered that this does not take into account the hazard of tsunamis locally generated in Hawaii.

Local tsunamis

In a study of local tsunamis in Hawaii (Cox, D.C. and J. Morgan, Local tsunamis in Hawaii--History, Generation, Distribution and Frequency, Hawaii Institute of Geophysics, in press) we have found historic evidence for the possible occurrence of 21 local tsunamis. Of them, however, only five had significant runup heights on the north coasts of Maui, Molokai, and Oahu. These were:

Probable Maximum Runups

<u>Date</u>	<u>Place</u>	<u>Feet</u>	<u>Existence</u>
1848 July ?	Maliko ?	11	Questionable
1860 Dec 1	Maliko	12	Questionable
1862 Jan 28	Waialua	8	Very doubtful
1878 Jan 20	Maliko	12	Very doubtful
1903 Nov 29	Honokohau	30	Questionable

The only information on the effects of these on Molokai is the following:

<u>Date</u>	<u>Place</u>	<u>Feet</u>
1862 Jan 28	Possibly observed on Molokai	
1903 Nov 29	Probable maximum runup at Pelekunu	13
	Possible runup at Kalaupapa	13

The possible runup of the latter at Kalaupapa is based on account in the Hawaiian Star (2 Dec 1903) that freight could not be landed there and an account in the Hawaiian Gazettee (4 Dec 1903) that two homes were washed away there.

Morgan and I will be making as good estimates as possible of the runups of other tsunamis at coastal sites where they were not measured or cannot be directly estimated from descriptions of effects. For the present, it seems reasonable to assume that there may have been two historic local tsunami runups of significance at Kalaupapa, one 13 feet and another, say, 5 feet.

Combination of local and distant tsunamis

The problem now is to combine the estimated hazard of distant tsunamis with the estimated hazard of local tsunamis. I have proposed that, for each coastal site, the WES tabulation of estimated runups of distant tsunamis be combined with a tabulation of our estimated runups of local tsunamis, and that the frequency distribution of the combination be estimated in the form of equ. (1), in accordance with the method used by Houston, et al., by the regression of the runup heights of the 10 highest tsunamis (regardless of origin) on log frequencies of occurrence. However, I do not have available the WES estimates of the runup heights of the distant tsunamis.

As a first approximation, the runup heights of the 10 highest distant tsunamis in the period of record may be taken as the heights associated by the Houston et al. distribution function with $F = N/140$, where $N = 1, 2, \dots, 10$. These runup heights are indicated by x's in the attached figure. However, the distribution function goes to zero at $F = 0.49$ ($N < 7$). Further, in listing for the 10-year runup at site 18 the value of 1.0 feet, Houston et al. imply that either the 14-year tsunami or the 10th highest historic tsunami runup at site 18 is about $1\frac{1}{2}$ feet. If the values of the 7th to 9th highest distant tsunamis were equal to or greater than $1\frac{1}{2}$ feet, (higher than indicated by the Houston et al. regression line), the runups of the higher tsunamis must have been lower, on the average, than indicated by the regression line, otherwise the regression line would be higher. However, if the runups of the 2nd to 6th highest tsunamis were lower than indicated by the regression line, the runups of the highest couple of tsunamis must have been higher than indicated by the regression line, otherwise the regression line would be steeper.

I have indicated by +'s in the attached figure a set of runups for the 10 highest distant tsunamis, of which the smallest is equal to $1\frac{1}{2}$ feet, and which are so distributed that the regression line would still be about where indicated by the Houston et al. coefficient a and b.

If the 13-foot and 5-foot local tsunami runups are included with the distant tsunamis runups so estimated, the runups of the 10 highest tsunamis (regardless of origin) would be as indicated by o's in the attached figure.

The above described means of estimation is so crude that I do not consider justified the application of least squares regression to the results. Instead I have simply drawn by hand a line that is roughly parallel to the Houston et al. regression line, but is displaced upward to account for the higher runup values resulting from the inclusion of local tsunamis with distant tsunamis. If anything the runups indicated by this line are probably too high.

The 100-year tsunami runup (200 feet inland from the shoreline at Kalaupapa) indicated by this line is 30 feet.

Runup and hazard inland

The runup elevation at other distances from the shoreline may be expected to decrease inland. Wybro (op. cit.) has provided means to estimate the decrease in runup in elevation inland, but for the present purposes I will merely assume that the decrease is 1% of the distance inland, a crude approximation to values obtained by his method.

A map of a part of Kalaupapa provided by Urban 9 (copy attached) indicates that, at their closest points, the shoreline distances of the proposed sites are as indicated in column (ii) of the following table:

(i) Site	(ii) Shoreline distance, feet	(iii) (ii)-200 feet	(iv) 0.01(iii) feet	(v) 30-(iv) feet	(vi) Ground Elevation feet
1	140	-60	+ .6	30½	32½
2	410	210	-2.1	28	38
3	250	50	-0.5	29½	35
4	620	420	-2.2	28	>37 ?
5	680	480	-2.8	27	>37 ?

Distances from a line 200 feet from the shoreline are shown in column iii; corresponding corrections to the tsunami runup elevations 200 feet from the shoreline in column iv, and 100-year tsunami elevations at the sites (assuming a 30-foot 100-year tsunami elevation at 200 feet) in column v. Minimum ground elevations at sites 1 and 3, taken from a contour map supplied by Urban 9 are shown in column vi.

It appears that, if safety from the 100-year tsunami is an appropriate criterion for the infirmary, the infirmary could be constructed on a ground-level floor slab even at site 1. The margin of safety would be $32\frac{1}{2} - 30\frac{1}{2} = 2\frac{1}{2}$ feet. If the infirmary floor level were a few feet above ground, there would be more protection. The margin of safety is greater at site 3 ($5\frac{1}{2}$ feet) for ground level construction, still greater at site 2 (10 feet) and probably about as great at site 4 and 5 as at site 2.

Mr. Hideo Murakami

- 6 -

October 4, 1977

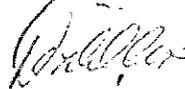
To judge from the WES regression line, the runup height of the 200-year tsunami would be about $10\frac{1}{2}$ feet greater than that of the 100-year tsunami. If protection from the 200-year tsunami were the criterion for the infirmary construction, the floor level of the infirmary would have to be 8 feet above ground at site 1 and $4\frac{1}{2}$ feet above ground at site 3.

Conclusions

I conclude that all proposed sites for the Kalaupapa infirmary are safe from tsunamis if the criterion of safety is that the expectable 100-year tsunami will not inundate the hospital floor. I conclude that if the criterion is freedom from inundation by the expectable 200-year tsunami, the floor level of the infirmary would have to be raised by about $10\frac{1}{2}$ feet above minimum ground level at site 1 and about $4\frac{1}{2}$ feet at site 3, but no significant raising would be necessary at site 2 or perhaps at site 4 and 5.

I would welcome criticism of these conclusions by those to whom copies of this report are addressed as indicated below.

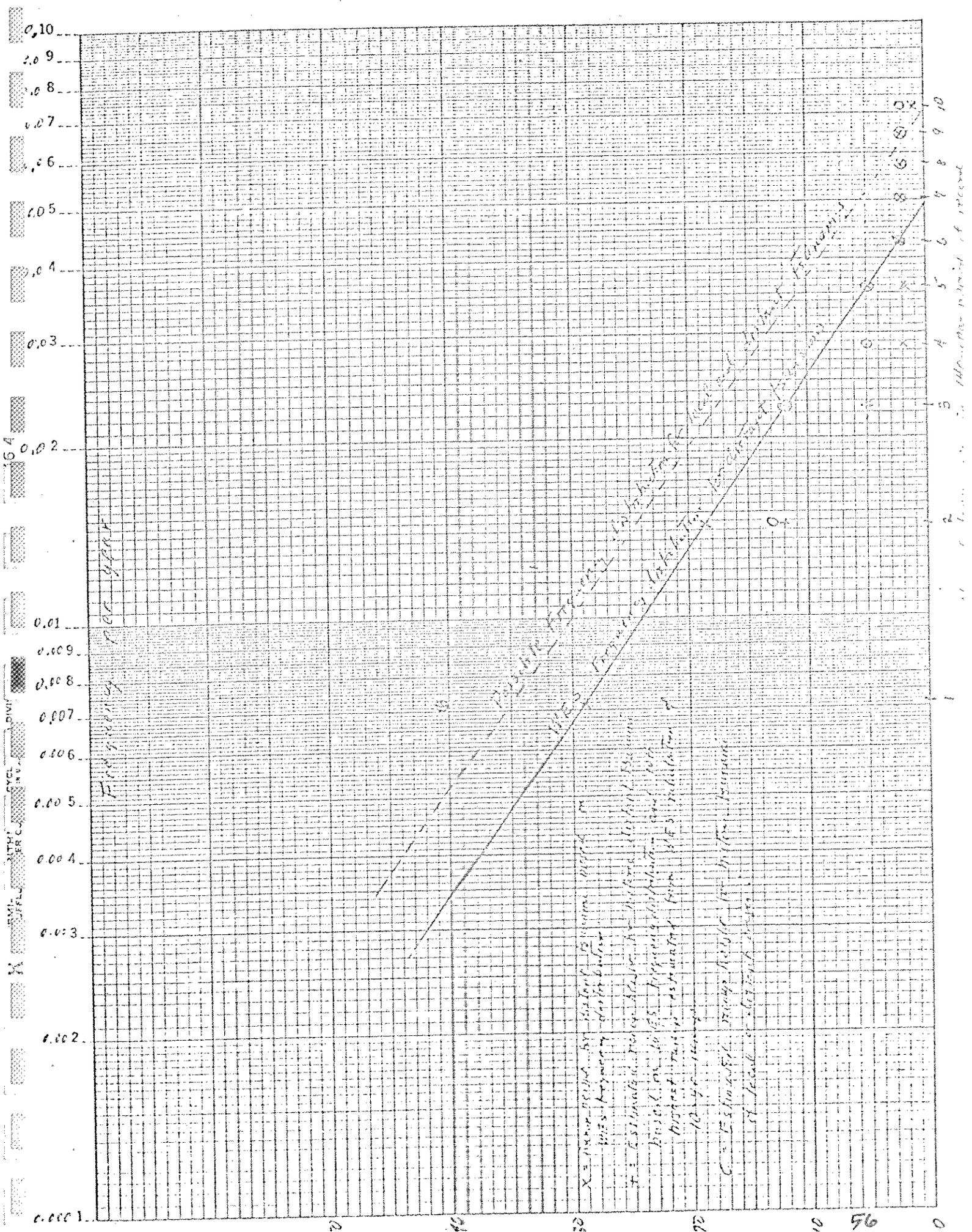
Yours very truly,

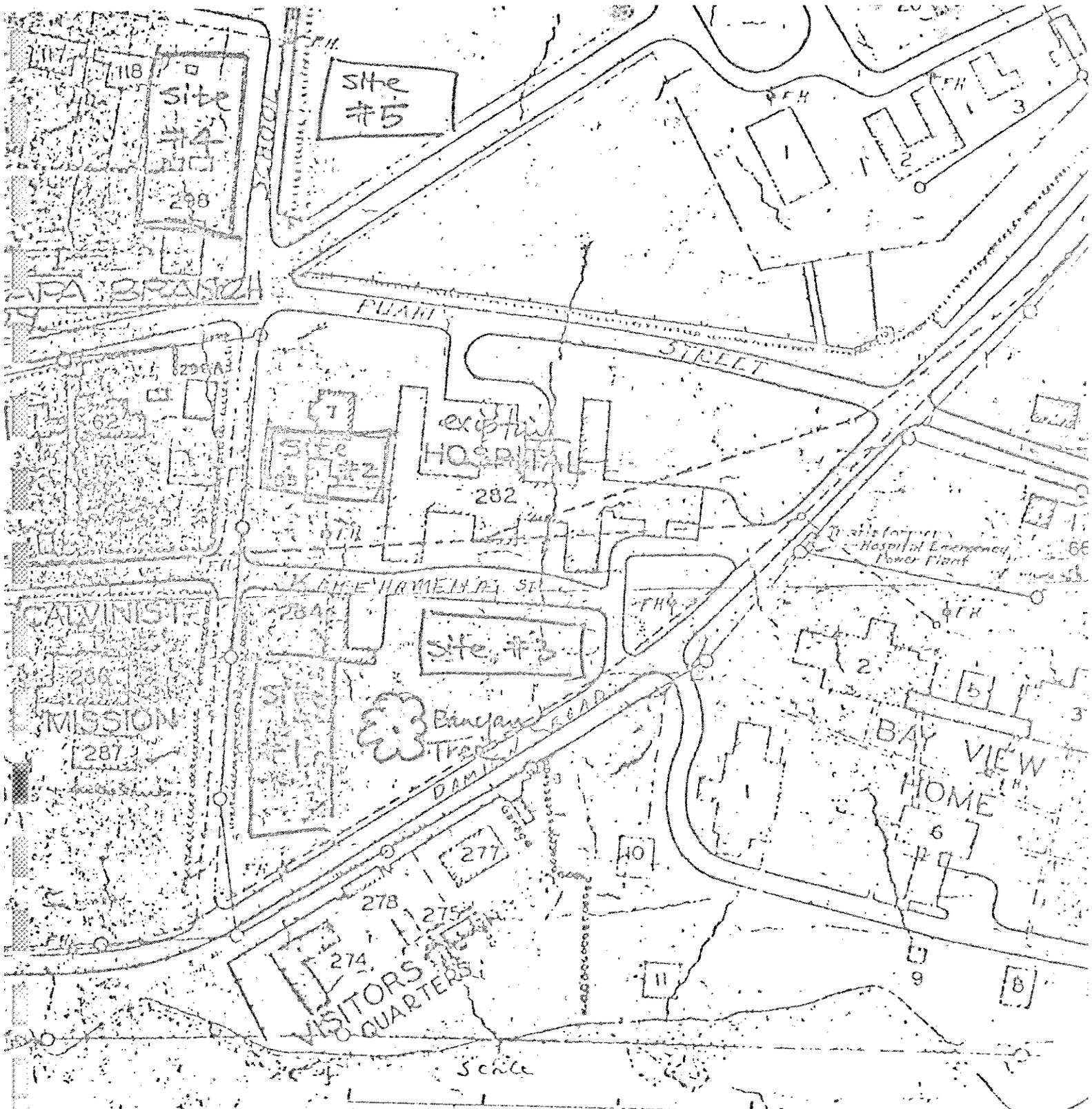


Doak C. Cox
Director

Enclosures

cc: J. R. Houston, WES
K. Cheung, COE, Honolulu Dist.
H.G. Loomis, HIG
C.L. Bretschneider, Ocean Engr.
D.H. Murabayashi, Urban 9 ✓





Kalaupapa Infirmery
Alternative Sites

PACIFIC OCEAN

Scale 1" = 100'

NOTE:
1. NUMBERED COTTAGE
2. THE ENGINE OR CHANGING



U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
ENVIRONMENTAL RESEARCH LABORATORIES

Joint Tsunami Research Effort
University of Hawaii - HIG 436
2525 Correa Road, Honolulu, Hi 96822

RECEIVED
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DIV. OF PUBLIC WORKS
October 19, 1977

Mr. Hideo Murakami, Director
Department of Accounting and
General Services
State Capitol
Honolulu, Hawaii 96813

DIVISION OF PUBLIC WORKS	
TO:	INITIAL FOR YOUR:
<u>1</u> State P. W. Engr.	Approval
— P. W. Secy.	Sign.
— Staff Serv. Br.	Info.
<u>2</u> Planning Br.	File
<u>3</u> Proj. Mgmt. Br.	See me
— Design Br.	Comments
— Insp. Br.	Invest. &
— Qual. Cont. Engr.	Rept.

Dear Mr. Murakami:

Re: Tsunami Hazard at Proposed Sites for Kalaupapa Infirmary
Molokai

I have Doak Cox's letter of October 4, 1977 to you on the above named subject. He has asked me to comment on his letter. I am essentially in agreement with his conclusions. However, in no case would I build below the level reached by the April 1, 1946 tsunami which on our crude map of the peninsula is given as 32' at the town itself and 44' at the western base of the peninsula. I would think that the residents themselves would have a more detailed description of where the water came to in 1946, and their information would be better than ours.

Another consideration, since this building is an infirmary and you might not want to evacuate at all during a tsunami alert is to give yourself a good margin and build at sites 4 or 5 at an elevation sufficient to be safe from any tsunami.

Sincerely,

Harold G. Loomis
Harold G. Loomis

HGL:cs

NOV 1 1977



DEPARTMENT OF THE ARMY
WATERWAYS EXPERIMENT STATION, CORPS OF ENGINEERS
P. O. BOX 631
VICKSBURG, MISSISSIPPI 39180

IN REPLY REFER TO: WES1111

19 October 1977

Dr. Doak C. Cox
Director, Environmental Center
3 Crawford 317
2550 Campus Road
Honolulu, HI 96822

Dear Doak:

Your letter to Mr. Murakami of the State of Hawaii (Incl 1) which you sent as an inclosure to your letter dated 5 October 1977 (Incl 2), contains errors which influence the predictions you made. Let me explain the errors and at the same time clarify parts of the WES report entitled "Tsunami-Wave Elevation Frequency of Occurrence for the Hawaiian Islands."

The elevation predictions in the WES report for Molokai were treated slightly different than for the other islands. This different treatment however, only changes predicted 100-year elevations by 10 percent or less. The Molokai predictions used only elevations greater than 20 percent of the largest historical observation (the 1946 tsunami) instead of the 10 largest tsunamis. The lack of historical data for Molokai made me believe that the low values we predicted for the smallest of the 10 tsunamis might be fairly uncertain. I also thought that the log-linear relationship might not hold for these small elevations, since the 1946 elevations were so much larger. Since your log-linear curve for Hilo, Hawaii, remained linear until it reached an elevation of approximately 20 percent of the maximum elevation, I decided to use this criteria. For Molokai site 18 this meant fitting a curve to three elevations (1946, 1957, and 1964 tsunamis). The precise coefficients were determined to be $A = 35.8$ and $B = 47.8$ (instead of the values $A = 35$ and $B = 46$ cited in your letter). These coefficients can be used to predict a 100-year elevation of 23.8 ft.. If all 10 tsunamis are fit by a log-linear curve, the 100-year elevation is equal to 22.0 ft.

Suppose we now include the local tsunamis you found may have occurred at Site 18 (13 ft 1903 tsunami and 5 ft 1862 tsunami). Since the 1946 tsunami was 28 ft at Site 18, the 5-ft tsunami falls just outside the 20 percent criteria. The 100-year elevation with the 13-ft elevation included is 24.2 ft. If the 5-ft elevation is included, the 100-year

WESHH
Dr. Doak C. Cox

19 October 1977

elevation is 24.3 ft. If all 10 tsunamis are considered (both the 5- and 13-ft elevations included, of course), the 100-year elevation is 23.3 ft.

It is obvious that your possible local tsunamis do not change the predicted 100-year elevation very dramatically. I believe the 24.2 ft prediction (1946, 1957, 1903, and 1964 tsunamis) is the elevation which would be most consistent with the WES techniques. The 30-ft elevation you obtain in your analysis by shifting the WES curve is clearly in error (of course, you mention that the 30-ft elevation is probably too high).

The following table is a correction of column (v) on page 5 of your letter to Mr. Murakami:

<u>Site</u>	<u>(v) Ft</u>
1	24.8
2	22.1
3	23.7
4	22.0
5	21.4

In your letter of 5 October, you had a question concerning the 10-year tsunami elevations in Table 1 of the WES report. The 10-year tsunami elevations are .7 times the 10th highest runup in 140 years.

The following elevations are the 10 largest (distant tsunamis) for Site 18 on Molokai (rounded off to nearest ft):

¹⁹⁴⁶ 28, ¹⁹⁵⁷ 22, ¹⁹⁰³ 10, 4, 4;
3, 3, 2, 2, 2

Sincerely,

James R. Houston

JAMES R. HOUSTON
Research Oceanographer
Wave Dynamics Division

2 Incl
As stated



University of Hawaii at Manoa

Environmental Center
Crawford 317 • 2550 Campus Road
Honolulu, Hawaii 96822
Telephone (808) 948-7361

Office of the Director

November 4, 1977

Mr. Hideo Murakami, Director
Department of Accounting
and General Services
State Capitol
Honolulu, Hawaii 96813

Dear Mr. Murakami:

TSUNAMI HAZARD AT PROPOSED SITES FOR KALAUPAPA INFIRMARY, MOLOKAI

I sent copies of my 4 October letter to you on the above topic to a number of people whose data I had used or whose judgement I wished on the matter. I have received the attached response from James Houston of the Corps of Engineers, Waterways Experiment Station (WES) in Vicksburg, Mississippi.

It is clear from this letter that WES has used a different method for estimation of height-frequency distributions for Molokai than the method used for other islands. Use of the exact values of the coefficients in their regression equation in place of the approximate values I read from the WES plots leads to little change in the estimate of the 100-year tsunami runup height 200 feet from the shoreline (23.8 feet instead of 24 feet). However, assuming that the regression coefficients were based on analysis to ten estimated tsunami heights (the method used generally by WES), I was led to believe that there must have been one very high value among the ten. This led me when combining the heights of distant tsunamis with our heights of local tsunami to estimate a 100-year tsunami height of 30 feet for the combination. According to Houston, WES used only three tsunamis for their Molokai analysis, and the 100-year tsunami height for the combination, by their method, is only 24.2 feet.

The corresponding tsunami runup elevations at the five sites proposed for the infirmary are also lower by about 6 feet than those shown in column (V) of my table.

I should point out that the 1946 tsunami had a runup height at Kalaupapa of 28 feet. Houston and his colleagues believe that this tsunami was the largest in the last 140 years, and that the 100-year tsunami height is not much greater than the height of the 1957 tsunami, 22 feet.

Clearly the 1946 tsunami was the highest in the last 31 years, and there is no evidence that any tsunami (local or distant) was higher in the last 100 years.

Mr. Hideo Murakami

-2-

November 4, 1977

Even if the regression analysis based on only three or four events is shaky, it seems reasonably safe to assume that the 100-year tsunami height would not exceed that of the 1946 tsunami.

Hence, my conclusions are still valid that all of the proposed sites of the Kalaupapa Infirmary are safe if the criterion of safety is freedom from inundation of the first floor by the 100-year tsunami. If the criterion is freedom from inundation by the 200-year tsunami, sites 2, 4, and 5 are safe, site 3 may be safe, and at site 1 the floor level would have to be raised, at the most about 8½ feet and perhaps no more than 4½ feet.

Yours very truly,



Doak C. Cox
Director

DCC/Tmk

cc: J.R. Houston, WES
Kisuk Cheung, COE, Honolulu Dist.
Harold Loomis, HIG
C.L. Bretschneider, Ocean Eng.
D.H. Murabayashi, Urban 9 ✓
Teuane Tominaga, DAGS

XI-2

Land Use Designation on Kalaupapa,
Maui Planning Director's Comments,
October 4, 1977.

PLANNING COMMISSION
Shiro Hokama, Chairman
Charles Ota, Vice Chairman
Patrick Kawano
Marvin Romme
Harlow Wright
Rojelio Taddol
Wesley Wong
Wayne Usmae, Ex-officio
Tatsumi Imada, Ex-Officio



Elmer Cravalho
Mayor

Tosh Ishikawa
Planning Director

Yoshikazu "Zuke" Matsui
Deputy Planning Director

COUNTY OF MAUI
PLANNING DEPARTMENT

200 S. HIGH STREET
WAILUKU, MAUI, HAWAII 96793

October 4, 1977

Mrs. Duk Hee Murabayashi
Project Planner
Urban 9
926 Bethel Street
Honolulu, Hawaii 96813

Dear Mrs. Murabayashi:

Re: Environmental Impact Statement for Kalaupapa Infirmary

In response to your letter dated September 16, 1977, I am enclosing herewith the following information as requested:

1. Special Management Area Map for Kalaupapa.
2. The Interim Coastal Zone Management Rules and Regulations of the County of Maui plus the Citizen's Guide to same.
3. General Plan No. 17 for the Island of Molokai
4. Please note that Kalaupapa settlement is classified State Urban and designated for residential use on the General Plan. Because no Kalawao or Maui County zoning has been established for the area the permitted uses in the State Urban District would prevail.

If additional clarification is required, please contact Mr. Chris Hart of our staff.

Yours very truly,

A handwritten signature in dark ink, appearing to read "Tosh Ishikawa".

TOSH ISHIKAWA
Planning Director

Encl.

XI-3

Comments by the State Historic Preservation Officer
August 23, 1977

GEORGE R. ARIYOSHI
GOVERNOR OF HAWAII



Stanley ns

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
DIVISION OF STATE PARKS
P. O. BOX 621
HONOLULU, HAWAII 96809

DIVISIONS:
CONVEYANCES
FISH AND GAME
FORESTRY
LAND MANAGEMENT
STATE PARKS
WATER AND LAND DEVELOPMENT

August 23, 1977

RECEIVED
AUG 26 12 55 PM '77
DIV. OF PUBLIC WORKS
DAGS

Mr. Hideo Murakami
Comptroller
Department of Accounting
and General Services
Honolulu, Hawaii

Dear Mr. Murakami:

Subject: New Infirmary, Kalaupapa
DAGS Job No. 03-20-1908

In reviewing the new infirmary construction for its effect on the Kalaupapa Leprosy Settlement national historic landmark district, five alternative sites have been checked. Any burials that might be located in the selected site should be handled by the Board of Health under its own regulations. If any other archaeological remains, including evidence of earlier historic structures are uncovered, work should be halted and this office notified to determine what archaeological work, if any, is needed at the site.

In regard to the buildings and structures on the sites, we find: [The description of the buildings which are attached are from the Department of Interior, National Park Service study, "Building Inventory, Kalaupapa-Hawaii" (March 1977), Vol. II]

Site 3 and Site 5: No buildings on site

Site 1: Building No 284 - The characteristics of style that would be preserved with this structure are found in more architecturally significant buildings. We would have no objections to its removal.

DIVISION OF PUBLIC WORKS

TO:	DATE:
1. Mr. [Signature]	8/23/77
2. Mr. [Signature]	
3. Mr. [Signature]	
4. Mr. [Signature]	
5. Mr. [Signature]	
6. Mr. [Signature]	
7. Mr. [Signature]	
8. Mr. [Signature]	
9. Mr. [Signature]	
10. Mr. [Signature]	
11. Mr. [Signature]	
12. Mr. [Signature]	
13. Mr. [Signature]	
14. Mr. [Signature]	
15. Mr. [Signature]	
16. Mr. [Signature]	
17. Mr. [Signature]	
18. Mr. [Signature]	
19. Mr. [Signature]	
20. Mr. [Signature]	

August 23, 1977

Site 2: Building 283 - Needs to be saved for its historical significance. This building was used as a fumigation room for people travelling away from the settlement in the 1960s and for their clothes. It is also said to have been used for mentally ill patients at one time.

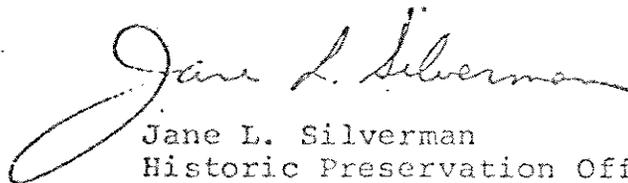
Building 7 - Used for outpatient treatment. Of historical interest.

Site 4: Building 118 - This is a fairly preservable example of a type of architecture which is fast dying out in the islands. It is located in a central core area. Since this building could date from before the turn of the century, rather than 1931 as listed, more information on the structure's history would need to be researched before a decision could be made regarding its retention or removal.

The architectural planning for the new infirmary should be coordinated with this office at an early stage of planning to assure its historical compatibility with adjacent structures and the general environment. This is especially true of siting next to the hospital (building 282) which should be preserved as a good example of Hawaiian institutional architecture of the period.

Thank you for this opportunity to comment on the new infirmary construction for Kalaupapa.

Sincerely yours,



Jane L. Silverman
Historic Preservation Officer
State of Hawaii

cc: National Park Service, Hawaii Group

Site 1



STRUCTURE: Building 284

LOCATION: Hospital area

USE: Garage

SIZE: Approx. 1560 sq. ft.

OWNERSHIP: State

DATE OF STRUCTURE: 1944

DESCRIPTION: The structure is a frame building of single wall construction. The walls consist of vertical plank siding. The foundation consists of a concrete slab, and concrete footings. The hip roof of the L-shaped structure is finished with composition shingles. One wing of the "L" is completely enclosed and is used for storage. The other wing is divided into two large garage bays (two cars in each bay) and is completely open on the south side. The building is in poor condition. The structure is riddled with termites and the eaves are warped badly on the north side of the building. To keep the structure serviceable, the building should be fumigated and painted. Termite damage should be repaired. Vegetation should be cleared away from the base of the building.

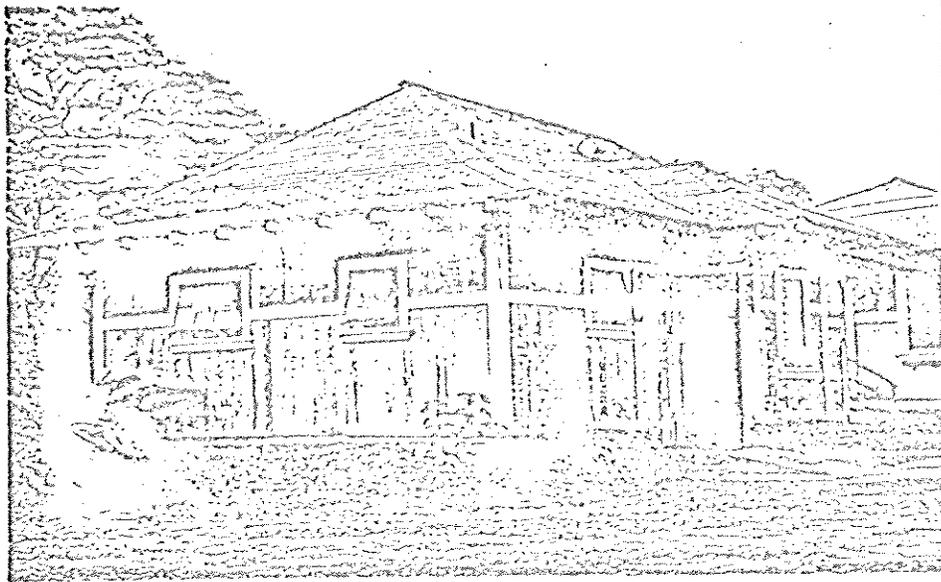
SIGNIFICANCE: Fits well with hospital, but that's about it.

MAINTENANCE COST: \$5,400

FUTURE MAINTENANCE COST: \$500/annum

DATE OF REPORT: January 17, 1977

Site 2



STRUCTURE: Building 283

LOCATION: Hospital area

USE: formerly fumigation room (possibly morgue, too?)

SIZE: Approx. 600 sq. ft.

OWNERSHIP: State

DATE OF STRUCTURE: 1935

DESCRIPTION: The structure is a frame building of single wall construction. The foundation consists of a thick concrete slab. The hip roof is finished with composition shingles. The walls are vertical plank siding. A girt, broken by the wood frames of the hinged windows, encircles the structure. The corners of the building are finished with cornerboards. The enclosed porch has two separate entrances - for men and women. The interior of the building is divided into two main sections. The building is in deteriorated condition. Vegetation should be cleared away from the structure. Termite damaged wood should be repaired. The building should be re-roofed, fumigated, cleaned and painted.

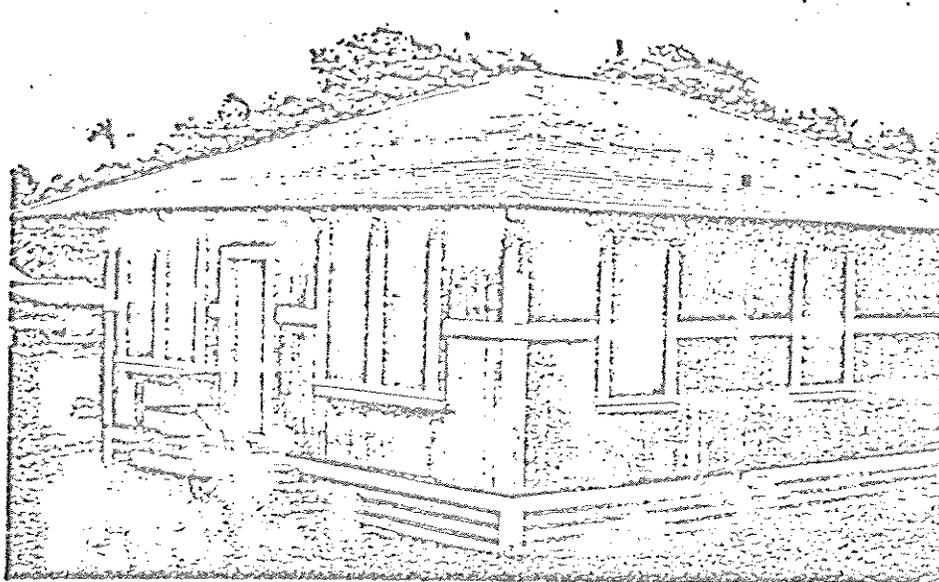
SIGNIFICANCE: Not any particular architectural significance. The building, according to Bernard Punikaia, was used as a fumigation room until the 1960's. Men and women leaving the settlement for a short period of time brought clothes here to be fumigated (to "kill the bacteria") the night before they left. Just before they left, they, too, would have to be fumigated (women on the left side of the building, men on the right side). They were then allowed to leave. Bernard states that the fumigation smell was terrible.

MAINTENANCE COST: \$12,600

FUTURE MAINTENANCE COST: \$400/annum

DATE OF REPORT: January 17, 1977

Site 2



STRUCTURE: Building 7

LOCATION: Hospital

USE: Formerly out patient clinic

SIZE: Approx. 572 sq. ft.

OWNERSHIP: State

DATE OF STRUCTURE: Unknown

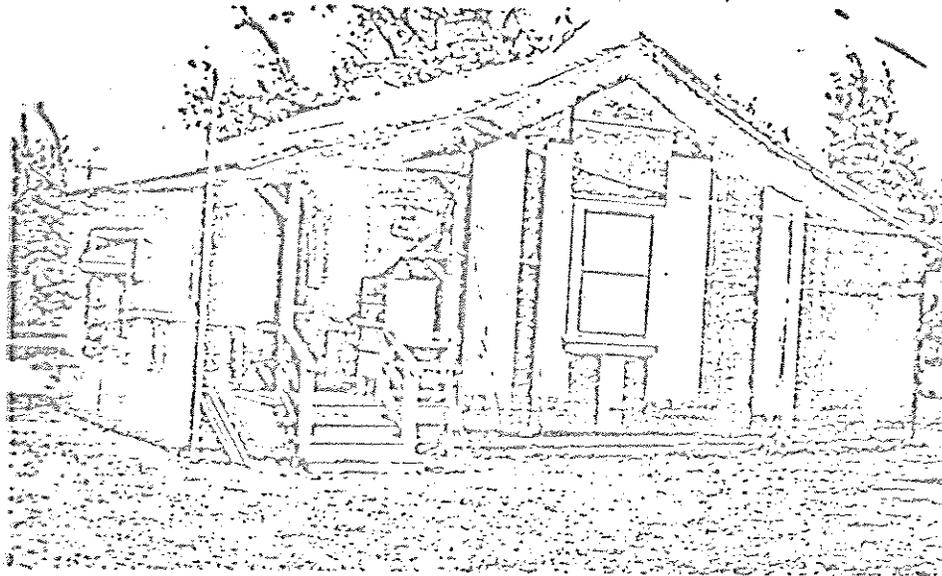
DESCRIPTION: The structure is a frame building of single wall construction. The foundation consists of stone pads and wood posts, camouflaged by a skirting made up of horizontal wood strips. A skirt, broken by the wood frames of the double-hung windows encircles the structure. A water table surrounds the sole plate. The hip roof is finished with composition shingles. The structure is in poor condition. Termite and rot damaged wood should be replaced (including the front steps to the building which are in an advanced state of collapse.) The building should be cleaned and painted, interior and exterior, and it should be fumigated.

SIGNIFICANCE: No architectural significance. Historically connected with hospital, though.

MAINTENANCE COST: \$6,000

FUTURE MAINTENANCE COST: \$400/annum

DATE OF REPORT: January 17, 1977



STRUCTURE: Building 118

LOCATION: Goodhue Street

USE: Residence

SIZE: 1000 sq. ft., incl porch OWNERSHIP: State

DATE OF STRUCTURE: 1931 (?)

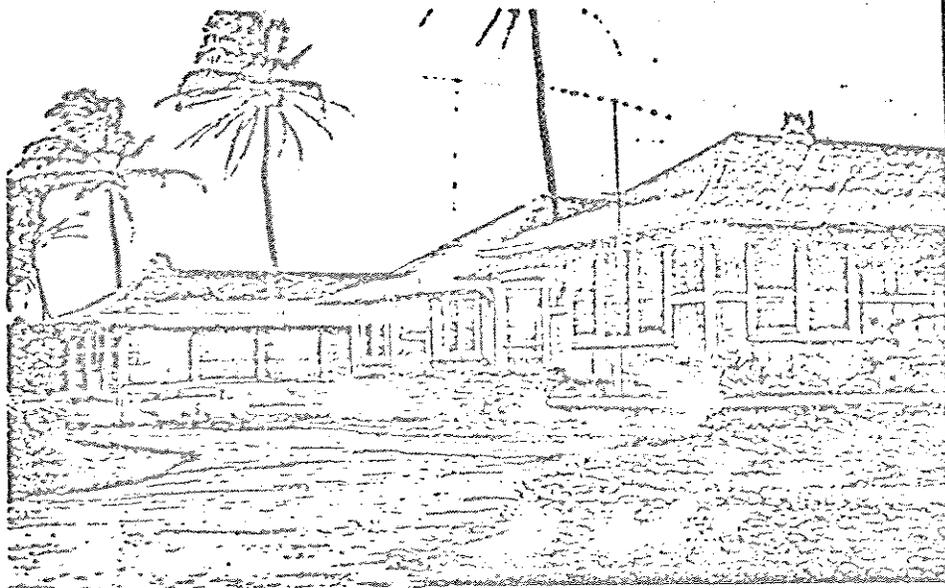
DESCRIPTION: The structure is a one-story building of single wall construction, with a stone pad and post foundation. The building has a saltbox roof, with another extension at the front of the structure which shelters the recessed veranda. The veranda, which runs the length of the front of the building still has some of the original details - chamfered posts, jigsaw work, diamond-patterned railing. The exterior finish is vertical plank. The structure is in deteriorated condition, but should be preserved because it is occupied, and because it is an example of a type. The building should be fumigated. Termite damage (floor, footings, walls, siding) should be repaired. The building should be re-roofed with original material, and the structure should be painted.

SIGNIFICANCE: A fairly preservable example of a type of architecture which is fast dying out in the islands (and Kalaupapa).

MAINTENANCE COST: \$8700

FUTURE MAINTENANCE COST: \$500/annum

DATE OF REPORT: January 13, 1977



STRUCTURE: Building 282

LOCATION: Hospital

USE: Hospital

SIZE: Approx. 18,500 sq. ft. OWNERSHIP: State

DATE OF STRUCTURE: 1932 (definite)

DESCRIPTION: The structure is a frame building of single wall construction. The foundation consists of concrete footings and wood posts. Most of the foundation is camouflaged by a latticework skirting. The enormous building consists of one main section which has been intersected by three large wings. The walls are vertical plank siding. A girt encircles the structure, and it is broken by the wood frames of the single, paired and tripled windows, and by the doors. The intersecting hip roofs, (with broken pitches) are finished with composition shingles. Several skylights in the roof provide natural lighting. Two ramps and recessed porches are located on the wings jutting out of the west side of the building. The rear (east) side of the structure seems to have had some minor alterations of loading docks and a metal shed roof. The building is in poor condition, and does not suit the needs of the settlement, nor does it meet code. To rehabilitate the structure, termite damaged wood would have to be replaced, as would the interior flooring. The building should be fumigated and painted (interior and exterior), and many of the window screens (with frames) replaced.

SIGNIFICANCE: Historically significant. Recording by HAES is recommended. Approximately thirty wild cats live around and under the building. When it rains, the fleas enter the building. The patients find this very uncomfortable. None of the animals is spayed or neutered, so the herd keeps growing. Many of the cats show obvious signs of disease. The cats are fed scraps daily, but are not owned. Therefore, they receive no shots, medical treatment or other proper care.

MAINTENANCE COST: \$103,225

FUTURE MAINTENANCE COST: \$6,000/annum

DATE OF REPORT: January 17, 1977

XII. SUMMARY OF UNRESOLVED ISSUES

The abandoned car-port on the proposed Infirmary site would be demolished and a further archaeological excavation is scheduled to start on March 13, 1978. The excavation would be conducted by the same archaeologist who previously conducted the archaeological survey of the proposed site and recommended a further excavation of the car-port area (see Page 23). Removal of concrete slab of the car-port and adjoining asphalt driveway would be supervised by the archaeologist. If no historic or prehistoric remains are present beneath these features, no further excavation would be continued as suggested by the archaeologist. Otherwise, a full excavation would be conducted. In any event, a final report would be submitted to the State Historic Preservation Officer no later than May 29, 1978.

Selection of construction workers and their working schedule, lodging and meals would be given serious consideration when the construction of the Infirmary is open for bid.

XIII. SELECTED REFERENCES

Interim Coastal Zone Management Rules and Regulations of the County of Maui, December 1, 1975.

State of Hawaii, County of Maui, Department of Hawaiian Home Lands, Citizens of Kalaupapa and the National Park Service, Alternative Study for the Future of the Kalaupapa Leprosy Settlement (Primary Review Draft), Nov. 1976.

State of Hawaii, Dept. of Hawaiian Home Lands, General Plan, April, 1976.

U.S. Dept. of the Interior, National Park Service, Building Inventory, Kalaupapa-Hawaii, March, 1977, 3 vols.

U.S. Dept. of the Interior, National Register of Historic Places Inventory - Nomination Format, January 14, 1976.

XIV. REPRODUCTION OF COMMENTS AND RESPONSES MADE DURING THE
PUBLIC REVIEW PERIOD (JANUARY 7-FEBRUARY 7, 1978)

List of Comments and Responses

A.	<u>Federal Agencies</u>	<u>Comments</u>	<u>Comment Date</u>
1.	Dept. of Agriculture, Soil Conservation Service	Soil Classification Information	2/6/78
	Dept. of Accounting and General Services	Reply	2/28/78
2.	Dept. of the Air Force	No Comment	1/31/78
3.	Dept. of the Army Engineering Division	Potential Flood Hazard	1/25/78
	Dept. of Accounting and General Services	Reply	2/28/78
4.	Dept. of the Interior Fish and Wildlife Service	No Comment	1/24/78
5.	Fourteenth Naval District	No Comment	1/19/78
6.	U.S. Army Support Command, Hawaii	No Comment	1/19/78
B.	<u>State Agencies</u>		
1.	Dept. of Agriculture	No Comment	1/19/78
2.	Dept. of Defense	No Comment	1/13/78
3.	Dept. of Education	No Comment	1/18/78
4.	Dept. of Hawaiian Home Lands	No Objection	1/27/78
5.	Dept. of Health	Water Quality and Kitchen Standard	2/6/78
	Dept. of Accounting and General Services	Reply	3/1/78
6.	Dept. of Planning and Economic Development	No Comment	1/26/78
7.	Dept. of Land & Natural Resources	No Comment	2/15/78
8.	Dept. of Land & Natural Resources Historic Preservation Office	Archaeological Excavation	2/7/78

	Dept. of Accounting and General Services	Reply	2/28/78
9.	Dept. of Social Services and Housing	No Comment	1/20/78
10.	Dept. of Transportation	No Comment	1/23/78
11.	Office of Environmental Quality Control	Social Impacts and others	2/9/78
	Dept. of Accounting and General Services	Reply	3/2/78
12.	University of Hawaii Environmental Center	No Comment	1/18/78
13.	University of Hawaii Water Resources Research Center	No Comment	2/2/78
C.	<u>County Agency</u>		
1.	Planning Department County of Maui	Visual Impact and SMA Permit	2/6/78
	Dept. of Accounting and General Services	Reply	2/28/78

UNITED STATES DEPARTMENT OF AGRICULTURE

SOIL CONSERVATION SERVICE

RECEIVED

P. O. Box 50004, Honolulu, HI 96850

FEB 06 11 33 AM '78
February 6, 1978
DIV. OF PUBLIC WORKS
DAGS

Mr. Hideo Murakami
Comptroller, Department of
Accounting and General Services
P. O. Box 119
Honolulu, Hawaii 96810

Dear Mr. Murakami:

Subject: EIS for the Proposed Kalaupapa Infirmery, Kalaupapa, Molokai

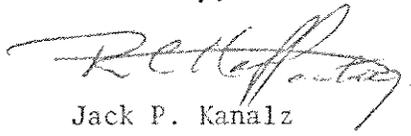
We have reviewed the above draft EIS and have the following comment to offer:

There is specific soils information available which can be found in the enclosed report entitled, "Soil Survey of Islands of Kauai, Oahu, Maui, Molokai, and Lanai, State of Hawaii.

The soil series at the proposed site is Haleiwa. Detailed description for this series can be found on page 33 of this report.

Thank you for the opportunity to review this document.

Sincerely,



Jack P. Kanalz
State Conservationist

Enclosure

cc: Office of Environmental Quality Control

DIVISION OF PUBLIC WORKS	
TO:	INITIAL FOR YOUR:
<u>1</u> State P. W. Engr.	Approval
___ P. W. Secy.	Sign.
___ Staff Serv. Br.	Info.
___ Planning Br.	File
<u>2</u> Proj. Mgmt. Br.	See me
___ Design Br.	Comments.
___ Insp. Br.	Invest. &
___ Qual. Cont. Engr.	Rept.



In a representative profile the surface layer is dark reddish-brown silty clay about 11 inches thick. The upper part of the subsoil is reddish-brown silt loam about 5 inches thick. The lower part is dark reddish-brown silty clay, about 28 inches thick, that has subangular blocky structure. The underlying material is silty clay loam over soft, weathered rock. The soil is strongly acid in the surface layer and very strongly acid in the subsoil.

Permeability is moderately rapid. Runoff is slow to medium, and the erosion hazard is slight to moderate. The available water capacity is about 1.2 inches per foot in the surface layer and 1.6 inches per foot in the subsoil. Roots penetrate to a depth of 5 feet or more. Tillage is somewhat difficult because of the slope.

Representative profile: Island of Molokai, lat. 21°7'4" N. and long. 156°45'47" W.

Ap—0 to 11 inches, dark reddish-brown (5YR 3/2) silty clay, dark brown (7.5YR 4/2) when dry; strong, very fine and fine, subangular blocky structure; very hard, firm, sticky and plastic; many roots; common, very fine, tubular pores; few wormholes; many glistening specks; high bulk density; strongly acid; abrupt, smooth boundary. 9 to 12 inches thick.

B21—11 to 16 inches, reddish-brown (5YR 4/4) heavy silt loam, dark brown (7.5YR 4/4) when dry; weak, medium and fine, subangular blocky structure; hard, friable, sticky and plastic; many roots; many very fine and fine tubular pores; bulk density is significantly lower than that of Ap horizon; very strongly acid; abrupt, smooth boundary. 4 to 6 inches thick.

1B22—16 to 26 inches, dark reddish-brown (5YR 3/4), moist and dry, silty clay; moderate, fine and very fine, subangular blocky structure; very hard, firm, sticky and plastic; many roots; many very fine pores; few pockets of friable silty clay loam; very strongly acid; clear, wavy boundary. 9 to 15 inches thick.

1B23t—26 to 44 inches, dark reddish-brown (2.5YR 3/4 moist, 5 YR 3/3 dry) silty clay; strong, medium, subangular blocky structure breaking to strong, fine and very fine, subangular blocky; very hard, firm, sticky and plastic; many roots; many very fine pores; thin, nearly continuous clay films on ped surfaces; many gritty lumps; very strongly acid; clear, wavy boundary. 11 to 18 inches thick.

1C1—44 to 58 inches, dark reddish-brown (5YR 3/4) silty clay loam, mottled with red (2.5YR 4/6), strong brown (7.5YR 4/6), and black (10YR 2/1); massive; hard, firm, sticky and plastic; few roots; many pores; very strongly acid. 12 to 16 inches thick.

1C2—58 inches, very porous saprolite.

The solum ranges from 33 inches to more than 51 inches in thickness. In the A horizon the concentration of heavy minerals is variable. In some areas the bulk density of the A horizon is high, but in others it is negligible. The A horizon ranges from 5YR to 7.5YR in hue, and, when moist, from 2 to 3 in value and chroma. The B horizon ranges from 5YR to 2.5YR in hue. It ranges from 2 to 4 in value and from 3 to 6 in chroma when moist.

This soil is used mainly for pasture. A small acreage is wooded. (Capability classification IVe, irrigated or nonirrigated; pasture group 6; woodland group 5)

Halawa silty clay, 3 to 25 percent slopes, severely eroded (#HD3).—This soil occurs near Kalae, Molokai. Its profile is like that of Halawa silty clay, 3 to 25 percent slopes, except that most of the surface layer and part of the subsoil have been removed by erosion. In many places cultivation has brought weathered rock fragments to the surface. Runoff is medium, and the erosion hazard is moderate to severe.

This soil is used mainly for pasture. Nearly all the acreage was once used for pineapple, but the crop was poorly suited. Only a few small areas are now used for pineapple. (Capability classification VIe, irrigated or nonirrigated; pasture group 6; woodland group 5)

Halawa silt loam, 20 to 35 percent slopes (#DE).—This soil occurs on side slopes of the Waianae Range, between Waiahua and Kolekole Pass. It has a profile like that of Halawa silty clay, 3 to 25 percent slopes, except for the texture of the surface layer. Runoff is medium to rapid, and the erosion hazard is moderate to severe. Tillage is difficult because of the slope.

Included in mapping were small areas that have been eroded down to the bedrock. In places there are remnants of a nearly massive subsoil. Also included, at the higher elevations, were very steep to precipitous areas of Rock land and Stony land.

This soil is used for pasture. Pineapple was formerly grown but was poorly suited. (Capability classification VIe, nonirrigated; pasture group 6; woodland group 5)

Halawa silt loam, 35 to 70 percent slopes, eroded (#HF2).—This soil has a profile like that of Halawa silty clay, 3 to 25 percent slopes, except that most of the surface layer and part of the subsoil have been removed by erosion. Runoff is rapid, and the erosion hazard is severe. Included in mapping were a few stony areas.

This soil is used for pasture. Cultivation is impractical, because the soil is too steep. (Capability classification VIIe, nonirrigated; pasture group 6; woodland group 15)

Haleiwa Series

This series consists of well-drained soils on fans and in drainageways along the coastal plains. These soils are on the islands of Oahu and Molokai. They developed in alluvium derived from basic igneous material. They are nearly level to strongly sloping. Elevations range from sea level to 250 feet. The annual rainfall amounts to 30 to 60 inches, most of which occurs between November and April. The mean annual soil temperature is 73° F. Haleiwa soils are geographically associated with Waialua and Kawaihapai soils on Oahu and Kalaupapa soils on Molokai.

These soils are used for sugarcane, truck crops, and pasture. The natural vegetation consists of koa haole, lantana, guava, Christmas berry, bermudagrass, and fingergrass.

Haleiwa silty clay, 0 to 2 percent slopes (#eA).—This soil occurs as large areas on alluvial fans or as long, narrow areas in drainageways. Included in mapping were small areas of poorly drained clayey soils in depressions, as well as small areas of moderately well drained clayey soils.

In a representative profile the surface layer is dark-brown silty clay about 17 inches thick. The subsoil and substratum, to a depth of more than 5 feet, are dark-brown and dark yellowish-brown silty clay that has subangular blocky structure. The soil is neutral to slightly acid.

Permeability is moderate. Runoff is very slow, and the erosion hazard is no more than slight. The available water capacity is about 1.9 inches per foot. In places

roots penetrate to a depth of 5 feet or more. The soil is subject to occasional nondamaging overflow in some places.

Representative profile: Island of Oahu, lat. 21°34'18" N. and long. 158°03'33" W.

- Ap1—0 to 9 inches, dark-brown (10YR 3/3) silty clay, very dark grayish brown (10YR 3/2) when moist; moderate, fine and medium, granular structure; hard, firm, sticky and plastic; abundant fine, medium, and coarse roots; many, very fine and fine, interstitial pores; moderate effervescence with hydrogen peroxide; slightly acid; gradual, smooth boundary, 4 to 9 inches thick.
- Ap2—9 to 17 inches, dark-brown (10YR 3/3) silty clay, very dark grayish brown (10YR 3/2) when moist; moderate, fine, subangular blocky structure; hard, firm, sticky and plastic; abundant very fine and fine, and few coarse roots; common, fine, tubular pores and few, medium, tubular pores; slight effervescence with hydrogen peroxide; slightly acid; clear, wavy boundary, 6 to 9 inches thick.
- B2—17 to 26 inches, dark-brown (10YR 3/3), moist and dry, silty clay; weak, fine, subangular blocky structure; hard, firm, sticky and plastic; abundant very fine and fine roots; common, fine, tubular pores and few, medium, tubular pores; patchy, red material that looks like clay films in pores and on some pods; slight effervescence with hydrogen peroxide; neutral; clear, wavy boundary, 8 to 16 inches thick.
- C1—26 to 36 inches, dark-brown (10YR 3/3), moist and dry, silty clay; weak, fine, subangular blocky structure; hard, firm, sticky and plastic; plentiful very fine and fine roots; many, very fine, tubular pores; common, medium, tubular pores; few, coarse, tubular pores; moderate effervescence with hydrogen peroxide; neutral; clear, smooth boundary, 8 to 12 inches thick.
- C2—36 to 48 inches, dark yellowish-brown (10YR 3/4) silty clay, dark brown (10YR 3/3) when moist; weak, fine, subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few very fine and medium roots; many, very fine, tubular pores; common, fine, tubular pores; few, medium, tubular pores; slight effervescence on soil mass with hydrogen peroxide; neutral; clear, wavy boundary, 10 to 12 inches thick.
- C3—48 to 65 inches, dark yellowish-brown (10YR 3/4) silty clay, dark brown (10YR 3/3) when moist; weak, fine, subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few very fine roots; many, very fine, tubular pores and few tubular pores; slight effervescence with hydrogen peroxide on stains within pores.

In places the A horizon is silty clay loam or very stony silty clay loam. The solum ranges from 10YR to 7.5YR in hue. A few rounded pebbles occur throughout the profile. In places stones or stratified sand and gravel occur at a depth below 40 inches.

This soil is used for sugarcane, pasture, and truck crops. (Capability classification IIe if irrigated, IIIe if nonirrigated; sugarcane group 1; pasture group 3; woodland group 1)

Haleiwa silty clay, 2 to 6 percent slopes (HcB).—On this soil, runoff is slow and the erosion hazard is slight.

This soil is used for sugarcane, pineapple, and truck crops. (Capability classification IIe if irrigated, IIIe if nonirrigated; sugarcane group 1; pasture group 3; woodland group 1)

Haleiwa silty clay loam, 0 to 10 percent slopes (HcB).—This soil occurs on the Kalaupapa peninsula on Molokai. It has a profile like that of Haleiwa silty clay, 0 to 2 percent slopes, except for the texture of the surface layer and the slope. Runoff is slow to medium, and the erosion

hazard is slight. In most places the slope is 3 to 10 percent. In most areas there are a few scattered stones in the surface layer.

This soil is used for pasture. (Capability classification IIIe, irrigated or nonirrigated; sugarcane group 1; pasture group 3; woodland group 1)

Haleiwa very stony silty clay loam, 0 to 15 percent slopes (HdC).—This soil occurs on the Kalaupapa peninsula on Molokai. Runoff is slow to medium, and the erosion hazard is slight to moderate. There are many stones on the surface and in the profile. The stones make cultivation difficult.

This soil is used for pasture. (Capability classification VIa, irrigated or nonirrigated; pasture group 3; woodland group 1)

Halii Series

This series consists of well drained and moderately well drained soils on uplands on the island of Kauai. These soils developed in material weathered from basic igneous rock, probably mixed with volcanic ash and ejecta. They are gently sloping to steep. Elevations range from 300 to 1,000 feet. The annual rainfall amounts to 100 to 200 inches. The mean annual soil temperature is 71° F. Halii soils are geographically associated with Kapaa and Koolau soils.

These soils are used for water supply, wildlife habitat, sugarcane, and pasture. The natural vegetation consists of melastoma, rhodomyrtus, guava, ricegrass, and associated shrubs and grasses.

Halii gravelly silty clay, 3 to 8 percent slopes (HfB).—This soil occurs on ridgetops and side slopes on uplands.

In a representative profile the surface layer is very dark grayish-brown gravelly silty clay about 6 inches thick. The upper part of the subsoil is dark reddish-brown and strong-brown silty clay and clay loam that has subangular blocky structure. Red bands up to 2 inches thick are common. The lower part of the subsoil consists of bands of red clay loam that continue to a depth of more than 60 inches. The substratum is soft, weathered rock. The soil is very strongly acid in the surface layer and very strongly acid to extremely acid in the subsoil.

Permeability is moderately rapid. Runoff is slow, and the erosion hazard is slight. In places roots penetrate to a depth of 5 feet or more.

Representative profile: Island of Kauai, lat. 22°00'32.3" N. and long. 159°25'54.3" W.

- A11—0 to 3 inches, very dark grayish-brown (10YR 3/2) gravelly silty clay, very dark brown (10YR 2/2) when dry; moderate, fine and very fine, subangular blocky structure; very hard, friable, slightly sticky and slightly plastic; abundant roots; the pebbles and sand grains are of the kind usually called ironstone; soil aggregates tend to harden irreversibly; very strongly acid; clear, smooth boundary, 2 to 5 inches thick.
- A12—3 to 6 inches, very dark grayish-brown (10YR 3/2) ironstone gravel and very coarse sand that contains a little clay; single grain; loose; abundant roots; very strongly acid; abrupt, smooth boundary, 2 to 8 inches thick.
- B21—6 to 15 inches, strong-brown (7.5YR 4/5) heavy silty clay loam, reddish brown (5YR 4/4) when dry; moderate, medium, subangular blocky structure; soft, friable, sticky and plastic; plentiful roots; common very fine pores; contains numerous hard and soft



GEORGE R. ARIYOSHI
GOVERNOR

HIDEO MURAKAMI
COMPTROLLER

MIKE N. TOKUNAGA
DEPUTY COMPTROLLER

STATE OF HAWAII
DEPARTMENT OF ACCOUNTING AND GENERAL SERVICES
DIVISION OF PUBLIC WORKS
P. O. BOX 119, HONOLULU, HAWAII 96810

LETTER NO. PM-0300.8

28 1978

Mr. Jack P. Kanalz
State Conservationist
Soil Conservation Service
Department of Agriculture
P. O. Box 50004
Honolulu, Hawaii 96850

Dear Mr. Kanalz:

Subject: EIS for Kalaupapa Infirmary
Kalaupapa, Molokai

Thank you for the report entitled "Soil Survey of Islands of Kauai, Oahu, Maui, Molokai, and Lanai, State of Hawaii." The soil data for Kalaupapa will be incorporated in the final Environmental Impact Statement.

Very truly yours,

R. Nishioka
RIKIO NISHIOKA
State Public Works Engineer

RF/si

DEPARTMENT OF THE AIR FORCE
 HEADQUARTERS 15TH AIR BASE WING (PACAF)
 HICKAM AIR FORCE BASE, HAWAII 96853



REPLY TO
 ATTN OF: DEEV (Mr. Nakashima, 4491831)

31 JAN 1978

SUBJECT: Environmental Impact Statement (EIS) for the Proposed Kalaupapa
 Infirmary, Kalaupapa, Molokai, Hawaii

TO: Governor, State of Hawaii
 Office of Environmental Quality Control
 550 Halekauwila Street
 Room 301
 Honolulu, Hawaii 96813

1. This office has reviewed the subject EIS and has no comment to render relative to the proposed project.
2. We greatly appreciate your cooperative efforts in keeping the Air Force apprised of your project and thank you for the opportunity to review the document.

ROBERT Q. K. CHING
 Chief, Engineering, Construction
 and Environmental Planning Div
 Directorate of Civil Engineering

1 Atch
 EIS

Cy to: Dept of Accounting and
 General Services
 P.O. Box 119
 Honolulu, Hawaii 96810

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DIVISION OF PUBLIC WORKS	
TO:	INITIAL FOR YOUR:
<input checked="" type="checkbox"/> State P. W. Engr.	Approval
<input type="checkbox"/> P. W. Secy.	Sign.
<input type="checkbox"/> Staff Serv. Br.	Info.
<input type="checkbox"/> Planning Br.	File
<input checked="" type="checkbox"/> Proj. Mgmt. Br.	See me
<input type="checkbox"/> Design Br.	Comments.
<input type="checkbox"/> Insp. Br.	Invest. &
<input type="checkbox"/> Qual. Cont. Engr.	Rept.



DEPARTMENT OF THE ARMY
 U. S. ARMY ENGINEER DISTRICT, HONOLULU
 BUILDING 230
 FT. SHAFTER, HAWAII 96858

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DIV. OF PUBLIC WORKS
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 25 January 1978

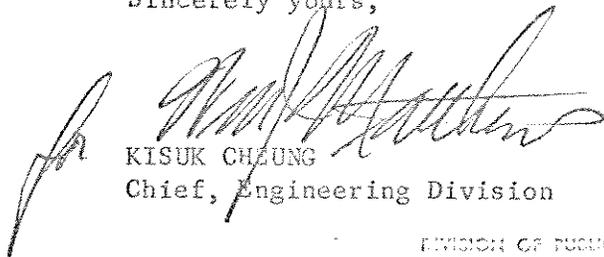
PODED-PV

Mr. Hideo Murakami
 Comptroller
 Department of Accounting and General Services
 State of Hawaii
 P. O. Box 119
 Honolulu, HI 96810

Dear Mr. Murakami:

We find the environmental statement for the proposed Kalaupapa Infirmary, Molokai, well prepared and the historical data well documented. Waihanau Stream appears to be the only defined watercourse in this area that could be a possible source of flood hazard. While we find no historic evidence of flooding from Waihanau Stream, no flood hazard studies have been completed for the stream. A discharge frequency analysis indicates peak discharges of 3,700, 8,450 and 11,400 cubic feet per second for the 10, 50 and 100-year floods, respectively. We suggest that the potential flood hazard for Waihanau Stream be evaluated in light of the discharge frequency data and that planning efforts and designs be considered for reducing potential flood losses or damages, as required.

Sincerely yours,


 KISUK CHEUNG
 Chief, Engineering Division

DIVISION OF PUBLIC WORKS	
TO:	FROM: (FOR INFO)
<input checked="" type="checkbox"/> Chief, P. W. Engr.	Approval
<input type="checkbox"/> P. W. Engr.	Sign.
<input type="checkbox"/> Chief Serv. Div.	Info.
<input checked="" type="checkbox"/> Planning Div.	File
<input checked="" type="checkbox"/> Insp. / Maint. Div.	See file
<input type="checkbox"/> Design Div.	Comments
<input type="checkbox"/> Insp. Div.	Invest. &
<input type="checkbox"/> Qual. Cont. Engr.	Rept.

GEORGE R. ARIYOSHI
GOVERNOR



HIDEO MURAKAMI
COMPTROLLER

MIKE N. TOKUNAGA
DEPUTY COMPTROLLER

STATE OF HAWAII
DEPARTMENT OF ACCOUNTING AND GENERAL SERVICES
DIVISION OF PUBLIC WORKS
P. O. BOX 119, HONOLULU, HAWAII 96810

LETTER NO. PM-0305.8

FEB 28 1978

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

Dear Mr. Cheung:

Subject: EIS for Kalaupapa Infirmary
Kalaupapa, Molokai

Thank you for your letter of January 25, 1978. We appreciate the data on the peak discharges for the 10-, 50- and 100-year floods.

Inadvertently, our consultant, Urban 9, submitted the response in their letter dated February 14, 1978, directly to your office. We are in agreement with the contents of that letter and it has the full endorsement of my Division.

Very truly yours,


RIKIO NISHIOKA
State Public Works Engineer

RF/si

February 14, 1973

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

Dear Mr. Cheung:

Thank you for your comments of January 25, 1973 on the potential flood hazard of Waihanau Stream in Kalaupapa.

Our analysis based on the hydrology data provided by your office and field inspection performed on February 9, 1973 indicates that there exists no potential flood hazard by the Waihanau Stream for the proposed Infirmary site. Water depth calculated for the 100-year flood is approximately 13'. Hydraulic calculation is as follows:

1. Hydrology data provided by the Department of the Army:
 - a. 3,700 CFS 10-year frequency
 - b. 8,450 CFS 50-year frequency
 - c. 11,400 CFS 100-year frequency
2. Stream profile obtained from 1" = 100' topo map provided by the D.A.G.S. is 4.7% ±.
3. Roughness coefficient is assumed 0.035.
4. The narrowest section of the stream is 26.5' x 13' (at the location of the bridge).
5. From King's Hydraulic Handbook page 7 - 44.

$$K' = \frac{0.035 \times 11,400}{(26.5)^{8/3} \times (0.047)^{1/2}} = \frac{399}{1353} = 0.294$$

$$D/h = 0.50$$

$$D = \text{Water Depth} = 26.5 \times 0.50 = 13.25'$$

Mr. Kisuk Cheung
Chief, Engineering Division
Department of the Army
Subject: Kalaupapa Infirmary
February 14, 1978

Page 2

In addition, a crest is located between the proposed Infirmary site and Waihanau Stream. Therefore, even if the silt is built-up in the stream bed in the near future or any cause of action would create the areas in both banks inundated, the potential flood hazard to the project site is still considered nil.

Thank you for your cooperation and concern expressed on the subject matter.

Yours very truly,

URBAN 9

Duk Hee Murabayashi

DHM:cs

cc: Mr. Donald Brenner, E.O.C.
Mr. Richard O'Connell, C.E.O.C.
Mr. Hideo Murakami, D.A.G.S.
Mr. Robert Ueoka, D.O.H.



United States Department of the Interior

FISH AND WILDLIFE SERVICE
Division of Ecological Services
300 Ala Moana Blvd., Rm. 5302
P. O. Box 50167
Honolulu, Hawaii 96850

Reference: ES

January 24, 1978

State of Hawaii
Environmental Quality Commission
Office of the Governor
550 Halekauwila Street, Rm. 301
Honolulu, Hawaii 96813

Re: EIS
Kalaupapa Infirmary
Kalaupapa, Molokai

Dear Sir:

We have reviewed the above referenced Environmental Impact Statement for the proposed Kalaupapa Infirmary in Kalaupapa, Molokai. Barring no change in project design, we have no comment to offer.

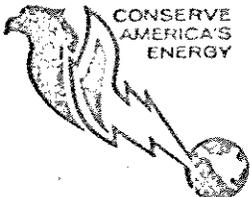
We are returning the EIS as requested.

Thank you for the opportunity for review.

Sincerely yours,

Maurice H. Taylor
Field Supervisor

cc: HA
HDF&G
NMFS



Save Energy and You Serve America!

HEADQUARTERS
FOURTEENTH NAVAL DISTRICT
BOX 110
PEARL HARBOR, HAWAII 96860

IN REPLY REFER TO:
002A:FWD:amn
Ser 101

19 JAN 1978

RECEIVED
JAN 23 10 52 AM '78
DIV. OF PUBLIC WORKS
DAGS

Environmental Quality Commission
Office of the Governor
State of Hawaii
550 Halekauwila Street, Room 301
Honolulu, Hawaii 96813

Gentlemen:

Environmental Impact Statement for the
Proposed Kalaupapa Infirmary

The Environmental Impact Statement for the proposed Kalaupapa Infirmary has been reviewed, and the Navy has no comments. As requested by your letter of 9 January 1978, the subject EIS is returned. Thank you for the opportunity to review the EIS.

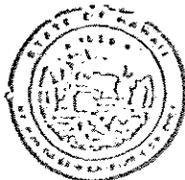
Sincerely,

R. P. NYSTEDT
CAPT, USN
DISTRICT CIVIL ENGINEER
BY DIRECTOR OF THE COMMANDANT

Encl

Copy to: (w/o encl)
State DAGS

DIVISION OF PUBLIC WORKS	
TO:	INITIALS (DATE)
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<input type="checkbox"/> P. W. Secy.	Sign.
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<input type="checkbox"/> Planning Br.	File
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<input type="checkbox"/> Qual. Cont. Engr.	Rept.



STATE OF HAWAII
ENVIRONMENTAL QUALITY COMMISSION
OFFICE OF THE GOVERNOR
550 HALEKAUWILA ST.
ROOM 301
HONOLULU, HAWAII 96813

January 9, 1978

Dear Reviewer:

Attached for your review is an Environmental Impact Statement (EIS) prepared pursuant to Chapter 343, Hawaii Revised Statutes and its Rules and Regulations:

Title - Proposed Kalaupapa Infirmary
Location - Kalaupapa, Moioikai
Classification - agency action

We would appreciate your comments or acknowledgement of no comments. Please submit one copy each to:

- 1) Accepting Authority: Governor, State of Hawaii
Address: Through: Office of Environmental Quality Control
550 Halekauwila St., #301
Honolulu, Hawaii 96813
- 2) Proposing Party: Dept. of Accounting and General Services
Address: P.O. Box 119
Honolulu, Hawaii 96810

Your comments must be received or postmarked by: February 7, 1978

If you have no future use for this document, please return the EIS to the Commission. (Comments or acknowledgement of no comments should be directed to both the accepting authority and proposing party.)

Thank you for your participation and cooperation in the EIS process!

attachment

13-January 1978

No comments.

Patricia A. Greene
Patricia A. Greene
Colonel, ANC
Chief, Health and Environment Activity
Directorate of Health Services, USASCH

GEORGE R. ARIYOSHI
GOVERNOR



JOHN FARIAS, JR.
CHAIRMAN, BOARD OF AGRICULTURE

YUKIO KITAGAWA
DEPUTY TO THE CHAIRMAN

BOARD MEMBERS:

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MEMBER - AT - LARGE

Sidney Goo
MEMBER - AT - LARGE

SHIZUTO KADOTA
HAWAII MEMBER

STEPHEN Q. L. AU
KAUAI MEMBER

FRED M. OGASAWARA
MAUI MEMBER

STATE OF HAWAII
DEPARTMENT OF AGRICULTURE
1428 SO. KING STREET
HONOLULU, HAWAII 96814

January 19, 1978

MEMORANDUM

To: Environmental Quality Commission
Office of the Governor

Subject: EIS - Proposed Kalaupapa Infirmary
Molokai TMK: 6-1-01:01

The Department of Agriculture has no comments regarding the above applicant.

Enclosed herewith please find the EIS for the subject project.

Thank you for the opportunity to comment.

A handwritten signature in cursive script, appearing to read "John Farias, Jr.", written in dark ink.

JOHN FARIAS, JR.
Chairman, Board of Agriculture

Enc.

GEORGE R. ARIYOSHI
GOVERNOR

RECEIVED



VALENTINE A. SIEFERMANN
MAJOR GENERAL
ADJUTANT GENERAL

JAN 16 2 48 PM '70 STATE OF HAWAII
DIV. OF PUBLIC WORKS DEPARTMENT OF DEFENSE
DAGS OFFICE OF THE ADJUTANT GENERAL
FORT RUGER, HONOLULU, HAWAII 96816

13 JAN 1978

HIENG

Department of Accounting and
General Services
P.O. Box 119
Honolulu, Hawaii 96810

Gentlemen:

Proposed Kalaupapa Infirmary
Kalaupapa, Molokai

Thank you for sending us a copy of the "Proposed Kalaupapa Infirmary,
Kalaupapa, Molokai" Environmental Impact Statement. We have received
the publication and have no comments to offer.

Yours truly,

Frederic W. Klevick
for WAYNE R. TOMOYASU CAPT, CE, HARNG
Captain, CE, HARNG
Contr & Engr Officer

DIVISION OF PUBLIC WORKS	
INITIAL	DATE
<input checked="" type="checkbox"/>	1/16/78
Chief Engr.	Approve
Asst. Chief Engr.	Sign
Staff Secy. Dir.	Info.
Planning Dir.	Info
Proj. Mgmt. Dir.	See me
Design Br.	Comments
Insp. Dir.	Inspect. &
Qual. Cont. Engr.	Rept.



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JAN 10 9 01 AM '78

STATE OF HAWAII
DEPARTMENT OF EDUCATION

DIV. OF PUBLIC WORKS
DAGS

P. O. BOX 2360
HONOLULU, HAWAII 96804

OFFICE OF THE SUPERINTENDENT

January 18, 1978

Mr. Donald A. Bremnen, Chairman
Environmental Quality Commission
550 Halekauwila Street
Honolulu, Hawaii 96813

Dear Mr. Bremnen:

Subject: Proposed Kalaupapa Infirmery

Thank you for sending to us for review the EIS for the proposed
Kalaupapa Infirmery.

We have no comments to offer at this time. We are, therefore, returning
the EIS document to you as requested.

Sincerely,

CHARLES G. CLARK
Superintendent
CEC:HH:sy

Attach.

cc ✓ DAGS - Proposing Party

DIVISION OF PUBLIC WORKS	
INTERNAL CONTROL	
TO: _____	_____ Approval
___ P. W. Secy. _____	Sign _____
___ Staff Serv. Cr. _____	Info _____
___ Planning Cr. _____	File _____
___ Insp. Mgmt. Cr. _____	See file _____
___ Design Cr. _____	Comments _____
___ Insp. Cr. _____	Invest. Cr. _____
___ Qual. Cont. Engr. _____	Rept. _____

PROJECT OFFICES

WAIMEA OFFICE

P. O. BOX 125

KAMUELA, HAWAII 96743

KEAUKAHA OFFICE

P. O. BOX 833

HILO, HAWAII 96720



STATE OF HAWAII

DEPARTMENT OF HAWAIIAN HOME LANDS

P. O. BOX 1879

HONOLULU, HAWAII 96805

January 27, 1978

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PROJECT OFFICES

MAUI OFFICE

P. O. BOX 22

KAHULUI, MAUI 96732

MOLOKAI OFFICE

P. O. BOX 198

HOOLEHUA, MOLOKAI 96729

KAUAI OFFICE

P. O. BOX 332

LILUUE, KAUAI 96766

Mr. Donald Bremner
Environmental Quality Commission
550 Halekauwila Street, Room 301
Honolulu, Hawaii 96813

Dear Mr. Bremner:

SUBJECT: Review of EIS for Kalaupapa Infirmary
Kalaupapa, Molokai

Pursuant to your request dated January 9, 1978, we have reviewed the Environmental Impact Statement (EIS) and have no objections to the subject project.

Owau no me ka ha'aha'a,
(I am, humbly yours)

(MRS.) BILLIE BEAMER, CHAIRMAN

WB:jm

cc: Office of Environmental Quality
✓ Dept. of Accounting and General Services

DIVISION OF PUBLIC WORKS	
TO:	INITIAL FOR YOUR:
<input checked="" type="checkbox"/> State P. W. Engr.	Approval
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GEORGE R. ARIYOSHI
GOVERNOR OF HAWAII



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

February 6, 1978

RECEIVED

FEB 9 2 44 PM '78
DIV. OF PUBLIC WORKS
DAGS

GEORGE A. L. YUEN
DIRECTOR OF HEALTH
Audrey W. Mertz, M.D., M.P.H.
Deputy Director of Health
Henry N. Thompson, M.A.
Deputy Director of Health
James S. Kumagai, Ph.D., P.E.
Deputy Director of Health

In reply, please refer to:
File: EPHS - SS

MEMORANDUM

To: Mr. Hideo Murakami, Comptroller
Department of Accounting & General Services

From: Deputy Director for Environmental Health

Subject: Environmental Impact Statement (EIS) for Proposed Kalaupapa
Infirmary, Kalaupapa, Molokai

Thank you for allowing us to review and comment on the subject EIS. On the basis that the project will comply with all applicable Public Health Regulations, please be informed that we have no objections to this project.

We submit the following comments for your information:

1. Kitchen infirmary shall comply with all applicable sections of Chapter 1-A of the Public Health Regulations.
2. Water quality has not been the best, probably due to the age of the disinfecting equipment. With new equipment and proper maintenance, water quality should meet the bacteriological requirements of the Safe Drinking Water Act.

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


JAMES S. KUMAGAI, Ph.D.

cc: Environmental Quality Commission
Office of Environmental Quality Control
DHO, Maui

DIVISION OF PUBLIC WORKS

TO:		INITIAL FOR YOUR:	
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GEORGE R. ARIYOSHI
GOVERNOR

HIDEO MURAKAMI
COMPTROLLER

MIKE N. TOKUNAGA
DEPUTY COMPTROLLER

STATE OF HAWAII
DEPARTMENT OF ACCOUNTING AND GENERAL SERVICES
DIVISION OF PUBLIC WORKS
P. O. BOX 119, HONOLULU, HAWAII 96810

LETTER NO. PM-0307.8

MAR 1 1978

Dr. James Kumagai
Deputy Director
Environmental Health Programs
Department of Health
P. O. Box 3378
Honolulu, Hawaii 96801

Dear Dr. Kumagai:

Subject: EIS for Kalaupapa Infirmery
Kalaupapa, Molokai

Thank you very much for your response to our environmental impact statement regarding the Kalaupapa Infirmery.

Please be assured that our detail design for this facility will be submitted to your division for review and approval to all the rules and regulations of the Department of Health and applicable state and federal statutes.

We recognize the problem of the water filtration system at Kalaupapa. We understand that the Department of Health has submitted a \$50,000 capital improvement project to the 1978 legislature to correct this problem. This \$50,000 request is contained in the Governor's supplemental budget request now pending before the 1978 legislature.

Very truly yours,


RIKIO NISHIOKA
State Public Works Engineer

RF/si

STATE OF HAWAII
DEPARTMENT OF PLANNING AND
ECONOMIC DEVELOPMENT
P. O. Box 2359
Honolulu, Hawaii 96804

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JAN 30 8 59 AM '78

DIV. OF PUBLIC WORKS
DAGS

January 26, 1978

Ref. No. 5454

MEMORANDUM

TO: The Honorable George R. Ariyoshi
Governor of Hawaii

THRU: Office of Environmental Quality Control

FROM: Hideto Kono, Director *[Signature]*

SUBJECT: Environmental Impact Statement for the Proposed Kalaupapa Infirmmary,
Kalaupapa, Molokai

We have reviewed the subject environmental impact statement and feel that it is generally adequate in its assessment of the probable impacts which can be anticipated from implementation of this project.

We have no further comments to offer at this time but appreciate the opportunity to review the statement.

cc: Dept. of Accounting & General Services ✓

DEPARTMENT OF PUBLIC WORKS
DIVISION OF PUBLIC WORKS
DAGS

<i>[Signature]</i>	Approval
_____	Sign
_____	Info.
_____	File
<i>[Signature]</i>	See me
_____	Comments
_____	Invest. C.
_____	Rept.



W. Y. THOMPSON, Chairman
~~CHRISTOPHER CORB, Chairman~~
 BOARD OF LAND & NATURAL RESOURCES

EDGAR A. HAMASU
 DEPUTY TO THE CHAIRMAN

STATE OF HAWAII
 DEPARTMENT OF LAND AND NATURAL RESOURCES
 P. O. BOX 621
 HONOLULU, HAWAII 96809

February 15, 1978

DIVISIONS:
 CONVEYANCES
 FISH AND GAME
 FORESTRY
 LAND MANAGEMENT
 STATE PARKS
 WATER AND LAND DEVELOPMENT

DIVISION OF PUBLIC WORKS

TO:	INITIAL FOR YOUR:
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RECEIVED
 GEORGE R. ARIYOSHI
 GOVERNOR OF HAWAII
 FEB 21 11 43 AM '78
 DIV. OF PUBLIC WORKS
 DAGS

Honorable George R. Ariyoshi
 Governor of Hawaii
 550 Halekauwila St.
 Honolulu, Hawaii 96813

Dear Sir:

We have reviewed the EIS for the Kalaupapa Infirmary which will serve the 149 people in Kalaupapa, including 121 who are not able-bodied.

The 6,000 square foot facility for which \$2,152,000 have been appropriated should prove a welcome replacement for the present health facilities which were built in the early 1930's.

We have little to add to our previous comments of August 23, 1977, except that the north arrow on Exhibit 1 should be corrected.

Very truly yours,

W. Y. THOMPSON
 Chairman of the Board

cc: Dept. of Accounting
 and General Services



GEORGE R. ARIYOSHI
GOVERNOR OF HAWAII



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DIV. OF PUBLIC WORKS
DAGS

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
DIVISION OF STATE PARKS
P. O. BOX 621
HONOLULU, HAWAII 96809

DIVISIONS:
CONVEYANCES
FISH AND GAME
FORESTRY
LAND MANAGEMENT
STATE PARKS
WATER AND LAND DEVELOPMENT

FILE NO. _____

February 7, 1978

DIVISION OF PUBLIC WORKS

TO:	INITIAL FOR YOUR:
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<input type="checkbox"/> Qual. Cont. Engr.	Rept.

Governor, State of Hawaii
Office of Environmental Quality Control
550 Halekauwila St., #301
Honolulu, Hawaii 96813

Dear Sir:

Subject: Proposed Kalaupapa Infirmary, Kalaupapa, Molokai

Thank you for the opportunity to comment on the above subject undertaking.

Further archaeological excavation in the area between test pits 3 and 12 as recommended by the archaeologist and shown in Exhibit 1X should be included in Chapter V(I) and VIII of the EIS. If this recommended work has already been done that report should be included as a supplement to appendix 4 of the EIS.

Sincerely yours,

Jane L. Silverman
Historic Preservation Officer
State of Hawaii



GEORGE R. ARIYOSHI
GOVERNOR

HIDEO MURAKAMI
COMPTROLLER

MIKE N. TOKUNAGA
DEPUTY COMPTROLLER

STATE OF HAWAII
DEPARTMENT OF ACCOUNTING AND GENERAL SERVICES
DIVISION OF PUBLIC WORKS
P. O. BOX 119, HONOLULU, HAWAII 96810

LETTER NO. PM-0302.8

FEB 28 1978

Ms. Jane L. Silverman
Historic Preservation Officer
Division of State Parks
Department of Land and
Natural Resources
P. O. Box 621
Honolulu, Hawaii 96809

Dear Ms. Silverman:

Subject: EIS for Kalaupapa Infirmary
Kalaupapa, Molokai

Thank you for your comments of February 7, 1978, on the subject matter.

The final archaeological survey by Chiniago, Inc. is scheduled to start on or about March 1, 1978. When the survey is completed, we will send you a copy of the report.

Very truly yours,

R. Nishioka
RIKIO NISHIOKA
State Public Works Engineer

RF/si

GEORGE R. ARIYOSHI
GOVERNOR



ANDREW I. T. CHANG
DIRECTOR OF SOCIAL SERVICES & HOUSING

RECEIVED

JAN 25 12 11 PM '78

DIV. OF PUBLIC WORKS
DAGS

STATE OF HAWAII
DEPARTMENT OF SOCIAL SERVICES AND HOUSING

P. O. Box 339
Honolulu, Hawaii 96809

January 20, 1978

MEMORANDUM

TO: Environmental Quality Commission
550 Halekauwila St., Room 301
Honolulu, Hawaii 96813

FROM: Andrew I. T. Chang, Director
Department of Social Services and Housing

SUBJECT: Environmental Impact Statement - Proposed Kalaupapa Infirmmary,
Kalaupapa, Molokai

Subject EIS has been reviewed for its impact on departmental programs.
We have no comment to make and we are returning the EIS for your usage.
Thank you for the opportunity to review and comment.

Andrew I. T. Chang

DIRECTOR

Attachment
cc: Governor (OEQC)
✓ DAGS

DIVISION OF PUBLIC WORKS	
TO:	INITIAL FOR YOUR:
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<input type="checkbox"/> Design Br.	<input type="checkbox"/> Comments.
<input type="checkbox"/> Insp. Br.	<input type="checkbox"/> Invest. C.
<input type="checkbox"/> Qual. Cont. Engr.	<input type="checkbox"/> Rept.

GEORGE R. ARIYOSHI
GOVERNOR



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

January 23, 1978

E. ALVEY WRIGHT
DIRECTOR

DEPUTY DIRECTORS
WALLACE AOKI
RYOKICHI HIGASHIONNA
DOUGLAS S. SAKAMOTO
CHARLES O. SWANSON

IN REPLY REFER TO:

STP 8.4674

Mr. Donald Bremner, Chairman
Environmental Quality Commission
550 Halekauwila Street
Honolulu, Hawaii 96813

Dear Mr. Bremner:

Subject: Environmental Impact Statement
Proposed Kalaupapa Infirmery

Thank you very much for giving us the opportunity to review the above-captioned document. We have no comments to offer which could improve the statement.

Sincerely,

Douglas S. Sakamoto
R. HIGASHIONNA, PH. D.
Acting Director

GEORGE R. ARIYOSHI
GOVERNOR

RECEIVED

FEB 14 9 56 AM '78
DIV. OF PUBLIC WORKS
DAGS



Richard L. O'Connell
DIRECTOR

TELEPHONE NO.
548-8915

STATE OF HAWAII
OFFICE OF ENVIRONMENTAL QUALITY CONTROL
OFFICE OF THE GOVERNOR
550 HALEKALUWILA ST.
ROOM 301
HONOLULU, HAWAII 96813

February 9, 1978

DIVISION OF PUBLIC WORKS	
TO:	INITIAL FOR YOUR:
1. State P. W. Engr.	Approval
P. W. Secy.	Sign.
Staff Secy. Br.	Info.
Planning Br.	File
3. Proj. Mgmt. Br.	See me
Design Br.	Comments.
Insp. Br.	Learn. &
Qual. Cont. Engr.	Rept.

MEMORANDUM

TO: Hideo Murakami, State Comptroller
Department of Accounting and General Services

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

SUBJECT: Environmental Impact Statement for Kalaupapa Infirmmary,
Kalaupapa, Molokai

We have completed our review of the subject Environmental Impact Statement. As of this date, we have received fifteen (15) comments on the subject EIS. We offer the following comments for your consideration:

- 1) The dimensions of the proposed building should be provided. The length, width and height of the infirmmary should be stated.
- 2) There is a repetition of several sentences in the first paragraph on page 16 of the EIS.
- 3) Although not specifically stated, it appears necessary that the garage on the site will have to be removed and that further archaeological investigation of the site will have to be done. Is this statement correct?
- 4) The EIS has a statement on page 35 that reads, "the proposed construction would have significant impacts both on the patient, residents, and construction crews during the construction." We feel this topic deserves further investigation and discussion in the EIS. If the workers are to be lodged and fed on Kalaupapa during the construction period, how and where would this occur? Would the workers stay over on weekends? Would the

Mr. Hideo Murakami
Page 2
February 9, 1978

possibility of flying the workers in daily be an effective mitigation measure to reduce the potential social impacts? The potential adverse social impacts both on the workers and the patients should be more detailed in the statement.

- 5) Comments and responses made during the consultation process, if any, should be printed in the EIS.

We have not attempted to summarize the comments of other reviewers. Because of this, we recommend that each comment be given careful consideration by yourself.

The EIS Regulations allow the accepting authority or his authorized representative to consider responses received after the fourteen day response period. This Office will exercise the option and will consider responses made by your agency after the fourteen day period.

Thank you for allowing us to review this EIS. We hope that our comments will prove useful to you in revising the EIS.

Attachments

List of comments on the EIS for Kalaupapa Infirmary, Kalaupapa,
Molokai. (DAGS)

<u>State Agencies</u>	<u>Comment Date</u>
Dept. of Agriculture	1/19/78
Dept. of Defense	1/13/78
Dept. of Education	1/18/78
Dept. of Hawaiian Home Lands	1/27/78
Dept. of Planning and Economic Development	1/26/78
Dept. of Social Services and Housing	1/20/78
Dept. of Transportation	1/23/78
Dept. of Land and Natural Resources	2/7/78
University of Hawaii - Environmental Center, Water Resources Reserves Center	1/18/78 2/2/78

Federal Agencies

U.S. Army Support Command, Hawaii	1/13/78
Dept. of the Air Force	1/31/78
Fourteenth Naval District	1/19/78
Fish and Wildlife Service	1/24/78
Soil Conservation Service	2/6/78

GEORGE R. ARIYOSHI
GOVERNOR



HIDEO MURAKAMI
COMPTROLLER

MIKE N. TOKUNAGA
DEPUTY COMPTROLLER

STATE OF HAWAII
DEPARTMENT OF ACCOUNTING AND GENERAL SERVICES
P. O. BOX 119, HONOLULU, HAWAII 96810

LETTER NO. PM-0299.8

1100 2 1978

Mr. Richard L. O'Connell
Director
Office of Environmental
Quality Control
Room 301
550 Halekauwila Street
Honolulu, Hawaii 96813

Dear Mr. O'Connell:

Subject: EIS for Kalaupapa Infirmery
Kalaupapa, Molokai

Thank you for your comments of February 9, 1978. Below, we have responded to each of your itemized comments.

1. The proposed single-story "L"-shaped building will be approximately 140'/105' (lengths) x 40' (width) x 22' (height).
2. The repetitive sentences on page 16 will be deleted.
3. It is correct that a final archaeological survey is necessary. This survey will be conducted by Chiniago, Inc. The removal of the abandoned garage and asphaltic driveway will be performed by the Hospital maintenance staff under the direct supervision of the archaeologist. If historic or prehistoric remains are present under the slabs, a full excavation survey will be performed. The field work will be completed by April 10, 1978. A copy of the final report will be submitted to the State Historic Preservation Office.
4. It is estimated that on a normal work day, there will be approximately 12-15 construction workers at the jobsite and for a short duration at the peak of construction, about 25 construction workers will be employed. The Settlement has available 12 beds for the workers. Addi-

Mr. Richard L. O'Connell
Letter No. PM-0299.8
Page 2

tional beds are available at the visitors' quarters if they are vacant. The General Contractor will probably utilize the permanent quarters and the subcontractors may need to set up temporary tents for overnight accommodations or fly in their men on a daily basis. Meals will be provided by the Hospital staff mess hall.

Normally, construction workers will fly in early Monday morning to report to work and depart on Friday evening or early Saturday morning. It will be too costly (air fares and lost travel time) and strenuous to commute daily on a small aircraft for an extended period of time.

On December 7, 1977, the Department of Health held a public hearing at the Settlement's Pashoal Hall with the staff, residents and patients to discuss the site and schedule for the construction of the infirmary. In addition, on February 9, 1978, the Department of Health held a meeting again at Kalaupapa to discuss the schematic plans with emphasis on the floor plan and appearance of the building. Both meetings were very constructive and the patients are looking forward for the construction to begin.

Enclosed are copies of the Memorandum of General Information and Instructions for Visitors to Kalaupapa Settlement. These documents will be inserted in the construction specifications to inform the workers of the special conditions prevailing at the Settlement.

5. The comments and responses will be incorporated in the final environmental impact statement.

We hope that we have adequately answered all of your concerns.

Very truly yours,



HIDEO MURAKAMI
State Comptroller

COMMUNICABLE DISEASE DIVISION
Department of Health - Hawaii

INSTRUCTIONS FOR VISITORS TO KALAUPAPA SETTLEMENT

GENERAL: The Department of Health encourages visits of interested persons as well as relatives and friends of patients. These visits afford opportunities to learn about the history and site of the original leprosy program, and contribute to the welfare of the patients by maintaining social and family ties. Information pertaining to the management and care of patients can best be obtained by a visit to Hale Mohalu Hospital, the leprosy treatment center near Honolulu.

PHOTOGRAPHS of patients may not be taken except as provided by law.

REST ROOMS for visitors are at the Airport Terminal, at the Main Office, at the Lion's Ocean View Pavilion, and at the Kalawao picnic grounds. Visitors will not use rest rooms reserved for patient use.

PERSONAL CONTACT WITH PATIENTS: Visitors may visit the hospital, only with permission of the Medical Administrator.

Visitors may speak with patients in any public place or building, or on walkways or streets.

Alcoholic beverages may not be consumed in public areas of the Settlement.

MINORS: Only when accompanied by parent or guardian will minors be permitted within the Settlement (Kalawao County).

EATING: There are no restaurants present so it will be necessary for visitors who expect to be present over a meal hour to provide their own food. Food may be eaten in certain areas set apart for this purpose.

TRANSPORTATION: Arrangements for transportation to and from the Settlement and within the Settlement area are the responsibility of the visitor. The usual means of entry is by commercial aircraft. Taxi and tour services privately operated by ex-patients are available for hire within the Settlement. Unescorted walking or riding about the Settlement, including the entire area of Kalawao County will not be permitted. Overnight camping within the area of Kalawao County, including the peninsula, Waikolu Valley and the adjacent beaches is not permitted.

PERMITS: Visitors taking a guided tour of the Settlement will sign a "group" permit provided by the airline prior to departure, signifying that they have read the "Instructions for Visitors" and agree to abide by them as a condition of the visit. Others not taking the guided tour will obtain permits from the offices of the Communicable Disease Division, Department of Health, Honolulu (phone 548-4580) or from the Institution Administrator, Kalaupapa Settlement (phone Molokai 567-6613) and submit them after signature to the Settlement authorities. Overnight visits are limited to relatives and friends of patients or staff or to officials having business in the Settlement and no overnight visitation is permitted by minors under the age of 16. Such visits can be approved only after certification that quarters are available and upon proper invitation or request for the visit.

7. Medical care is not available in the Settlement for Contractor's personnel except on an emergency basis when the situation is such that immediate medical care is indicated.

Attachment

Prepared by Richard Young, Administratorⁱⁿ-Officer,
Communicable Disease Division, Department of Health,
Honolulu, Hawaii

October 3, 1973

January, 1978

RECEIVED

UNIVERSITY OF HAWAII

Water Resources Research Center

FEB 8 11 43 AM '78

DIV. OF PUBLIC WORKS
DACS

Office of the Director

February 2, 1978

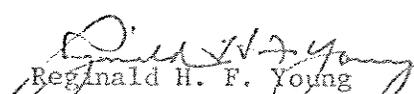
Office of Environmental
Quality Control
550 Halekauwila St.
Honolulu, Hawaii 96813

Gentlemen:

Subject: EIS, Proposed Kalaupapa Infirmary

We have reviewed the subject EIS and have no critical comments at this time.

Sincerely,


Reginald H. F. Young
Asst. Director, WRRC

RHFY:jmn

cc: Dept. of Accounting /
and General Services

DIVISION OF PUBLIC WORKS	
TO:	INITIAL FOR YOUR:
<input checked="" type="checkbox"/> State P. W. Engr.	Approval
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<input checked="" type="checkbox"/> Proj. Mgmt. Br.	See me
<input type="checkbox"/> Design Br.	Comments.
<input type="checkbox"/> Insp. Br.	Invest. &
<input type="checkbox"/> Qual. Cont. Engr.	Rept.

PLANNING COMMISSION
 Shiro Hokama, Chairman
 Charles Ota, Vice Chairman
 Patrick Kawano
 Marvin Romme
 Harlow Wright
 Rojeho Tacadol
 Wesley Wong
 Wayne Uemasa, Ex-officio
 Tatsumi Imada, Ex-officio



Elmer Cravalho
 Mayor

RECEIVED

Tosh Ishikawa
 Planning Director

FEB 9 12 15 PM '78

Oshikazu "Zuke" Matsui
 Deputy Planning Director

DIV. OF PUBLIC WORKS
 DAGS

COUNTY OF MAUI
 PLANNING DEPARTMENT

200 S. HIGH STREET
 WAILUKU, MAUI, HAWAII 96793

February 6, 1978

Honorable George R. Ariyoshi
 Governor, State of Hawaii
 c/o Office of Environmental Quality Control
 550 Halekauwila Street, #301
 Honolulu, Hawaii 96813

DIVISION OF PUBLIC WORKS	
TO:	INITIAL FOR YOUR:
<input checked="" type="checkbox"/> State P. W. Engr.	Approval
<input type="checkbox"/> P. W. Secy.	Sign.
<input type="checkbox"/> Staff Serv. Br.	Info.
<input checked="" type="checkbox"/> Planning Br.	File
<input checked="" type="checkbox"/> Proj. Mgmt. Br.	See me
<input type="checkbox"/> Design Br.	Comments.
<input type="checkbox"/> Insp. Br.	Invest. &
<input type="checkbox"/> Qual. Conf. Engr.	Rept.

Dear Governor Ariyoshi:

Re: Environmental Impact Statement (EIS - Proposed
 Kalaupapa Infirmary, Kalaupapa, Molokai

Our review of the above document is complete, and we can only reiterate past statements that the 133 patients residing at the Kalaupapa Settlement deserve the best possible health care and that this long overdue infirmary should be constructed in the most efficient and expeditious manner possible. The document is quite complete in its analysis of alternative sites in response to potential natural, social, archaeological and historical impacts; except, however, that no attempt has been made to communicate the architectural character of the project and its resultant visual impact.

It has been noted on pages 2 & 17 that the State of Hawaii Department of Accounting and General Services will be initiating an application for a Special Management Area Permit pursuant to the Interim Coastal Zone Management Rules and Regulations of the County of Maui and that architectural plans will be submitted for evaluation by the Maui County Urban Design Review Board. Please note that the foregoing application has not been initiated to date and that time is of the essence in this project.

Thank you for the opportunity to evaluate this long overdue project.

Yours very truly,

TOSH ISHIKAWA
 Planning Director

- cc Mayor Cravalho
- cc S. Goshi
- cc P. Mancini
- cc C. Hart
- cc DAGS

GEORGE R. ARIYOSHI
GOVERNOR



HIDEO MURAKAMI
COMPTROLLER

MIKE N. TOKUNAGA
DEPUTY COMPTROLLER

STATE OF HAWAII
DEPARTMENT OF ACCOUNTING AND GENERAL SERVICES
DIVISION OF PUBLIC WORKS
P. O. BOX 119, HONOLULU, HAWAII 96810

LETTER NO. PM-0304.8

28 1978

Mr. Toshio Ishikawa
Director
Planning Department
County of Maui
200 S. High Street
Wailuku, Hawaii 96793

Dear Mr. Ishikawa:

Subject: EIS for Kalaupapa Infirmary
Kalaupapa, Molokai

Thank you for the comments of February 6, 1978, on the Environmental Impact Statement for the proposed Kalaupapa Infirmary.

As you know, we submitted the application for a Special Management Area Permit to you on February 7, 1978. The floor layout and the exterior elevations of the proposed Infirmary are shown on the schematic plans that were submitted with our application.

Our consultants have recommended that the color of the exterior walls be off-white and the roof shingles of the single-story building be green to blend in with the adjacent buildings.

The architectural plan and its visual impact will be discussed further at the Shoreline Management Area Permit Public Hearing scheduled in Kalaupapa on April 3, 1978.

Very truly yours,


RIKIO NISHIOKA
State Public Works Engineer

RF/si

XV. LIST OF NECESSARY PERMITS

The proposed Kalaupapa Infirmary project must obtain the following permits prior to its implementation:

1. Shoreline Management Permit: Planning Department,
County of Maui
2. Building Permit: Department of Health, State of
Hawaii

MEMORANDUM OF GENERAL INFORMATION

Pertinent information in regards to special conditions at Kalaupapa have been included in the specifications for this job. The Department of Health would like to take the opportunity afforded by the pre-construction conference to stress the following points:

1. For liaison purpose the Department of Health's Administrator in residence at the Settlement is Mr. ~~Elmer A. Wilson~~, Institution Administrator, Kalaupapa Settlement. *CHARLES BUSBY*
2. Rules and Regulations. All rules and regulations of the Settlement shall be strictly adhered to, and the contractor shall be responsible for his employees. No liquor other than beer will be allowed.
3. Fraternizing. The Contractor shall take all necessary precautions to prevent, and shall assume the responsibility for, the fraternizing of his construction or administrative personnel with the patients of the Settlement. The attached leaflet titled "Instructions For Visitors To Kalaupapa Settlement" gives more detailed information on conditions that visitors to the Settlement are to abide by and is made a part of this memorandum.
4. Upon application, a term permit will be issued to contractor's personnel for the duration of the job. It is expected that only adult personnel will be assigned by the Contractor to this job unless an exception is granted by the Chief, Communicable Disease Division for a specific individual for good cause.
5. The Contractor is requested to inform the Institution Administrator of the person designated in charge of the job at the Settlement. The person in charge will notify the Institution Administrator in advance of all movement in and out of the Settlement by his men.
6. These are general instructions since it is difficult to anticipate all possible contingencies that may come up. In dealing with such contingencies the Institution Administrator can be expected to approach each problem in a spirit of helpfulness and will cooperate to the extent possible taking into consideration all pertinent factors that have a bearing upon the particular problem under review. We hope the Contractor and the contracting agency will also approach each problem in the same spirit.

Appendix 1

-Certificate of Need

GEORGE R. ARIYOSHI
GOVERNOR OF HAWAII

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DAGS



STATE OF HAWAII
DEPARTMENT OF HEALTH

P.O. Box 3378
HONOLULU, HAWAII 96861

GEORGE A. L. YUEN
DIRECTOR OF HEALTH

AUDREY W. MERTZ, M.D., M.P.H.
DEPUTY DIRECTOR OF HEALTH

HENRY N. THOMPSON, M.A.
DEPUTY DIRECTOR OF HEALTH

JAMES S. KUMAGAI, Ph.D., P.E.
DEPUTY DIRECTOR OF HEALTH

June 18, 1976 DIVISION OF PUBLIC WORKS
INITIAL FOR YOUR IN REPLY, PLEASE REFER TO:
FILE: CD-Adm.

<u>1</u> State P. W. Engr.	<u> </u> Approval	<u> </u>
<u> </u> W. Secy.	<u> </u> Sign.	<u> </u>
<u>2</u> Staff Serv. Br.	<u> </u> Info.	<u> </u>
<u> </u> Planning Br.	<u> </u> File	<u> </u>
<u> </u> Proj. Mgmt. Br.	<u> </u> See me	<u> </u>
<u> </u> Design Br.	<u> </u> Comments.	<u> </u>
<u> </u> Insp. Br.	<u> </u> Invest. &	<u> </u>
<u> </u> Qual. Cont. Engr.	<u> </u> Repl.	<u> </u>

Mr. Hideo Murakami
State Comptroller
Department of Accounting & General Services
State Office Building
1151 Punchbowl Street
Honolulu, Hawaii 96813

Dear Mr. Murakami:

Attention: Mr. Donald Nakanishi

The State Advisory Council For Comprehensive Health Planning voted unanimously yesterday afternoon to grant a Certificate of Need to the Department of Health to build a fourteen bed SNF/ICF/CHF facility in Kalaupapa Settlement at an estimated cost of about \$1,197,000 to replace the present non-conforming infirmary.

The Department of Health had amended its original application for an eleven bed SNF/ICF facility to a fourteen bed SNF/ICF/CHF facility because of serious concerns expressed by the Review Panel of the Comprehensive Health Planning Agency that an eleven bed facility would not be adequate to meet the needs of the Kalaupapa community. In re-analyzing the data it was found that while an eleven bed facility would meet the projected SNF/ICF needs about 98% of the time, the present facility also provides CHF services. When SNF/ICF/CHF needs are considered together, an eleven bed facility would meet the combined needs only about 38% of the time. Accordingly, the Department amended its application to request a fourteen bed facility. It is projected that fourteen beds would meet the needs about 80% of the time with a bed occupancy rate of 85%. Needs in excess of the capacity will be transferred to Honolulu for temporary care.

The Review Panel also recommended that 2-bed wards instead of 4-bed wards be built. We indicated that these details would be resolved during the design stage with opportunities for input accorded to all parties concerned. It appears probable that the fourteen beds may include a mixture of one, two or four bed units. Details in support of the amended application are provided in the attachments to this letter for your general information.

We would appreciate having you expedite processing a request for release of funds to initiate this project.

Sincerely,

Res Yuen
GEORGE YUEN
Director of Health



EVLVIA L. LEVY
ADMINISTRATOR

A. DUANE BLACK, CHAIRMAN
STATE ADVISORY COUNCIL FOR
COMPREHENSIVE HEALTH PLANNING

STATE OF HAWAII
COMPREHENSIVE HEALTH PLANNING AGENCY
P. O. BOX 3378
HONOLULU, HAWAII 96801

June 9, 1976

MEMORANDUM

TO: Members of the State Advisory Council
FROM: Curt Leser, Chairman
SUBJECT: Report of the Review Panel

The Review Panel met on June 8, 1976 and recommends approval of the following applications for certificates of need under Act 209 and approval under Section 1122.

#83 from G. N. Wilcox Hospital to change 12 beds from SNF/ICF licensure to acute licensure.

Wilcox Hospital is currently operating 55 SNF/ICF beds which are insufficient to meet the need. In a rather complicated reshuffling of beds, Wilcox proposed to increase its operating SNF/ICF beds from 55 to 59 and decrease its operating acute beds from 84 to 58. Because the changes involve closing units which are now open and opening units which are closed, the change in licensed beds will be to change 12 SNF/ICF to acute. The change in beds in operation will be to increase SNF/ICF by four and decrease acute by 26.

The Kauai CHP Council recommends approval of this application on a non-substantive basis.

RECOMMENDATION OF THE REVIEW PANEL: The Review Panel unanimously recommends approval of this application on a non-substantive basis.

#81 from Kapiolani Hospital for a sex abuse center.

Kapiolani Hospital is proposing to establish a sex abuse care center primarily for rape victims and children who are victims of sex abuse. No capital expenditure is involved but the operating budget will be subsidized by a \$200,000 appropriation from the State Legislature.

The Health and Community Services Council recommends approval of this application.

RECOMMENDATION OF THE REVIEW PANEL: The Review Panel unanimously recommends approval of this application under Act 209 and Section 1122.

#80 from the Department of Health for an expenditure of \$1,050,000 for the construction of an 11-bed SNF/ICF and outpatient facility at Kalaupapa.

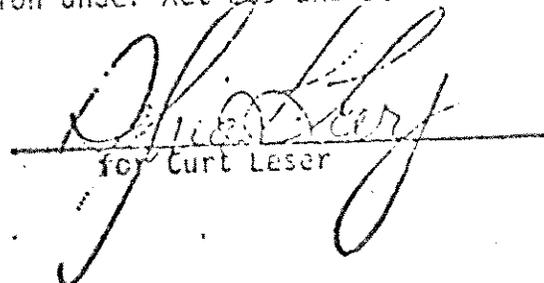
The Department of Health proposed the above replacement for the existing infirmary at Kalaupapa. The existing infirmary with a capacity of 40 beds is more than 40 years old and badly in need of replacement. The facility is in violation of Fire and Life Safety Code standards. The Review Panel made a trip to Kalaupapa to inspect the current infirmary and to discuss the Department of Health's proposal with staff and patients. An open meeting with the patients was attended by approximately 55 patients and 10 staff. As a result of this meeting and further discussions with the staff, the Review Panel has a number of concerns about the proposal. We are apprehensive that an 11-bed facility may not be sufficient and have asked the Department of Health for further study of the need. We are also concerned that the initial primary consideration apparently was not planning to meet the needs of the patients but to stay within a suggested preset cost ceiling. Finally, we are concerned that the preliminary sketches seem to have a number of deficiencies.

The Department of Health's representatives have indicated that if the request for additional beds is supported by these statistics and costs considerations, they would recommend to the Director of Health that the application be amended to provide for an increase of beds over the initial eleven.

In spite of our concerns, we wholeheartedly support the Department's plan to construct the facility at Kalaupapa. We recommend that a certificate of need be issued for this proposal and that the Department of Health be requested to come back with plans for further changes which may be required to meet the needs. We have also requested the Department to study the feasibility of instituting home care services as an alternative to institutionalizing some of the patients.

The Tri-Isle CH? Council and the Hill-Burton Agency recommend approval of this proposal.

RECOMMENDATION OF THE REVIEW PANEL: The Review Panel unanimously recommends approval of this application under Act 209 and Section 1122.


for Curt Leser

Appendix 2

Soils Information for the Proposed
Infirmary Site

In a representative profile the surface layer is dark reddish-brown silty clay about 11 inches thick. The upper part of the subsoil is reddish-brown silt loam about 5 inches thick. The lower part is dark reddish-brown silty clay, about 28 inches thick, that has subangular blocky structure. The underlying material is silty clay loam over soft, weathered rock. The soil is strongly acid in the surface layer and very strongly acid in the subsoil.

Permeability is moderately rapid. Runoff is slow to medium, and the erosion hazard is slight to moderate. The available water capacity is about 1.2 inches per foot in the surface layer and 1.6 inches per foot in the subsoil. Roots penetrate to a depth of 5 feet or more. Tillage is somewhat difficult because of the slope.

Representative profile: Island of Molokai, lat. 21°7'4" N. and long. 156°45'47" W.

Ap—0 to 11 inches, dark reddish-brown (5YR 3/2) silty clay, dark brown (7.5YR 4/2) when dry; strong, very fine and fine, subangular blocky structure; very hard, firm, sticky and plastic; many roots; common, very fine, tubular pores; few wormholes; many glistening specks; high bulk density; strongly acid; abrupt, smooth boundary. 9 to 12 inches thick.

B21—11 to 16 inches, reddish-brown (5YR 4/4) heavy silt loam, dark brown (7.5YR 4/4) when dry; weak, medium and fine, subangular blocky structure; hard, friable, sticky and plastic; many roots; many very fine and fine tubular pores; bulk density is significantly lower than that of Ap horizon; very strongly acid; abrupt, smooth boundary. 4 to 6 inches thick.

HB22—16 to 26 inches, dark reddish-brown (5YR 3/4), moist and dry, silty clay; moderate, fine and very fine, subangular blocky structure; very hard, firm, sticky and plastic; many roots; many very fine pores; few pockets of friable silty clay loam; very strongly acid; clear, wavy boundary. 9 to 15 inches thick.

HB23t—26 to 44 inches, dark reddish-brown (2.5YR 3/4 moist, 5 YR 3/3 dry) silty clay; strong, medium, subangular blocky structure breaking to strong, fine and very fine, subangular blocky; very hard, firm, sticky and plastic; many roots; many very fine pores; thin, nearly continuous clay films on ped surfaces; many gritty lumps; very strongly acid; clear, wavy boundary. 11 to 18 inches thick.

HC1—44 to 58 inches, dark reddish-brown (5YR 3/4) silty clay loam, mottled with red (2.5YR 4/6), strong brown (7.5YR 4/6), and black (10YR 2/1); massive; hard, firm, sticky and plastic; few roots; many pores; very strongly acid. 12 to 16 inches thick.

HC2—58 inches, very porous saprolite.

The solum ranges from 33 inches to more than 51 inches in thickness. In the A horizon the concentration of heavy minerals is variable. In some areas the bulk density of the A horizon is high, but in others it is negligible. The A horizon ranges from 5YR to 7.5YR in hue, and, when moist, from 2 to 3 in value and chroma. The B horizon ranges from 5YR to 2.5YR in hue. It ranges from 2 to 4 in value and from 3 to 6 in chroma when moist.

This soil is used mainly for pasture. A small acreage is wooded. (Capability classification IVe, irrigated or nonirrigated; pasture group 6; woodland group 5)

Halawa silty clay, 3 to 25 percent slopes, severely eroded (#HD3).—This soil occurs near Kalae, Molokai. Its profile is like that of Halawa silty clay, 3 to 25 percent slopes, except that most of the surface layer and part of the subsoil have been removed by erosion. In many places cultivation has brought weathered rock fragments to the surface. Runoff is medium, and the erosion hazard moderate to severe.

This soil is used mainly for pasture. Nearly all the acreage was once used for pineapple, but the crop was poorly suited. Only a few small areas are now used for pineapple. (Capability classification VIe, irrigated or nonirrigated; pasture group 6; woodland group 5)

Halawa silt loam, 20 to 35 percent slopes (#HE).—This soil occurs on side slopes of the Waianae Range, between Waiaiaua and Kolekole Pass. It has a profile like that of Halawa silty clay, 3 to 25 percent slopes, except for the texture of the surface layer. Runoff is medium to rapid, and the erosion hazard is moderate to severe. Tillage is difficult because of the slope.

Included in mapping were small areas that have been eroded down to the bedrock. In places there are remnants of a nearly massive subsoil. Also included, at the higher elevations, were very steep to precipitous areas of Rock land and Stony land.

This soil is used for pasture. Pineapple was formerly grown but was poorly suited. (Capability classification VIe, nonirrigated; pasture group 6; woodland group 5)

Halawa silt loam, 35 to 70 percent slopes, eroded (#HF2).—This soil has a profile like that of Halawa silty clay, 3 to 25 percent slopes, except that most of the surface layer and part of the subsoil have been removed by erosion. Runoff is rapid, and the erosion hazard is severe. Included in mapping were a few stony areas.

This soil is used for pasture. Cultivation is impractical, because the soil is too steep. (Capability classification VIIe, nonirrigated; pasture group 6; woodland group 15)

Haleiwa Series

This series consists of well-drained soils on fans and in drainageways along the coastal plains. These soils are on the islands of Oahu and Molokai. They developed in alluvium derived from basic igneous material. They are nearly level to strongly sloping. Elevations range from sea level to 250 feet. The annual rainfall amounts to 30 to 60 inches, most of which occurs between November and April. The mean annual soil temperature is 73° F. Haleiwa soils are geographically associated with Waihua and Kawaihapai soils on Oahu and Kalaupapa soils on Molokai.

These soils are used for sugarcane, truck crops, and pasture. The natural vegetation consists of koa haole, lantana, guava, Christmas berry, bermudagrass, and fingergrass.

Haleiwa silty clay, 0 to 2 percent slopes (HeA).—This soil occurs as large areas on alluvial fans or as long, narrow areas in drainageways. Included in mapping were small areas of poorly drained clayey soils in depressions, as well as small areas of moderately well drained clayey soils.

In a representative profile the surface layer is dark-brown silty clay about 17 inches thick. The subsoil and substratum, to a depth of more than 5 feet, are dark-brown and dark yellowish-brown silty clay that has subangular blocky structure. The soil is neutral to slightly acid.

Permeability is moderate. Runoff is very slow, and the erosion hazard is no more than slight. The available water capacity is about 1.9 inches per foot. In places

roots penetrate to a depth of 5 feet or more. The soil is subject to occasional nondamaging overflow in some places.

Representative profile: Island of Oahu, lat. 21°34'18" N. and long. 158°03'33" W.

- Apl—0 to 9 inches, dark-brown (10YR 3/3) silty clay, very dark grayish brown (10YR 3/2) when moist; moderate, fine and medium, granular structure; hard, firm, sticky and plastic; abundant fine, medium, and coarse roots; many, very fine and fine, interstitial pores; moderate effervescence with hydrogen peroxide; slightly acid; gradual, smooth boundary. 4 to 9 inches thick.
- Ap2—9 to 17 inches, dark-brown (10YR 3/3) silty clay, very dark grayish brown (10YR 3/2) when moist; moderate, fine, subangular blocky structure; hard, firm, sticky and plastic; abundant very fine and fine, and few coarse roots; common, fine, tubular pores and few, medium, tubular pores; slight effervescence with hydrogen peroxide; slightly acid; clear, wavy boundary. 6 to 9 inches thick.
- B2—17 to 26 inches, dark-brown (10YR 3/3), moist and dry, silty clay; weak, fine, subangular blocky structure; hard, firm, sticky and plastic; abundant very fine and fine roots; common, fine, tubular pores and few, medium, tubular pores; patchy, red material that looks like clay films in pores and on some pedis; slight effervescence with hydrogen peroxide; neutral; clear, wavy boundary. 8 to 10 inches thick.
- C1—26 to 36 inches, dark-brown (10YR 3/3), moist and dry, silty clay; weak, fine, subangular blocky structure; hard, firm, sticky and plastic; plentiful very fine and fine roots; many, very fine, tubular pores; common, medium, tubular pores; few, coarse, tubular pores; moderate effervescence with hydrogen peroxide; neutral; clear, smooth boundary. 8 to 12 inches thick.
- C2—36 to 48 inches, dark yellowish-brown (10YR 3/4) silty clay, dark brown (10YR 3/3) when moist; weak, fine, subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few very fine and medium roots; many, very fine, tubular pores; common, fine, tubular pores; few, medium, tubular pores; slight effervescence on soil mass with hydrogen peroxide; neutral; clear, wavy boundary. 10 to 12 inches thick.
- C3—48 to 65 inches, dark yellowish-brown (10YR 3/4) silty clay, dark brown (10YR 3/3) when moist; weak, fine, subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few very fine roots; many, very fine, tubular pores and few tubular pores; slight effervescence with hydrogen peroxide on stains within pores.

In places the A horizon is silty clay loam or very stony silty clay loam. The solum ranges from 10YR to 7.5YR in hue. A few rounded pebbles occur throughout the profile. In places stones or stratified sand and gravel occur at a depth below 40 inches.

This soil is used for sugarcane, pasture, and truck crops. (Capability classification IIe if irrigated, IIIe if nonirrigated; sugarcane group 1; pasture group 3; woodland group 1)

Haleiwa silty clay, 2 to 6 percent slopes (HcB).—On this soil, runoff is slow and the erosion hazard is slight.

This soil is used for sugarcane, pineapple, and truck crops. (Capability classification IIe if irrigated, IIIe if nonirrigated; sugarcane group 1; pasture group 3; woodland group 1)

Haleiwa silty clay loam, 0 to 10 percent slopes (HcB).—This soil occurs on the Kalaupapa peninsula on Molokai. It has a profile like that of Haleiwa silty clay, 0 to 2 percent slopes, except for the texture of the surface layer and the slope. Runoff is slow to medium, and the erosion

hazard is slight. In most places the slope is 3 to 10 percent. In most areas there are a few scattered stones in the surface layer.

This soil is used for pasture. (Capability classification IIIe, irrigated or nonirrigated; sugarcane group 1; pasture group 3; woodland group 1)

Haleiwa very stony silty clay loam, 0 to 15 percent slopes (HcC).—This soil occurs on the Kalaupapa peninsula on Molokai. Runoff is slow to medium, and the erosion hazard is slight to moderate. There are many stones on the surface and in the profile. The stones make cultivation difficult.

This soil is used for pasture. (Capability classification VI, irrigated or nonirrigated; pasture group 3; woodland group 1)

Halii Series

This series consists of well drained and moderately well drained soils on uplands on the island of Kauai. These soils developed in material weathered from basic igneous rock, probably mixed with volcanic ash and ejecta. They are gently sloping to steep. Elevations range from 300 to 1,000 feet. The annual rainfall amounts to 100 to 200 inches. The mean annual soil temperature is 71° F. Halii soils are geographically associated with Kapaa and Koolau soils.

These soils are used for water supply, wildlife habitat, sugarcane, and pasture. The natural vegetation consists of melastoma, rhodomyrtus, guava, ricegrass, and associated shrubs and grasses.

Halii gravelly silty clay, 3 to 8 percent slopes (HfB).—This soil occurs on ridgetops and side slopes on uplands.

In a representative profile the surface layer is very dark grayish-brown gravelly silty clay about 6 inches thick. The upper part of the subsoil is dark reddish-brown and strong-brown silty clay and clay loam that has subangular blocky structure. Red bands up to 2 inches thick are common. The lower part of the subsoil consists of bands of red clay loam that continue to a depth of more than 60 inches. The substratum is soft, weathered rock. The soil is very strongly acid in the surface layer and very strongly acid to extremely acid in the subsoil.

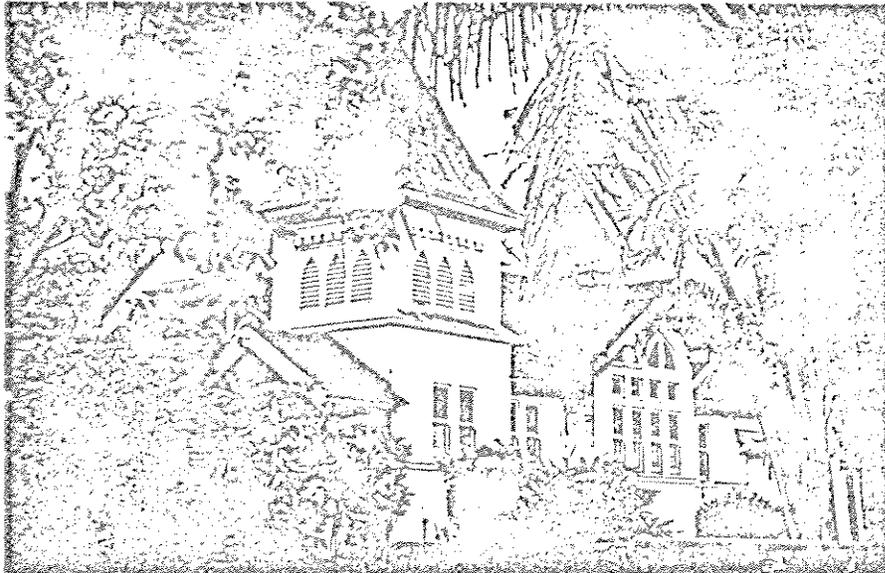
Permeability is moderately rapid. Runoff is slow, and the erosion hazard is slight. In places roots penetrate to a depth of 5 feet or more.

Representative profile: Island of Kauai, lat. 22°00'32.3" N. and long. 159°25'54.3" W.

- A11—0 to 3 inches, very dark grayish-brown (10YR 3/2) gravelly silty clay, very dark brown (10YR 2/2) when dry; moderate, fine and very fine, subangular blocky structure; very hard, friable, slightly sticky and slightly plastic; abundant roots; the pebbles and sand grains are of the kind usually called ironstone; soil aggregates tend to harden irreversibly; very strongly acid; clear, smooth boundary. 2 to 5 inches thick.
- A12—3 to 6 inches, very dark grayish-brown (10YR 3/2) ironstone gravel and very coarse sand that contains a little clay; single grain; loose; abundant roots; very strongly acid; abrupt, smooth boundary. 2 to 8 inches thick.
- B21—6 to 15 inches, strong-brown (7.5YR 4/5) heavy silty clay loam, reddish brown (5YR 4/4) when dry; moderate, medium, subangular blocky structure; soft, friable, sticky and plastic; plentiful roots; common very fine pores; contains numerous hard and soft

Appendix 3

Building Descriptions of Historic Buildings,
Excerpts from Building Inventory, Kalaupapa-
Hawaii, by the U.S. Dept. of Interior, National
Park Service, March 1977, 3 vols.



STRUCTURE: Building 286

LOCATION: Calvinist Mission

USE: Church

SIZE: Approx. 34 x 60

OWNERSHIP: United Church of Christ

DATE OF STRUCTURE: 1915

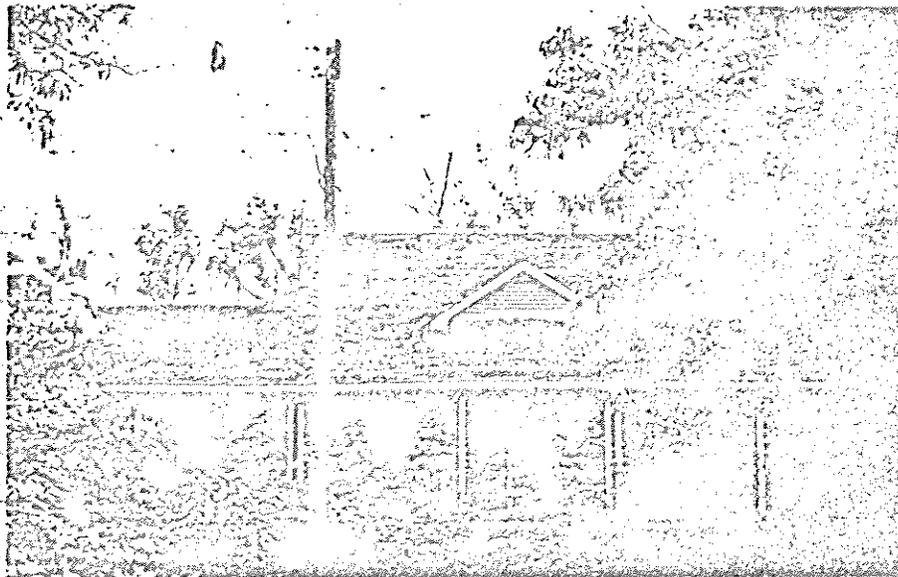
DESCRIPTION: The structure is a frame building of single wall construction, with a foundation consisting of stone footings and wood posts, and concrete. The main gable roof is transected by two smaller gables which cover the windows projecting from the middle sections of the east and west walls. These gables are approximately two feet lower than the main gable. A tower which designates the main entrance to the building is located in the northwest corner of the structure. The tower has a hip roof finished with wood shingles, and ventilating louvers in the shapes of pointed arches on all four sides. Walls consist of vertical plank siding, surrounded by a continuous girt just below window level, and a water table at the sole plate. The large window areas - one at each gable end and each wing - are broad, pointed arches filled with fixed sash and double hung windows. Structural outlookers project beyond the roof-lines at the gable ends. The interior space is articulated with wood barrel vaults and exposed trusses. The building is in very deteriorated condition, and is in need of virtual board-by-board reconstruction.

SIGNIFICANCE: According to the Pastor, nearly similar to Nanikoole Church on Oahu. "... in 1915 the present ornate building was erected by Sam Kaaumoana, leader of the choir of Kaunakapili Church, who brought his crew of carpenters and painters with him from Honolulu. This crew consisted of his two brothers-in-law, and son-in-law and three sons." (Ethel Damon, Siloama, Church of the Healing Spring, Honolulu: Hawaiian Board of Missions, 1948. p. 82) Simplified Stick Style.

MAINTENANCE COST: \$75,000

FUTURE MAINTENANCE COST: \$1,000/annum

DATE OF REPORT: January 17, 1977



STRUCTURE: Building 9

LOCATION: Bishop Home

USE: Former dormitory

SIZE: Approx. 30 x 50

OWNERSHIP: State

DATE OF STRUCTURE: Unknown

DESCRIPTION: The structure is a frame building of single wall construction.

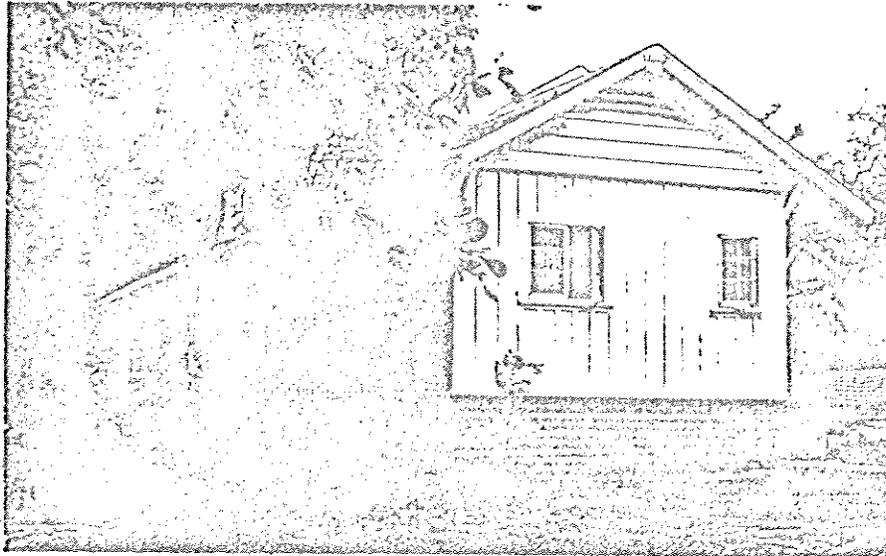
The foundation consists of concrete piers. The building has a hip roof over the main section, and smaller hip roofs over the flanking wings to the north and south. All of the roofs have gables. Another gable, which houses a louver, is located in the main roof section directly above the front entrance. The roofs are finished with wood shingles. A veranda which runs the length of the front of the main section is recessed under the hip roof. The paired posts of the veranda have decorative, jigsaw brackets. The remains of the railing shows that it had a diamond pattern. The corners of the structure are finished with cornerboards. A small wing at the rear (east) of the building has a very solid concrete slab for a foundation, and served as the bathroom area. The building is in very deteriorated condition. The roof shingles are missing in many places. Much of the wood from the building (railings, veranda ceiling, interior walls) has been stripped for luau wood. The building is beyond repair.

SIGNIFICANCE: One of the most architecturally significant building on the peninsula. Recording by the Historic American Building Survey is highly recommended - and to be done as soon as possible. The building will not last much longer. According to a patient, the building is haunted and was probably constructed in an area where it should not have been constructed. Removal is recommended AFTER proper recording has been done. Note: the recording should be done only after the koa is removed so that the building is visible from all elevations.

MAINTENANCE COST: No estimate

FUTURE MAINTENANCE COST: No estimate

DATE OF REPORT: January 16, 1977



STRUCTURE: Building 15

LOCATION: Bishop Home

USE: Residence for nuns.

SIZE: Approx. 3600 sq. ft. (2-story) OWNERSHIP: State

DATE OF STRUCTURE: Unknown (prior to 1939)

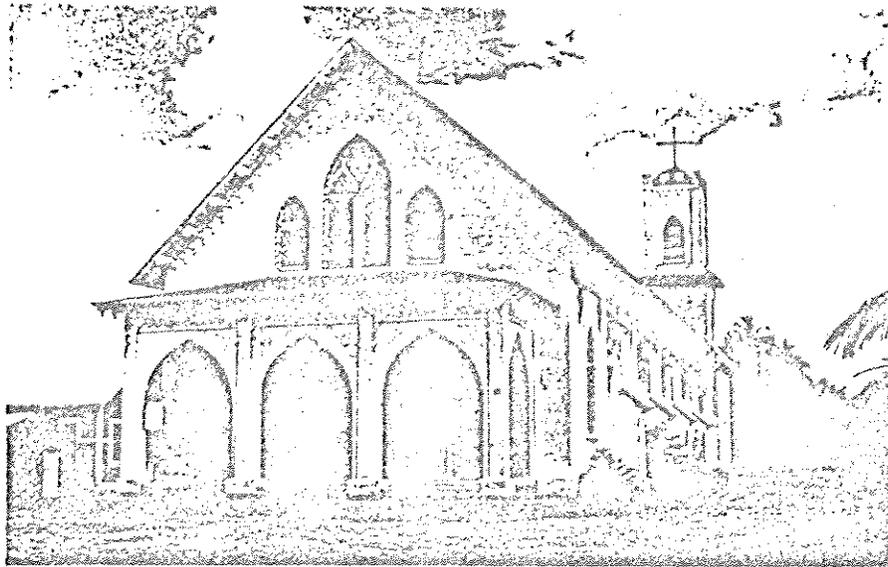
DESCRIPTION: The structure is a frame building of single wall construction with an exterior finish of board and batten. The foundation consists of concrete footings and wood posts. The gable roofs have long second story dormers on the north and south sides of the structure which run approximately one-third the length of the building. A recessed porch is located in the central section of the north side. Two smaller porches are located at the rear of the building. Most windows are two-sash casement windows with twelve lights. The foundation is camouflaged by a skirting which consists of horizontal wood strips. The roofs are finished with green composition shingles. The building is in poor condition. The structure should be fumigated, and termite and rot damage should be repaired. The copper gutters and downspouts (yes, this building has gutters!) should be replaced. The exterior should be painted.

SIGNIFICANCE: Historical significance. Architectural significance is lacking.

MAINTENANCE COST: \$7900

FUTURE MAINTENANCE COST: \$1200/annum

DATE OF REPORT: January 16, 1977



STRUCTURE: Building 291

LOCATION: Industrial area

USE: Catholic church

SIZE: Approx. 38 x 100

OWNERSHIP: Catholic Church

DATE OF STRUCTURE: Completed 1908

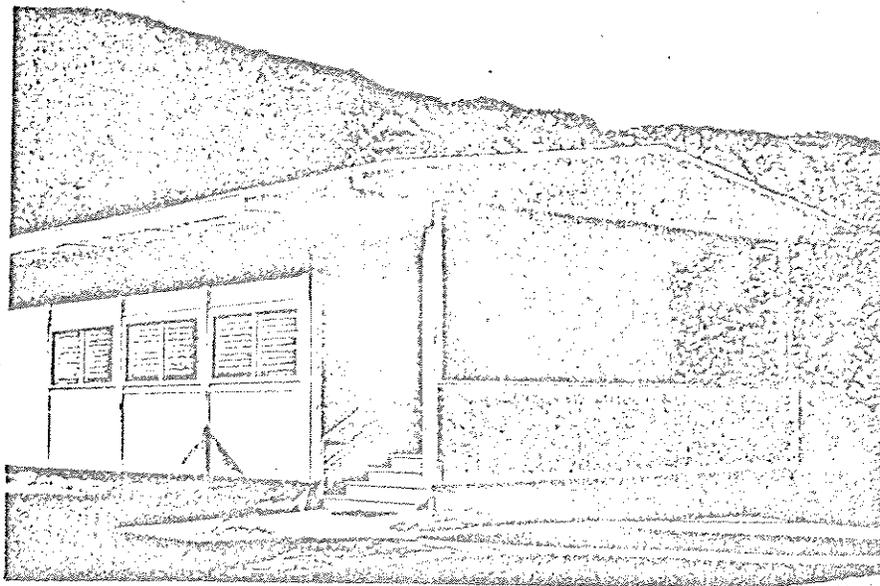
DESCRIPTION: The building is a reinforced concrete structure with a concrete foundation. The rectangular building has an arched portico at the west side sheltered by a hip roof, a large nave with a gable roof, and a sacristy at the east end with a shed roof. A three-tiered steeple with a pyramidal roof is located in the southeast corner of the structure. All roofs are covered with corrugated metal. The hooded gothic windows are interspersed with reinforced concrete buttresses on the north and south walls. Other windows through the structure, as well as the louvers in the steeple are also of the hooded gothic type. Flanking the tops of the windows on the north and south are quatrefoils which have been filled in with masonite (replacing the original glass?). Corinthian columns on the interior help support the gothic vaults. The interior floor is scored concrete. The structure is used daily, and is in poor condition. Any termite damage should be repaired (windows, roof structure.) The stained glass windows should be stabilized. The structure should be re-roofed. The interior and exterior should be painted.

SIGNIFICANCE: Quite a massive building effort for Kalaupapa. More research is warranted without question. Architecturally imposing, and really serves as the visual landmark for Kalaupapa. The church is the building most easily distinguished from the top of the pali, and from the air. Also exemplifies the efforts of one religion trying to out-do the other, which was so common for decades in Hawaii.

MAINTENANCE COST: \$41,500

FUTURE MAINTENANCE COST: \$1,000/annum

DATE OF REPORT: January 26, 1977



STRUCTURE: Building 287

LOCATION: Kanasna Hou Church

USE: Parish Hall

SIZE: Approx. 30 x 40

OWNERSHIP: Private

DATE OF STRUCTURE: Unknown (very recent)

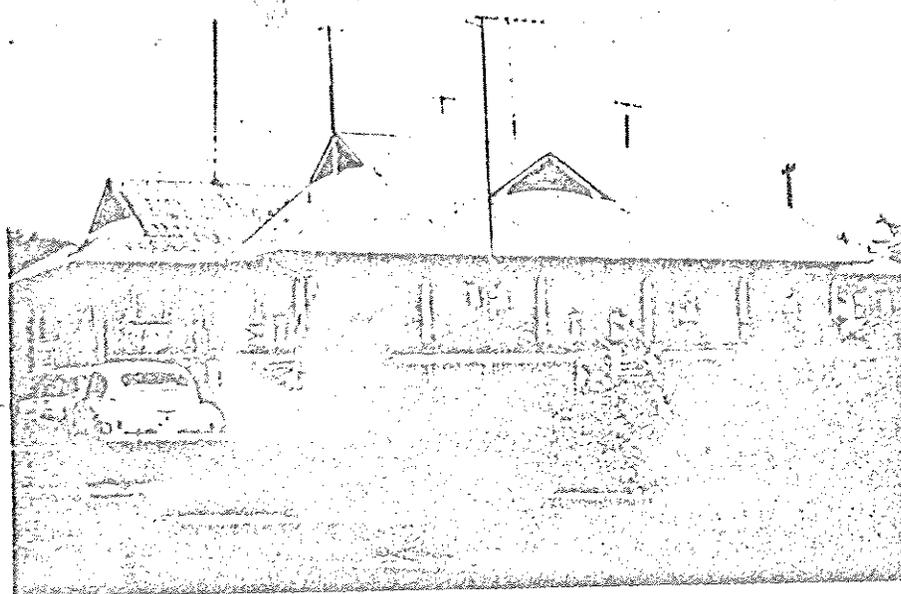
DESCRIPTION: The structure is a frame building, with a plywood exterior. The foundation consists of concrete pads and metal posts. The gable roof is finished with composition shingles. A veranda, sheltered by the gable roof, stretches across the north end of the structure. The building is frequently used, and seems to be in fair to good condition.

SIGNIFICANCE: None

MAINTENANCE COST: No estimate

FUTURE MAINTENANCE COST: No estimate

DATE OF REPORT: October 14, 1976

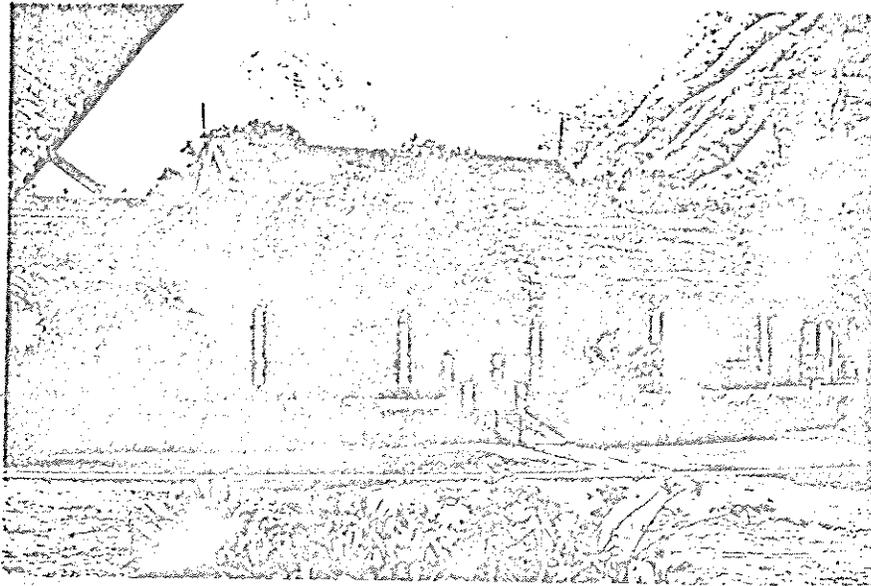


STRUCTURE: Building 1
LOCATION: Bay View Home
USE: Residence
SIZE: Approx. 3700 sq. ft. OWNERSHIP: State
DATE OF STRUCTURE: 1916

DESCRIPTION: The structure is a frame building of single wall construction. The plan is generally symmetrical: a main section with a veranda is flanked by two smaller wings to the east and west and a third wing to the north. The dominant architectural feature of the building is the combination of the intersecting hip roofs, all with louvered gables at the ridges. Another louvered gable projects from the roof directly above the main entrance to the building. The veranda which is recessed under the main roof is bordered by a diamond-patterned railing and chamfered posts and pilasters with jigsaw bracketing. The foundations are concrete piers. Concrete steps, edged with concrete and wood railings provide access to the veranda from the east, west and south. The walls are vertical plank siding. Windows are usually double hung, twelve-light. The structure is identical in plan to Building 3. Termite and rot damaged wood should be replaced. The foundation needs reconstruction. Grade and vegetation should be cleared. The interior and exterior should be painted. The building should be fumigated. The building is in poor condition. Further information is provided in the cost estimates.

SIGNIFICANCE: Identical to Building 3. Building 4 (now gone) would have been identical to Building 2. Historically the Bay View Home was the residential area for elderly and blind patients (now occupied by male patients. This is the least altered of the Bay View group. Other than that, same significance as the others.

MAINTENANCE COST: \$30,400
FUTURE MAINTENANCE COST: \$1650/annum
DATE OF REPORT: January 16, 1977



STRUCTURE: Building 2

LOCATION: Bay View Home

USE: Residence

SIZE: Approx. 3700 sq. ft.

OWNERSHIP: State

DATE OF STRUCTURE: 1916

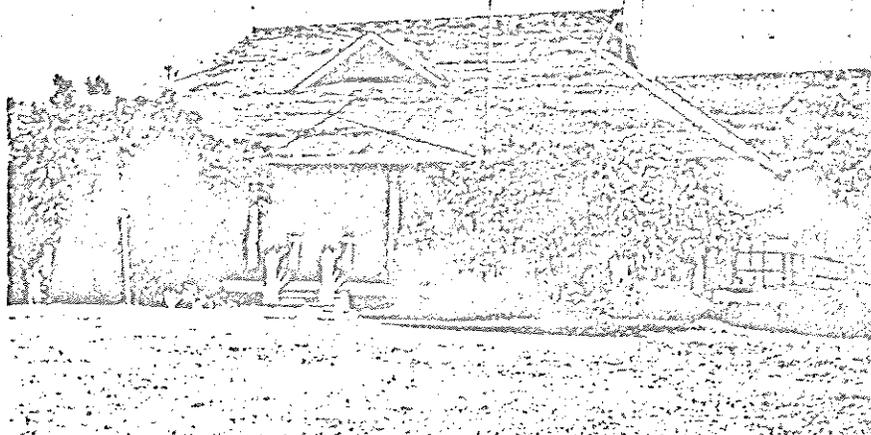
DESCRIPTION: The structure is a frame building of single wall construction. The plan is generally symmetrical: a main section with a veranda is flanked by two smaller wings to the north and south, and a third wing to the east (rear). The dominant architectural feature of the building is the combination of intersecting hip roofs, all with lowered gables for ridges. Another lowered gable projects from the roof directly above the main entrance to the building. The veranda which is recessed under the main roof is bordered by a diamond-patterned railing and chamfered posts - some with jigsaw bracketing. The foundations consist of concrete piers. The main set of concrete steps (edged with concrete posts) have been covered with a ramp to make access to the building easier for some patients. The walls consist of vertical plank siding. Windows are usually double-hung, twelve light. The building is connected to Building 5 and 3 by a covered walkway which was constructed attaching the verandas. The walkway probably dates from the 1930's. The structure is in poor condition. The building should be fumigated, and termite damage repaired. The foundation should be rebuilt. The structure should be painted, and the building should be re-roofed eventually with the original shingles. For more detailed description of the work, see construction estimate sheets.

SIGNIFICANCE: Historically the Bay View Home was the residential area for elderly and blind patients (now occupied by male patients). Architecturally a well-designed small community which should eventually be restored to its pre-1930's state even though one of the early structure was razed.

MAINTENANCE COST: \$13,000

FUTURE MAINTENANCE COST: \$1650/annum

DATE OF REPORT: January 16, 1977



STRUCTURE: Building 3

LOCATION: Bay View Home

USE: Residence

SIZE: Approx. 3700 sq. ft.

OWNERSHIP: State

DATE OF STRUCTURE: 1916

DESCRIPTION: The structure is a frame building of single wall construction.

The plan is generally symmetrical: A main section with a veranda is flanked by two smaller wings to the north and south, and a third wing to the east (rear). The dominant architectural feature of the building is the combination of intersecting hip roofs, all with louvered gables for ridges.

Another louvered gable projects from the roof directly above the main entrance to the building. The veranda which is recessed under the main roof is bordered by a diamond-patterned railing and chamfered posts with jigsaw bracketing. The foundation consists of concrete piers. Concrete steps with concrete and wood railings serve as the major entrance to the building. A wood ramp replacing the concrete steps on the south side of the structure has made access to the building easier. The walls consist of vertical plank siding.

Windows are usually double hung, twelve light. The building is connected to Building 2 and 5 by a covered walkway which is an extension of the veranda.

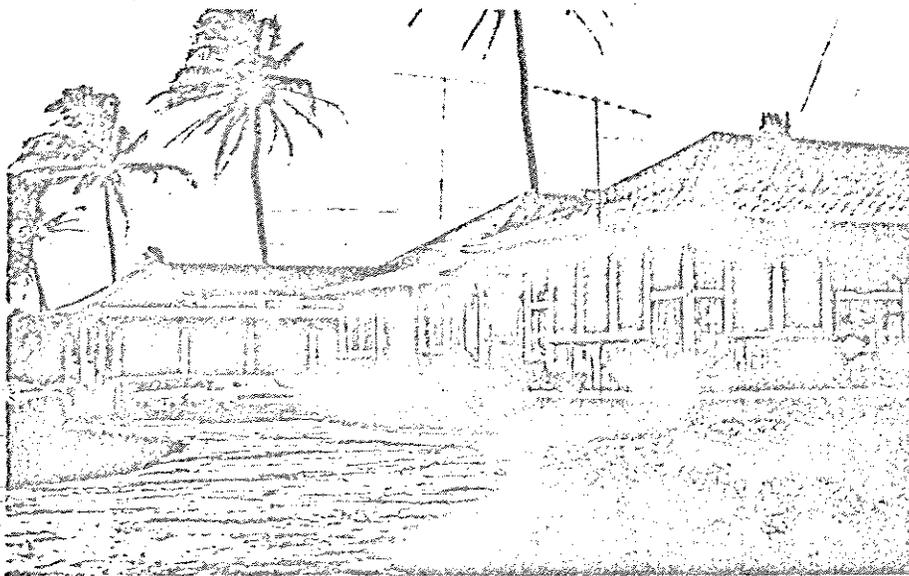
The structure is in poor condition. The building should be fumigated, and termite and rot damage repaired. The foundations should be rebuilt. The structure should be painted, and eventually re-roofed with the original wood shingles. For more detailed description of work needed, see cost estimated sheets.

SIGNIFICANCE: Part of Bay View Home, formerly for the elderly and blind patients. Now for male patients. Architecturally the building is the mirror plan of Building 2, and has the same significance.

MAINTENANCE COST: \$43,000

FUTURE MAINTENANCE COST: \$1650/annum

DATE OF REPORT: January 16, 1977



STRUCTURE: Building 282

LOCATION: Hospital

USE: Hospital

SIZE: Approx. 18,500 sq. ft. OWNERSHIP: State

DATE OF STRUCTURE: 1932 (definite)

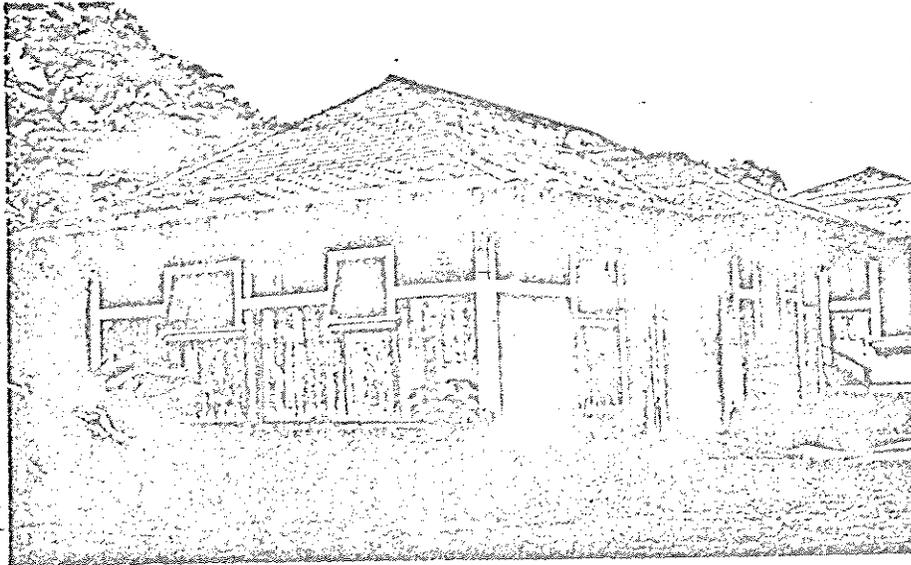
DESCRIPTION: The structure is a frame building of single wall construction. The foundation consists of concrete footings and wood posts. Most of the foundation is camouflaged by a latticework skirting. The enormous building consists of one main section which has been intersected by three large wings. The walls are vertical plank siding. A girt encircles the structure, and it is broken by the wood frames of the single, paired and tripled windows, and by the doors. The intersecting hip roofs, (with broken pitches) are finished with composition shingles. Several skylights in the roof provide natural lighting. Two ramps and recessed porches are located on the wings jutting out of the west side of the building. The rear (east) side of the structure seems to have had some minor alterations of loading docks and a metal shed roof. The building is in poor condition, and does not suit the needs of the settlement, nor does it meet code. To rehabilitate the structure, termite damaged wood would have to be replaced, as would the interior flooring. The building should be fumigated and painted (interior and exterior), and many of the window screens (with frames) replaced.

SIGNIFICANCE: Historically significant. Recording by HAES is recommended. Approximately thirty wild cats live around and under the building. When it rains, the fleas enter the building. The patients find this very uncomfortable. None of the animals is spayed or neutered, so the herd keeps growing. Many of the cats show obvious signs of disease. The cats are fed scraps daily, but are not owned. Therefore, they receive no shots, medical treatment or other proper care.

MAINTENANCE COST: \$103,225

FUTURE MAINTENANCE COST: \$6,000/annum

DATE OF REPORT: January 17, 1977



STRUCTURE: Building 283

LOCATION: Hospital area

USE: formerly fumigation room (possibly morgue, too?)

SIZE: Approx. 680 sq. ft.

OWNERSHIP: State

DATE OF STRUCTURE: 1935

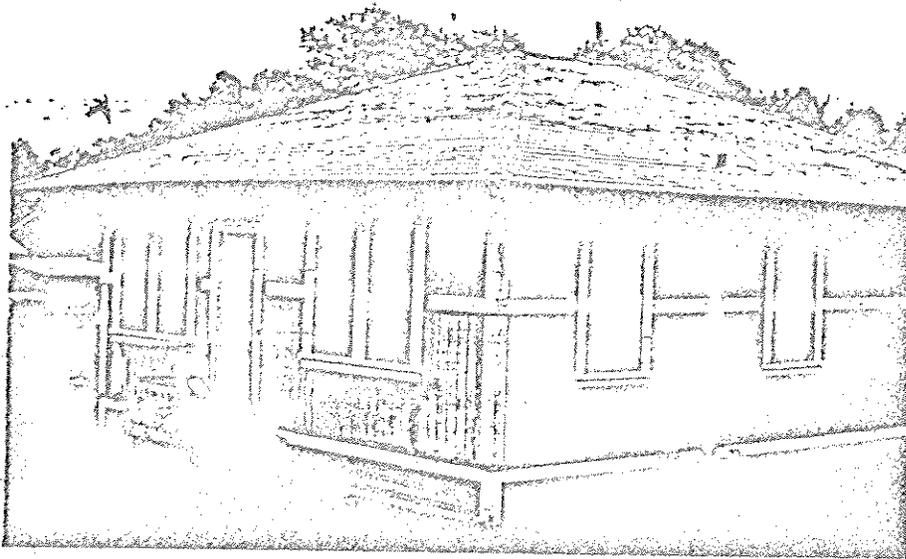
DESCRIPTION: The structure is a frame building of single wall construction. The foundation consists of a thick concrete slab. The hip roof is finished with composition shingles. The walls are vertical plank siding. A girt, broken by the wood frames of the hinged windows, encircles the structure. The corners of the building are finished with cornerboards. The enclosed porch has two separate entrances - for men and women. The interior of the building is divided into two main sections. The building is in deteriorated condition. Vegetation should be cleared away from the structure. Termite damaged wood should be repaired. The building should be re-roofed, fumigated, cleaned and painted.

SIGNIFICANCE: Not any particular architectural significance. The building, according to Bernard Punikaia, was used as a fumigation room until the 1960's. Men and women leaving the settlement for a short period of time brought clothes here to be fumigated (to "kill the bacteria") the night before they left. Just before they left, they, too, would have to be fumigated (women on the left side of the building, men on the right side). They were then allowed to leave. Bernard states that the fumigation smell was terrible.

MAINTENANCE COST: \$12,600

FUTURE MAINTENANCE COST: \$400/annum

DATE OF REPORT: January 17, 1977



STRUCTURE: Building 7

LOCATION: Hospital

USE: Formerly out patient clinic

SIZE: Approx. 572 sq. ft.

OWNERSHIP: State

DATE OF STRUCTURE: Unknown

DESCRIPTION: The structure is a frame building of single wall construction. The foundation consists of stone pads and wood posts, camouflaged by a skirting made up of horizontal wood strips. A girt, broken by the wood frames of the double-hung windows encircles the structure. A water table surrounds the sole plate. The hip roof is finished with composition shingles. The structure is in poor condition. Termite and rot damaged wood should be replaced (including the front steps to the building which are in an advanced state of collapse.) The building should be cleaned and painted, interior and exterior, and it should be fumigated.

SIGNIFICANCE: No architectural significance. Historically connected with hospital, though.

MAINTENANCE COST: \$6,000

FUTURE MAINTENANCE COST: \$400/annum

DATE OF REPORT: January 17, 1977



STRUCTURE: Building 304

LOCATION: Beretania Street

USE: Social Hall and Movie House

SIZE: Approx. 6000 sq. ft.

OWNERSHIP: State

DATE OF STRUCTURE: 1920

DESCRIPTION: The structure is a 2 story building of single wall construction, with a foundation of concrete piers. The multiple roofs, finished with green composition shingles, are hip roofs usually with gables. The facade of the structure is symmetrical. The east and west sides differ slightly (additions and alterations?) although the windows are of the same type, size and spacing on each of those walls. A veranda, sheltered by a hip roof which intersects the main roof, runs the length of the front (south) of the structure and serves as the main entrance. A diamond-patterned railing and chamfered posts and pilasters articulate the edges of the veranda. Other entrances are located at the middle of the east and west sides. The interior consists of a large portion of empty floor space, several storage rooms, and an auditorium with tiers of seating which rise up to the balcony. The audience area was originally separated so that kokua sat in the balcony, separated from the patients by a railing. Access to the balcony is by means of an exterior stairway from the front porch (or now through the tiers of seating). The structure is in fair to poor condition. Termite damage should be repaired. The building should

SIGNIFICANCE: be re-roofed, fumigated and painted (interior and exterior). Architecturally, the building seems to have been slightly modified since its construction (stairways, minor addition, etc.); a formal, symmetrical building which has been slightly adapted to fit needs better. Warrants preservation.

MAINTENANCE COST: \$48,700

FUTURE MAINTENANCE COST: \$2,000/annum

DATE OF REPORT: January 27, 1977



STRUCTURE: Building 5

LOCATION: Staff Row

USE: Staff Dining Hall and central kitchen

SIZE: Approx. 2500 sq. ft. OWNERSHIP: State

DATE OF STRUCTURE: Unknown

DESCRIPTION: The structure is a one-story building of single wall construction, with a stone pad and post foundation. The generally rectangular building has a broken-pitch hip roof, with a recessed porch at the southwest corner. Concrete steps, bordered by two planters (as in the Administrator's Residence) lead to the front porch and two entrance doors. The wooden posts of the porch have jigsaw decorative brackets. The porch ceiling is plasterboard or "Cerotex". Most of the windows are paired, and are wood frame, double hung (twelve-light). The exterior finish is board and batten. The corners of the structure are finished with endboards. The structure has been altered-the south wall includes a wall section of concrete block. The building is used daily, and is in fair condition. The structure should be fumigated and painted, re-roofed with original material, and termite damage repaired.

SIGNIFICANCE: Probably the earliest structure on staff row, originally the Administrator's Residence. Architectural significance has been marred by the alterations. Eventually should be restored to its original condition.

MAINTENANCE COST: \$14,300

FUTURE MAINTENANCE COST: \$850/annum

DATE OF REPORT: January 12, 1977



STRUCTURE: Building 10

LOCATION: Staff Row

USE: Administrator's Residence

SIZE: Approx. 2200 sq. ft.

OWNERSHIP: State

DATE OF STRUCTURE: unknown

DESCRIPTION: The structure is a one-story building of single wall construction, with a stone pad and post foundation and latticework skirt around the posts of the foundation. The T-shaped structure, which seems to have had at least one addition to the north, has intersecting gable roofs, finished with metal. The L-shaped front porch, located in the southwest corner of the structure, is sheltered in part by a hip roof which juts out below the main gable, and partially recessed under that gable. Chamfered posts and pilasters articulate the edges of the porch. The corners of the building are finished with end boards. A broken girt encircles the exterior of the structure. A second porch, sheltered by a shed roof, is located in the northwest section of the building. A small entryway, again sheltered by a shed roof, is located at the rear (east) of the structure. Concrete steps provide access to the front porch. The wood frame windows are double hung (12-light). The structure presently is not occupied, but is in good condition. The structure has been recently painted. The structure should be fumigated, and vegetation should be cleared from the base.

SIGNIFICANCE: Historical and architectural significance to settlement, although neither the State nor the National Register forms had a date.

MAINTENANCE COST: \$1200

FUTURE MAINTENANCE COST: \$940/annum

DATE OF REPORT: January 12, 1977

Appendix 4

ARCHAEOLOGICAL TEST PIT SURVEY AT KALAUPAPA, MOLOKAI

Prepared for:

URBAN 9
926 Bethel Street
Honolulu, HI. 96813

Prepared by:

William Barrera, Jr.
CHINIAGO INC.
76 NORTH KING STREET, ROOM 202
HONOLULU, HAWAII 96817

I. INTRODUCTION

An archaeological test pit survey of the proposed location of a new hospital facility at Kalaupapa, Molokai [Figure 1] was conducted between October 17 and October 23, 1977. The purpose was to determine the presence or absence of archaeological or historical remains and to make recommendations regarding mitigation of any adverse impacts resulting from the hospital construction.

The site was given the number 50-60-03-515 in accordance with the State of Hawaii historic site designation system. It is located immediately to the west of the existing hospital in a triangular plot of land bounded by School Street, Kamehameha Street and Damien Road [Figure 2].

Thirteen test pits were excavated. All materials were sifted through 0.25-inch mesh and the residue of artifacts and midden materials was saved and quantified. These are presented in Appendices I and II. Bone material from the excavations has been separated and will be submitted to a zoologist for identification, and these results will be made an appendix to this report at a later date.

Geological and soil analyses were conducted in Squares 6 and 12 by Dr. Maury Morgenstein of Hawaii Marine Research. This firm also conducted hydration-rind dating analyses of four specimens of basaltic glass recovered from the excavations. The results of these analyses of the soil and geology are presented in Appendix III.

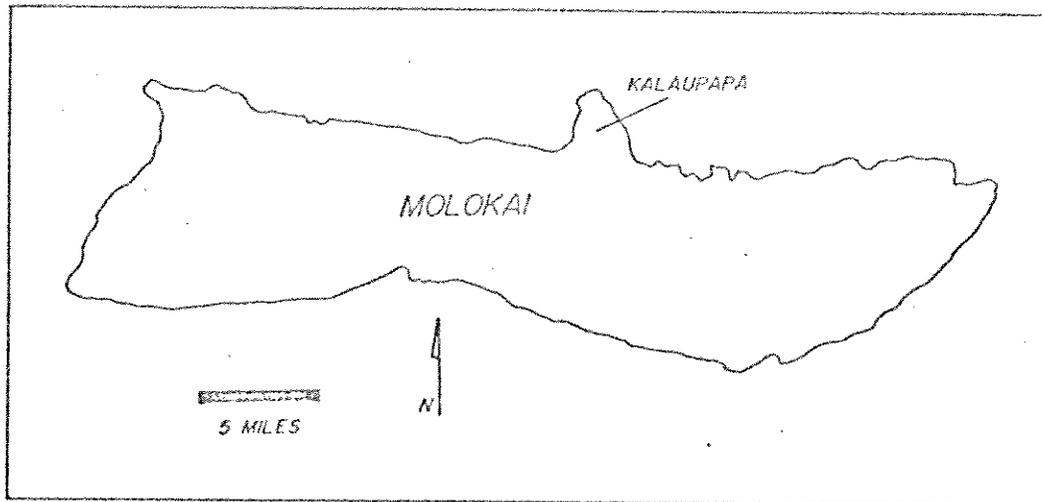


Figure 1. Map of Molokai Island, Showing Location of Project Area

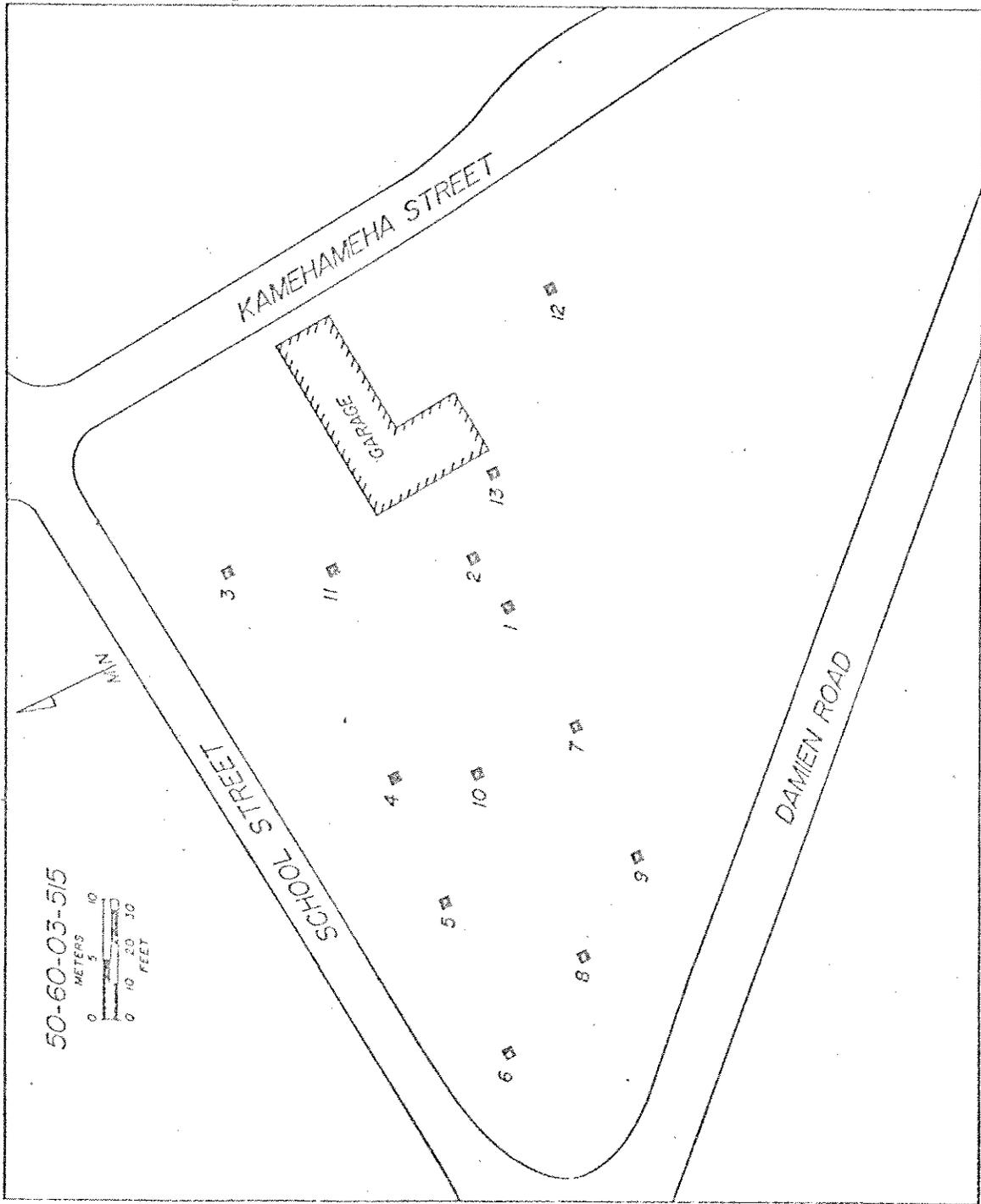


Figure 2. Map of Project Area, Showing Locations of Test Pits

II. EXCAVATION RESULTS

SQUARE ONE

Cultural materials extended to a depth of approximately 15 centimeters, with the majority being found in the 10 to 20 centimeter level. Shell midden was extremely scarce, only three pieces being found, and all artifacts date from the historic period.

SQUARE TWO

Cultural materials in this test pit extended to a depth of 60 centimeters, but this was because of the presence of a historic refuse pit that had been excavated in this area. There was no evidence that any materials formed a cultural horizon below a depth of about 20 centimeters. The only aboriginal artifacts recovered were a basaltic glass flake from the 0 to 10 centimeter level and a basalt flake from the 30 to 40 centimeter level; the remainder of the 48 artifacts recovered were of historic age.

SQUARE THREE

This test pit was situated so as to determine the nature of what appeared on the surface to be a stone-paved area or a low platform measuring approximately 3.5 meters on each side and standing to a height of 15 to 20 centimeters. Cultural materials were not found below the 0 to 10 centimeter level, but the midden remains were relatively more common than in most of the other test pits. Only two artifacts, both historic in age, were found.

SQUARE FOUR

Cultural remains were found as far down as the 20 to 30 centimeter level. Midden materials were scarce and the artifacts numbered only five, all but one of which, a basalt flake, were definitely historic in age.

SQUARE FIVE

Cultural materials were quite scarce in this test pit, and extended only as far as the 10 to 20 centimeter level. The only artifacts recovered were a stone chip broken off of a basalt adze and a basaltic glass flake, both from the 0 to 10 centimeter level.

SQUARE SIX

Artifacts, all of which are historic in age, were found only as deep as the 10 to 20 centimeter level, but midden remains extended into the 30 to 40 centimeter level, with a 5 to 10 centimeter thick band of shell remains located in the 20 to 30 centimeter level. These remains, although relatively more plentiful than the midden materials from the other test pits, were still quite scarce. The geological analyses discussed later in this report indicate that this level represents a transition zone between disturbed and undisturbed deposits, and this band of midden may represent an in situ cultural deposit. Unfortunately, no artifacts or pieces of basaltic glass for dating were found, but the absence of historic materials in this layer suggests the possibility that it is prehistoric in age.

SQUARE SEVEN

Cultural materials were not found below the 0 to 10 centimeter level in this test pit. Shell midden materials were virtually non-existent, and catalogued artifacts consisted only of a nail and a neck of a glass bottle.

SQUARE EIGHT

Cultural materials extended as far down as the 20 to 30 centimeter level. The majority were historic in age, but five catalogued artifacts [an adze chip, two basalt flakes, a basaltic glass core and a basaltic glass flake] representing aboriginal tool types were found in the 0 to 10 centimeter level.

SQUARE NINE

Artifacts and midden remains were found as deep as the 30 to 40 centimeter level. Again, the majority of the remains dated from the historic period, but seven artifacts of aboriginal style were found. These included three basalt flakes, an adze fragment, a chip of stone from an adze and two basaltic glass flakes. Among the historic artifacts, a copper cross and a copper crucifix represent two of the more interesting specimens found during the excavations.

A concentration of large rocks, some of which were waterworn, was found between 20 and 40 centimeters in depth. No specific cultural associations were observed with this feature.

SQUARE TEN

Cultural materials were scarce in this test pit and extended only to the 20 to 30 centimeter level. Most of the artifacts were Western in origin, but a core and a flake of basaltic glass were found in the 10 to 20 centimeter level.

SQUARE ELEVEN

Cultural materials were found only in the 0 to 10 centimeter level, and were all of historic age.

SQUARE TWELVE

This square was the most productive in terms of quantities of cultural materials, and the evidence of human activity extended to a depth of 71 centimeters, the deepest such deposit found at this site. The major part of the deposit [the 20 to 60 centimeter levels] consisted of ash and large numbers of basalt rocks, with numerous historic artifacts in association. Preliminary indications are that this deposit represents a historic building which was destroyed by fire. The only artifact of aboriginal type found was a flake of basaltic glass in the 0 to 10 centimeter level.

SQUARE THIRTEEN

Cultural materials were quite scarce in this square, and were found only in the 0 to 10 centimeter level. All were historic in age.

III. BASALTIC GLASS DATES

Nine samples of basaltic glass found during the excavations were submitted to Dr. Maury Morgenstein of Hawaii Marine Research for hydration-rind dating. This technique has been discussed in detail elsewhere [Barrera and Kirch 1973], but briefly it involves the measurement of a surface rind or patina which forms at a regular rate on the exterior of a specimen of basaltic glass. Since the rate of formation of this patina is known, it is a relatively simple matter to determine the period of time required to form a patina of any given thickness. If the specimen of basaltic glass functioned as an artifact, the resulting age represents the date at which the artifact was used.

<u>Catalogue #</u>	<u>Basaltic Glass Sample #</u>	<u>Square</u>	<u>Depth</u>	<u>Date</u>
105	4069	8	0-10 cm.	1863+24
107	4071	9	0-10 cm.	1753+27
108	4072	9	0-10 cm.	1748+40
111	4075	12	0-10 cm.	1866+21

Table 1. Initial Hydration-Rind Analyses of Basaltic Glass Specimens

Only four dates could be obtained, as five of the samples contained large amounts of manganese which prevented visual inspection of the rind. Dr. Morgenstein's discussion of the dating analyses is as follows:

"Table 1 presents four dates obtained by standard hydration-rind dating methods. In many instances rinds vary on the basaltic glass because of natural erosion, and oblique rinds may be produced as a result of the angles of the flake scars or oblique cutting of the thin-section, among other variables such as human and equipment error. As a consequence, the greatest frequency range of rind thicknesses and the corresponding dates can sometimes clarify the chronological interpretation of a site. For this study we obtained the most frequent rind thickness from a total of ten traverses and calculated the A.D. ages for these. We are also reporting the confidence limit that these dates fall within the reported age range by a certain probable frequency. These data are

presented in Table 2, and suggest that Squares 8 and 12 are contemporaneous, which further indicates that these are primary manufacture events and not clastic or pedifacts. Since use wear was indicated by typological study for Sample 4069, it appears that basaltic glass was used at this site during historic times."

<u>Catalogue #</u>	<u>Reported Range</u>	<u>Probable Age</u>	<u>Level of Confidence</u>	<u>Human Error</u>	<u>Total Error</u>
105	1839-1887	1882 \pm 4	60%	\pm 9	\pm 13
107	1726-1780	1764 \pm 17	80%	\pm 9	\pm 26
108	1708-1788	1748 \pm 0	60%	\pm 9	\pm 9
111	1845-1887	1882 \pm 4	80%	\pm 9	\pm 13

Table 2. Refined Hydration-Rind Analyses of Basaltic Glass Specimens

IV. DISCUSSION OF THE SURVEY DATA

These test pit survey data demonstrate both a prehistoric and a historic utilization of the project area. The depositional history as suggested by a consideration of both the archaeological and the geological analyses would appear to have been as follows.

1. Natural deposition of geological sediments of windblown and overland wash origin over the entire site area, with a small contribution of beach sediments at the seaward end of the site.

2. Formation of an A-B-C soils profile, indicating relatively stable geological conditions.

3. Human utilization of the project area at least by the mid-1700s and possibly earlier. The precise nature of this utilization cannot be determined because of later events which obscured the in situ remains. However, there does not appear to have been a very intensive prehistoric utilization of the immediate site area, judging from the scarcity of aboriginal artifacts, and especially of artifacts which are definitely of prehistoric age.

4. Historic utilization of the project area, indicated by the disruption of the soil profile and the deposition of undoubtedly historic artifacts. The precise sequence of events within this period cannot be determined from our limited excavations, but it involved the construction and subsequent destruction of a structure on the southeast side of the project area and possibly the utilization of the remainder of the project area for agricultural purposes. This latter possibility is suggested by the churned nature of the sediments, which had as one result the mixing of prehistoric and historic materials within the same layer. This accounts for the two basaltic glass hydration dates in the A.D. 1700s from a level situated stratigraphically above historic materials.

Tentative dates for this historic utilization would be from about the middle of the nineteenth century for construction of the structure and the late nineteenth or early twentieth century for its destruction. The hypothesized agricultural utilization may have been contemporary with the structure, may have followed its destruction, or may have occurred continuously through both periods.

5. The final phase of the sequence at the site is marked by geological stability and the formation of another complete soil profile, indicating no human utilization involving ground disturbance.

V. RECOMMENDATIONS

Because of the disturbed and mixed nature of the deposits on the west side of the survey area, little of scientific value would result from an archaeological excavation in that area, and it is recommended that no further work be done. The east side of the project area, however, between Squares Three and Twelve should be the subject of archaeological investigations before any construction activities take place. If the proposed hospital facility can be designed in such a way that its construction will not interfere with the sub-surface remains here, the need for archaeological investigations would be negated. In the event that this is not possible, the exact nature of the paving or platform into which Square Three was excavated should be investigated further, and its relationship to the structure uncovered in Square Twelve determined. The unfortunate presence of a garage with a concrete slab floor prevented any attempt to delimit the northern extent of this latter feature, and it will be necessary to remove this slab and archaeologically excavate beneath it.

This feature has the potential for providing valuable information about a period of Hawaiian history which is relatively unknown from the archaeological point of view. An analysis of the strategies developed for coping with isolation during the historic period will shed much light on the cultural dynamics operative under adverse conditions, a subject which archaeologists have had little opportunity to study. Our test excavations have demonstrated the continuance well into historic times of an almost exclusively prehistoric tool type, the basaltic glass cutting tool. To my knowledge, historic dates have been obtained from only two other places in Hawaii, Lapakahi and Waimea, on the Island of Hawaii [Tuggle and Griffin 1973: 97; Barrera 1974: 62]. The presence of such tools at a period when most aboriginal tool types had been replaced by metal tools is an interesting situation, and the question of the overall pattern of adaptation to the particular social and cultural environment present at Kalaupapa during the 1800s is a subject worthy of investigation.

APPENDIX I. ARTIFACTS FROM SITE 50-60-03-515

SQUARE ONE

0-10 cm.

<u>Catalogue #</u>	<u>Artifact</u>	<u>Material</u>	<u>Length/ Diameter</u>	<u>Width</u>	<u>Thickness</u>
1	Nail	Iron	3.4	0.4	
2	Nail	Iron	2.1	0.3	
3	Bead	Glass	0.4	0.45	
4	Ring	Metal	0.5		

SQUARE ONE

10-20 cm.

5	Nail	Iron	1.1	0.7	0.2
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SQUARE TWO

0-10 cm.

6	Nail	Iron	3.2	0.7	
7	Button	Copper	1.6		

SQUARE TWO

10-20 cm.

8	Band	Copper	8.2	3.2	0.02
9.	Band	Copper	7.8	2.0	0.02

SQUARE TWO

20-30 cm.

<u>Catalogue #</u>	<u>Artifact</u>	<u>Material</u>	<u>Length/ Diameter</u>	<u>Width</u>	<u>Thickness</u>
10	?	Copper	3.6	1.1	0.2
11	Nail	Iron	2.4	0.8	
12	Nail	Iron	2.5	0.9	0.5

SQUARE TWO

30-40 cm.

13	Watch Part	Metal	2.9		
14	Flake	Basalt	2.5	1.9	0.65
15	Bottle Cap	Metal	3.0		
16	?	Copper/Brass	6.4	1.1	0.2
17	?	Lead	9.1	1.5	
18	5 Nails	Iron			
19	10 Nail Fragments	Iron			
20	2 Nails				
21	?	Copper			

SQUARE TWO

40-50 cm.

22	6 Nails				
23	?	Copper			
24	Ring	Copper/Brass	1.7	1.3	0.15

SQUARE TWO

40-50 cm.

<u>Catalogue #</u>	<u>Artifact</u>	<u>Material</u>	<u>Length/ Diameter</u>	<u>Width</u>	<u>Thickness</u>
25	Bottle	Glass	8.8	6.0	
26	Button	Glass	1.1	0.5	

SQUARE TWO

50-60 cm.

27	Door Lock	Iron	9.8	8.1	2.0
28	6 Nails	Iron			

SQUARE THREE

0-10 cm.

29	Nail	Iron	4.7	0.5	0.3
30	?	Iron	5.3	2.8	1.5

SQUARE FOUR

0-10 cm.

31	Nail	Iron	2.3	0.4	0.4
32	Wire	Copper	11.0		0.7
33	Brick Fragment		9.8	8.2	6.6

SQUARE FOUR

10-20 cm.

<u>Catalogue #</u>	<u>Artifact</u>	<u>Material</u>	<u>Length/ Diameter</u>	<u>Width</u>	<u>Thickness</u>
34	Nail	Iron	3.1		0.6
35	Flake	Basalt	4.4	3.2	0.5

SQUARE FIVE

0-10 cm.

36	Adze Chip	Basalt	3.4	2.4	1.1
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SQUARE SIX

0-10 cm.

37	Nail	Iron	2.1	0.7	0.4
38	Pot Fragment	Iron	6.6	5.9	0.6
39	Button	Glass	1.1		0.35

SQUARE SIX

10-20 cm.

40	Bottle Neck	Glass	fragments only		
41	Nail	Iron	3.0	0.5	0.4

SQUARE SEVEN

0-10 cm.

42	Nail	Iron	3.4		0.6
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SQUARE SEVEN

0-10 cm.

<u>Catalogue #</u>	<u>Artifact</u>	<u>Material</u>	<u>Length/ Diameter</u>	<u>Width</u>	<u>Thicknes</u>
43	Bottle Neck	Glass			

fragments only

SQUARE EIGHT

0-10 cm.

44	Adze Chip	Basalt			
45	Flake	Basalt	1.3	1.1	0.25
46	Flake	Basalt	1.1	1.2	0.25
		Basalt	0.75	1.3	0.25

SQUARE EIGHT

10-20 cm.

47	Buckle	Copper/Brass			
48	Nail	Iron	2.6	2.0	0.2
49	Ring	Metal	4.5	0.7	0.6
			0.75		0.2

SQUARE EIGHT

20-30 cm.

50	5 Nails	Iron			
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SQUARE NINE

0-10 cm.

51	2 Nails	Iron			
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SQUARE NINE

0-10 cm.

<u>Catalogue #</u>	<u>Artifact</u>	<u>Material</u>	<u>Length/ Diameter</u>	<u>Width</u>	<u>Thickness</u>
52	Flake	Basalt	3.7	5.1	0.7
53	Button	Copper	1.7		0.1
54	Buckle	Copper/Brass	2.7	3.4	0.7
55	Spring	Copper	2.5		0.1
56	Brick Fragment		8.8	6.4	4.7

SQUARE NINE

10-20 cm.

57	Hinge	Iron	6.6	2.1	0.1
58	Nail	Iron	16.3		0.8
59	Adze Chip	Basalt	2.1	2.0	1.2
60	Cross	Copper	5.5	3.2	0.1
61	Bowl Fragment	Ceramic	5.9	4.0	0.75
62	?	Copper	1.0		0.6
63	?	Metal	1.3	0.9	
64	Crucifix	Copper	6.3	5.2	0.1

SQUARE NINE

20-30 cm.

65	Flake	Basalt	2.6	2.3	0.5
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SQUARE NINE

20-30 cm.

<u>Catalogue #</u>	<u>Artifact</u>	<u>Material</u>	<u>Length/ Diameter</u>	<u>Width</u>	<u>Thickness</u>
66	Flake	Basalt	2.9	3.0	0.75
67	Adze Fragment	Basalt	5.4	2.6	1.2
68	?	Iron	7.6	2.3	0.5
69	3 Nails	Iron			

SQUARE NINE

30-40 cm.

70	4 Nails	Iron			
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SQUARE NINE, ROCK CONCENTRATION

71	?	Iron	4.6		0.3
72	Plaster	Burnt Coral [?]	2.9	2.4	1.6

SQUARE TEN

10-20 cm.

73	?	Copper	3.0	0.35	0.1
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SQUARE TWELVE

0-10 cm

74	Brick Fragment		6.6	5.7	4.3
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SQUARE TWELVE

0-10 cm.

<u>Catalogue #</u>	<u>Artifact</u>	<u>Material</u>	<u>Length/ Diameter</u>	<u>Width</u>	<u>Thickness</u>
75	Coil	Copper	0.85	0.5	
76	534 Nails	Iron			

SQUARE TWELVE

10-20 cm.

77	Brick Fragment		13.8	11.3	6.0
78	688 Nails	Iron			

SQUARE TWELVE

20-30 cm.

79	Hammerstone	Basalt	18.3	7.8	6.7
80	?	?	2.2	2.2	0.25
81	632 Nails	Iron			
82	Hinge	Iron	in fragments		
83	Bolt	Iron	8.7	2.1	1.2
84	Screw	Iron	3.5		0.7
85	Knife	Iron	9.4	2.8	1.6

SQUARE TWELVE

30-40 cm.

86	?	Bone	4.4	2.4	0.8
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SQUARE TWELVE

30-40 cm.

<u>Catalogue #</u>	<u>Artifact</u>	<u>Material</u>	<u>Length/ Diameter</u>	<u>Width</u>	<u>Thickness</u>
87	453 Nails	Iron			

SQUARE TWELVE

40-50 cm.

88	Safety Pin	Metal	4.0	1.0	0.3
89	?	?	3.2		0.7
90	Button	Metal	1.35		0.4
91	Button	Shell	1.3		0.15
92	Bead or Seed	?	0.6	0.6	
93	401 Nails	Iron			
94	Coil	Iron	1.0	1.5	
95	Screw	Iron	3.2		0.7

SQUARE TWELVE

50-60 cm.

96	Blue Chalk Fragment		1.7	1.4	1.4
97	Buckle	Copper/Brass	3.7	3.9	0.6
98	Bead or Seed	?	0.7	0.6	
99	301 Nails	Iron			

SQUARE TWELVE

60-70 cm.

<u>Catalogue</u> <u>#</u>	<u>Artifact</u>	<u>Material</u>	<u>Length/ Diameter</u>	<u>Width</u>	<u>Thickness</u>
100	11 Nails	Iron			

SQUARE THIRTEEN

0-10 cm.

101	4 Nails	Iron			
102	?	Plastic	5 fragments		

APPENDIX II. MIDDEN FROM SITE 50-60-03-515

SQUARE ONE

DEPTH [cm]	Artifact Name	Count
0-10	Anigona reticulata	
0-10	Conus sp.	
0-10	Cypraea caputserpentis	
0-10	Cypraea sp.	
0-10	Drupa ricina	
0-10	Echinodermata	
0-10	Cellana sp.	
0-10	Nerita picea	
0-10	Thais aperta	
0-10	Unidentified Shell	3
0-10	Diodon hystrix	
0-10	Scarus sp.	
10-20	Aleurites moluccana	1
10-20	Cocunut	
10-20	Coral	
10-20	Glass	5
10-20	Metal	
10-20	Ceramic	2

SQUARE TWO

DEPTH [cm]	Anigona reticulata	Conus sp.	Cypraea caputserpentis	Cypraea sp.	Drupa ricina	Echinodermata	Cellana sp.	Nerita picea	Thais aperta	Unidentified Shell	Diodon hystrix	Scarus sp.	Aleurites moluccana	Coconut	Coral	Glass	Metal	Ceramic
0-10							3							4	1	21	4	
10-20													2			14	3	1
20-30								1		3			2		2	22		2
30-40		1					1			2			4		3	14	15	7
40-50																1		
50-60																2		1

SQUARE FIVE

DEPTH [cm]	Anigona reticulata	Conus sp.	Cypraea caputserpentis	Cypraea sp.	Drupa ricina	Echinodermata	Cellana sp.	Nerita picea	Thais aperta	Unidentified Shell	Diodon hystrix	Scarus sp.	Aleurites moluccana	Coconut	Coral	Glass	Metal	Ceramic
0-10																5		7
10-20																4		5

SQUARE SIX

DEPTH [cm]	Anigona reticulata	Conus sp.	Cypraea caputserpentis	Cypraea sp.	Drupa ricina	Echinodermata	Cellana sp.	Nerita picea	Thais aperta	Unidentified Shell	Diodon hystrix	Scarus sp.	Aleurites moluccana	Coconut	Coral	Glass	Metal	Ceramic
0-10										3						18		2
10-20		1	3						1	15			2			18		
20-30		4	9							31					42	5		
30-40						1		3		7				16				

SQUARE SEVEN

DEPTH [cm]	Anigona reticulata	Conus sp.	Cypraea caputserpentis	Cypraea sp.	Drupa ricina	Echinodermata	Cellana sp.	Nerita picea	Thais aperta	Unidentified Shell	Diodon hystrix	Scarus sp.	Aleurites moluccana	Coconut	Coral	Glass	Metal	Ceramic
0-10		1													1	4		10

SQUARE EIGHT

DEPTH [cm]	Anigona reticulata	Conus sp.	Cypraea caputserpentis	Cypraea sp.	Drupa ricina	Echinodermata	Cellana sp.	Nerita picea	Thais aperta	Unidentified Shell	Diodon hystrix	Scarus sp.	Aleurites moluccana	Coconut	Coral	Glass	Metal	Ceramic
0-10									1	3		1		1	2	29	8	12
10-20										1			1			16	3	5
20-30																14	1	6

SQUARE NINE

DEPTH [cm]	Anigona reticulata	Conus sp.	Cypraea caputserpentis	Cypraea sp.	Drupa ricina	Echinodermata	Cellana sp.	Nerita picea	Thais aperta	Unidentified Shell	Diodon hystrix	Scarus sp.	Aleurites moluccana	Coconut	Coral	Glass	Metal	Ceramic
0-10				2											5	22	3	21
10-20			1						1						3	1		3
20-30					1			1		1			1		3	10		5
30-40										1					2	1		4

SQUARE TEN

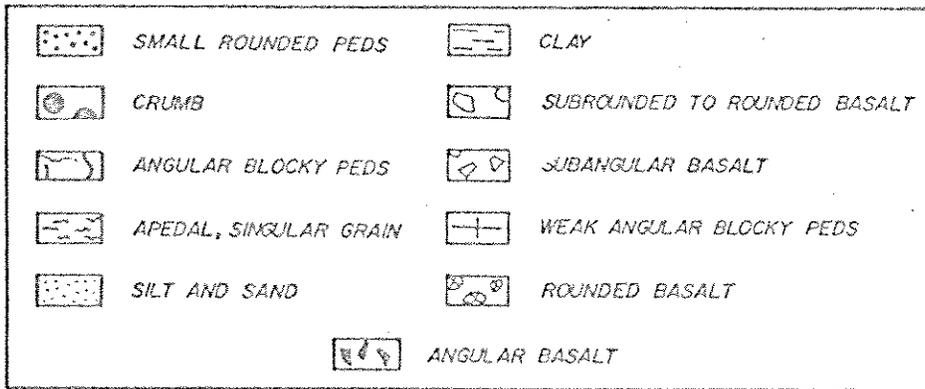
DEPTH [cm]	Anigona reticulata	Conus sp.	Cypraea caputserpentis	Cypraea sp.	Drupa ricina	Echinodermata	Cellana sp.	Nerita picea	Thais aperta	Unidentified Shell	Diodon hystrix	Scarus sp.	Aleurites moluccana	Coconut	Coral	Glass	Metal	Ceramic
0-10										2						14		1
10-20													1			2		3
20-30			2													1		

SQUARE ELEVEN

DEPTH [cm]	Anigona reticulata	Conus sp.	Cypraea caputserpentis	Cypraea sp.	Drupa ricina	Echinodermata	Cellana sp.	Nerita picea	Thais aperta	Unidentified Shell	Diodon hystrix	Scarus sp.	Aleurites moluccana	Coconut	Coral	Glass	Metal	Ceramic
0-10							5						1			4		1

SQUARE TWELVE

DEPTH [cm]	Anigona reticulata	Conus sp.	Cypraea caputserpentis	Cypraea sp.	Drupa ricina	Echinodermata	Cellana sp.	Nerita picea	Thais aperta	Unidentified Shell	Diodon hystrix	Scarus sp.	Aleurites moluccana	Coconut	Coral	Glass	Metal	Ceramic
0-10	1						1							4	65	15	2	8
10-20															76	3		
20-30	1														19	1	17	1
30-40			1							1	2				9	6	22	
40-50										5	4				15	6	20	
50-60										2	6				6	7	24	1
60-70																1		1



Key to Symbols Used in Figures 1 and 2

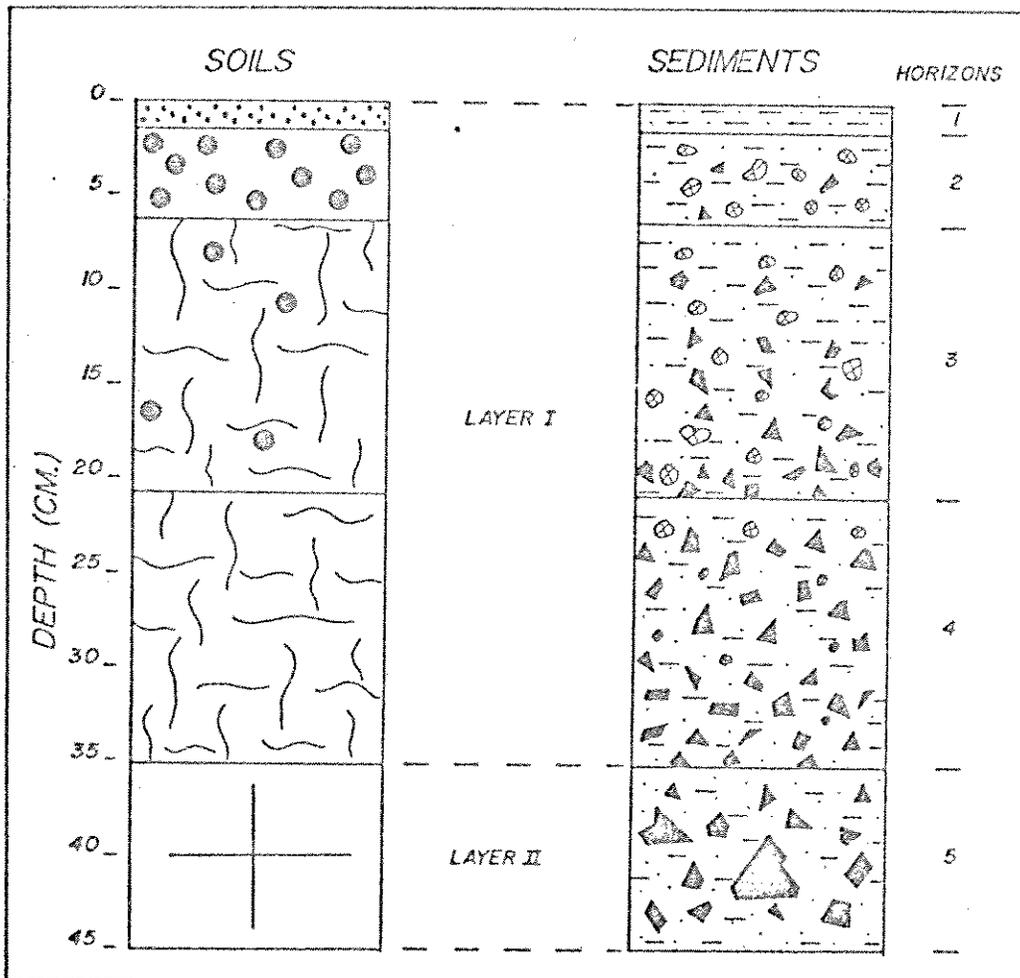


Figure 1. Profile of Square Six

0.1 cm.] strong blocky to slightly granular, sub-angular peds, slightly sticky, slightly plastic with common medium horizontal roots and rare small vertical roots, bioturbated by roots. Bottom contact gradational and drawn because of change in ped structure,

Soil Horizon 4: 21-35 cm., B2 horizon, medium [0.75 to 1.5 cm.] moderately strong, blocky, angular to sub-angular peds, moderately sticky, slightly plastic, with common vertical and horizontal medium roots, bioturbated by roots. Sharp wavy to indistinct gradational bottom contact drawn because of lithology and ped structure changes.

Sediment: Culturally modified sediment with 0-21 cm. consisting of very common [about 40% visual estimate] well rounded beach pebbles, rare [less than 2%] sub-angular to angular locally derived vesicular basalt in a silty fine to medium sandy mud matrix. The rounded pebble fraction continues to the bottom of Soils Horizon 4 [35 cm.] and ranges from about 10-20% and is reverse graded. The angular basalt increases in concentration [normal grading] and apparently in size toward the bottom of Horizon 4. Apparent churning from 0-21 cm. [Horizons 1 - 3], with probable disturbance from 21-35 cm. [Horizon 4] is indicated by soils morphology and by scatter of degraded biocarbonates. Biocarbonate degradation is evident, solution pitting and granulation are common. Blocky, chunky small charcoal fragments are scattered from 0-35 cm. without apparent bedding or pocket concentrations. Charcoal is of fireplace origin. Pebbles are unbedded and not imbricated. Bioturbation from worm burrows and casts and root tubes and casts are in evidence throughout Layer I. Sharp wavy to indistinct gradational bottom contact drawn because of lithology change.

LAYER II - 35-45 cm. Aeolian and in situ basaltic boulder sediment, with boulders indicative of talus derivation and naturally sourced from pahoehoe lava flows, bimodal sediment, 7.5YR 4/2, dry 10% moisture content at 40 cm., homogeneous matrix with 5YR 5/1.5 and 7.5YR 4.5/2 common sub-angular to angular pebbles to cobbles and moderately common large cobble to boulders [rare].

Soil Horizon 5: 35-45 cm., C horizon, apedal to very weak angular blocky peds when broken, slightly sticky, slightly plastic, with rare root tube bioturbation. Unmodified, aeolian matrix with basalt is locally derived. Designated a C soil horizon which is developing into a B horizon - transitional. No evidence of churning or disturbance. No bottom contact.

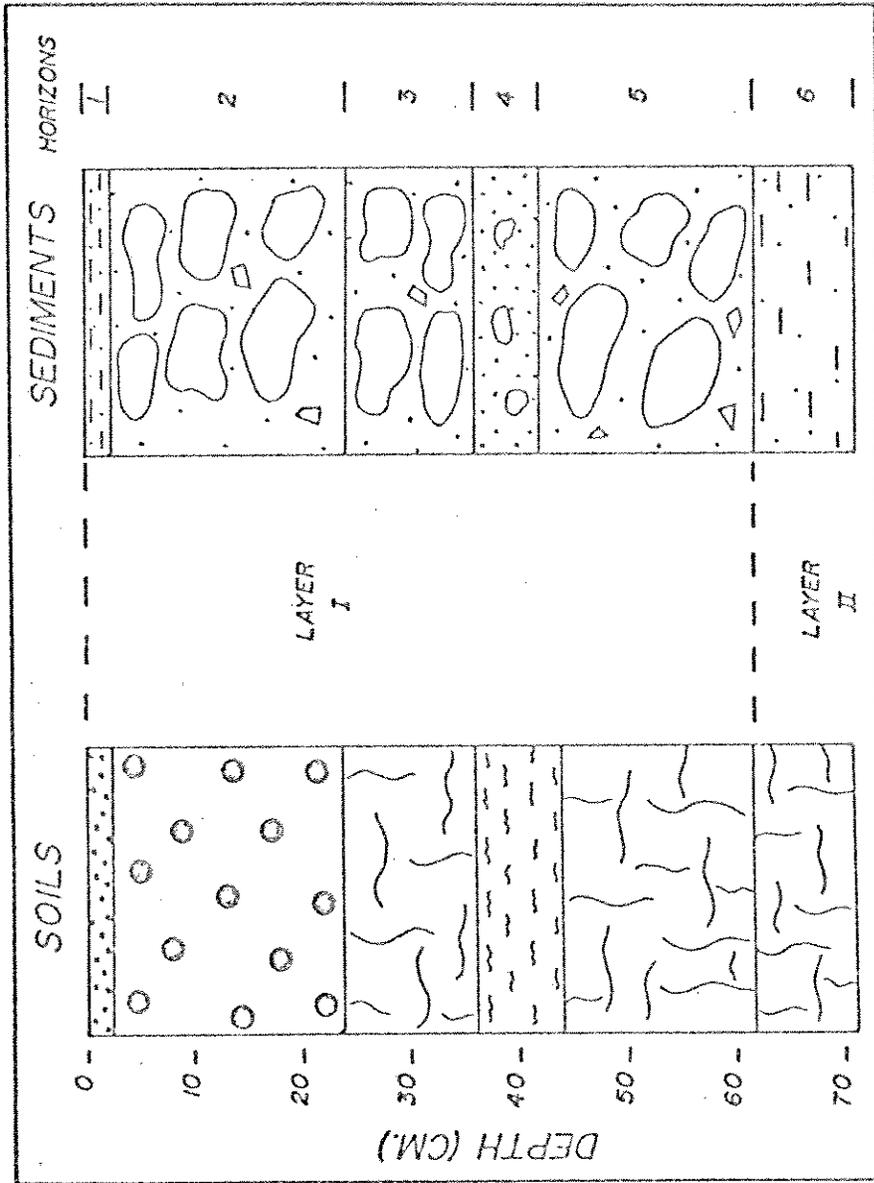


Figure 2. Profile of Square Twelve

Summary

Two sedimentary layers with Layer I containing four soils horizons from O-A1 to B2. The A1-A3 horizons are very poorly developed; A1 is especially shallow, and both contain evidence of churning from previous A/B stratigraphy. The A3 [Horizon 2] is actually composed of independent B1 and A1 peds and is designated here as A3 - transitional. Horizons 3 and 4 show some evidence of mixing of B and C horizons with rare A peds occurring intrapedally toward the upper portion of Horizon 3. Churning here is not as evident as in Horizons 1 and 2 and is interpreted as being an earlier period of disturbance. The primary depositional stratigraphy of Layer I has been modified by cultural activities. Layer II is an unmodified C [B transitional] horizon, designated as a C soil horizon because of the paucity of ped structure and abundant local angular basalts with unmodified aeolian matrix.

SQUARE TWELVE [Figure 2]

LAYER I - 0-62 cm. Culturally modified sediment of aeolian and cultural origin, very poorly sorted, 7.5YR 4/2, dry, with abundant angular blocky [1 by 2 cm.] charcoal, bio-carbonate pebbles [coral] degraded, an ash lense from 35.5 to 43.0 cm., and heavy concentration of cultural materials.

Soil Horizon 1: 0-1 cm., O - A1 horizon, weak crumb to moderately strong sub-rounded crumb, slightly sticky and slightly plastic with grass vegetation including small vertical roots, root tubes and casts, bioturbated. Bottom contact indistinct and drawn by change in ped shape and size.

Soil Horizon 2: 1-24 cm., A3 horizon, strong sub-angular crumb, slightly sticky and slightly plastic with common vertical small roots, few horizontal medium roots, bioturbated. Gradational bottom contact.

Soil Horizon 3: 24-63 cm., B1 horizon with 35.5 to 43.0 cm. apedal ash lense, medium to strong blocky to slightly granular sub-angular peds, slightly sticky, slightly plastic with rare roots, bioturbated. Gradational to sharp bottom contact.

Sediment: Culturally modified sediment with 6 by 20 to 8 by 17 cm. sub-angular to sub-rounded basalt [vesicular to