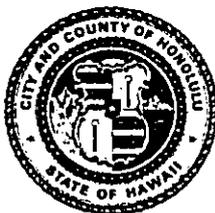


DEPARTMENT OF LAND UTILIZATION
CITY AND COUNTY OF HONOLULU
650 SOUTH KING STREET
HONOLULU, HAWAII 96813 • (808) 523-4200

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OFFICE OF ENVIRONMENTAL
QUALITY CONTROL

JEREMY HARRIS
MAYOR

PATRICK T. ONISHI
DIRECTOR

LORETTA K.C. CHEE
DEPUTY DIRECTOR

94/ED-008 (ASK)

April 4, 1995

The Honorable Gary Gill, Director
Office of Environmental Quality Control
State of Hawaii
220 S. King Street, 4th Floor
Honolulu, Hawaii 96813

Dear Mr. Gill:

CHAPTER 343, HRS
Environmental Assessment/Determination
Negative Declaration

Recorded Owner/
Applicant : Bernice Pauahi Bishop Museum
Agent : Media Five Limited
Location : 1525 Bernice Street, Kalihi, Oahu
Tax Map Key : 1-6-24: Various parcels
Request : Zone Change For A Property Listed On The
Historic Register
Proposal : Redevelopment Of The Museum In Accordance
With A Proposed Master Plan
Determination : A Negative Declaration Is Issued

Attached and incorporated by reference is the Final Environmental Assessment (FEA) prepared by the applicant for the project. Based on the significance criteria outlined in Chapter 200, State Administrative Rules, we have determined that preparation of an Environmental Impact Statement is not required.

We have enclosed a completed OEQC Bulletin Publication Form and four (4) copies of the FEA. If you have any questions, please contact Ardis Shaw-Kim of our staff at 527-5349.

Very truly yours,

A handwritten signature in cursive script, appearing to read "Patrick T. Onishi".

PATRICK T. ONISHI
Director of Land Utilization

PTO:am
Attachments
g:nd94ed8.ask

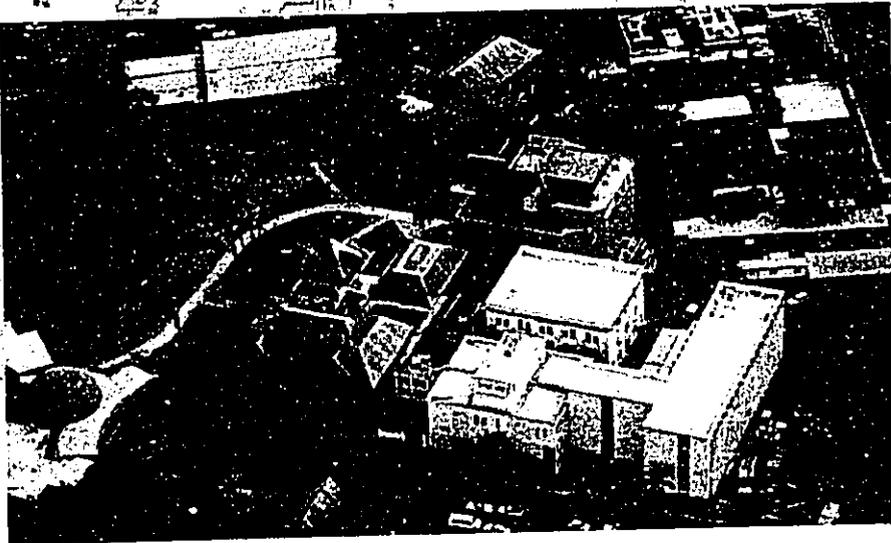
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1995-04-23-0A-FAA- Bishop Museum Science Center

APR 23 1995

Potential Environmental Effects of Construction of the Bishop Museum Science Center

Final Environmental Assessment Report
prepared for the
Department of Land Utilization



Allen Allison Ph.D.
Neal Evenhuis Ph.D.
Bishop Museum
P.O. Box 19000-A
Honolulu, Hawaii 96817

**Potential Environmental Effects
of Construction of the
Bishop Museum Science Center**

Final Environmental Assessment Report
prepared for the
Department of Land Utilization

Allen Allison, Ph.D.
Neal L. Evenhuis, Ph.D.

BISHOP MUSEUM

The State Museum of Natural and Cultural History
1525 Bernice Street, P.O. Box 19000
Honolulu, Hawai'i 96817-0916 USA



ENVIRONMENTAL ASSESSMENT REPORT

Table of Contents and Attachments

	Page
Cover Letter	1
Executive Summary	2
Details on Federal Grant for Science Learning Center	4
Documentation	
Figure 1: Project Location	6
Figure 2: Bishop Museum Campus - Map	7
Figure 3: Bishop Museum Campus - Area of Proposed Zone Change	8
Figure 4: Bishop Museum Campus - Aerial Photograph	9
Figure 5: Campus Master Plan - First Phase Projects	10
Figure 6a: Schematic - Master Plan Phases 1 and 2 - NW View	11
Figure 6b: Schematic - Master Plan Phases 1 and 2 - SW View	12
Figure 6c: Schematic - Master Plan Phases 1 and 2 - NE View	13
Figure 7: Proposed Demolition Plan	14
Figure 8: Site Topography	15
Table 1: Master Plan Phasing	16
Description of Proposed Action	17
Description of Affected Environment	22
Potential Environmental Effects	23
1. THREATENED AND ENDANGERED SPECIES	25
2. OTHER PROTECTED SPECIES	46
3. WETLANDS	47
4. ARCHAEOLOGICAL/HISTORIC RESOURCES	49
5. PRIME, UNIQUE OR IMPORTANT FARMLAND	69
6. NON-ATTAINMENT AREAS	71
7. CLASS I AIR QUALITY CONTROL REGION	75
8. SPECIAL SOURCES OF GROUNDWATER	76
9. NAVIGABLE AIR SPACE	77
10. COASTAL ZONES	79
11. SPECIAL DESIGNATION	80
12. FLOODPLAIN	84
13. CLEARING AND EXCAVATION	88
14. DREDGE AND FILL	89
15. NOISE	90

CORRECTION

THE PRECEDING DOCUMENT(S) HAS
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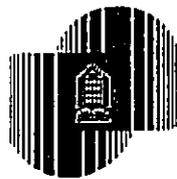
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Bishop Museum Science Center**

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Allen Allison, Ph.D.
Neal L. Evenhuis, Ph.D.

BISHOP MUSEUM

The State Museum of Natural and Cultural History
1525 Bernice Street, P.O. Box 19000
Honolulu, Hawai'i 96817-0916 USA



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CITY & COUNTY OF HONOLULU

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100

ENVIRONMENTAL ASSESSMENT REPORT

Table of Contents and Attachments

	Page
Cover Letter	1
Executive Summary	2
Details on Federal Grant for Science Learning Center	4
Documentation	
Figure 1: Project Location	6
Figure 2: Bishop Museum Campus - Map	7
Figure 3: Bishop Museum Campus - Area of Proposed Zone Change	8
Figure 4: Bishop Museum Campus - Aerial Photograph	9
Figure 5: Campus Master Plan - First Phase Projects	10
Figure 6a: Schematic - Master Plan Phases 1 and 2 - NW View	11
Figure 6b: Schematic - Master Plan Phases 1 and 2 - SW View	12
Figure 6c: Schematic - Master Plan Phases 1 and 2 - NE View	13
Figure 7: Proposed Demolition Plan	14
Figure 8: Site Topography	15
Table 1: Master Plan Phasing	16
Description of Proposed Action	17
Description of Affected Environment	22
Potential Environmental Effects	23
1. THREATENED AND ENDANGERED SPECIES	25
2. OTHER PROTECTED SPECIES	46
3. WETLANDS	47
4. ARCHAEOLOGICAL/HISTORIC RESOURCES	49
5. PRIME, UNIQUE OR IMPORTANT FARMLAND	69
6. NON-ATTAINMENT AREAS	71
7. CLASS I AIR QUALITY CONTROL REGION	75
8. SPECIAL SOURCES OF GROUNDWATER	76
9. NAVIGABLE AIR SPACE	77
10. COASTAL ZONES	79
11. SPECIAL DESIGNATION	80
12. FLOODPLAIN	84
13. CLEARING AND EXCAVATION	88
14. DREDGE AND FILL	89
15. NOISE	90

16. ASBESTOS REMOVAL	91
17. PCBs	98
18. TOXIC SUBSTANCES	101
19. CHEMICAL STORAGE/USE	102
20. PESTICIDE USE	103
21. HAZARDOUS WASTE (EMISSIONS)	104
22. LIQUID EFFLUENT	105
23. UNDERGROUND INJECTION	108
24. HAZARDOUS WASTE	109
25. UNDERGROUND STORAGE TANKS	110
26. RADIOACTIVE MIXED WASTE	111
27. RADIOACTIVE WASTE	112
28. RADIATION EXPOSURE	113
29. THREATENED VIOLATION OF ES&H REQUIREMENTS	114
30. SITING/CONSTRUCTION/WASTE RECOVERY	115
31. DISTURBANCE OF PRE-EXISTING CONTAMINATION	116
32. NEW OR MODIFIED FEDERAL/STATE PERMITS	117
33. PUBLIC CONTROVERSY	118
34. INVOLVEMENT OF ANOTHER FEDERAL AGENCY	134
35. ACTION OF A STATE AGENCY	135
36. PUBLIC UTILITIES SERVICES	136
37. DEPLETION OF NON-RENEWABLE RESOURCES	137

Appendix

Qualifications of Museum Consultants

Allen Allison, Ph.D.	139
Robert H. Cowie, Ph.D.	141
Neal L. Evenhuis, Ph.D.	143
Derral R. Herbst, Ph.D.	145
Clyde T. Imada, B.S.	146
Paul Klieger, Ph.D.	147
Scott E. Miller, Ph.D.	148
Robert L. Pyle, Ph.D.	149
Tracy Leo Tam Sing	150

BISHOP MUSEUM



CELEBRATING A
CENTURY OF DISCOVERY

March 15, 1995

Mr. Patrick Onishi
Director
Department of Land Utilization
650 South King Street
Honolulu, Hawaii 96813

Dear Mr. Onishi:

Project Name: Bishop Museum Master Plan
Tax Map Key: 1-6-24: various

In accordance with provisions of Chapter 343, HRS, I am enclosing a Final Environmental Assessment for the first two phases of Bishop Museum's master plan: Science Learning Center and Science Learning Center Expansion. The final phase of the master plan, Historic Preservation, is still in the preliminary stage of planning. Following discussions with your staff, we have decided to prepare a separate Environmental Assessment at some future date for that component of the master plan.

We trust that the enclosed Final Environmental Assessment report provides sufficient detail on potential environmental effects and proposed mitigative measures to satisfy the provisions of Chapter 343, HRS for the first and second phases of the master plan.

Sincerely yours,

Allen Allison
Assistant Director, Research

The State Museum of Natural and Cultural History
1525 Bernice Street • P.O. Box 19000A • Honolulu, Hawai'i • 96817-0916
Telephone: (808) 847-3511 • Fax: (808) 841-8968

EXECUTIVE SUMMARY

Bishop Museum has received a \$10 million federal appropriation to construct a Science Learning Center on its campus in the Kalihi District of Honolulu. The Museum intends to supplement this appropriation with funding from other sources to implement a long-term master plan for the campus that involves surrounding the central Great Lawn with public buildings and interpretative outdoor exhibits, consolidating research, collections and administrative activities in the northern portion of the campus and using peripheral areas for parking. This is expected to bring many educational and economic benefits to local residents and visitors through expanded Museum programs in science and culture.

The master plan has been conceived in three phases: 1. Science Learning Center; 2. Science Learning Center Expansion; and 3. Historic Preservation. The first two phases will be implemented as part of an overall project that will generally be referred to herein as the Science Learning Center. The Museum has carefully considered all possible environmental effects of the construction of the Science Learning Center, and these are detailed in this Final Environmental Assessment report which is intended to satisfy Chapter 343, HRS for this project.

Planning for the Historic Preservation Phase of the master plan is still very preliminary. It will involve mainly the restoration of Hawaiian, Polynesian and Bishop Halls and is therefore very different from the first two phases, which involve mainly new construction. For these reasons, this phase of the master plan will be treated in a separate environmental assessment at some later date.

The first phase of the master plan will involve construction of an environmentally efficient poured in place concrete Science Learning Center building of ca. 50,000 square feet that will house a science museum (featuring natural and cultural history exhibits based on a Hawaii/Pacific theme), planetarium/large format theater and associated support activities, and will serve as the Museum's main entrance. The area around the Science Learning Center will be landscaped into a science garden with interpretative outdoor exhibits. Also included in this phase is construction of a 4-5 story building to house Museum collections of specimens and artifacts.

The second phase of the master plan involves expanding the size of the Science Learning Center by 10,000 sq. ft., constructing a technology center and a new support services building.

Construction of the Science Learning Center (first and second phases of the master plan) will require demolition of six existing Museum buildings and removal of several temporary office trailers and work/storage sheds. One of these buildings, Dorm D, a 105 year old former school dormitory condemned because of damage by water and termites, is historically significant. The Museum is far advanced in the process of signing a

memorandum of agreement with the State Division of Historic Preservation, and other government regulatory agencies to mitigate the effect of demolition.

Bishop Museum is in the process of purchasing the improvements on nineteen house lots (total area is 2.9 acres) that it owns on the perimeter of the campus along Bernice Street and Kapalama Avenue. Six of the houses are vacant and are owned by the Museum. The remaining thirteen houses are privately owned under Hawaii's leasehold system. Nine homeowners have signed agreements of sale that provide for life tenancy or occupancy until the year 2007 when their leases expire. The Museum is negotiating with the remaining four homeowners and expects to reach amicable agreements with them. As houses are vacated, they will be demolished or relocated to other sites and the land will be added to the main campus and developed for on-grade parking.

The Science Learning Center project and associated construction will require that seven plants of four federally listed endangered species be relocated elsewhere on campus. The Museum has successfully concluded a Section 7 consultation (Endangered Species Act) with the U.S. Fish and Wildlife Service to mitigate the effects of this action and has only to obtain federal and state permits to relocate the plants once plans are finalized and appropriate sites have been prepared.

The long range master plan will require a change in the Museum's zoning classification from R-5 (Residential) to B-2 (Business) and a change in land use designation for the nineteen perimeter house lots. The lots are currently designated Residential on the Development Plan (DP) Land Use Map and must be redesignated as Public and Quasi-Public to match the DP Land Use Map for the main Museum campus and to conform to anticipated future use. A re-zoning application to accomplish these changes will be submitted as soon as this Final Environmental Assessment is accepted by the Department of Land Utilization.

There are no other significant environmental effects associated with this project.

bishop museum *memorandum*
July 22, 1994

To: Allen Allison
From: Alan Haines
Subject: DOE Science Center Grant

Per our telephone conversation earlier today, the following may be helpful in describing the nature of our agreement with the Department of Energy:

- a. On 26 May 1993 Bishop Museum received a "Financial Assistance Award" from DOE;
- b. Legislative Program Title: Energy Research;
- c. Project Title: Design and Construction of the Bishop Science Center;
- d. Authority: Public Law(s) 102-377, 102-396, 95-238 and 95-91;
- e. Instrument Type: Grant;
- f. Instrument No.: DE-FG02-93CH10543, Amendment A000
- g. Amount: \$10,000,000
- h. Total approved budget: \$37,617,103

The Statement of Work (SOW) for the Project is attached.

April 14, 1993

BISHOP SCIENCE CENTER
STATE MUSEUM OF NATURAL AND CULTURAL HISTORY
STATEMENT OF WORK

The State Museum of Natural and Cultural History (commonly known as the Bishop Museum), as grantee, shall furnish or cause to be furnished the necessary facilities, personnel, equipment, materials and other services to accomplish the design, procurement and construction of the Bishop Science Center, as generally described in the "Federal Assistance" application and supplementary information provided by the Bishop Museum.

- A. The Bishop Science Center will be located on the 11-acre site of the Bishop Museum in Honolulu, Hawaii. The Science Center will be a multi-story building of approximately 78,900 net square feet which will include an exhibition hall, IMAX-type theatre, administrative offices, planetarium, labs and classrooms, restaurant and gift store, and physical plant support areas.
- B. The State Museum of Natural and Cultural History, as grantee, has the responsibility for the design, procurement and construction of the facility and will perform the following:
1. Furnish or cause to be furnished the necessary architectural, engineering and construction management services.
 2. Competitively procure all construction, materials and equipment contracts.
 3. Manage the cost, schedule and technical performance during the performance of the work under this grant, taking appropriate action as necessary to assure that the project is completed on schedule and within budget.
 4. Fulfill the reporting requirement in the Federal Assistance Reporting Checklist (Form EIA-459A).
 5. Conduct at the State Museum of Natural and Cultural History quarterly meetings to discuss with DOE project status and progress of the work during the preceding period.
- C. The State Museum of Natural and Cultural History, as grantee, shall provide to DOE at the completion of Conceptual Design, Title I (design development) and 95% of Title II (construction documents) design stages, two copies of design plans, specifications, construction schedules and cost estimates. The State Museum of Natural and Cultural History shall provide prompt-response and resolution to any DOE comments arising from the reviews of the documents and, if required by DOE, convene a meeting to discuss/review the documents and/or resolution of comments.

BISHOP MUSEUM CAMPUS

- 1. **ATHERTON HALLAU**
Crafts and Hula Show
- 2. **BISHOP HALL**
Archaeology Lab
Board Room
- 3. **CASTLE MEMORIAL BUILDING**
Native Hawaiian Culture and Arts
Pacific Regional Conservation
- 4. **COOKE ROTUNDA**
- 5. **DORM D**
Bishop Museum Association
Development
- 6. **Hale Oma'o (greenhouse)**
- 7. **HALL OF DISCOVERY**
- 8. **HAWAIIAN COURT**
- 9. **HAWAIIAN HALL**
- 10. **Applied Research Group**
- 11. **Ichthyology**
- 12. **JABULKA PAVILION**
- 13. **Director's Office**
- 14. **Public Information**
- 15. **Shop Pacifica**
- 16. **Ticket Booth**
- 17. **KAMALA**
Accounting
Administration and Finance
Buildings and Grounds
Inventory and Supply
- 18. **KONIA HALL**
- 19. **PAUAI HALL**
Anthropology
Malacology
Photographic Services
Lanai Restaurant
Mailroom Trailer
- 20. **Maintenance Sheds**
- 21. **PAKI HALL**
Bishop Museum Press
Map Collection
Library
Registration
Visual Collections
Zoology
- 22. **PAUAI HALL**
Botany
Bishop Museum Press
Entomology
Pacific Science Association
Planetarium
Docent Office
Housekeeping
Security
- 23. **PLANETARIUM OFFICE**
- 24. **POLYNESIAN HALL**
Reception - Pauahi Hall
Telescope/Observatory
Woodshop
Rest rooms

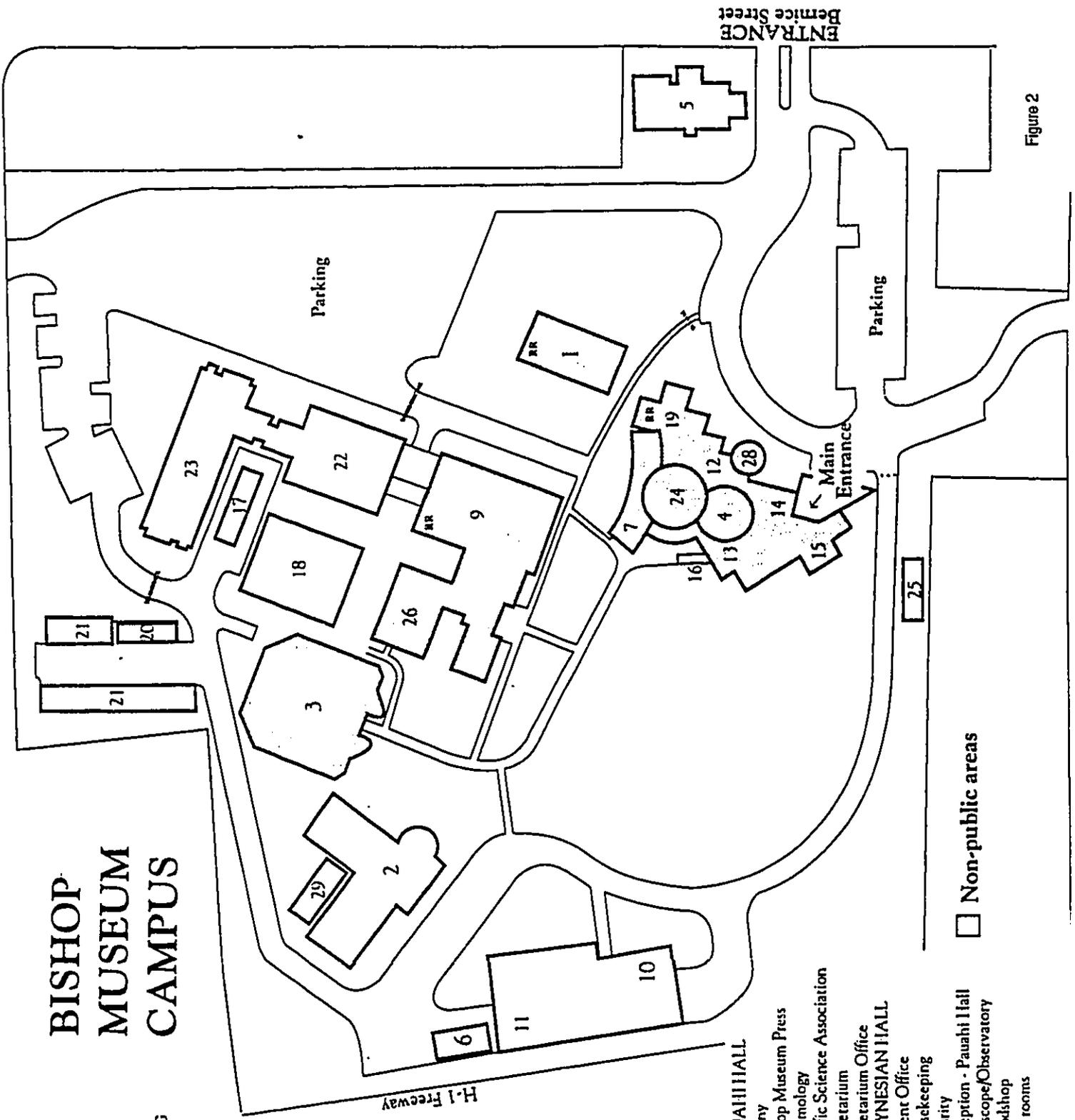
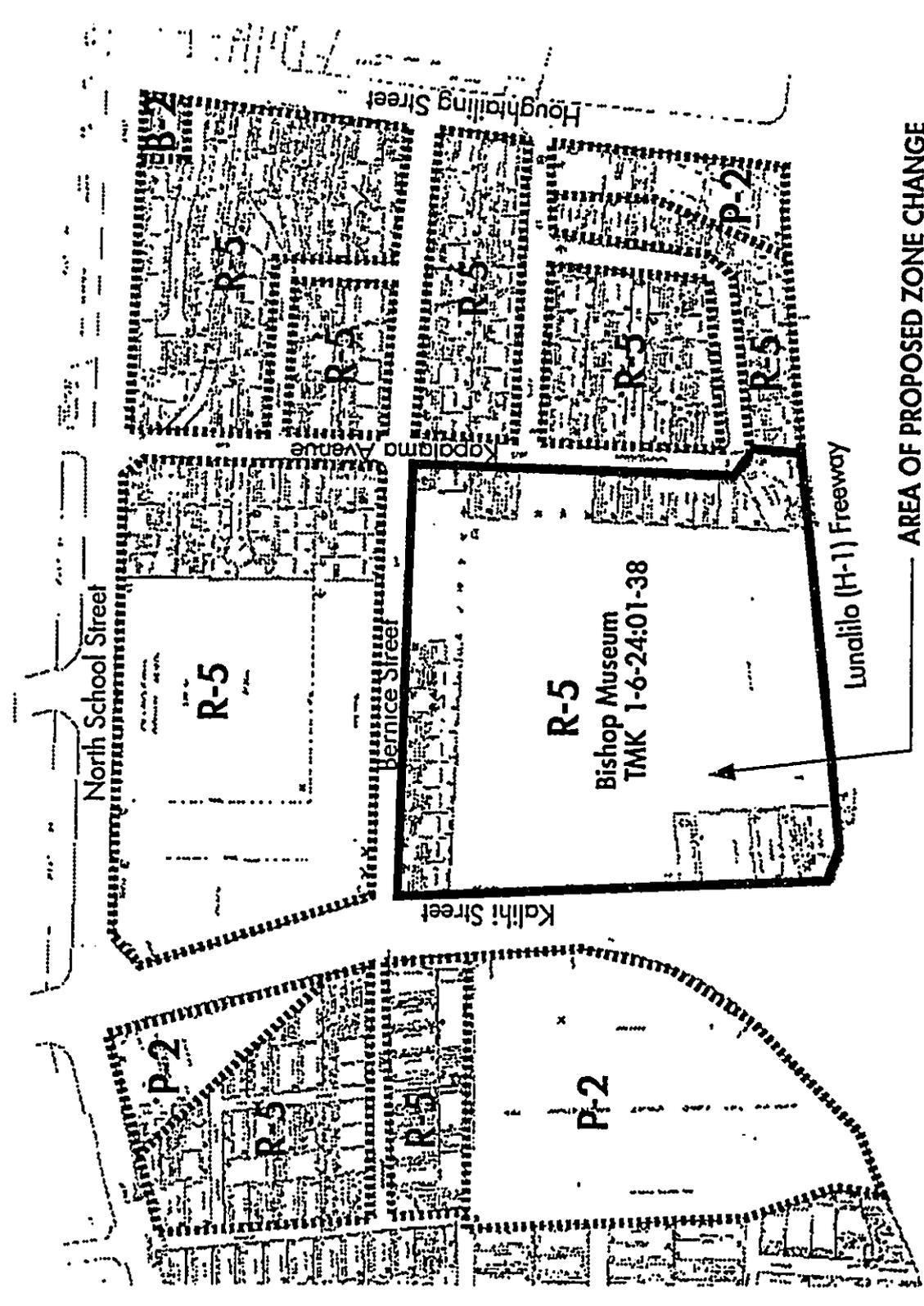


Figure 2

100' 200' 300' 400' 500' 600' 700' 800' 900' 1000'

Bishop Museum



AREA OF PROPOSED ZONE CHANGE

Site Context : Immediate Vicinity / Existing Zoning

Figure 3

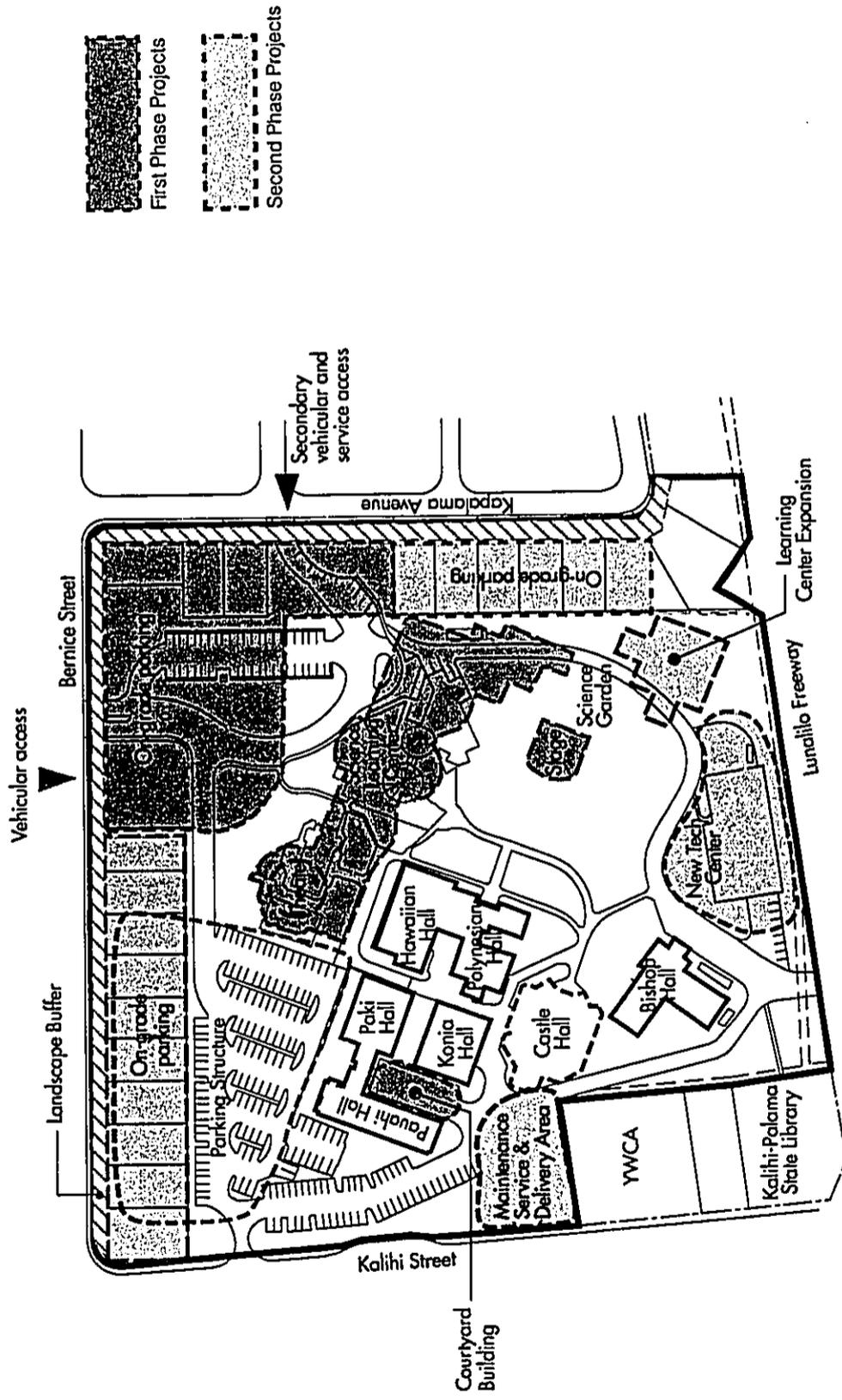
Bishop Museum



Aerial Photo of the Site

Figure 4

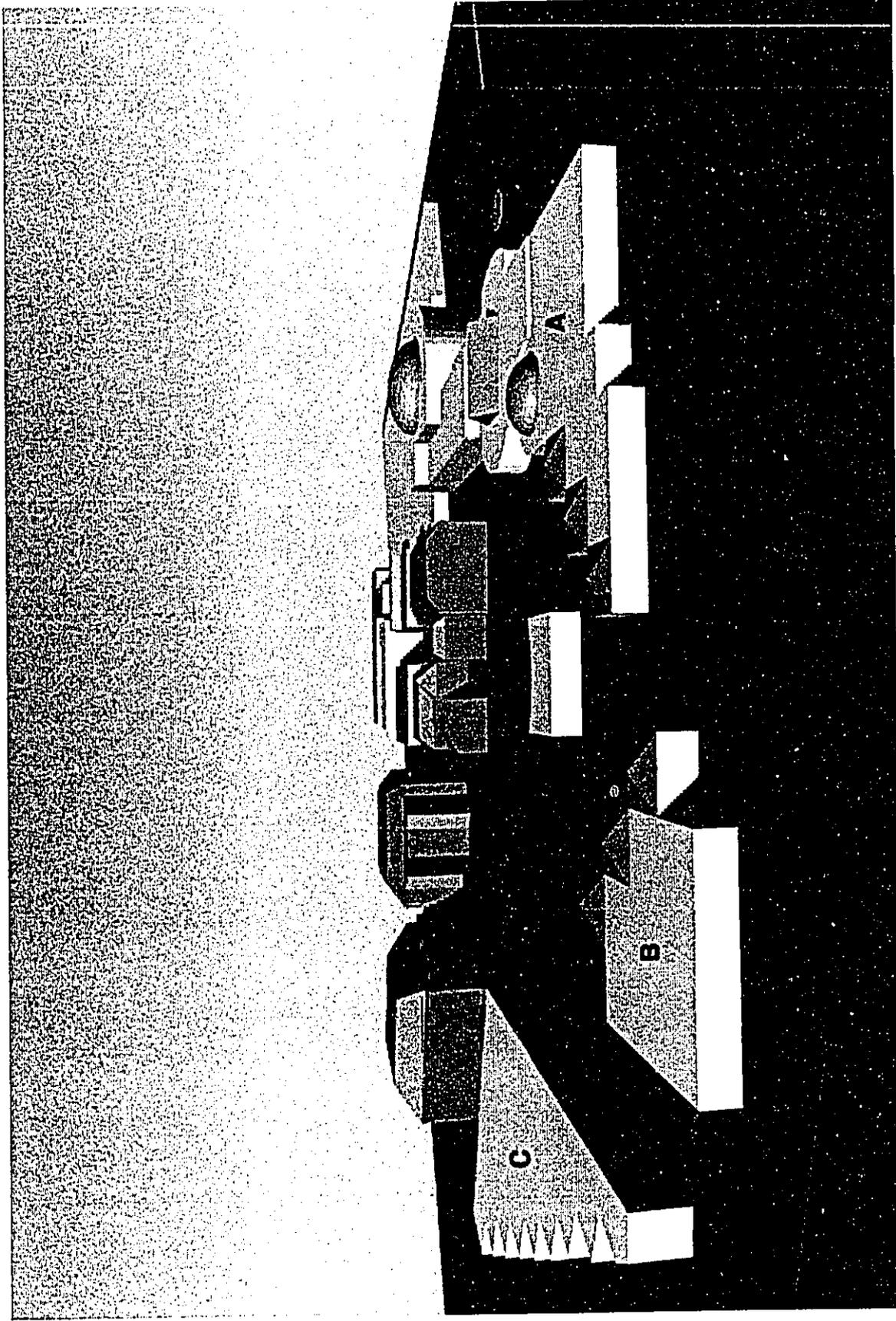
Bishop Museum



Bishop Museum Project Phases

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Figure 5



A - SCIENCE LEARNING CENTER
B - LEARNING CENTER EXPANSION
C - NEW TECHNOLOGY CENTER

FIG. 6A SCHEMATIC RENDERING OF FIRST AND SECOND PHASES
VIEW TO THE NORTHWEST

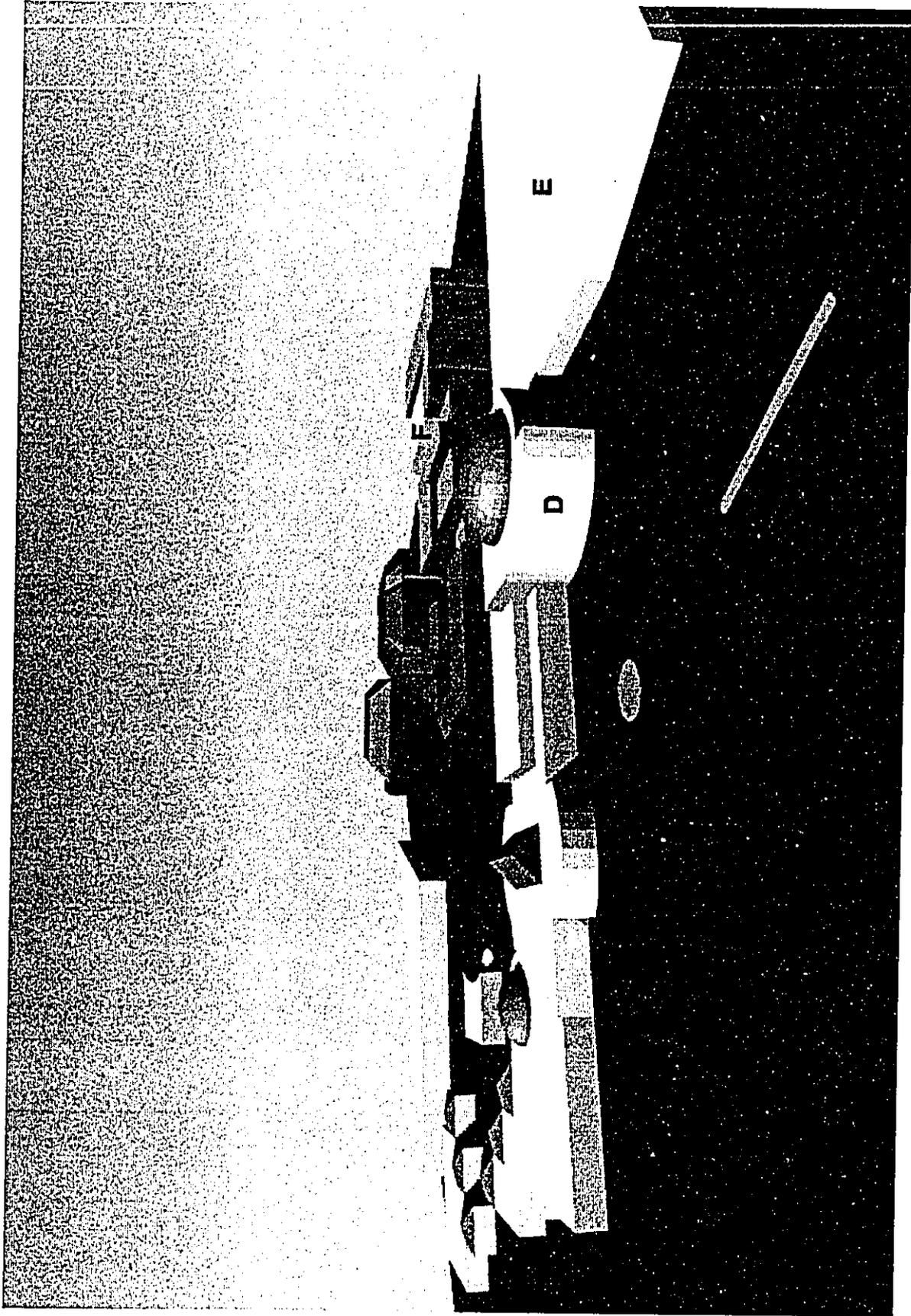


FIG. 6B SCHEMATIC RENDERING OF FIRST AND SECOND PHASES
VIEW TO THE SOUTHWEST

D - THEATER / PLANETARIUM
E - PARKING GARAGE
F - COURTYARD BUILDING

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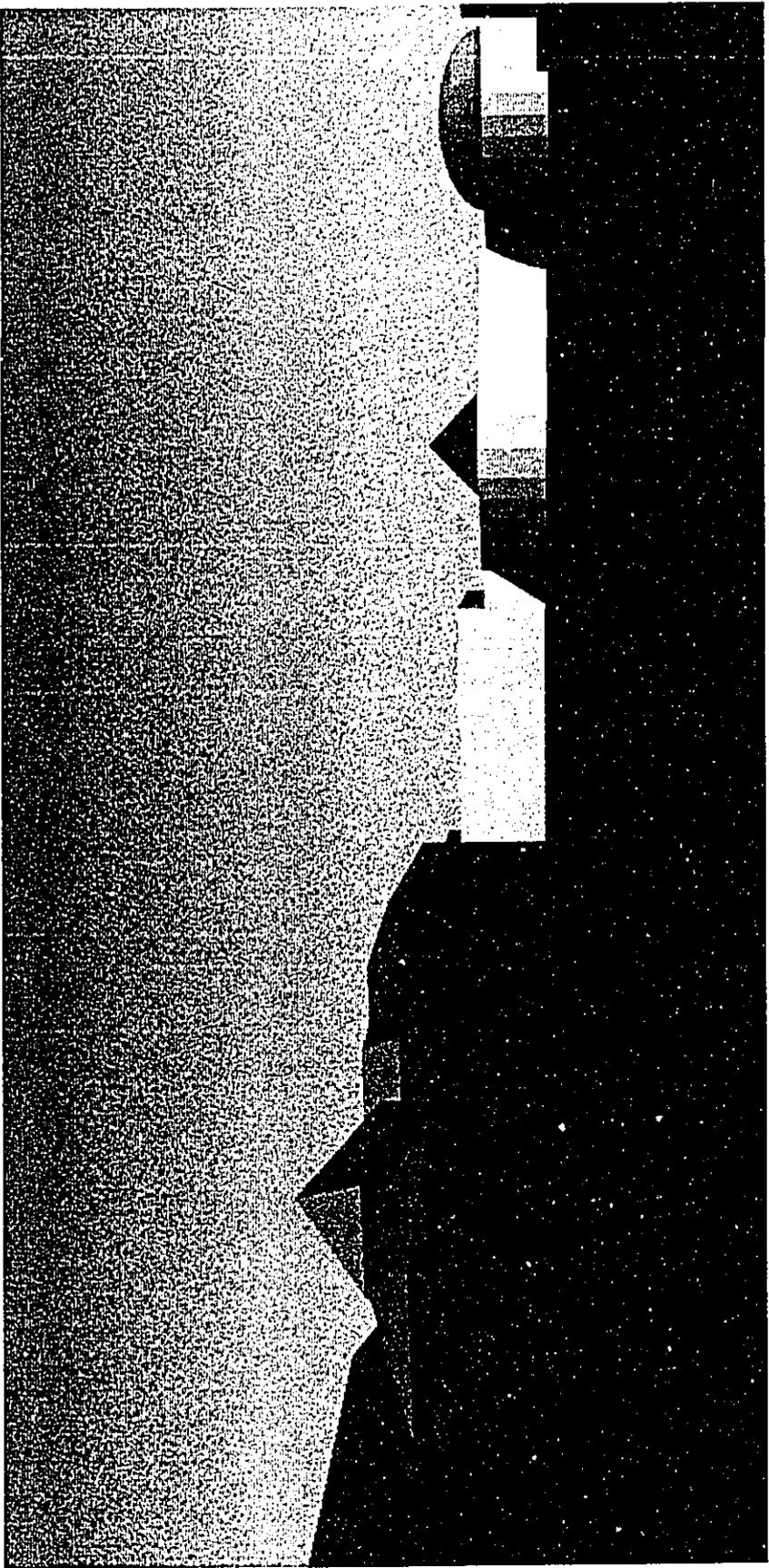
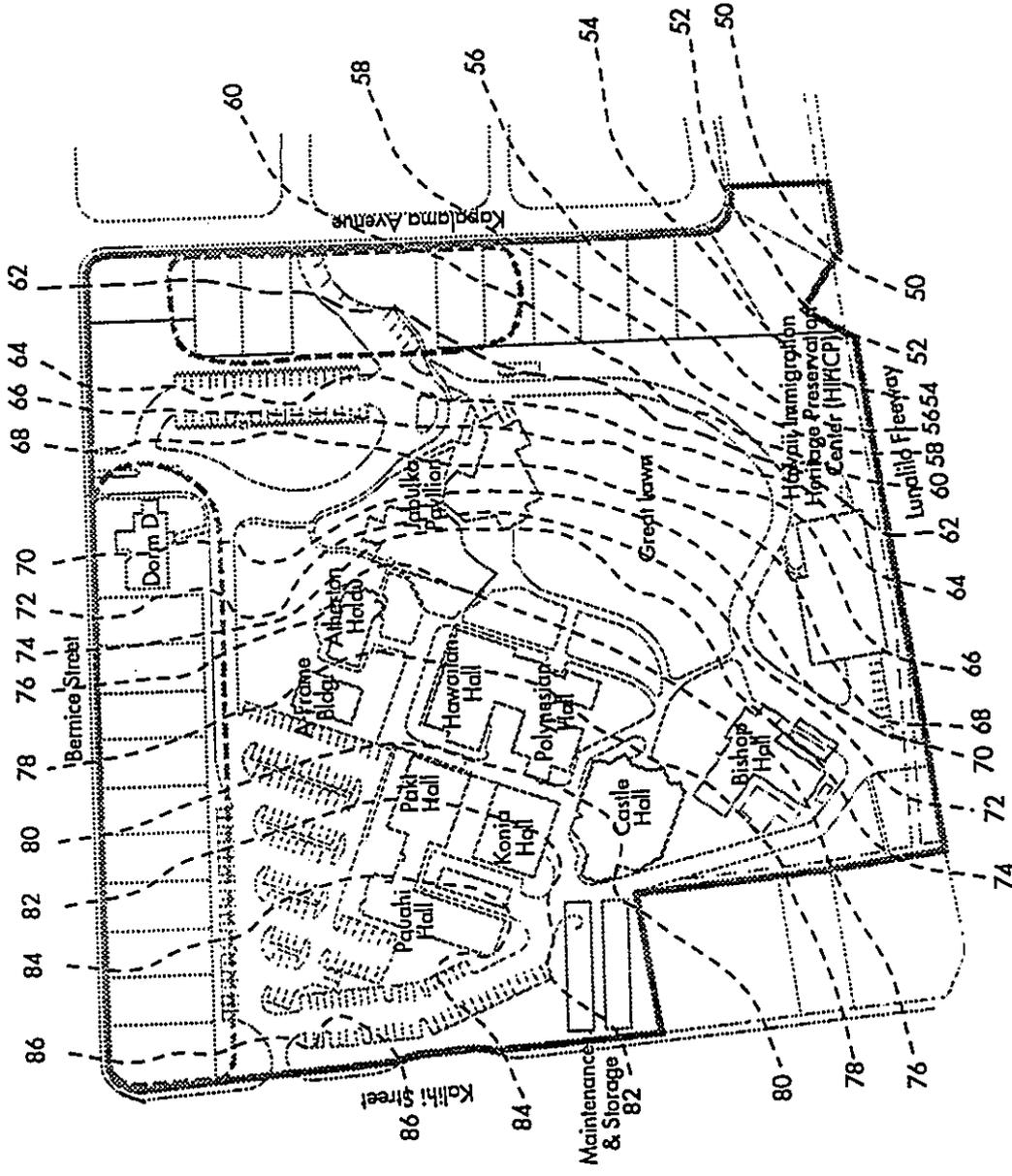


FIG. 6C SCHEMATIC RENDERING OF FIRST AND SECOND PHASES
VIEW FROM EYE LEVEL TO THE NORTHEAST

Bishop Museum



TMK: 1-6-24:01-38

Topography

Figure 8

Table 1: Master Plan Phasing

Bishop Museum Master Plan - 15 March 1995

Science Learning Center - Phase 1

- Museum Entrance Building and Science Museum (Entrance lobby, exhibit hall, planetarium/theater, gift shop, restaurant, and multi-purpose facility)
- Science Garden (Outdoor exhibit area)
- Site Work (Site preparation and parking)
- Collections Storage Facility (New collections building)

Science Learning Center Expansion - Phase 2

- Entrance building expansion (Additional exhibit area)
- Technology Center (Replace Hale Kini with new exhibit building)
- Support Services Building (Replace maintenance shed with new building)

Historic Preservation - Phase 3

- Bishop Hall Restoration
- Hawaiian Hall Renovation
- Paki, Konia, and Pauahi Hall Renovations

I. DESCRIPTION OF PROPOSED ACTION

Bishop Museum is located on a 12.4 acre campus in the Kalihi District of Honolulu approximately 2 miles NW of the city center (Figures 1-4, pages 6-9). To make the most effective use of this space, the Museum has adopted a long-term facilities master plan that involves surrounding the central Great Lawn with public buildings and interpretative outdoor exhibits, consolidating research, collections and administrative activities in the northern portion of the campus and using peripheral areas for parking (which would add an additional 2.9 acres to the campus) (see Figures 5-6, pages 10-13).

The master plan has been divided into three phases: 1. Science Learning Center; 2. Science Learning Center Expansion; and 3. Historic Preservation (see Table 1, page 16). This environmental assessment covers only the first two phases of the master plan (generally referred to herein as the Science Learning Center project) and is intended to satisfy Chapter 343, HRS. However, for simplicity we have treated the entire campus as the impact area for most environmental factors and where necessary have discussed the third phase of the master plan, Historic Preservation, in order to put first and second phase objectives into perspective.

The U.S. Department of Energy made a \$10 million grant to Bishop Museum for construction of the Science Learning Center (see page 4, also Figures 5-6, pages 10-13). The Museum intends to supplement this appropriation with funds raised from other sources to begin construction of the first phase of the master plan. This will include the Science Learning Center (new entrance building and science museum [featuring exhibits on Hawaiian and Pacific cultural and natural history], planetarium/theater, and science garden [interpretative outdoor exhibits]), and a new collections building. These new additions will require demolition or relocation of four existing Museum buildings, removal of several office trailers and, as they are vacated, nineteen detached houses on the perimeter of the Museum campus (see Figure 7, page 14). Total cost for the first phase is estimated to be \$22 million.

The Museum buildings scheduled for demolition during the first phase of the master plan include Dorm D, a wooden two story structure of 5299 sq. ft. erected in 1889, and three structures, all less than 50 years old: a temporary A-frame shed built in 1992 to provide shelter for a team of artisans constructing a Hawaiian voyaging canoe, Jabulka Pavilion, a split level multi-purpose building of wood construction (11,638 sq. ft.), which houses a gift shop, restaurant and administrative offices and includes a planetarium, small observatory and a circular exhibit area (Cooke Rotunda) constructed of poured in place concrete; and the Atherton Halau, an open air building of wood construction used for meetings, lectures and the performing arts (2875 sq. ft.).

The second phase of the master plan involves expanding the size of Science Learning Center building by 10,000 sq. ft. and constructing a Technology Center and a

new support services building. This will require demolition of Hale Kini (HIHPC), a metal building (15,500 sq. ft.) approximately 30 years old located on the southern edge of the campus, removal of a temporary office trailer and a carpentry shop located near Bishop Hall, demolition of a maintenance building and storage sheds on the northwestern edge of the campus and development of additional on-grade parking (and, if necessary, construction of a single story parking structure) (see Figure 5, page 10, and Figure 7, page 14).

The Museum is in the process of purchasing the improvements on nineteen house lots (total area is 2.9 acres) that it owns along the perimeter of the campus along Bernice Street and Kapalama Avenue. Six of the houses are vacant and are owned by the Museum. Nine homeowners have signed agreements of sale that provide for life tenancy or occupancy until the year 2007 when their leases expire. The Museum is negotiating with the remaining four homeowners and expects to reach amicable agreements with them. As houses are vacated, they will be demolished or relocated to other sites and the land will be added to the main campus and developed for on-grade parking.

Science Learning Center

In place of the A-frame shed, Atherton Halau and Jabulka Pavilion, the Museum will construct a poured in place reinforced concrete, environmentally efficient Science Learning Center building of ca. 50,000 square feet that will be the major landmark component of the campus, combining two primary functions as the Museum's main entry and a "state of the art" public access exhibition facility (Figure 6a, page 11). The building will be one story in height with the exception of the theater building and a second floor of adjoining administrative offices. It extends southward from a position northeast of Hawaiian Hall, terminating at the opposite side of the Great Lawn from the entrance to Polynesian Hall. The visible roof forms will be metal to complement the roofs of existing buildings.

The positioning of the building is intended to reduce its impact on the historically significant older buildings on campus, and to preserve the openness of the campus to the greatest extent possible. The building design has not been finalized, but the exterior materials will be selected to minimize distracting contrasts to the character of the existing architecture of Hawaiian and Polynesian Halls. These materials may include native stone and textured concrete. The theater is set back to the north of Hawaiian Hall in order to maintain the prominence of Polynesian and Hawaiian halls on the campus courtyard.

The Science Learning Center will be approximately 436 feet long on its north-south axis and 262 feet wide on the east-west axis. The tallest element of the building will be the theater/planetarium dome which will be approximately 57 feet high. The

balance of the building will be mostly one story and will range in height from 16 to 24 feet.

The Science Learning Center will provide a much more effective campus layout than the Museum has now and will significantly improve visitor access and orientation to Museum programs, expand the Museum's total exhibit and public space by ca. 58% and replace the Museum's obsolete planetarium with a modern, state of the art facility. The Science Learning Center will emphasize programs in biology, ecology, astronomy, oceanography and the earth sciences developed in close collaboration with Hawaii's schools and universities and is expected to increase significantly science literacy in Hawaii.

The expansion of the Science Learning Center planned for the second phase of the master plan will provide 10,000 sq. ft. of additional exhibit space and will be located southwest of the first phase. The architectural character and building height of the second phase will be similar to that of the first phase.

Science Garden

Planning for the Science Garden is still preliminary. It is expected to comprise interpretative outdoor exhibits that will be modeled on the Hawaiian unit of land division, *ahupua`a*, that includes environments from the coast to the mountains. The Science Garden will be closely integrated with the Science Learning Center and will be 1-2 acres in area.

Collections Storage (Courtyard) Building

In conjunction with construction of the Science Learning Center, the Museum intends to construct a new 4-5 story poured in place concrete building to house specimen and artifact collections. This building will be located in the courtyard between Konia, Paki and Pauahi halls and will not affect the overall architectural appearance of the campus. The southwest wall of the building will be painted concrete with wall articulations and fenestration to complement the character of adjoining structures. Each story will be 5600 sq. ft.

Parking Structure

The Museum believes that it will be able to provide sufficient on-grade parking to meet City and County of Honolulu requirements. However, should this not be possible, the Museum intends to construct a parking structure in the northeast portion of the campus (see Figure 5, page 10) during the second phase of the master plan. This would be a single story building, approximately 16 feet high with parking on-grade and on the upper deck. The fascia line of the garage would be low and set-back from the adjoining street frontage. The structure's appearance would be designed to mute its

visual presence, and planters or concrete fascia panels with decorative motifs would be used to screen parked cars from immediate view.

New Technology Center

The appearance and configuration of the Technology Center is only generally known at this time but is expected to be one story and approximately 24 feet high. The guiding principles for its design will be the same as for the first phase buildings: minimize any obtrusiveness on the open space of the campus and respect the massing, character and materials of the existing historic buildings. The Technology Center is estimated in the master plan to be 20,000 sq. ft. and will be located on the southwest part of the campus adjacent to the H-1 (Lunalilo) Freeway (see Figure 5, page 10, "New Tech Center"). It will house interactive exhibits relating to technology. Construction of this building will require demolition of Hale Kini (HIHPC), a metal storage building of 15,500 sq. ft. that is less than 30 years old and therefore not of historic significance. Collections currently housed in Hale Kini will be moved to Castle Hall and the new Courtyard Building.

Support Services Building

The support services building will be located on the western edge of campus and is estimated to occupy 11,300 sq. ft. It will house the Museum's departments of Exhibits, and Buildings and Grounds (see Fig 5, page 10, "Maintenance, Service and Delivery Area"). Construction of this building will require demolition of the current maintenance building and associated storage sheds and removal of a temporary office trailer (see Figure 7, page 14).

Historic Preservation

The final phase of the master plan, Historic Preservation, is not included in this Final Environmental Assessment because planning is still at a very preliminary stage. The Museum's basic plan for this phase is to renovate Hawaiian, Polynesian and Bishop halls (see Figure 2, page 7) and possibly increase net usable space in Bishop Hall through interior redesign or the addition of an annex building.

Socio-Economic Impacts of the Science Learning Center:

The Bishop Museum is Hawaii's premier natural and cultural history museum and is among the five largest independent natural history museums in the United States. Its collections of more than 22,000,000 items from the Pacific basin are the largest in the world from this region. In 1988 the Museum was designed by the State Legislature as the State Museum of Natural and Cultural History. In 1992 the Museum was further designated by the State Legislature as the Hawaii Biological Survey. It is

currently implementing a plan, in close cooperation with state and federal agencies, to produce a comprehensive inventory of the plants and animals of Hawaii. The Science Learning Center is integral to this effort and will help the Museum better serve its diverse constituencies that include the public, resource managers, ecotourism planners, scientists, historians, educators and others working to understand, preserve, and protect Hawaii's unique tropical environment.

The Museum's primary mission is education and its programs of exhibits, public outreach and research are international in scope. The Science Learning Center and large format theater will greatly expand and update the Museum's educational programs, particularly for primary and secondary schools, and will provide additional attractions to accommodate future growth in the number of visitors to Hawaii. In particular this new facility will greatly expand the Museum's exhibits in Hawaiian and Pacific natural history, including the earth sciences. Total Museum paid attendance is projected to increase by at least 24%, to more than 455,000 people, once the Science Learning Center is completed.

The Museum brings in several million dollars each year to the State of Hawaii in federal grants, and employs more than 350 people. Its programs in informal science education are unmatched anywhere in the state. The Museum's plan to expand and update its programs by developing a Science Learning Center is therefore an important factor in the growth and diversification of Hawaii's economic base.

In summary, the Science Learning Center will bring many educational and economic benefits to Hawaii's residents and visitors and will be an important new asset for the state. Potential environmental effects are minimal and are easily mitigated.

II. DESCRIPTION OF AFFECTED ENVIRONMENT

Background

The Bishop Museum campus currently consists of 12.4 acres in a suburban neighborhood of the Kalihi District of Honolulu and includes 12 major buildings (total of ca. 165,000 sq. ft.), situated around a large, expansive lawn (see Figs. 1-3, pages 7-9). The campus is extensively landscaped with native and exotic plants, including four endangered species under cultivation. The campus is bounded on the west by the Likelike Highway (=Kalihi Street), a major cross island thoroughfare, on the north by Bernice Street, on the east by Kapalama Avenue and on the south by the H-1 interstate, Oahu's major east-west freeway (see Figure 2, page 7 and Figure 3, page 8).

The Museum grounds slope slightly southward and the site is well drained (see Fig 8, page 15).

There are nineteen perimeter house lots (a total of 2.9 acres) along Bernice and Kapalama Streets. The Museum owns this land and six of the houses and is in the process of purchasing the remaining houses. As these houses are vacated, they will be demolished or relocated elsewhere to provide additional on-grade parking. This will increase the size of the Museum campus to 15.3 acres. All spoils from demolition will be hauled away to approved City and County of Honolulu landfill sites.

As described in the preceding section (I. Description of Proposed Action), the Museum will be demolishing four existing buildings on the eastern part of the campus to implement the first phase of the master plan: Dorm D, A-frame shed, Atherton Halau and Jabulka Pavilion. During the second phase of this plan, the Hawaiian Immigrant Historic Preservation Center will be demolished, as will the current maintenance building and associated storage sheds (see Figure 7, page 14). All of the spoils will be hauled away to approved City and County of Honolulu landfill sites.

The site currently occupied by Dorm D, on the perimeter of the Museum campus, is already level and will be paved for on-grade parking. The Science Learning Center will be built in the area occupied by the A-frame shed, Atherton Halau and Jabulka Pavilion. The Technology Center will be built on the site currently occupied by the Hawaii Immigrant Heritage Preservation Center and the support services building will occupy the site of the current maintenance building. Although building design plans have not been finalized, the Museum intends to use natural terracing wherever possible. Some cutting and filling will be necessary for site preparation but this will be minimal and is expected to balance, with no net spoils.

III. POTENTIAL ENVIRONMENTAL EFFECTS

Bishop Museum has carefully assessed all possible environmental effects of the Science Learning Center project. This has included extensive consultation with the U.S. Fish and Wildlife Service, the divisions of Forestry and Wildlife and Historic Preservation of the State Department of Land and Natural Resources, the Army Corps of Engineers, the State departments of Agriculture and Health, the Office of State Planning and the City and County departments of Land Utilization and Wastewater Management.

Construction of the Science Learning Center and Courtyard Building will require relocation of seven plants of four endangered species cultivated on the Museum campus. The Museum's plan for accomplishing this has been accepted by the U.S. Fish and Wildlife Service and the State Division of Forestry and Wildlife under a Section 7 consultation (Endangered Species Act). Relocating the endangered plants will require additional permits (see pages 25-45 for additional details).

The Museum has conducted archaeological/historic surveys of the campus and found nothing of significance. The State Historic Preservation Division (SHPD) of the State Department of Lands and Natural Resources has reached this same conclusion (see page 49 for additional details).

Dorm D, constructed in 1889, has been condemned because of severe water and insect damage, and is therefore scheduled for demolition. This action is regulated by the National Historic Preservation Act. SHPD has concluded that demolition would be an adverse effect that will require mitigation, as provided in the National Historic Preservation Act (see page 66). The Museum has discussed this matter with SHPD and has proposed appropriate mitigative measures (photo documentation and preparation of a detailed historic report) required for that agency to approve demolition. The Museum expects shortly to sign a memorandum of agreement with SHPD and other relevant government agencies to formalize this matter.

Other potential environmental effects are either minor or are being dealt with through state, and City and County of Honolulu regulatory agencies (see below).

Removal of a small amount of asbestos will be necessary prior to demolishing the existing planetarium (see page 91). Inasmuch as this asbestos was previously sealed, its removal involves disturbance of pre-existing contamination (see page 116).

The project will require re-zoning by the City and County of Honolulu and a change in land use designation for the nineteen perimeter house lots (see page 117; also see Figure 3, page 8).

There is a potential for public controversy to arise from the demolition of Dorm D, and during the re-zoning process for local residents to complain about parking problems during Museum special events. However, the Museum is working closely with community organizations and the project has been proceeding smoothly and has good community support (see pages 49 and 118).

As mentioned above, this Final Environmental Assessment report concerns only the first two phases of the Museum's long-term master plan. However, for simplicity, we treated the entire campus as the impact area for most environmental factors (e.g., endangered species, wetlands) and, where necessary, have discussed the long-range master plan in order to put first and second phase objectives into perspective. The potential effects of specific environmental factors are assessed in the section that follows (pages 25-137).

1. THREATENED AND ENDANGERED SPECIES

Museum botanist Clyde Imada and entomologist Dr. Neal Evenhuis conducted a campus wide biological survey on 30 March 1994. They identified three species of endangered plants growing on campus under the care of Museum horticulturalists: *Hibiscus clayi*, *Achyranthes splendens* var. *rotundata*, *Sesbania tomentosa*. They also reported (page 27) that there were a number of *Pritchardia* (palms) growing on the Museum campus.

Pritchardia, a complex genus of ca. 25 species restricted to tropical Pacific islands, is extremely difficult to identify to species. There are 19 taxa endemic to the Hawaiian island. Two of these are federally listed endangered species, two additional species have been proposed for listing, and four additional taxa are candidate one species.

The Museum has a number of *Pritchardia* planted on campus but most of these are common cultivated species (mostly from Fiji). However, a careful check of Museum accession records showed that a juvenile *Pritchardia* growing near Paki Hall (see map, page 29) had been given to the Museum by Waimea Arboretum and was identified by them as *Pritchardia affinis*, a federally listed species.

Dr. Evenhuis updated the report on endangered plant species in late August 1994 and prepared a map showing the location of these species on the Museum campus (page 29). All but *Pritchardia affinis* are also in propagation in the Museum's nursery (see copy of propagation permit, page 32).

On 3 June 1994 the Museum advised the U.S. Fish and Wildlife Service (USFWS) that it had identified *Hibiscus clayi*, *Achyranthes splendens* var. *rotundata*, *Sesbania tomentosa* growing on campus and requested guidance on relocating to safe sites any individuals of these species currently growing in or near any of the proposed construction zones. (The *Pritchardia affinis* was not identified until 19 July 1994.) The USFWS responded on 30 June saying that state and federal permits would be required to relocate these plants and that the Science Learning Center project "would have to pass muster under the [Endangered Species] Act".

No other endangered species were found on or are thought to occur on the Museum campus (surveys carried out by Museum malacologist Dr. Robert Cowie and ornithologist Dr. Robert Pyle). Bishop Museum maintains a comprehensive database of all bird sightings on the Hawaiian Islands and Pyle used this database to confirm that no species of threatened or endangered birds have ever been reported from the Bishop Museum campus and indicated that "none are likely to occur there in future" (letter dated 3 June 1994, page 30).

On 12 July 1994 the Department of Energy designated Dr. Allen Allison,

Assistant Director (Research), Bishop Museum to work with the USFWS on the Section 7 consultation (see letter, page 38). On July 26 1994 Dr. Allison submitted a report to the USFWS providing details on the Science Learning Center project (essentially the same information provided on pages 27-35 of this report) and enclosed a list of the endangered plant species and their locations on the Museum campus. In consultation with the USFWS, the Museum determined that seven individuals of these plants were in the proposed construction zone for the first phase of the master plan (Science Learning Center Building and Courtyard Building) and would have to be relocated.

The USFWS responded on 4 August 1994 (see page 39) stating that "the benefits to be gained through public education of protected plants out-weigh any unlikely complications that could arise during relocation of these plants", concluding that "the Service does not object to the relocation of these specimens to the Science Garden upon its completion and the proposed re-location of the seven plant specimens is not likely to adversely affect the above mentioned species." This successfully concluded the Section 7 consultation.

On 3 June 1994 the Museum also notified the State Division of Forestry and Wildlife (DOFAW) about the endangered species growing on campus. On 25 June DOFAW responded saying that a federal license would be required to transplant the endangered species and that a "USFWS Section 7 consultation" would be needed.

On 28 July 1994 the Museum submitted to DOFAW the same report on the Science Learning Center project and lists and locations of endangered plants as submitted to the USFWS on 26 July. On 31 August DOFAW responded essentially saying that they were prepared to issue permits once the Museum had finalized plans for transplanting the species and had obtained the necessary federal permits (see page 43).

The Museum intends to obtain the services of Dr. Diane Ragone of the National Tropical Botanical Garden to assist in the relocation of the endangered plant species to the Science Garden (see page 34). Dr. Ragone is the world's foremost expert on the propagation of Hawaiian plants. All that remains is for the Museum to obtain federal and state permits once plans are finalized to relocate the plants.

Bishop Museum
30 March 1993

MEMORANDUM

To: Scott E. Miller
From: Neal L. Evenhuis
Re: Campus Environmental Assessment for Science Center

Yesterday I phoned Loyal Meyrhoff of U.S. Fish & Wildlife concerning the need for information concerning any Threatened or Endangered species of plants and animals occurring on the Bishop Museum campus. He said that there are no animals, but that there are plants and recommended we resurvey the grounds and check against the latest listings.

Clyde Imada and I toured the campus today to inventory and map the Threatened and Endangered plants found on Bishop Museum grounds.

The following is the inventory of plant species found and their protection status according to the latest *Federal Register* and U.S. Fish & Wildlife listings:

- | | | |
|----|---------------------------------------|----|
| 1. | <i>Hibiscus clayi</i> | E |
| 2. | <i>Hibiscus kokio kokio</i> | C2 |
| 3. | <i>Sesbania tomentosa</i> | PE |
| 4. | <i>Acaranthus splendens rotundata</i> | E |
| 5. | <i>Euphorbia haeleleana</i> | ?? |
| 6. | <i>Arbutilon menziesii</i> | E |

E = Endangered

PE = Proposed Endangered

C2 = Candidate level 2 for listing

?? = Loyal Meyrhoff (pers. commun.) mentioned this species as Threatened or Endangered, but we could not find it on the list. Need to check further.

[Loyal is out of town until Monday, so we could not verify the status of the *Euphorbia* at this time.]

In addition, there are a number of *Pritchardia* (native palms) that dot the campus. These have not been identified to species and some are most likely on the list (12 species out of the 20 occurring in Hawaii are listed). Someone needs to more thoroughly examine and identify these before we can finalize any list of T & E plants on campus.

I will contact Loyal Monday to ask what we do next with regard to possible mitigation or other action that will be necessary to proceed.

cc: Allen Allison
Pat Duarte

Bishop Museum
25 August 1994

MEMORANDUM

To : Allen Allison
From : Neal L. Evenhuis
Re : Endangered plant species on campus (update)

The following is the current status of endangered (listed) plants on the Bishop Museum campus (numbers equal those on attached map)

1. Hibiscus clayii

- Currently 3 plants in cultivation on campus (see Map: = # 1).
- Currently 3 plants in propagation

2. Pritchardia affinis

- Currently one plant in cultivation (Ewa end of courtyard). It will take an estimated 10 years before it will fruit.
- No plants in propagation.

3. Sesbania tomentosa

- Currently 1 plant in cultivation (mauka of Atherton Halau). Another plant in the ground recently died. The one in the ground is not doing well and may die soon.
- Four plants are in propagation. Two of these are not doing well.

4. Achyranthes splendens var. rotundata

- Currently 2 plants in cultivation across the driveway from Dorm D.
- Cuttings have been taken for propagation.
- One plant in propagation, 12 additional cuttings in pots.

We propose to move all plants to be impacted by construction activity of the Science Center to the proposed "Science Garden" (in the Makai-Diamond Head corner of the campus—see map) where they will not be impacted by any construction activity.

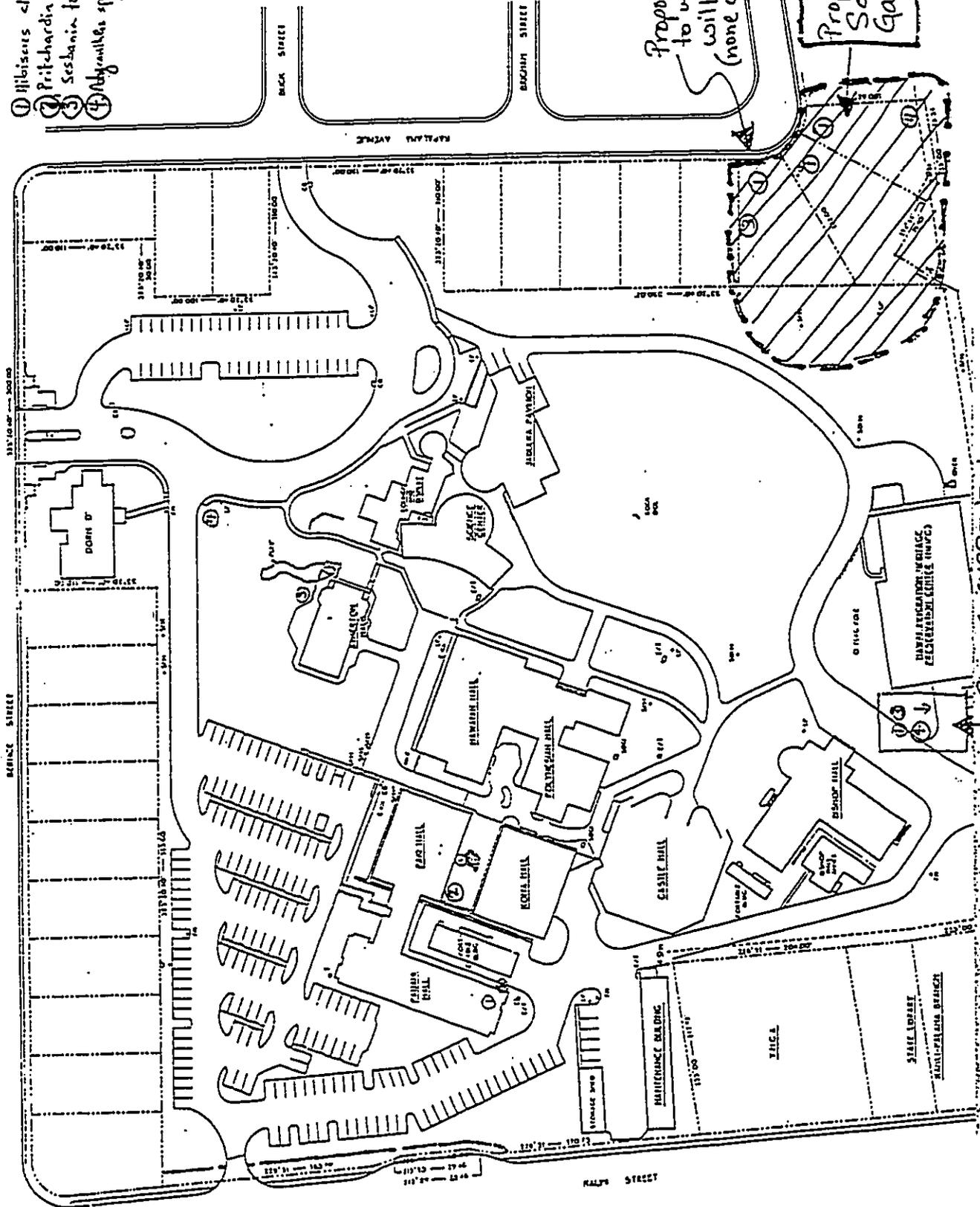
Care will be taken to ensure proper transplanting methods are implemented with regard to any proposed move. We plan to consult with Dr. Diane Ragone (National Tropical Botanical Garden, Lawai, Kauai), an expert authority in propagation techniques, to assist us with transplanting protocol and to help with propagation of the three plants for which we can obtain propagules (the *Pritchardia affinis* will not be able to produce propagules for a number of years).

- ① Hibiscus elygi E
- ② Pritchardia affinis E
- ③ Sesbania tomentosa TE
- ④ Abutilon splendens rotundata E

Proposed area
to which plants
will be moved
(none currently here)

Proposed
Science
Garden

PLANTS CURRENTLY
IN PROPAGATION



BISHOP MUSEUM



CELEBRATING A
CENTURY OF DISCOVERY

June 3, 1994

Dr. Neal Evenhuis
Entomology Dept.
Bishop Museum
P.O.Box 19000-A
Honolulu, HI 96817

Neal:

In response to your inquiry, no birds currently listed by state or federal agencies as Threatened or Endangered Species have been reported from the Bishop Museum grounds (or nearby) in recent decades, and none are likely to occur there in the future.

The Pacific Golden-Plover, one of many species afforded federal protection as a migratory bird, does occur regularly on the Bishop Museum grounds as a winter visitor from about August through early May. Fewer than ten individuals are likely to be found on the grounds at any one time, and they move readily to other feeding areas when disturbed. The population of many thousands found on O'ahu each winter would not be impacted by construction activity which may affect a portion of the Great Lawn for a period of a year or so. A few alien introduced species (e.g. Northern Cardinal, House Finch) that also are federally protected as migratory birds may visit the grounds, but irregularly and in such small numbers that O'ahu populations would be similarly unaffected.

I hope that this provides the information you need.

Sincerely,

Robert L. Pyle
Curatorial Assistant, Birds

The State Museum of Natural and Cultural History
1525 Bernice Street • P.O. Box 19000A • Honolulu, Hawai'i • 96817-0916
Telephone: (808) 847-3511 • Fax: (808) 841-8968

BISHOP MUSEUM



CELEBRATING A
CENTURY OF DISCOVERY

3 June 1994

Dr. Robert Smith, Pacific Islands Ecoregion Manager
U.S. Fish & Wildlife Service
300 Ala Moana Blvd. Rm. 5302
P.O. Box 50167
Honolulu, HI 96850

Dear Dr. Smith:

We are currently in the process of doing an Environmental Assessment of our museum campus with regard to the proposed construction of a Science Center, to be made possible with federal funding.

I have conferred with Neal Evenhuis (Entomologist), Robert Pyle (Ornithologist), Robert Cowie (Malacologist), and Clyde Imada (Botanist) concerning any threatened or endangered species that may occur on the grounds of the Bishop Museum.

Surveying the museum campus, we have found no animals, but only the following plants as currently listed as Endangered and Threatened Species. Those that are presently planted in the ground at various spots on the museum campus are as follows:

Hibiscus clayi
Sesbania tomentosa
Achyranthes splendens rotundata

All three of these species are in propagation in our nursery and being attended by Thomas E.K. Boyd, who currently holds a license by the State (P-25) to propagate these species. An additional Endangered plant species (*Arbuton menziesii*) is also in propagation in the nursery, but is not planted on the grounds of our campus.

There are in addition approximately a dozen *Pritchardia* planted on campus. Some are from Fiji, but others may be Hawaiian. We are not able to identify these to species to determine if any are listed species; and according to the *Manual of Flowering Plants of Hawaii*, identification keys to species for this genus are not useful because of the amount of variation of the characters used in the key.

With regard to other protected species, I have attached documentation from Robert Pyle that shows we have on campus at various times of the year the migratory Golden Plover. Dr. Pyle has reviewed the planned construction for the campus and has concluded that the proposed construction should not impact the population levels of this species and that there will be enough open space on the campus for their continued activities.

In order to fulfill NEPA procedures, could your office verify the listed species on our campus; and if the above statements are accurate, may we request permission from your office to move the planted species listed above if and when necessary to avoid any construction that may take place on or near its current place of planting.

Thank you for your attention in this matter.

Sincerely yours,

Patrick Duarte
Associate Director

Attachment: Letter from Robert Pyle

cc: Allen Allison
Thomas E.K. Boyd

The State Museum of Natural and Cultural History
1525 Bernice Street • P.O. Box 19000A • Honolulu, Hawaii • 96817-0916
Telephone: (808) 847-3511 • Fax: (808) 841-8908

State of Hawaii
Department of Land and Natural Resources
Division of Forestry and Wildlife
1151 Punchbowl Street, #325
Honolulu, Hawaii 96813

License No.: P-25

Date of Issue: March 23, 1994

Expiration Date: March 22, 1999

SCIENTIFIC PLANT COLLECTING LICENSE
(for Threatened and Endangered Plants)

The Board of Land and Natural Resources hereby grants permission under the authority of Section 195D-4, Hawaii Revised Statutes and all other applicable laws, to (name, title, affiliation, and address of licensee):

Thomas E.K. Boyd, Grounds Foreman
Bishop Museum
P.O. Box 19000-A
Honolulu, HI 96817-0916

to possess for the purpose of propagation the following plant life:

<u>Common Name</u>	<u>Scientific Name</u>	<u>No. & Type of Specimens</u>	<u>Collection Location</u>
Clay's hibiscus	Hibiscus clayi	5	Kauai
--	Achyranthes splendens var. rotundata	2	Barber's Pt.
'Ohai	Sesbania tomentosa	10	Kaena Pt. (via Lyon Arboretum)

subject to the following conditions:

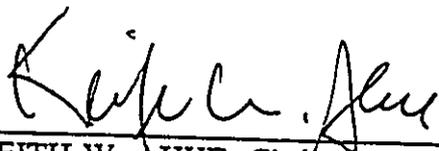
I. GENERAL CONDITIONS:

- A. 1. This license is not transferable or assignable. A copy must be kept at the site of activities permitted under this license.
2. Each licensee is individually responsible and accountable for his or her actions under this license.
- B. This license authorizes the licensee to conduct propagation activities only when the licensee has obtained prior approval from the landowner, tenants and all others involved, including other Divisions of the DLNR, County, State, and Federal agencies.
- C. This license does not in any way make the Board of Land and Natural Resources of the State of Hawaii liable for any claims of personal injury or property damage to the licensee(s) or his party which may occur while engaged in activities permitted under this license; further, the licensee(s) agrees to hold the State harmless against any claims for personal injury, death or property damage resulting from the activities of the licensee(s).
- D. This license is valid for species protected by federal law and listed on page 1 of this license only if accompanied by proper federal permits where applicable. The license is valid only for the number and type of specimens stipulated on page 1.
- E. This license shall become valid upon completion of the following:
 1. All persons whose names are listed in the Attachment which is part of this license, have read this entire license and acknowledge understanding and agreement to abide by all stated conditions by signing in the space provided on the original and duplicate copies.
 2. Both copies of the signed license must be returned to the Division of Forestry and Wildlife. Upon complete execution of the license, a copy will be returned to the applicant.

- F. Any person violating any of the conditions stipulated under this license shall be subject to penalty by law. Further, any infractions of this license may be cause for denial of future license requests.
- G. The licensee shall provide copies of all published reports resulting from possession of endangered plant materials to the Division of Forestry and Wildlife. The licensee shall also provide or make available for inspection any raw data that may be obtained under this license when requested by the Division.

II. SPECIAL CONDITIONS:

- 1) All plants will be kept at the Bishop Museum and no plants, plant parts or offspring including seeds will be given away to other individuals or organizations.
- 2) If at any time the licensee wishes to dispose of any or all plants or seeds, DOFAW will be consulted regarding the distribution or disposal of such plant material.
- 3) At least 30 days prior to expiration of this license, the licensee will contact DOFAW regarding renewal of the license.



KEITH W. AHUE, Chairperson and Member
Board of Land and Natural Resources

cc: /X DOCARE
/X District Protection Forester
/ / Special Agent in Charge, USFWS, Honolulu

Page 4 of 4

Attachment to Scientific Collecting License No. P-25

The undersigned have read, understand and hereby agree to abide by the general and specific conditions stipulated on pages 1 through 3 in Scientific Plant Collecting License No. P-25.

Thomas E. K. Boyd

Principal licensee Thomas E. K. Boyd

Sub-licensees (please type name below each signature line):

Anastacio Aquino
Anastacio Aquino



United States Department of the Interior

FISH AND WILDLIFE SERVICE

Pacific Islands Office
P.O. Box 50167
Honolulu, Hawaii 96850



Mr. Patrick Duarte
Associate Director
Bishop Museum
1525 Bernice Street
P.O. Box 19000A
Honolulu, Hawaii 96817

JUN 30 1994

Dear Mr. Duarte:

This is in response to your letter dated June 3, 1994, concerning the construction of a Science Center on the Bishop Museum campus at Bernice Street, Honolulu, Hawaii.

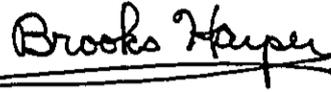
Abutilon menziesii, *Achyranthes splendens rotundata*, and *Hibiscus clayi* are protected as endangered under the U.S. Endangered Species Act (Act). *Sesbania tomentosa* is currently proposed for listing as endangered. Several species of *Pritchardia* are currently listed, proposed, or candidate species under the Act. The Pacific golden-plover (*Pluvialis fulva*), although listed under the Migratory Bird Treaty Act, is not listed as endangered or threatened under the Act. The Migratory Bird Treaty Act is administered by our Division of Law Enforcement and we will forward a copy of your letter to them for their input on migratory birds.

In accordance with section 9(a)(2)(B) of the Act and 50 CFR 17.61(c), a Federal permit is required to remove and reduce to possession any endangered or threatened plant from an area under Federal jurisdiction. A Federal permit is not required for the collection (and transplanting) of endangered or threatened plants on non-Federal lands. A permit may be required by the State. We will forward a copy of your letter to their office; however, you should be sure to contact Ms. Carolyn Corn of the Division of Forestry and Wildlife, Department of Land and Natural Resources, 1151 Punchbowl Street, Room 325, Honolulu, HI 96813 (808/587-0166) for information on obtaining any necessary State permits.

Although a Federal permit is not required, it appears as though this project, due to its utilization of Federal funds, would have to pass muster under section 7 of the Act. Section 7 requires all Federal agencies which fund, authorize, or carry out activities that "may affect" listed species to first consult with the Service. The Federal agency providing you funds should contact this office with a request for consultation under section 7 of the Act. The Service anticipates a successful conclusion to such consultation, which may be resolved at the informal stage.

We appreciate your concern for endangered species, and we look forward to reviewing the Draft Environmental Assessment for the construction project. If you have any questions, please feel free to contact Fish and Wildlife Biologist Diane Bowen of this office at 808/541-2749 (FAX: 808/541-2756).

Sincerely,



Brooks Harper
Field Supervisor
Ecological Services

cc: Ernie Mayer - LE (w/copy of incoming)
Loyal Mehrhoff - ES Listing
Jerry Leinecke - NWR Complex
Karen Rosa - Recovery
Carolyn Corn - State

July 12, 1994

Mr. Alan Haines
Contracting Officer
Bishop Museum
1525 Bernice Street
P.O. Box 150066
Honolulu, Hawaii 96817

FFAD
Brewington

07/12/94

FFAD

Sterzel

07/ 194

Dear Mr. Haines:

SUBJECT: BISHOP SCIENCE CENTER ENDANGERED SPECIES

According to the letter Bishop Museum received from the U.S. Fish and Wildlife Service (FWS), there are several endangered plant species on the grounds of the Museum that may be affected by proposed construction of the Science Center Project. The Endangered Species Act requires all Federal agencies which fund, authorize, or carry out activities that "may affect" listed species to first consult with the FWS.

I contacted the FWS by telephone (July 6, 1994), and was informed of the process that must be completed before the Department of Energy (DOE) can authorize the Museum to proceed with the project. To facilitate the exchange of information and expedite the process, DOE may designate someone at the Bishop Museum to work directly with the FWS. In accordance with your recommendation, I am hereby designating Mr. Allen Allison, Associate Director for Research, to serve as the DOE non-Federal representative. By copy of this letter, the FWS is being notified of his authorization.

Please have Mr. Allison write to FWS and request an informal consultation. Our point of contact is Diane Bowen, who can be reached at 808/541-2749, (Fax: 808/541-2756). Mr. Allison should be prepared to provide the FWS with more information regarding the Science Center Project: e.g., a description of the project with a map showing the areas to be affected by construction, locations of the endangered plants, and a discussion of possible mitigation measures the Museum is considering. After receiving this information, the Service may send a biologist to visit the site.

Sincerely,

Patrice L. Brewington, General Engineer
Engineering and Real Property Management
Research
Programs and Facilities Management
Division

cc: Diane Bowen, FWS
Vicki Prouty, GED
Bill White, EEPD

Post-It® brand fax transmittal memo 7571		# of pages	13
To	Alan Haines	From	P. Brewington
cc	Bishop Museum	to	DOE/CH
Dept		Phone	708/252-6223
Fax#	808/842-1329	Cell#	808/252-2114



United States Department of the Interior



FISH AND WILDLIFE SERVICE

Pacific Islands Ecoregion
300 Ala Moana Blvd, Room 6307
P.O. Box 50167
Honolulu, Hawaii 96850

Mr. Allen Allison
Assistant Director, Research
Bishop Museum
1525 Bernice Street
P.O. Box 19000A
Honolulu, Hawaii 96817-0916

AUG 04 1994

Dear Mr. Allison:

The U.S. Fish and Wildlife Service (Service) has received your July 26, 1994, letter requesting initiation of informal consultation under section 7 of the U.S. Endangered Species Act of 1973, as amended (Act). The Department of Energy submitted a letter to the Service dated July 12, 1994, designating you as their non-Federal representative for this activity in accordance with 50 CFR 402.8.

The Service has reviewed the maps and documents provided with your request concerning the construction of a Science Center and the proposed renovation of the Bishop Museum campus at Bernice Street, Honolulu, Hawaii, along with pertinent information in our files.

The following plant species have been identified as being affected by the proposed construction of the Science Center:

Endangered

<i>Achyranthes splendens</i>	- 2 specimens
var. <i>rotundata</i>	
<i>Hibiscus clayi</i>	- 3 specimens
<i>Pritchardia affinis</i>	- 1 specimen

Proposed Endangered

<i>Sesbania tomentosa</i>	- 1 specimen
---------------------------	--------------

The letter stated that these plant specimens would be relocated, with the aid of Dr. Diane Ragone of the National Tropical Botanical Garden, to prevent possible harm during the construction phase. Bishop Museum plans to move the seven plant specimens to the new Science Garden where they will be permanently housed and available for educational display. The benefits to be gained through public education of protected plants outweigh any unlikely complications that could arise during the re-location of these plants. In addition, the Bishop Museum has been successful with the propagation of three of these four species and we would like to encourage their continued propagation of endangered and threatened plants.

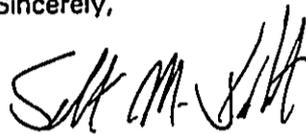
Therefore, the Service does not object to the relocation of these specimens to the Science Garden upon its completion and the proposed re-location of the seven plant specimens is not likely to adversely affect the above-mentioned species. We would appreciate notification of the successful transplantation of these individuals.

As a note, the State of Hawaii Scientific Plant Collecting License, No. P-25, issued to the Bishop Museum does not currently include *Pritchardia affinis*. We recommend you contact Ms. Carolyn Corn of the Division of Forestry and Wildlife, Department of Land and Natural Resources, 1151 Punchbowl Street, Room 325, Honolulu, HI 96813 (808/587-0166) for information on amending this license should you decide to propagate this species.

We appreciate your concern for endangered species, and we look forward to developing a Cooperative Agreement between our agencies for future Federally-funded activities on Bishop Museum property. If you have any questions, please feel free to contact our Branch Chief for Interagency Cooperation, Ms. Margo Stahl or Fish and Wildlife Biologist, Ms. Diane Bowen at 808/541-2749 (FAX: 808/541-2756).

Sincerely,

Acting



Brooks Harper
Field Supervisor
Ecological Services

cc: Loyal Mehrhoff - ES Listing
Karen Rosa - Recovery
Carolyn Corn - State

BISHOP MUSEUM



CELEBRATING A
CENTURY OF DISCOVERY

3 June 1994

Dr. Michael Buck
Hawaii State Dept. Land and Natural Resources
1115 Punchbowl, Rm. 325
Honolulu, HI 96850

Dear Dr. Buck:

We are currently in the process of doing an Environmental Assessment of our museum campus with regard to the proposed construction of a Science Center, to be made possible with federal funding.

I have conferred with Neal Evenhuis (Entomologist), Robert Pyle (Ornithologist), Robert Cowie (Malacologist), and Clyde Imada (Botanist) concerning any threatened or endangered species that may occur on Bishop Museum grounds.

Surveying the museum campus, we have found no animals (however; see below for migratory birds), and only the following plants as currently listed as Endangered and Threatened Species. Those plants that are presently in cultivation at various spots on the museum campus are as follows:

Hibiscus clayi
Sesbania tomentosa
Achyranthes splendens rotundata

All three of these species are in propagation in our nursery and being attended by Thomas E.K. Boyd, who currently holds a license by the State (P-25) to propagate these species. An additional Endangered plant species (*Arbuton menziesii*) is also in propagation in the nursery, but is not planted on the grounds of our campus. The propagules are at a 3:1 or greater ratio (propagules to plants in cultivation). If it is found necessary to move any plants that may be impacted by construction, we will also be prepared to plant the propagules at locations that will be suitable for their survival in areas of the campus that will not receive future disturbance from any construction activities.

There are in addition approximately a dozen *Pritchardia* planted on campus. Some are from Fiji, but others may be Hawaiian. We are not able to identify these to species to determine if any are listed species; and according to the *Manual of Flowering Plants of Hawaii*, identification keys to species for this genus are not useful because of the amount of variation of the characters used in the key.

With regard to other protected species, I have attached documentation from Robert Pyle that shows we have on campus at various times of the year the migratory Golden Plover. Dr. Pyle has reviewed the planned construction for the campus and has concluded that the proposed construction should not impact the population levels of this species and that there will be enough open space on the campus for their continued activities.

In order to fulfill NEPA procedures, could your office verify the listed species on our campus; and if the above statements are accurate, may we request permission from your office to move the planted species listed above if and when necessary to avoid any construction that may take place on or near its current place of planting.

Thank you for your attention in this matter.

Sincerely yours,

Patrick Duarte
Associate Director

Attachments: Bishop Museum site map
Letter from Robert Pyle

cc: Allen Allison

The State Museum of Natural and Cultural History
1525 Bernice Street • P.O. Box 19300A • Honolulu, Hawaii • 96817-0916
Telephone: (808) 847-3511 • Fax: (808) 841-8968

JOHN WAIHEE
GOVERNOR OF HAWAII



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

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1744I(45)

July 25, 1994

Mr. Patrick Duarte, Associate Director
Bishop Museum
P. O. Box 19000A
Honolulu, Hawaii 96817-0916

Dear Mr. Duarte:

This is in response to your letter concerning transplanting of cultivated endangered plants at Bishop Museum for construction of a science center. Dr. Carolyn Corn of this office has talked with Allen Allison and explained our proposed rule change regarding licensing of cultivated threatened and endangered plants. However, these changes may not become effective for several months. The three species on Bishop Museum grounds, Achyranthes splendens, Abutilon menziesii, and Hibiscus clayii are among those native species most likely to survive transplanting.

Under current rules, we are allowed to issue licenses for propagation toward the perpetuation of the species. This requirement can be met by transplanting the existing cultivated plants into amendable habitats elsewhere on the grounds and planting three propagules of each plant as backups if (or incase) the transplants do not survive. All plants will need good care and watering during their transplanting and establishment phase. Root balls of larger plants may be necessary prior to the transplants to promote successful establishment.

We understand federal monies will be involved in the construction of the science center and a USFWS Section 7 consultation is needed. As part of a license condition, a plan is needed showing number of plants per species, where they are located, and where they will be planted and that a federal license must first be obtained.

Sincerely yours,

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

MICHAEL G. BUCK
Administrator

cc: Allen Allison

JOHN WAIHEE
GOVERNOR OF HAWAII



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HONOLULU, HAWAII 96813

August 31, 1994

1744I(50)

Dr. Allen Allison
Bishop Museum
P. O. Box 19000A
Honolulu, Hawaii 96817-0916

Dear Allen:

Thank you for your letter of July 28, 1994 concerning the transplanting/propagation of four endangered plant species due to planned construction activity at the Bishop Museum.

Your earlier correspondence and maps help us to visualize the scope of the construction plans and the need to transplant/transport the cultivated endangered species to another location. Comments that we made in our letter dated July 25, 1994 for three of the four species remain viable: Your July 28th letter states that a fourth, now identified species, Pritchardia affinis, will also need to be relocated. We understand the palm in question is a juvenile, 3-5 feet tall and located outside Paki Hall in the courtyard. If this palm is to be transplanted, the roots need to be balled and moved by a responsible horticulturist as recommended for the other plants. Since the proposed garden site is a sunny, southern exposure, some species may be less acclimated to this new site versus its present site where it receives less sunlight.

Once you have finalized the dates and your plans, received the needed Federal permits, and prepared the proposed garden site, please contact us. We will need about three weeks advanced notice to process the license.

Sincerely yours,

CAROLYN CORN
State Botanist



NATIONAL TROPICAL BOTANICAL GARDEN
CHARTERED BY CONGRESS TO CREATE A NATIONAL RESOURCE IN TROPICAL BOTANY

9 August 1994

Alan Allison
Bishop Museum
1525 Bernice Street, BOX 19000A
Honolulu, HI 96817

Dear Alan,

I am writing to offer the services of the National Tropical Botanical Garden to the Bishop Museum to assist with an environmental assessment of proposed sites for the museum's new Science Center. As you know, the NTBG has the most active program in the state to collect, propagate, and study native Hawaiian plants. Comprehensive, broad-based, propagation research has resulted in determining propagation methods for more than 350 native taxa, including 102 endangered species. This research has also produced an extensive body of knowledge on characteristics and handling requirements of native plant seeds. Cultivation requirements of native plants are being documented in the extensive living collections at the NTBG.

The NTBG proposes to develop a propagation and management plan for endangered plant species at the Bishop Museum. The cost of this service is estimated at \$2,760 and is detailed on the following page. I will be out of the office until August 25 and look forward to discussing this project with you when I return.

Regards,

Diane Ragone, Ph.D.
Director of Horticulture



NATIONAL TROPICAL BOTANICAL GARDEN
CHARTERED BY CONGRESS TO CREATE A NATIONAL RESOURCE IN TROPICAL BOTANY

Proposal to Develop a Propagation and Management Plan
for Endangered Plant Species Growing at the Bishop Museum

Scope of service:

- Assess the cultivated status of endangered plant species grown at the Bishop Museum.
- Identify seed sources and sample size needed for propagation.
- Provide guidelines for seed handling.
- Provide detailed propagation protocols for all endangered species at site.
- Provide recommendations for establishment and cultural requirements to establish plants at a new location.

Performance schedule

Plant assessment	1 day
Preparation of propagation and management plan	2 days
Staff training of museum horticulturist/groundskeeper	1 day

Based upon the scope of services, fees are summarized below:

NTBG consultants	2,160
Nursery Manager (4 days)	
Project Coordinator (2 days)	
Clerical support (2 days)	
Report preparation	75
Estimated reimbursable expenses	525

\$2,760

Total

Estimated reimbursable expenses included above are for travel, customary out-of-pocket expenses, and shall include a 20% handling charge plus tax.

Diane Ragone, Ph.D.
Director of Horticulture
August 9, 1994

2. OTHER PROTECTED SPECIES

The only other protected species found on the Museum campus (besides the four plants discussed in section 1, page 25, is the Pacific Golden Plover, *Pluvialis dominica*, and several species of introduced birds, all of which are protected under the Migratory Bird Act. Dr. Robert Pyle, of Bishop Museum, has confirmed that Science Learning Center construction will not adversely affect the populations of any of these species (letter dated 3 June 1994, page 30).

3. WETLANDS

There are no wetlands or wetland plant species on the Museum campus (see page 48 - letter dated 12 July 1994 from Dr. Derral Herbst).

12 July 1994

Dr. Allen Allison
Assistant Director,
Research & Scholarly Studies
Bishop Museum
P.O. Box 19000-A
Honolulu, HI 96817-0916

Dear Allen:

RE: Our telephone conversation of 8 July 1994, concerning the presence of wetlands on the Bishop Museum Kalihi Campus

Three elements are used to characterize wetlands: the hydrology of the area, the presence of obligate wetland species of plants, and the presence of hydric soils. I have been an associate of the museum's botany department for several decades and am at the museum several times a week, researching my projects. I have spent much time on the campus grounds and believe that I know it very well. The hydrology of the campus, as well as the lack of obligate wetland species of plants and hydric soils indicates that neither the campus, nor any part of it could be considered a wetland according to the definitions used by various federal agencies.

Should you have any questions, please feel free to call me.

Sincerely,



Derral Herbst, Ph.D.
Botanist

4. ARCHAEOLOGICAL/HISTORIC RESOURCES

The Museum has previously conducted limited archaeological surveys of the campus and found nothing of significance (see page 51). The State Historic Preservation Division (SHPD) of the State Department of Lands and Natural Resources reviewed the Draft Environmental Assessment and reached this same conclusion (see letter from Don Hibbard, page 52). Museum archaeologists Tracy Leo Tam Sing and Paul Christiaan Klieger conducted a careful review of the historical record and subsequently reached this same conclusion (see their report, page 53).

Dorm D, constructed in 1889, is the oldest building on campus and is covered under the National Historic Preservation Act. This structure has been extensively damaged by termites and water. A structural inspection performed on 4 August 1994 by Martin & Bravo, Consulting Structural Engineers resulted in a finding that the "structure poses a hazard to the Bishop Museum Property and should be demolished or structurally strengthened" (see pages 60).

The Museum arranged for the consulting firm of Rider Hunt Ltd. to evaluate three options for renovating Dorm D: 1. Rehabilitate; 2. Move on campus and rehabilitate; 3 Move off-campus. The estimated costs of these options were, respectively, \$434,000, \$515,000 and \$174,000.

Kamehameha School/Bishop Estate (the original owner of Dorm D) had earlier examined the possibility of funding the renovation of this building but is no longer interested because of the high cost. No other potential funder has been identified. In addition, the Museum's master planning consultants, Media 5 Ltd., has concluded that it would be difficult to accommodate Dorm D in the Museum's long-range plan. The Museum has therefore condemned the building and is planning to demolish it.

Bishop Museum has discussed this extensively with State Historic Preservation Division (SHPD) architects Carol Ogata (who conducted a site inspection) and Tonia Moy. SHPD has concluded that this would be an adverse effect (see letter from Don Hibbard, page 66). The Museum has proposed appropriate mitigative measures and is in the process of entering into a memorandum of agreement between SHPD, the U.S. Department of Energy and the Federal Preservation Council as required by section 106 of the National Historic Preservation Act. Dr. Allen Allison, the Museum's Assistant Director for Research, has been "designated [by the Department of Energy] to act as the non-federal representative for matters related to the Section 106 review" process (see page 68).

The mitigative measures that the Museum will be taking include photographic documentation to Historic American Building Survey (HABS) standards and the preparation of a detailed historical report. SHPD has favorably reviewed the draft report and suggested some minor additions that can easily be accomplished. The

report will be finalized in April 1995.

A memorandum of agreement (MOA), based on the 1 March 1995 letter from SHPD (see page 66), has been drafted and is currently being reviewed by the U.S. Department of Energy. The Museum expects by May 1995 to have the MOA finalized and signed by all required government agencies.

Bishop Museum is working with the Bishop Estate to organize a "goodbye" ceremony for Dorm D to be attended by Kamehameha School alumni, who once resided in Dorm D, and other dignitaries. Bishop Estate archivists plan to record oral histories at that ceremony and to deposit this material in the Bishop Estate archives.

Memorandum
Bishop Museum

May 11, 1993

TO: Angela Steiner-Horton, Archaeology Lab
FROM: Boyd Dixon, Supervising Archaeologist

SUBJECT: Project 499, BPBM Site 50-02-A6-26, "Kaiwi'ula"

Project 499 was undertaken in response to mechanical trenching conducted on the Great Lawn at the Bishop Museum, to install electrical service for the Space Exhibit during the last 3 weeks of August, 1992. Concern was raised that buried cultural remains might be exposed during backhoe excavations, so Steve Clark took charge of profiling and interpreting stratigraphy from seven (7) localities along the east wall of the trench. No evidence of pre-Contact occupation or utilization of the area was observed, although several filling layers were documented which presumably were associated with early leveling for the original school buildings or subsequent Museum landscaping, especially beneath the raised lawn supporting the present sidewalk. Large bedrock boulders were encountered within more undisturbed soils on the far south end of the lawn paralleling the current access road.

Early ethnohistoric literature for the island of O'ahu mentions "the plain of Kaiwi'ula..." ('Ii 1959:95) as being located along a footpath between the taro patches of Kapalama and Kalihi streams. During the mid-1800s, this plain was selected as a burial ground for Honolulu after the existing one in Honuakaha was filled from plague victims (Kamakau 1992:417). The red dust from the plain is also mentioned when describing traveling between the "school at Kaiwi'ula [Kamehameha School ?]..." and other parts of the island (ibid 305, 339). Whether the origin of the place name is derived from earlier battles taking place on this spot, or a more recent reference to the dust and bones historically associated with the plain is unclear. Place Names of Hawai'i (Pukui, Elbert, and Mookini 1974:71) indicates that this plain is in fact situated on the present property of the Bishop Museum.

A blue button and some fragments of copper wire, glass, and a metal bolt were encountered in the backfill of the trenching and may have been associated with the Kamehameha School period of occupation on the site. No report was filed from this project, as the expectation is that future construction efforts which may occur on the Great Lawn will continue to contribute small bits of information for some time to come.

BENJAHIN J. CAYETANO
GOVERNOR OF HAWAII



STATE OF HAWAII

DEPARTMENT OF LAND AND NATURAL RESOURCES

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

December 9, 1994

Donald A. Clegg
Director of Land Utilization
Department of Land Utilization
City and County of Honolulu
650 South King Street
Honolulu, Hawaii 96813

94-08930
KEITH AMIE, CHAIRPERSON
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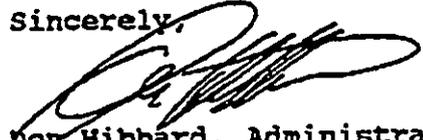
Dear Mr. Clegg:

SUBJECT: Environmental Assessment: Bishop Museum Science Center
Master Plan
Kalihi, Kona, O'ahu
TMK: 1-6-24

Thank you for the opportunity to review the Environmental Assessment (EA) for the Bishop Museum Science Center Master Plan. A review of our records shows that there are no known archaeological sites at the project location. A possible spring site potentially of archeological and historical significance located near the current science center, was investigated in the 1980s and determined to be a result of a broken water line. Since the new science center is planned for areas previously developed on the museum campus, it is unlikely that historic sites remain. Therefore, we believe that this project will have no effect on historic sites.

We also look forward to receiving the detailed historical report and photo documentation on the Dorm D Building as stated in the EA.

Sincerely,


Don Hibbard, Administrator
Historic Preservation Division

EJ:jk

69-2-12-14-15-16
1994 DEC 14 PM 2:59
STATE UTILIZATION
DIVISION

**Kaiwi`ula-The Grounds of the Bishop Museum
and the Original Kamehameha Schools**

Background History of TMK(1)1-6-24

by Tracy Leo Tam Sing
and Paul Christiaan Klieger, Ph.D.

Anthropology Department
Bishop Museum
1525 Bernice Street
Honolulu, Hawai'i 96817

Third Draft

March 1995

Introduction

The following report is an historical evaluation of the property of the Bishop Museum campus, located in the *ahupua`a* of Kapālama, Honolulu, O`ahu, Hawai`i (TMK [1] 1-6-24). This report has examined or used ethnohistoric accounts, land tenure documents, photographic collections, cartographic references, previous archaeology, and interviews.

The purpose of this report is to review the historical background of the subject property, with an objective of obtaining information predicting the possible discovery of subsurface, pre-Contact, and early post-Contact archaeological features at the site.

The Pre-Contact Era

The present project area is defined as a parcel of the original Museum tract (see Figure 1). The current project area consists of the modern Bishop Museum campus and adjacent lots, bounded *mauka* by Bernice Street, *makai* by the Lunalilo Freeway, Kalihi Street on the `Ewa side, and Kapalama Avenue on the Diamond Head side. The present project area includes parcels 1 and 6-35 of TMK [1] 1-6-24. Kapālama refers to an enclosure made from the wood of the *lama* (Pukui et al. 1976:87). Within this enclosure young *ali`i* were ritually separated from society prior to marriage (Malo 1951:135). Bernice Pauahi, who established girls' and boys' schools on her lands in Kapālama after her death 1884, may have been aware of this tradition. The *ahupua`a* of Kapālama, which was located in the Kona district of the Island of O`ahu, extended from its widest point at the ocean, nearly to the ridge of the Ko`olau Mountains. The two *ahupua`a* that border Kapālama were Nu`uanu or Honolulu on the east and Kalihi on the west. The present Museum is probably just to the east of the ancient Kalihi/Kapālama boundary. Along with Honolulu and Waikīkī, Kapālama was an O`ahu land that Kamehameha I reserved for himself after conquering O`ahu in 1795 (Equity 200 1847; see also Kamakau 1992:190).

The name of the land upon which the project area sits has been referred to in ethnohistoric accounts as Kaiwi`ula, literally "the red bone" according to Pukui et al. (1976:71). That designation may be interpreted in several ways. Kaiwi`ula may also refer to a "red" or "sacred boundary," which may be relevant to the Kalihi/Kapālama border. John Papa `I`i writes of the main trail which passed through Kaiwi`ula:

When the trail reached a certain bridge, it began going along the banks of taro patches, up to the other side of Kapalama, to the plain of Kaiwi`ula; on to the taro patches of Kalihi; down to the stream and up to the other side; down into Kahauiki and up to the other. [Ii 1959:95].

It is possible that "red" or "sacred boundary" referred to the *ahu* or altar/boundary marker customarily erected at the intersection of the main trail (*ala loa*) and the *ahupua`a*. The marker was usually decorated with an image of a pig (*pua`a*) carved from *kukui* wood and stained red.

A second reference to Kaiwi`ula comes from Samuel Kamakau. He states that in 1831, a rumor circulated among the populace of O`ahu to the effect that Governor Boki, who was presumably lost at sea in 1829, had returned to Wai`anae:

"Boki is at Wai`anae! Boki is at Wai`anae with a warship!" The man was taken before Kuakini until his words could be verified. The people were in an uproar, some frightened,

some pleased. People ran from place to place in their joy. The red dust rose in clouds from the plain of Kaiwi`ula as natives and foreigners started out on horse back for Wai`anae. (Kamakau 1992:305)

Kamakau also writes that during the 1853 smallpox epidemic on O`ahu, the dead were so numerous that they "fell like dried *kukui* twigs tossed down by the wind" (Kamakau 1992:417). He mentions that many of the dead were buried at Kaiwi`ula: "When the graveyard at Honuakaha was filled, Keone`ula was taken for a burial ground, and the plains of Kaiwi`ula and the rocky land of Mau`oki and Laepohaku" (Kamakau 1992:417).

It seems evident from these ethnohistorical accounts that the plain of Kaiwi`ula was barren and not inhabited.

The exact reason for the name of Kaiwi`ula is no longer known. Kaiwi`ula may have been an `ili or subdivision of the *ahupua`a*, simply a place name, or a reference to the boundary marker (*ahupua`a*). These facts seem to have not been recorded. The name Kaiwi`ula, however, lives on poetically in several Hawaiian songs such as "The Kamehameha March" and the "Moana-lua" (Elbert and Mahoe 1970:77).

The Mahele-Era Land Tenure

During the Great Mahele of 1848, the *ahupua`a* of Kapālama, including the modern Museum tract, which had been private lands¹ of King Kamehameha III, was awarded under LCA 7714B to Moses Kekūāiwa, a nephew of the king (*Indices* 1929). There were no *kuleana* awarded or claimed by commoners or anyone else in the immediate neighborhood of the project area. The land of Kapālama totaled 1,570.30 acres. After Moses' death in 1848, the *ahupua`a* of Kapālama was bequeathed to his sister Victoria Kamāmalu.

According to Mitchell (1993:9), in 1856 "Prince Lot renamed the `Ewa *makai* portion of Kapālama, calling it Kalihi; while the lands on the Waikiki side, parallel to it, retained the name Palāma." It seems, however, that Kalihi was considered an *ahupua`a* in its own right during the Great Mahele of 1848 and probably before (Landrum and Klieger 1991:21-24; Hawaiian Studies Institute 1987; Equity 200 1847). Victoria Kamāmalu died in 1866, and the 1,570.30 acres of Kapālama, was bequeathed to her brother Lota Kapuāiwa, King Kamehameha V. After the death of Kamehameha V in 1872, his private lands were inherited by his half-sister Princess Ruth Ke`elikōlani. In 1883, upon Princess Ruth's death, the estate was willed to Princess Bernice Pauahi Bishop.

Bernice Pauahi, born in 1831 to Pakī and Konia and *hānai* sister of Queen Lili`uokalani, was the great-granddaughter of Kamehameha I. In 1850, at the early age of 18 Bernice Pauahi married a 27-year old New Yorker by the name of Charles Reed Bishop. Charles Bishop, who came to Hawai`i in 1847, found numerous business opportunities in the Hawaiian Islands and in 1858 formed the firm of Aldrich and Bishop, one of Hawai`i's first banks. In 1872, at the death of Kamehameha V, Bernice was offered the throne, but humbly she declined.

¹After the Māhele, a distinction was made between the private lands of the king as a person and the lands belong to the king as an institution. The latter became inalienable Crown Land.

After the death of Princess Ruth in 1883, Ruth's first cousin Bernice became the final heiress of the Kamehameha family. With this vast inheritance, Bernice controlled most of all the private Kamehameha lands, which at the time totalled close to 9% of the land in all of the Hawaiian Islands. Before the death of Bernice in 1884, she named five trustees to look after her estate with the intentions of educating the children of Hawaiian ancestry. Kapālama was one of her lands that formed the Bishop Estate.

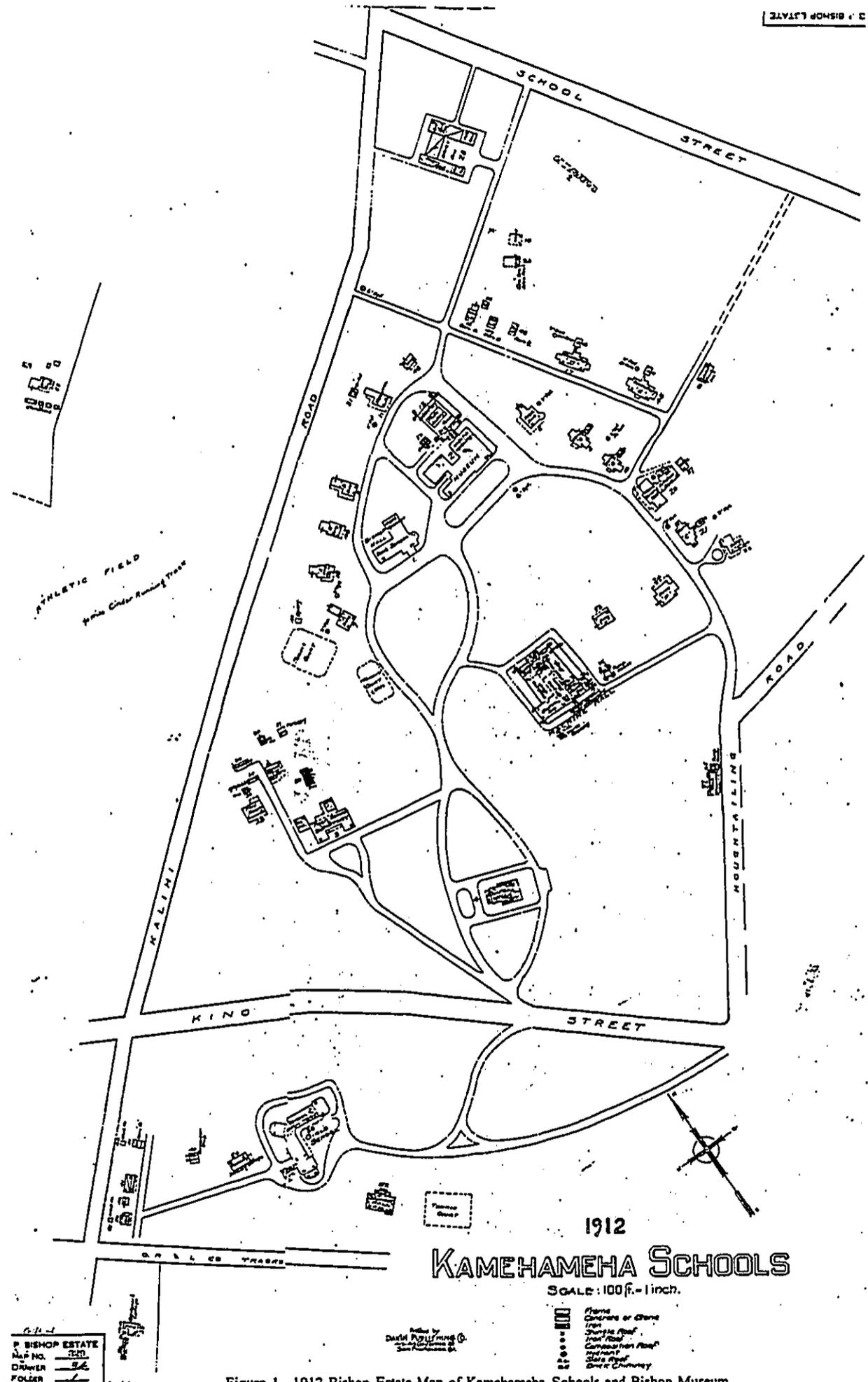
On 9 April 1885, the five trustees of the Bernice Pauahi Bishop Estate conducted their first meeting at Keoua Hale to discuss the immediate details of the Estate. The first priority of the trustees was to fulfill Mrs. Bishop's request of building a school for Hawaiian children. On 26 February 1886, after the location was decided, the Manual School for boys was established on Bernice's land at Kaiwi`ula in Kapālama. The Principal's House, which was located where the present-day Atherton Halau now sits, became the first building on the grounds of the project area. Soon after the other buildings for the school along with the museum were built.

At the time of its establishment, Kaiwi`ula was still a relatively barren, dusty plain peppered with basalt outcrops. The school site was isolated, and very much in "the country." Basalt was quarried on site for the building of the school and museum buildings, while other rocks and vast quantities of soil were used to level the land and fill the excavated quarries (Mitchell 1993). The Museum tract was originally much larger than at present, and included areas now covered by the Lunalilo Highway and Farrington High School (Figure 1).

Previous Archaeology

The present project area at 1525 Bernice Street in Honolulu unfortunately has not undergone any type of intensive archaeological surveys. During the construction of Castle Memorial Building in 1989, no archaeological surveys were undertaken. However, that the building site was mostly rock rubble, most likely from the dressing of the basalt blocks used in the construction of Bishop and Hawaiian Halls (Mueller-Ali personal communication, 1994). In August of 1992, a trench was excavated on the Great Lawn to install electrical wiring for a space exhibit at Castle Hall. Due to the concern that subsurface archaeological features may become exposed during the backhoe trenching, the Anthropology Department took charge of monitoring the excavations. Under the guidance of Steve Clark, Project 499, BPBM Site 50-Oa-A6-26, "Kaiwi`ula", was undertaken. Profiling and interpretation of the stratigraphy from seven various areas, located along the east wall of the trench, was conducted. Boyd Dixon of the Anthropology Department explained that:

No evidence of pre-Contact occupation or utilization of the area was observed, Contact occupation or utilization of the area was observed, although several filling layers were documented which presumably were associated with early leveling for the original school buildings or subsequent Museum landscaping, especially beneath the raised lawn supporting the present sidewalk. Large bedrock boulders were encountered within more undisturbed soils on the far south end of the lawn paralleling the current access road. A blue button and some fragments of copper wire, glass, and a metal bolt were encountered in the back fill of the trenching and may have been associated with the Kamehameha School period of occupation on the site. [Dixon 1993:1]



C.P.B.E.
 P. BISHOP ESTATE
 MAP NO. 1220
 DRAWN BY S.E.
 FOLDER 7

Designed by
 DAVID P. WILSON & CO.
 ARCHITECTS
 SAN FRANCISCO, CALIF.

1912
KAMEHAMEHA SCHOOLS
 SCALE: 100 ft. = 1 inch.

- ▬ Frame
- ▬ Concrete or Stone
- ▬ Iron
- ▬ Shingle Roof
- ▬ Flat Roof
- ▬ Corrugation Roof
- ▬ Mansard Roof
- ▬ Slate Roof
- ▬ Chimney

Figure 1. 1912 Bishop Estate Map of Kamehameha Schools and Bishop Museum campus. Scale 1:2700

Recommendation

The present Museum campus contains buildings and other features that are of historical significance and some are on the National Register. These structures are from the early school and museum periods. The details of their construction and history are discussed elsewhere in the campus survey report.

There is no documentary evidence that the present project area was important to pre-Contact or early post-Contact Native Hawaiians, nor is there any evidence that the area was used for human habitation or cultivation. Described as a rock-strewn, dusty plain, it is possible that Kaiwi`ula was barren until the establishment of the schools in the 1880s. The present project area most likely has a low probability of archaeological significance for the period before the establishment of the schools and the museum, and little if any archaeological work seems warranted.

References Cited

Bishop Estate Map

1912 Map of the Kamehameha Schools. Number 329, Drawer 34, Folder 1. Dakin Publishing, San Francisco. 1:1200.

Dixon, Boyd

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Equity 200

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AUG 09 1994

MEDIA FIVE
LIMITED

MARTIN & BRAVO, INC.

CONSULTING STRUCTURAL ENGINEERS

COPY

Pacific Tower, Suite 2660
1001 Bishop Street
Honolulu, Hawaii 96813
(808) 521-4513
FAX (808) 531-4508

August 9, 1994

John C. Bravo, S.E.
John A. Martin, S.E.
Gary Y.K. Chock, S.E.
Brian M. Iida, S.E.

Media Five, Ltd.
345 Queen Street, 9th Floor
Honolulu, Hawaii 96813

Attention: Myron Hoeffler

Subject: Dorm D, Bishop Museum
Structural Inspection

Dear Myron:

A structural inspection was performed at 8:30 a.m., 4 August 1994 with representatives from Media Five, Ltd. and Rider Hunt Cost Consultants. The purpose of the investigation was to formulate our opinions on the structural condition of Dorm D.

The building is reported to be 130 years old, which means the building was 30-something when the Moana Hotel was constructed. The two-story wood-framed building has been abandoned on the second floor, but is currently occupied on the ground floor. In general, the condition of the structure is not good. Insects, water and time have worked on the structural, as well as non-structural, elements of the building. Our professional opinion is that a further, more intense investigation (other than just the one-hour walk-through) would probably conclude that the building is unsafe and should be strengthened or demolished.

A brief description of the structural elements of the building follows. The main roof is corrugated metal supported by rough sawn 2 x 4's at approximately 4 feet apart. Wood roof trusses are rough sawn 2 x 4 top and bottom chords with 1 x 6 diagonals nailed to the chord with about three nails. The trusses generally span to the exterior walls, however may receive support from certain interior partitions. The bottom chords of the trusses indicate visual termite damage. Certain areas of the roof are one-story extensions, and those have a variety of covering including: asphalt shingles, wood shingles and roll roofing, none of it in very good condition.

The second floor has one inch flooring with quite heavy termite damage in certain areas, particularly where moisture is present. The few second floor joists we were able to view in the Diamond Head-mauka corner of the building appeared to be in reasonably good condition, and appeared to be very fine-grain, old growth, rough sawn 2 x 10 or 12 joists. However, the floor was generally uneven, most likely a result of failure of ground floor girders due to termite damage. Foundation settlement could be a cause, however, we would not expect poor soils in this area. Certain wood wall siding material was also termite-damaged.

AFFILIATED WITH OFFICES IN: LOS ANGELES • SAN FRANCISCO • NEWPORT BEACH
LAS VEGAS • RENO • TUCSON • DENVER • SALT LAKE CITY • TAIPEI

MARTIN
&
BRAVO

Media Five, Ltd.
August 9, 1994
Page 2

The foundations appeared to be concrete or stone footings and posts supporting the wood floor girders. The whole lower floor system appears to be undersized according to current standards. One exterior floor beam was observed to be twisted and had extreme termite damage. Typically around the perimeter dirt was piled up against the wood, which provides ideal conditions for termites.

In summary, Dorm D has deteriorated over the years to the point that we feel the structure poses a hazard to the Bishop Museum Property and should be demolished or structurally strengthened. An undertaking to strengthen the building for historical preservation should include upgrading to the current building code. The primary structural considerations are as follows:

1. A full structure survey and engineering analysis, including both gravity and lateral loadings (hurricane and earthquake) should be performed to establish the current level of structural safety. We would expect the results to be unfavorable and indicate strengthening is required.
2. Foundations: Most likely adequate for gravity loads, inadequate for hurricanes. Some tie downs will need to be added for footings to piers to floor girders.
3. Many first floor girders, especially at the perimeter, will most likely require replacement or strengthening. Floor joists appear undersized, therefore should probably be doubled up. The floor decking will likely require replacement for up to 50% of the pieces.
4. The second floor decking will also require partial replacement, up to 50%. The floor joist deterioration needs verification, but we suspect maybe 20% to 25% replacement. The ceiling is wood decking with "Canek" covering and the decking could have damage.
5. The wall studs were concealed, but could have significant termite damage. We suggest perhaps 20% to 25% replacement will be necessary. The wood siding replacement could be 40% of the total. Much trim will also require replacement.
6. The corrugated roofing should be removed, plywood decking added for a lateral diaphragm, then a new roofing material be applied. Some truss repairs, maybe 10% to 15% of the top and bottom chords will require strengthening.

MARTIN & BRAVO

Media Five, Ltd.
August 9, 1994
Page 3

7. Hurricane ties need to be added between the roof trusses and the second floor wall studs, the second to first floor wall studs and the first floor wall studs to the floor girders.
8. Wall plywood and end stud tie downs will also be needed at appropriate locations.

We will work with Rider Hunt in an attempt to quantify the strengthening cost issues if you wish. Please call if you have any questions.

Very truly yours,

MARTIN & BRAVO, INC.

John C. Bravo
Its President

JCB:nmr

cc: Rider Hunt

MARTIN
&
BRAVO

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President
JAJ Anderson
Senior
Vice President
D A Smith

RDR:MT11:3428:E
26 September 1994

Media Five Ltd
345 Queen Street
9th Floor
HONOLULU HAWAII 96813

Attention: Mr Myron Hoefler

Dear Sirs,

RE: BISHOP MUSEUM DORM "D"

In accordance with your request, we have prepared a Preliminary Estimate of construction cost for this project.

ESTIMATE

We estimate the probable construction cost, based upon September 1994 prices, as follows:

Alt. 1 Rehabilitate Dorm D	-	\$434,000
Alt. 2 Move Dorm D on campus and rehabilitate	-	\$515,000
Alt. 3 Move Dorm D off campus.	-	\$174,000

BASIS OF ESTIMATE

Our estimate is based upon the following;

- o observations and recommendations by Martin & Bravo Inc contained in letter dated 9 August 1994
- o scope of work by Media Five Limited contained in letter dated 1 September 1994
- o discussions between Media Five Limited and Rider Hunt Ltd
- o existing conditions observed during our site inspection.

This estimate is based upon measured approximate quantities with rates current as at September 1994.

No allowance has been included for the following;

- o negotiated, staged or other special form of contract
- o overtime necessitated by a restricted contract period or to attract labor

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LIMITED

Hawaii
Pacific Tower, Suite 1340
1001 Bishop Street
Honolulu, Hawaii 96813
Tel (808) 521 2641
Fax (808) 521 3296

RIDER HUNT LTD

Construction Cost
Consultants and
Quantity Surveyors

Offices
Adelaide
Auckland
Bangkok
Brisbane
Coims
Canberra
Christchurch
Darwin
Gold Coast
Guam
Hong Kong
Kota Kinabalu
Kuala Lumpur
London
Los Angeles
Melbourne
Newcastle
Palmerston North
Perth
Port Moresby
San Francisco
Singapore
Sunshine Coast
Sydney
Taipei
Tokyo
Townsville
Vancouver
Wellington

A Hawaii
Corporation

RE: BISHOP MUSEUM DORM "D"

BASIS OF ESTIMATE (Cont'd)

- o limitations on equipment and construction methods permitted to be used (because of the presence of adjoining occupiers and/or restricted site access).

INCLUSIONS

The following items have been included in our estimate;

- o State of Hawaii General Excise Tax
- o construction phase contingency.

EXCLUSIONS

The following items have been excluded from our estimate;

- o removal of hazardous material
- o exterior water, sewer, plumbing and electrical
- o tent fumigation
- o rock excavation
- o loose, soft and hard furnishings
- o murals and works of art
- o landscaping
- o work outside site boundaries
- o staging/phasing costs
- o statutory authorities' charges, contributions (and compliance orders)
- o land and legal costs
- o professional fees
- o escalation beyond September 1994.

REPORTS

We enclose the following reports for your review and information, namely;

- o **PROJECT SUMMARY** - which sets out the Basis of Estimate, Items Specifically Included and Items Specifically Excluded for the estimate
- o **PROJECT ELEMENTAL** - which dissects the cost of the various elements
- o **ITEM DETAILS** - which gives a detailed break-up of the estimate for each work item.

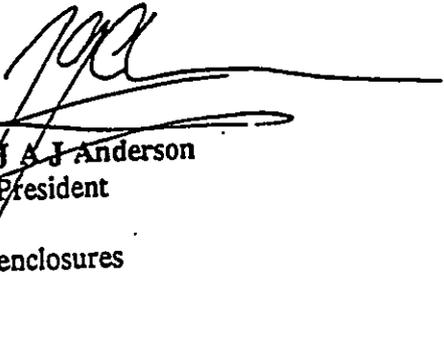
Page 3
26 September 1994

RE: BISHOP MUSEUM DORM "D"

We trust that this is satisfactory to your immediate requirements. However, should you have any queries concerning this or any other matter, please do not hesitate to contact Mr Roger Rafanan or the undersigned.

Yours faithfully,

RIDER HUNT LTD


J & J Anderson
President

enclosures

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII



STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES

STATE HISTORIC PRESERVATION DIVISION
33 SOUTH KING STREET, 6TH FLOOR
HONOLULU, HAWAII 96813

March 1, 1995

Mr. Allen Allison
Bishop Museum
1525 Bernice Street
P.O. Box 19000A
Honolulu, Hawaii 96817-0916

MICHAEL D. WILSON, CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES

DEPUTY
GILBERT COLOMA-AGARAN

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

LOG NO: 14009
DOC NO: 9502TM27
Architecture

Dear Mr. Allison:

**SUBJECT: Section 106 Compliance (NHPA)
Demolition of Dorm D Building at
Bishop Museum Campus
TMK: 1-6-24:001, Honolulu, Oahu**

FILE

MAR 6 1995

FOR SCHOLARLY
PURPOSES

Thank you for transmitting a draft report on the history of Dorm D and a draft Memorandum of Agreement (MOA). We believe that Dorm D is significant as a part of the history and development of Kamehameha Schools and Bishop Museum and may be eligible for listing in the State or National Register of Historic Places. While we understand its dilapidated condition, demolition of this building will, nonetheless, be considered an "adverse effect" which may be mitigated through stipulations listed in a Memorandum of Agreement.

As discussed in a telephone conversation with Tonia Moy, we concur that the floor plan has changed dramatically throughout the years and no longer retains any association to its original dormitory use. Therefore, we will not be requesting measured drawings. However, photo-documentation using Historic American Building Survey (HABS) standards will be required. Please see the terminology used in the enclosed sample MOA. We would also like a written history included as a stipulation. The draft history you sent is an excellent draft with wonderful anecdotes that bring the history to life and we would like to offer the following comments:

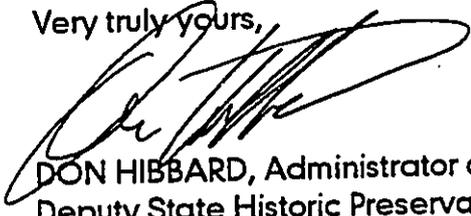
1. Needs a short written description of the building (original and current, if known); what are the materials, type of construction, roof form, window type, any special details, etc. Call Tonia (587-0005) if you need assistance in this area.

Mr. Allen Allison
Page 2

2. Include a brief overall history of Kamehameha Schools and Bishop Museum so that people not familiar with Hawaii may be able to understand its significance.
3. A graphic timeline noting significant changes in use or building form will be of great assistance as a summary of the building's history.

We look forward to reviewing the final draft. Thank you for the opportunity to comment. Should you have any questions, please call Tonia Moy at 587-0005.

Very truly yours,



DON HIBBARD, Administrator and
Deputy State Historic Preservation Officer

TM:ab

enclosure

cc: Ms. Pat Brewington, U.S. Department of Energy



Department of Energy

Chicago Operations Office
9800 South Cass Avenue
Argonne, Illinois 60439

August 24, 1994

Dr. Donald Hibbard
State Historic Preservation Division
Department of Land and Natural Resources
33 South King St. - 6th Floor
Honolulu, HI 96813

Dear Dr. Hibbard:

The purpose of this letter is to notify you that Mr. Allen Allison of the Bishop Museum in Honolulu, Hawaii, is designated to act as a non-Federal representative for matters related to the Section 106 review of the proposed Museum.

The Department of Energy (DOE) has executed a grant with the Bishop Museum, for design, construction, and equipping of the proposed Bishop Science Center on the Museum grounds. However, under the terms of the grant, DOE funds are available to the Museum only for the limited purpose of performing preliminary studies, including analyses necessary under the National Environmental Policy Act (NEPA), until DOE provides a NEPA clearance. This means that the Museum may not initiate construction or take any other action that would affect the environment or limit alternatives until the DOE NEPA process has been completed and DOE has determined that such action should proceed. Consideration of impacts on historic resources is a necessary part of the decision making process under the DOE NEPA regulations. Naming Mr. Allison as a non-Federal representative should expedite document transmittals and other communications with your agency which are necessary to complete the Section 106 and NEPA process.

If you have any questions, please feel free to contact me at (708) 252-6623. I am the DOE Project Manager for this activity.

Sincerely,

Patrice E. Brewington
Patrice E. Brewington, General Engineer
Engineering and Real Property Management
Branch
Programs and Facilities Management
Division

cc: A. Allison, Bishop Museum
A. Haines, Bishop Museum

5. PRIME, UNIQUE OR IMPORTANT FARMLAND

The State Department of Agriculture has confirmed that the Museum campus is not classified as "prime, unique or important farmland (see letter dated 5 July 1994 from Paul J. Schwind, Ph.D., Planning Program Administrator, page 70)

JOHN WAIHEE
Governor



State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 So. King Street
Honolulu, Hawaii 96814-2512

YUKIO KITAGAWA
Chairperson, Board of Agriculture
LETITIA N. UYEHARA
Deputy to the Chairperson

FAX: (808) 973-9613

Mailing Address:
P. O. Box 22159
Honolulu, Hawaii 96823-2159

July 5, 1994

Mr. Allen Allison
Assistant Director, Research
The Stare Museum of Natural and Cultural History
Bishop Museum
P. O. Box 19000-A
Honolulu, Hawaii 96817-0916

Dear Mr. Allison:

Subject: Agricultural Land Rating for Bishop Museum - Kalihi

The subject property is not classified as Prime, Unique, or Other Important farmland. Should you need further clarification, please call Earl Yamamoto at 973-9466.

Sincerely,

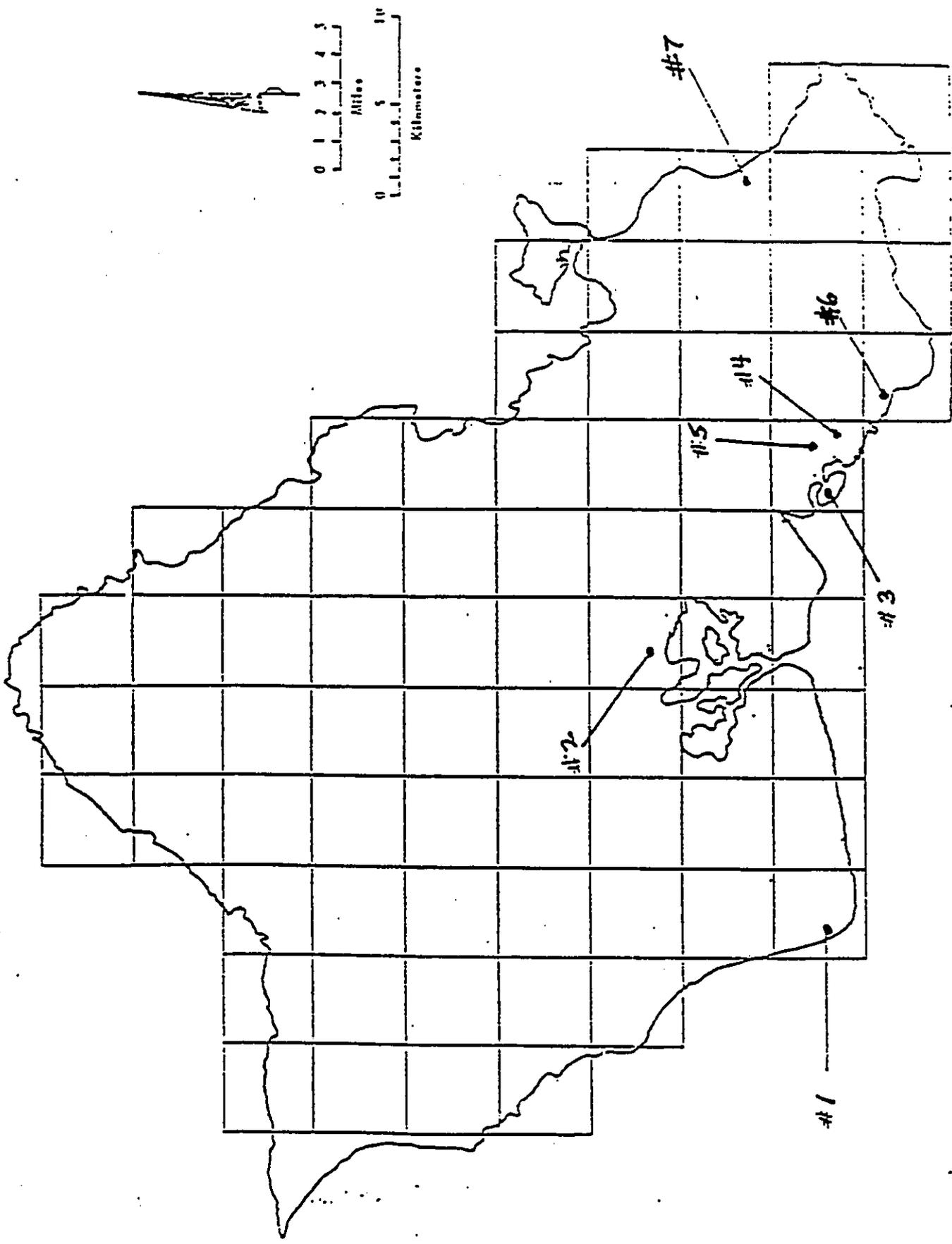
A handwritten signature in cursive script that reads "Paul J. Schwind".

PAUL J. SCHWIND, Ph.D.
Planning Program Administrator



6. NON-ATTAINMENT AREAS

The entire State of Hawaii meets federal air quality standards. None of the monitoring stations on the island of Oahu has ever exceeded federal standards for carbon monoxide, particulate matter, sulfur oxides, ozone, PM-10 or lead (see copy of relevant sections of latest report obtained from the Clean Air Branch of the State Department of Health, page 72). There are no activities planned for the Science Learning Center that should have any significant impact on air quality.



AIR SAMPLING SITES - OAHU, HAWAII

TABLE II
SUMMARY OF STATE OF HAWAII AND
FEDERAL AMBIENT AIR QUALITY STANDARDS

POLLUTANT	STANDARDS		
	HAWAII STATE STANDARD	FEDERAL PRIMARY STANDARD ^a (HEALTH)	FEDERAL SECONDARY STANDARD ^b (WELFARE)
CARBON MONOXIDE 1 HOUR 8 HOUR	10 mg/m ³ 5 mg/m ³	40 mg/m ³ 10 mg/m ³	40 mg/m ³ 10 mg/m ³
NITROGEN DIOXIDE 1 HOUR 24 HOUR ANNUAL (ARITHMETIC)	— — 70 ug/m ³	— — 100 ug/m ³	— — 100 ug/m ³
PARTICULATE MATTER 24 HOUR ANNUAL (ARITHMETIC)	150 ug/m ³ 60 ug/m ³	— —	— —
PM-10 ^c 24 HOUR ANNUAL (ARITHMETIC)	— —	150 ug/m ³ 50 ug/m ³	150 ug/m ³ 50 ug/m ³
OZONE 1 HOUR	100 ug/m ³	235 ug/m ³	235 ug/m ³
SULFUR DIOXIDE 3 HOUR 24 HOUR ANNUAL (ARITHMETIC)	1300 ug/m ³ 365 ug/m ³ 80 ug/m ³	— 365 ug/m ³ 80 ug/m ³	1300 ug/m ³ — —
LEAD 3 MONTHS (ARITHMETIC)	1.5 ug/m ³	1.5 ug/m ³	1.5 ug/m ³

^a Designated to prevent against adverse effects on public health.

^b Designated to prevent against adverse effects on public welfare, including effects on comfort, visibility, vegetation, animals, aesthetic values, and soiling and deterioration of materials.

^c Particulate Matter which is 10 microns or less in diameter.

TABLE III

NUMBER OF TIMES FEDERAL AND STATE AIR QUALITY STANDARDS EXCEEDED
(January 1988 to December 1990)

	Dept. of Health, Oahu	Barbers Point, Oahu	Pearl City, Oahu	Sand Island, Oahu	Liliha, Oahu	Waipahoehoe, Oahu	Waikiki, Oahu	Lihue, Kauai	Lehaina, Maui	Kihui, Maui
CARBON MONOXIDE (1-hour standard)	1013	-	-	-	-	-	1025	-	-	-
1. No. of samples	0	-	-	-	-	-	0	-	-	-
2. Federal standard exceeded	1	-	-	-	-	-	1	-	-	-
3. State standard exceeded	-	-	-	-	-	-	-	-	-	-
PARTICULATE MATTER (24-hour standard)	171	-	30	-	176	60	-	-	-	-
1. No. of samples	0	-	0	-	0	0	-	-	-	-
2. Federal standard exceeded	0	-	0	-	0	0	-	-	-	-
3. State standard exceeded	-	-	-	-	-	-	-	-	-	-
SULFUR OXIDES (24-hour standard)	162	171	-	-	-	-	-	-	-	77
1. No. of samples	0	0	-	-	-	-	-	-	-	0
2. Federal standard exceeded	0	0	-	-	-	-	-	-	-	0
3. State standard exceeded	-	-	-	-	-	-	-	-	-	-
OZONE (1-hour standard)	-	-	-	1044	-	-	-	-	-	-
1. No. of samples	-	-	-	0	-	-	-	-	-	-
2. Federal standard exceeded	-	-	-	2	-	-	-	-	-	-
3. State standard exceeded	-	-	-	-	-	-	-	-	-	-
PM-10 (24-hour standard)	-	174	146	-	162	113	-	121	103	74
1. No. of samples	-	0	0	-	0	0	-	0	0	0
2. Federal standard exceeded	-	-	-	-	-	-	-	-	-	-
3. State standard exceeded	-	-	-	-	-	-	-	-	-	-
LEAD (24-hour standard)	141	-	-	-	161	-	-	-	-	-
1. No. of samples	0	-	-	-	0	-	-	-	-	-
2. Federal standard exceeded	0	-	-	-	0	-	-	-	-	-
3. State standard exceeded	-	-	-	-	-	-	-	-	-	-

7. CLASS I AIR QUALITY CONTROL REGION

Not applicable. The only Class 1 air quality control regions in Hawaii are national parks located on other islands.

8. SPECIAL SOURCES OF GROUNDWATER

Not applicable. The Museum does not have any wells and is not involved in any special activities that could possibly affect ground water.

9. NAVIGABLE AIR SPACE

No impact. The Museum is located 2.2 miles from the nearest airport runway. The FAA has conducted a full aeronautical study and in a notice dated 26 August 1994 determined that the proposed Science Learning Center will not affect air traffic (see page 78).

DOCUMENT CAPTURED AS RECEIVED

DO NOT REMOVE CARBONS

Form Approved OMB No. 2120-0001

US Department of Transportation Federal Aviation Administration		NOTICE OF PROPOSED CONSTRUCTION OR ALTERATION		Aeronautical Study Number <u>94-AWP-1136-0E</u>	
1. Nature of Proposal A. Type <input checked="" type="checkbox"/> New Construction <input type="checkbox"/> Alteration			B. Class <input checked="" type="checkbox"/> Permanent <input type="checkbox"/> Temporary (Duration _____ months)		C. Work Schedule Dates Beginning <u>7/1/95</u> End <u>7/1/2000</u>
3A. Name and address of individual, company, corporation, etc. proposing the construction or alteration. (Number, Street, City, State and Zip Code) (808) <u>848-4145</u> area code Telephone Number TO <input checked="" type="checkbox"/> Allen Allison Assistant Director, Research Bishop Museum 1525 Bernice St. Honolulu, HI 96817			2. Complete Description of Structure A. Include effective radiated power and assigned frequency of all existing proposed or modified AM, FM or TV broadcast stations utilizing this structure. B. Include size and configuration of power transmission lines and their supporting towers in the vicinity of FAA facilities and public airports. C. Include information showing site orientation, dimensions and construction materials of the proposed structure. 1. Concrete over steel structure with a planetarium dome less than 70 feet high (dome will be copper or kevlar). Two structures. 2. Concrete over steel approx. 4-5 stories high (less than 60 feet). (plans not final - dimen. approx. if more space is required, continue on a separate sheet.)		
B. Name, address and telephone number of proponent's representative if different than 3 above.			4. Location of Structure A. Coordinates (To nearest second) 21° 20' 19" N 157° 52' 21" W		
B. Nearest City, Town and State Honolulu, HI		C. Name of nearest airport, heliport, flight park, or seaplane base 3 miles		A. Elevation of site above mean sea level 80 ft.	
(1) Distance to 4B 2 Miles		(1) Distance from structure to nearest point of nearest runway 2.2 miles		B. Height of Structure including all appurtenances and lighting (if any) above ground, or water if so situated 60 ft.	
(2) Direction to 4B 160° M		(2) Direction from structure to airport 250° 30' M		C. Overall height above mean sea level (A + B) 140 ft.	
D. Description of location of site with respect to highways, streets, airports, prominent terrain features, existing structures, etc. Attach a U.S. Geological Survey quadrangle map or equivalent showing the relationship of construction site to nearest airport(s). (if more space is required, continue on a separate sheet of paper and attach to this notice.) Bishop Museum is bounded on the west by the Likelike Highway, on the north by Bernice St., on the east by Kapalama Ave. and on the south by the H-1 freeway (see attached map).					
Notice is required by Part 77 of the Federal Aviation Regulations (14 C.F.R. Part 77) pursuant to Section 1101 of the Federal Aviation Act of 1958, as amended (49 U.S.C. 1101). Persons who knowingly and willingly violate the Notice requirements of Part 77 are subject to a fine (criminal penalty) of not more than \$500 for the first offense and not more than \$2,000 for subsequent offenses, pursuant to Section 902(a) of the Federal Aviation Act of 1958, as amended (49 U.S.C. 1472(a)).					
I HEREBY CERTIFY that all of the above statements made by me are true, complete, and correct to the best of my knowledge. In addition, I agree to obstruction mark and/or light the structure in accordance with established marking & lighting standards if necessary.					
Date <u>13 July 94</u>		Typed Name/Title of Person Filing Notice Allen Allison, Assistant Dir. Research		Signature 	
FOR FAA USE ONLY: <u>NA033-21 20 07 60 7159 52 11 12</u> FAA will either return this form or issue a separate acknowledgment.					
The Proposal: <input type="checkbox"/> Does not require a Supplemental Notice of Construction (SNC) as required by Part 77 of the Federal Aviation Regulations (14 C.F.R. Part 77) and is subject to the marking and lighting requirements of Part 77.					
<input checked="" type="checkbox"/> Is identified as an obstruction under the standards of FAR, Part 77, Subpart C, but would not be a hazard to air navigation.					
<input type="checkbox"/> Is identified as an obstruction under the standards of FAR, Part 77, Subpart C, but would be a hazard to air navigation.					
<input type="checkbox"/> Should be obstruction.					
<input type="checkbox"/> Lighted per FAA Advisory Circular 700-1, Chapter 1.					
<input checked="" type="checkbox"/> Obstruction marking and lighting are not necessary.					

10. COASTAL ZONES

The entire State of Hawaii is classified as a coastal zone. However, the Museum campus is located ca. 1½ miles from the ocean in a suburban neighborhood (see map, Figure 1, page 6). Informal discussions with staff in the Office of State Planning, which administers the Coastal Zone Management Act, haven't turned up any potential problems with the Museum's master plan. Staff in the Office of State Planning have suggested that once the Museum has concluded the Section 106 review process for demolition of Dorm D (see page 49) that it submit a completed CZM Assessment and Supplemental Information Form for formal administrative review. All the areas of concern to Coastal Zone Management are already being addressed in this Final Environmental Assessment.

11. SPECIAL DESIGNATION (E.G., NATIONAL FOREST, PARKS, TRAILS)

Not applicable. The Army Corps of Engineers has determined that the Museum does not require a DA permit (letter with attachments dated 29 June 1994, page 81)



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

June 29, 1994

REPLY TO
ATTENTION OF

Planning Division

Mr. Patrick Duarte
Associate Director
Bishop Museum
1525 Bernice Street
Honolulu, Hawaii 96817-0916

Dear Mr. Duarte:

Thank you for the opportunity to review and comment on the Proposed Environmental Assessment for Construction of a Science Center at Bishop Museum. The following comments are provided pursuant to Corps of Engineers authorities to disseminate flood hazard information under the Flood Control Act of 1960 and to issue Department of the Army (DA) permits under the Clean Water Act; the Rivers and Harbors Act of 1899; and the Marine Protection, Research and Sanctuaries Act.

a. Based on the information provided, a DA permit will not be required.

b. According to the enclosed Federal Emergency Management Agency's Flood Insurance Rate Map, panel number 150001 0112C dated September 28, 1990, the project site is located in Zone X (unshaded; areas determined to be outside the 500-year flood plain).

Sincerely,

A handwritten signature in cursive script, appearing to read "Ray H. Jyo", is written over the typed name.

Ray H. Jyo, P.E.
Director of Engineering

Enclosure

SPECIAL FLOOD HAZARD AREAS INUNDATED BY 100-YEAR FLOOD

- ZONE A** No base flood elevations determined.
- ZONE AE** Base flood elevations determined.
- ZONE AE** Flood depths of 1 to 3 feet (usually areas of ponding); base flood elevations determined.
- ZONE AO** Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
- ZONE A99** To be protected from 100-year flood by Federal flood protection system under construction; no base elevations determined.
- ZONE V** Coastal flood with velocity hazard (wave action); no base flood elevations determined.
- ZONE VE** Coastal flood with velocity hazard (wave action); base flood elevations determined.

FLOODWAY AREAS IN ZONE AE

OTHER FLOOD AREAS

- ZONE X** Areas of 500-year flood; areas of 100-year flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 100-year flood.

OTHER AREAS

- ZONE X** Areas determined to be outside 500-year flood plain.
- ZONE D** Areas in which flood hazards are undetermined.

Flood Boundary

Floodway Boundary

Zone D Boundary

Boundary Dividing Special Flood Hazard Zones, and Boundary Dividing Areas of Different Coastal Base Flood Elevations Within Special Flood Hazard Zones.

Base Flood Elevation Line: Elevation in Feet*

Cross Section Line

(ELEV 987)

Base Flood Elevation in Feet Where Uniform Within Zone*

RM7X Elevation Reference Mark

*Referenced to the National Geodetic Vertical Datum of 1929

NOTES

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size, or all planimetric features shown on Special Flood Hazard Maps.

NATIONAL FLOOD INSURANCE PROGRAM

**FIRM
FLOOD INSURANCE RATE MAP**

CITY AND COUNTY OF
HONOLULU,
HAWAII

PANEL 112 OF 135
(SEE MAP INDEX FOR PANELS NOT PRINTED)



PANEL LOCATION
COMMUNITY-PANEL NUMBER
150001 0112 C

MAP REVISED:
SEPTEMBER 28, 1990



Federal Emergency Management Agency

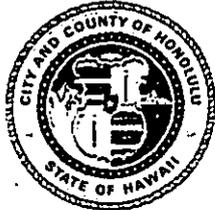
CUSTOMER COPY

12. FLOODPLAIN

Not applicable. Both the Army Corps of Engineers and the City and County Department of Land Utilization have determined that the Museum campus is not located on a flood plain (see reports by the Army Corps, page 81, and Department of Land Utilization, City and County of Honolulu, page 85).

DEPARTMENT OF LAND UTILIZATION
CITY AND COUNTY OF HONOLULU

650 SOUTH KING STREET
HONOLULU, HAWAII 96813 • (808) 523-4432



FRANK F. FASI
MAYOR

DONALD A. CLEGG
DIRECTOR

LORETTA K.C. CHEE
DEPUTY DIRECTOR

1994--Flood Misc. (MS)

June 30, 1994

Mr. Allen Allison
Bishop Museum
1525 Bernice Street
Honolulu, Hawaii 96817

Dear Mr. Allison:

Request for Flood Hazard Interpretation
National Flood Insurance Program (NFIP)
Bishop Museum and Perimeter Lots, Honolulu, Hawaii
Tax Map Key: 1-6-24: 1, 6 to 15, 22 to 24, and 28 to 33.

This is in response to your letter dated June 28, 1994, requesting a flood hazard interpretation for the subject properties.

According to our interpretation of the Federal Flood Insurance Rate Map (FIRM) Panel No. 150001-0112-C, dated September 28, 1990, the parcels are located in Zone X, an area determined to be outside the 500-year flood plain (see attached copy of portion of the FIRM). Zone X is not considered a Special Flood Hazard Area (SFHA) under the National Flood Insurance Program (NFIP).

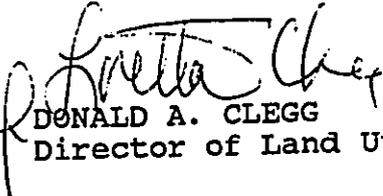
This interpretation is provided only for the purpose of compliance with NFIP and City flood plain management regulations to ensure that new developments located in the SFHA will not increase the flood threat and to protect new and existing buildings from anticipated floods.

Mr. Allen Allison
1994--Flood Misc. (MS)
Page 2

Please be advised that the City is not responsible to determine the flood insurance purchase requirements for properties financed by loans from lending institutions. Under the Flood Disaster Protection Act of 1973 (Title 42, USC 4104), all federally regulated and/or supervised lending institutions are responsible for their own determinations as to whether a property, that is to be financed by a loan from that institution, is located in a SFHA and, thus, requires the purchase of flood insurance as a condition for approval of the loan.

Should you have any questions, please contact Mario Siu-Li of our staff at 523-4247.

Very truly yours,


DONALD A. CLEGG

Director of Land Utilization

DAC:est
(bishop.msl)
Attachment



ZONE X

PANEL 0112 C

ZONE X

111 AMELIA ST

G

MAKILANI

HIKI LANE

STREET

LEILANI

KEALOHA STREET

BERNICE

STREET

NORTH

SCHOOL

STREET

HOUGHTALING

HALONA

STREET

KALMI

LAKIKA

NORTH

13. CLEARING AND EXCAVATION

No effect. Although the design of the Science Learning Center has not been finalized, the Museum expects to use existing terracing where possible. Some cutting and filling will be necessary for site preparation but this is expected to be minimal and to balance, with no net spoils.

14. DREDGE AND FILL

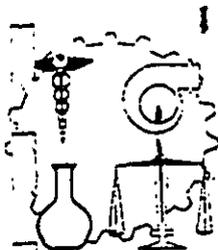
Not applicable.

15. NOISE

Not applicable. Noise from nearby highways will almost certainly drown out any noise associated with construction. No significant noise generating activities are planned for the Science Learning Center.

16. ASBESTOS REMOVAL

Bishop Museum arranged for a comprehensive asbestos survey in 1987 by the Industrial Analytical Laboratory, Inc. (see page 92 for a copy of that report). Asbestos was discovered in two Museum buildings, Pauahi Hall and the Planetarium (scheduled for demolition to make way for the Science Learning Center). In 1989 the Museum hired a professional contractor to remove all asbestos from Pauahi Hall; subsequent testing showed that this was successful. The Museum will seek similar professional assistance in removing asbestos from the planetarium before that building is demolished.



INALAB

INDUSTRIAL ANALYTICAL LABORATORY, INC.

1523 Kalakaua Avenue • Suite 207 • Honolulu, Hawaii 96826 • (808) 947-5402

An AIHA / NIOSH Accredited Industrial Hygiene Laboratory
Certification No. 154

17 June 1987

Bernice Pauahi Bishop Museum
Post Office Box 19000-A
Honolulu, Hawaii 96817

Attention: Mr. Michael Müller-Ali

Dear Mr. Müller-Ali:

In accordance with your earlier request, you will find enclosed a listing of recommended corrective action for the various ceilings found to contain asbestiform minerals on the four floors of Pau'Ahi Hall.

It is my professional opinion in each instance that the recommended corrective action in each instance is the most suitable to assure abatement of a potential asbestos health hazard for staff and visitors while still being cost effective.

Should you or your staff have additional questions concerning any aspect of this evaluation, please feel free to call or write me personally.

Sincerely,

Fred Hertlein III, CIH, CPC
Laboratory and Industrial
Hygiene Director, President

FH:nv

CC: Mark R. Hagadone
Vice President/Director
Dr. Michael K. W. Li
Vice President of Operations



Industrial hygiene surveys • SCUBA air analyses • Asbestos bulk and air sampling and analysis • Organic vapor and permanent gas analyses • Trace metal analyses • Mineral dust analyses • Method development and research
Mass Spectrometry • Expert Witness/Litigation • Hazardous waste evaluation

PAU'AHU HALL FIRST FLOOR

<u>ROOM OR LOCATION</u>	<u>RECOMMENDED CORRECTIVE ACTION</u>
Room 102	Adequate as is (already painted)
Corridor (101)	Selective removal
Room 103	Adequate as is
Elevator	Adequate as is
Corridor to Room 106	Adequate as is
Room 104	Selective removal
Room 109	Selective removal
Room 110	Selective removal
Room 108 (Packing Room): 3rd bay from corridor door	Selective removal
Room 107 (Room with naphthalene odor)	Encapsulate (shelves and storage near ceiling)
Room 106	
1st bay	Selective removal
2nd bay	Selective removal
3rd bay	Selective removal or adequate as is, if only nailhead is causing discoloration
4th bay	Adequate as is
5th bay	Selective removal
6th bay	Adequate as is
7th bay	Adequate as is
8th bay	Adequate as is or selective removal if only nailhead is causing discoloration
9th bay	Selective removal
10th bay	Selective removal
11th bay	Selective removal
12th bay	Adequate as is
13th bay	Adequate as is
14th bay	Adequate as is
15th bay	Adequate as is
16th bay	Selective removal
17th bay	Adequate as is
18th bay	Adequate as is

PAU'AHU HALL SECOND FLOOR

<u>ROOM OR LOCATION</u>	<u>RECOMMENDED CORRECTIVE ACTION</u>
Corridor	Selective removal
Room 201 across elevator	Selective removal
Room 202 (lounge)	Selective removal
Room 203 (Ladies' Restroom)	Selective removal
Room 204 (Mens' Restroom)	Selective removal
Room 205 (Janitor's closet)	Complete removal
Room 208 Entomology All 3 entry bays	Adequate as is
1st, 2nd, 3rd bays by Rm 210	Adequate as is
Room 209	Selective removal
Room 210	Selective removal
Room 211	Adequate as is
5th and 6th bays	Adequate as is
Room 208	Adequate as is
7th bay	Selective removal
8th bay	Selective removal
9th bay	Selective removal
10th bay	Selective removal
11th bay	Selective removal
12th bay	Selective removal
13th bay	Selective removal
14th bay	Selective removal
15th bay	Selective removal
16th bay	Adequate as is
Room 207	Adequate as is
17th bay	Selective removal
18th bay	Selective removal

PAU' AHI HALL THIRD FLOOR

<u>ROOM OR LOCATION</u>	<u>RECOMMENDED CORRECTIVE ACTION</u>
Corridor	Adequate as is (could encapsulate and paint)
Room 304	Adequate as is (could encapsulate and paint)
Room 303 (Shower Room)	Encapsulate and paint
Room 302	Adequate as is
Room 309 (Computer Room)	Adequate as is
Room 308 (Entomology)	
Right after entry	Adequate as is
1st bay	Selective removal
2nd bay	Selective removal
3rd bay	Selective removal
4th bay	Adequate as is
5th bay	Selective removal
6th bay	Selective removal
7th bay	Selective removal
8th bay	Selective removal
9th bay	Selective removal
10th bay	Selective removal
11th bay	Selective removal
12th bay	Selective removal
Remaining corridors	Selective removal
Room 306	
All bays	Selective removal
Room 307 (End Room)	Selective removal
Room 306 (Rest of Big End Room)	Encapsulation (shelves and storage near ceiling)

BISHOP MUSEUM ASBESTOS SURVEY: JUNE 11 - 12, 1987

PAU'AHU HALL FOURTH FLOOR

<u>ROOM OR LOCATION</u>	<u>RECOMMENDED CORRECTIVE ACTION</u>
Room 414	Complete removal (too much water damage)
Room 413	Complete removal
Room 412	Complete removal
Room 407 Bays (from mauka end):	
4th bay	Selective removal
5th bay	Selective removal
6th bay	Selective removal
7th bay	Selective removal
8th bay	Selective removal
9th bay	Selective removal
10th bay	Complete removal
11th bay	Complete removal
12th bay	Complete removal
13th bay	Selective removal
14th bay	Selective removal
15th bay	Selective removal
16th bay	Selective removal
Room 410 (17th bay)	Complete removal
Room 409 (18th bay)	Complete removal
Lobby to Room 407	
Left end as you enter	Selective removal
Center	Adequate as is
Right side	Encapsulation
Entrance to 407 (Room 401)	Selective removal
Room 406 (ante room)	Complete removal
Room 405 (bathroom)	Complete removal
Room 404 (Janitor's closet)	Complete removal
Room 403	Complete removal
Room 401 (Corridor)	Complete removal
Room 402	Repaint

PLANETARIUM

<u>ROOM OR LOCATION</u>	<u>RECOMMENDED CORRECTIVE ACTION</u>
Room 111 (Rotunda) Upper level Lower level	Adequate as is or encapsulate Complete removal
Room 112 (Entry to Planetarium)	Complete removal
Room 113 Planetarium Theater	Complete removal (Remove first, then cut back ledge overhang)
Room 124 (Observatory)	Encapsulate or apply K-13

17. PCBs

There are three electrical transformers on the Museum campus. Two recently tested positive for PCBs (#30758 - 380 parts per million [ppm] and #30768 - 257 ppm). These transformers are owned and maintained by Hawaiian Electric Company, Inc. (HEI) and are on the opposite side of the campus from the proposed Science Learning Center site. In a letter dated 28 November 1994, HEI stated that the "transformers do not need to be replaced at this time and do not pose any health risk to personnel working near this location." See memorandum dated 30 November 1994 from Michael Mueller-Ali, Bishop Museum's former superintendent of buildings and grounds (see page 99) and letter dated 28 November 1994 from Scott Antinoro of HEI (see page 100).

Bishop Museum
November 30, 1994

MEMORANDUM

TO: Allen Allison
cc: Jeff Bell
Michael Weaver
FROM: Michael Mueller-Ali *Car. 11/30/94*
SUBJECT: PCB'S

A test by Hawaiian Electric Co of their transformers on Bishop Museum Grounds confirmed that two of their three transformers contain PCB'S. Please see the attached letter for levels.

As I indicated to you, HECO is responsible for any problems arising from those units.

The results of the test on the Pauahi Hall floor tile have been received. We have 1603 sq ft of floor covering containing up to 15% chrysotile asbestos. At this time there are no plans to remove the tiles, however my recommendation is to schedule this work for FY96.

We have set up an operations and management program and will check the floor covering every six months.

Please call me if you need additional information.



RECEIVED
NOV 29 1994

BUILDINGS & GROUNDS

November 28, 1994

Bishop Museum
Attn: Mr. Michael Mueller-Ali
P.O. Box 19000A
Honolulu, HI 96817-0916

COPY

Subject: TRANSFORMERS

Dear Mr. Mueller-Ali,

Upon sampling and analysis of the transformer oil, polychlorinated biphenyl (PCBs) were found in two out of the three transformers. The transformers are located within HECO electrical vault #517 in the maintenance building on Bishop Museum property. The PCB levels were as follows:

<u>Transformer #</u>	<u>PCB Level</u>
30758	380 parts per million
30768	257 parts per million

HECO intends to clean up any PCB spills resulting from either of these transformers. The transformers do not need to be replaced at this time and do not pose any health risk to personnel working near this location.

Please call me at 543-4773 if you have any questions.

Sincerely,

Scott Antinoro
Marketing Service Representative

18. TOXIC SUBSTANCES

Not applicable. The Museum does not now and does not plan in future to import, process or manufacture toxic substances.

19. CHEMICAL STORAGE/USE

No impact. The Science Learning Center will include a small photographic darkroom that will be equipped with a silver trap and all required environmental controls (the Museum currently maintains two darkrooms, both of which meet all applicable environmental standards (see page 105). No other activities planned for the Science Learning Center involve the additional use or storage of chemicals.

20. PESTICIDE USE

Not applicable. If fumigation of the Science Learning Center is ever required it will be carried out by a licensed pest control operator.

21. HAZARDOUS WASTE (EMISSIONS)

Not applicable. No hazardous wastes will be produced by the Science Learning Center.

22. LIQUID EFFLUENT

Bishop Museum currently maintains two photographic darkrooms on campus and is in compliance with the City and County of Hawaii Department of Public Works industrial wastewater regulations (Chapter 11 of the Revised Ordinances of Honolulu). See page 106-107 for a copy of the discharge certificate. There are no activities planned for the Science Learning Center that will change the composition of the Museum's liquid effluent.

The sewer system that serves the Museum campus is part of the Hart Street Pump Station System. The collection system delivers sewage to this station which pumps it to the Sand Island Waste Water Plant. These sewer lines are more than 60 years old.

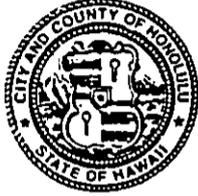
The Engineering firm of R.M. Towill Corporation has briefly reviewed the sewer requirements for the Science Learning Center project and concluded that this project will produce an additional 3946 gallons per day (Museum visitation will increase by ca. 90,000 visitors per year or 247 visitors per day). This small increase will be offset over the long term by the eventual removal of nineteen along Bernice Street and Kapalama Avenue. Assuming that each house occupant generates ca. 75 gallons of sewage per day and that there are an average of 3 occupants per house, the removal of the houses will produce a savings of 4275 gallons, more than offsetting the increase from the Science Learning Center.

However, only six of these houses are currently vacant and can be removed immediately. Under existing agreements with the occupants of the remaining houses, two houses will not be vacated until the year 2007 and seven homeowners have life tenancy. Four homeowners are still negotiating with the Museum.

The Department of Waste Water Management (DWWM) has indicated that a ten inch sewer line, that is part of the Hart Street system, is inadequate. DWWM will require that this line be upgraded before any new connections are made. This is a large cost that developers will have to face before DWWM will approve building permits. However, we expect that mitigative measures can be worked out during the initial phases of the Science Learning Center project (before the perimeter houses are removed). Appropriate measures would include holding tanks, waste vaults and the temporary use of pump trucks.

DEPARTMENT OF PUBLIC WORKS
CITY AND COUNTY OF HONOLULU
DIVISION OF WASTEWATER MANAGEMENT
630 SOUTH KING STREET
HONOLULU, HAWAII 96813

FRANK F. FASI
MAYOR



SAM CALLEJO
DIRECTOR AND CHIEF ENGINEER

GEORGE M. UYEMA
CHIEF

WPW 89-663

October 19, 1989

Bishop Museum
1525 Bernice Street
P.O. Box 19000-A
Honolulu, Hawaii 96817-0916

Gentlemen:

Subject: Industrial Wastewater
Discharge Certificate (IWDC)

Enclosed you will find a revised Industrial Wastewater Discharge Certificate that reflects corrections made to your previously submitted certificate. Please discard the previous certificate and display this revised version.

Thank you for your attention to this matter. If you have any questions, please call Tina de Jesus at 527-6805.

Very truly yours,


GEORGE M. UYEMA
Chief

Enclosure

B-165

City and County of Honolulu
Department of Public Works

INDUSTRIAL WASTEWATER DISCHARGE CERTIFICATE

This is to certify that BISHOP MUSEUM
has complied with Chapter 11 of the Revised Ordinances of Honolulu.

Discharge Classification 8411 - Museums and Art Galleries

Discharge Location 1525 Bernice Street Honolulu 96817-0916

Restrictions No discharge of solids greater than 1/4" size, pH between 5.5 and 9.5,
No discharge of silver greater than 0.43 mg/L concentration, No discharge
of fixer solution

Pretreatment Requirements Neutralization Tank

Monitoring Requirements Maintain record of neutralizing medium replacement

This certificate is valid until October 5, 1999 unless revoked sooner.

Certificate No. 19890249

Issued under my hand at Honolulu,
Hawaii this 6th day
of October, 1989

Sam Callio
Director and Chief Engineer

23. UNDERGROUND INJECTION

Not applicable.

24. HAZARDOUS WASTE

Not applicable. No hazardous wastes will be produced by the Science Learning Center.

25. UNDERGROUND STORAGE TANKS

Not applicable. There are no underground storage tanks currently located anywhere on the Bishop Museum campus and there are no plans to install underground tanks of any kind in the future.

26. RADIOACTIVE MIXED WASTE

Not applicable. Bishop Museum does not currently work with any radioactive material on campus and has no plans for doing so in the future.

27. RADIOACTIVE WASTE

Not applicable. Bishop Museum does not currently work with any radioactive material on campus and has no plans for doing so in the future.

28. RADIATION EXPOSURE

Not applicable. Bishop Museum does not currently work with any radioactive material on campus and has no immediate plans for doing so in the future.

29. THREATENED VIOLATION OF ES&H REGULATIONS/PERMIT REQUIREMENTS

Not applicable. The Science Learning Center project will not violate any ES&H regulations or permit requirements.

30. SITING/CONSTRUCTION/MAJOR MODIFICATIONS OF WASTE RECOVERY

Not applicable. The Science Learning Center project will increase the number of visitors to campus and this will result in increased sewage. This will be offset over the long term by the removal of nineteen perimeter houses along Bernice Street and Kapalama Avenue. No other significant waste products will be produced by the Science Learning Center.

31. DISTURBANCE OF PRE-EXISTING CONTAMINATION

The Science Learning Center project will result in the elimination of the small amount of asbestos in the dome of the planetarium (see page 91). Since this asbestos was previous sealed, its removal prior to the demolition or relocation of the planetarium presumably involves disturbance of a pre-existing condition.

32. NEW OR MODIFIED FEDERAL/STATE PERMITS

The Science Learning Center project will require a change in Bishop Museum's zoning classification from R-5 (Residential - an historical anomaly) to B-2 (Business) and a change in the designation of the nineteen perimeter house lots from Residential on the Development Plan (DP) Land Use Map to Public and Quasi-Public to match the DP Land Use Map for the main Museum campus (see Figure 3, page 8) and to conform to current and anticipated use. Permit applications requesting these changes will be submitted to regulatory authorities as soon as the Final Environmental Assessment is accepted.

The Science Learning Center is unlikely to require an updated wastewater permit but will require a building permit. Relocating the endangered plants will require permits from the State Division of Forestry and Wildlife and the U.S. Fish and Wildlife Service (the Museum's general plan for accomplishing this has already been approved). No other changes to state, local or federal permits will be required.

33. PUBLIC CONTROVERSY

The Museum's programs have strong public support. However, these activities, particularly special events, result in additional vehicular traffic in the local neighborhood and intense competition with local residents for on-street parking. The Science Learning Center is unlikely to exacerbate this problem (see below) but concerns about parking and traffic will undoubtedly arise during the public hearings required by the applications to change the Museum's zoning classification and land use designation (see page 117).

The Science Learning Center is expected to increase the number of daily Museum visitors by ca. 24% (to ca. 455,000) but is not expected to increase the number of people attending during peak periods (exhibit openings and Family Sunday [first Sunday of each month when admission to the Museum is free to local residents]). Family Sundays generally attract ca. 4,000 - 8,000 visitors over the course of the day and have attracted as many as 21,200 people. The Museum's average daily attendance is 825 adults and children (excluding Family Sunday and special events). School children (who come in buses) comprise about half that total. Total annual attendance, including daily visitors, school groups, group tours and Family Sunday and special events visitors, is currently 367,000. This averages out to 1008 people per day and, except for Family Sundays, these visitors are easily accommodated by existing on-campus parking. Increases in on-campus parking planned for phase 2 of the master plan will easily accommodate the increased number of visitors expected to come to the Museum after the Science Learning Center is completed.

The Museum commissioned a traffic survey by Julian Ng to assess a projected 24% increase in the number of Museum visitors that will be attracted to the campus by the Science Learning Center project. "The assessment found that the impact of the proposed project would be minimal during the normal peak hours of the adjacent streets; the traffic impact will occur primarily during non-peak traffic hours." See page 120 for a copy of the report.

The Demolition of Dorm D has potential to generate some public controversy but this is unlikely. The Museum is in close contact, in regard to the master plan, with all interested parties and community groups (e.g., Kamehameha Schools/Bishop Estate, Kalihi Neighborhood Board, Kalihi Business Association, local residents, the Kalihi representative on the City Council (Jon Yoshimura), Mayor Jeremy Harris, and is developing a comprehensive mitigation plan for Dorm D under guidance of the State Historic Preservation Division (see page 49) that will be formalized in a memorandum of agreement with cognizant government agencies. Moreover, the Museum intends to organize a "goodbye" ceremony, in collaboration with the Bishop Estate (the original owner of Dorm D), to record oral histories from former Dorm D residents and reflect on the history of the building before it is demolished.

Demolition or relocation of the nineteen perimeter houses could also generate some public controversy but this is unlikely. The Museum has offered generous terms that include lifetime tenancy for seven homeowners and occupancy until the year 2007 (when the leases expire) for two homeowners. Fifteen homeowners have agreed to sell or have already sold their houses to the Museum. The Museum is negotiating with the remaining four homeowners and expects to reach amicable agreements with them.

Julian Ng, Incorporated
P.O. Box 816 Kaneohe, Hawaii 96744-0816

Letter of Transmittal
(808) 236-4325

Date: November 4, 1994

To: Media Five Limited
345 Queen Street
Honolulu, Hawaii 96813

Attn: Mr. Myron Hoefer, AIA

Re: Bishop Museum Rezoning

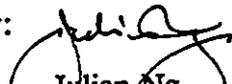
Attached as requested are the following for your use:

<u>Quantity</u>	<u>Date</u>	<u>Description</u>
1	November 1994	Traffic Assessment Report (original set)
1	---	diskette with MS Word file TRAFFIC.DOC (text of report)

Remarks:

These are transmitted as requested via the Museum. As discussed, the report text was created in MS Word 5.5.

By:


Julian Ng

Traffic Assessment Report Bishop Museum Rezoning

November 1994

The Bishop Museum has proposed to develop a science center and to implement other components of their Development Plan, as described in a report dated June 17, 1994. The Bishop Museum expects an increase in visitation and has made projections that the number of annual visits will increase by a total of 24% over the current visits as a result of this development. The plan includes use of several properties adjacent to the present museum site, owned by the museum, that are currently leased for use by single-family residences.

This traffic assessment was conducted to determine the potential traffic impact of implementation of the museum's Development Plan; this implementation is assumed to occur over a period of twenty years. The assessment was limited geographically to the streets adjacent to the site, extending to the nearest signalized intersections. The assessment found that the impact of the proposed project would be minimal during the normal peak hours of the adjacent streets; the traffic impact will occur primarily during non-peak traffic hours. Increased visitation to the monthly "Family Sunday" events, while not expected, could be mitigated with the increased parking that would be provided with the proposed development on the museum site.

Existing Traffic Conditions

The Bishop Museum is located in Kalihi, approximately two miles west of downtown Honolulu (Figure 1). The site is adjacent to State Highway 61 (Kalihi Street/Likeli Highway) and the H-1 (Lunalilo Freeway). A grade separated interchange of these two highways is located southwest of the museum. The interchange provides ramps for movements from and to the north (mauka) to/from both directions of the freeway. Connection to the south, however, is limited to an on-ramp from Kalihi Street to eastbound H-1 (a slip off-ramp from westbound H-1 to Halona Street, approximately 1/2 mile east of Kalihi Interchange provides for the opposite movement). The H-1 Freeway forms the south (makai) boundary of the museum site, while Kalihi Street is the west boundary.

The museum site is also bounded by Bernice Street to the north and Kapalama Avenue to the east. Bernice Street is a collector street which also provides access to Kapalama Elementary School; Kapalama Avenue adjacent to the museum site is a local residential street. Bernice Street also provides a link, with the H-1 Kalihi Interchange and Houghtailing Street, for traffic traveling from eastbound H-1 to destinations in Kalihi makai of the freeway.

Vehicular access to the museum is through a two-way driveway connection to Bernice Street, approximately 300 feet west of Kapalama Avenue. An exit-only driveway to Kapalama Avenue is located opposite Peter Buck Street, approximately 300 feet south of Bernice Street. A gated driveway to the northbound lanes of Kalihi Street near the intersection of Bernice Street is used by delivery vehicles during non-peak traffic times. No direct access from the site to the freeway is available.

Intersections in the vicinity of the project site are controlled either by stop signs or traffic signals. The intersection of Bernice Street and Kapalama Avenue is a four-way stop intersection. The School Street intersections with Kalihi Street, Makuahine Street, Kapalama Avenue, and Houghtailing Street are signalized, as is the intersection of Houghtailing Street and Bernice Street. All other intersections are stop controlled, with stop signs controlling traffic on the street with less volume.

Traffic count data from the State Highways Division and the City and County Department of Transportation Services were used in determining existing traffic conditions. At Kalihi Interchange, a 24-hour volume of 17,600 vehicles was counted on the off-ramp from eastbound H-1 to northbound Kalihi Street in March 1991. At the same time, 14,600 vehicles per day were counted on the opposite flow, from southbound Kalihi Street to westbound H-1.

The traffic data for the streets in the vicinity of the museum included only total approach or departure volumes by 15-minute periods, and did not include turning movement counts. However, estimates of peak hour turning movements were made from an analysis of the count data that was available, as shown in Figure 2.

Traffic conditions are described relative to capacity at signalized intersections and by Levels of Service determined from average delays at unsignalized intersections. An attached Appendix A describes these conditions.

Analyses of the estimated volumes shown in Figure 2 indicated near-capacity conditions at the signalized intersection of School Street and Kapalama Avenue in the morning peak hour; afternoon peak hour conditions were under capacity. The signalized intersection of Houghtailing Street and Bernice Street was found to operate at under capacity conditions in both peak hours. The analysis of the four-way stop at Bernice Street and Kapalama Avenue showed Level of Service C in the morning peak hour and Level of Service B in the afternoon peak hour.

The existing traffic generated by the Bishop Museum was estimated by simulating movements during a typical weekday, using information received from the museum. Museum traffic includes employees arriving to and departing from work at the site and museum visitors. Traffic movements and parking accumulation from the simulation are presented in Appendix B.

The museum gates are typically open between 5:30 AM and 6:30 PM. Employees generally arrive between 7:00 and 9:00 AM. The museum is open for visitors between 9:00 AM and 5:00 PM; the museum estimates that 70% of their visitors are on the site sometime between 10:00 AM and 2:00 PM. On weekdays, 136 parking stalls on the museum site are available for visitors; on weekends, most of the employee parking areas are also available, for a total of 245 visitor stalls.

The museum reports that existing visits total 379,000 per year, with an average weekday visitation of 1,008 persons. Of these, 180 arrive in buses. Weekend (except Family Sunday) visits average 1,676 persons. Average Family Sunday attendance was reported to be 7,125 persons. Average duration of visits is two hours, except on Family Sunday, where average visits last 2½ hours.

Based on the reported weekday visitation and other characteristics, existing conditions were estimated using a simulation of daily traffic. The simulation shows that weekday parking occupancy is nearly full between 11:30 AM and noon. Peak hour traffic generated by the museum occurs between 11:00 AM and noon. Exhibit 1 of Appendix B illustrates the museum's impact to traffic, assuming conservatively that all of the traffic generated by the museum uses the intersection of Bernice Street and Kapalama Avenue. As illustrated in Exhibit 1, traffic due to the museum is a small portion of the peak hour traffic.

On weekends, traffic volumes on the surrounding streets are spread out throughout the day. While no traffic count data are available, weekend hourly volumes are estimated to be less than weekday peak hours, and approximately equal to weekday off-peak hours. The 66% higher museum traffic on weekends (other than on Family Sundays) would still be only a small portion of the total traffic.

On Family Sundays, visitation is about seven times that of an average weekday. Using Exhibit 1 of Appendix B, a seven-fold increase in museum visitors would result in midday traffic volumes which would be approximately equal to the weekday morning peak hour. Parking is also a concern due to the high number of visitors on Family Sunday. Security personnel are used to manage parking on the museum site and at Kapalama Elementary School, located across Bernice Street from the main entrance. On the museum site, the lower lawn area is used in addition to regular stalls, accommodating a total of approximately 300 cars on site at one time. The Bishop Museum has estimated that visitors on an average Family Sunday find parking:

1,000	on site
1,000	at Kapalama Elementary School
<u>340</u>	elsewhere in the neighborhood
2,340	total daily cars (Family Sunday)

Future Traffic Conditions Without Project

Independent of any change in Bishop Museum activity, traffic volumes are expected to increase in the Honolulu area. Using an average growth of 0.57% per year based on Hali 2005 estimates (Kapalama screenline)* and extrapolating out to year 2015, a 12.7% increase in traffic is calculated. This increase in traffic would change the morning peak hour condition at the four-way stop at Bernice Street and Kapalama Avenue to Level of Service D. While conditions at the signalized intersection of Bernice Street and Houghtailing Street will remain at under capacity, over capacity conditions would describe the morning peak hour at the intersection of Kapalama Avenue and School Street. Mitigative measures, while not identified here, may be needed at this intersection.

Exhibit 2 of Appendix B illustrates the distribution of future (2015) traffic at the intersection of Bernice Street and Kapalama Avenue without the Museum expansion.

Proposed Project

The first phase of the proposed development at the Bishop Museum site includes construction of a new 50,000 square foot Bishop Science Center, the addition of new collection storage areas, and the demolition of 10,000 square feet of existing building area. Full development will also include renovation of existing buildings, and additional exhibit areas and office space. As part of the Development Plan, additional parking will be provided as adjacent properties currently leased for single-family residences are returned to the museum, for a total of 560 cars (for the first phase of development, parking for 380 cars will be provided).

The Bishop Museum has made projections of future annual visitation with the development described above. Total site visits are projected to increase from the present 379,074 per year (1993) to 469,152. This increase in annual visitation of 23.76% has been assumed to result in a similar increase in site traffic generation and parking needs for visitors.

Employment at the site, however, is not expected to increase. At present, many employees are researchers on contract for specialized work doing archaeological studies related to ongoing highway construction projects. The museum does not expect this work to continue; total employment at the site, therefore, could be at levels lower than today.

* Preliminary projections for the update of the Oahu Regional Transportation Plan, released September 22, 1994, forecasted Kapalama screenline vehicle trips increasing at a rate of 0.56% per year between 1990 and 2020 (base case).

Traffic Impacts

The increase in site traffic due to the proposed project would only be due to increased visitation; future traffic due to employees is expected to be unchanged from the existing. Exhibit 3 of Appendix B shows future traffic volumes at the intersection of Bernice Street and Kapalama Avenue.

As indicated in Exhibit 3, the proposed project would have no effect on traffic conditions during the morning peak hour; while some of the traffic is due to museum employees, this traffic is not expected to be any greater than existing. During the afternoon peak hour, the increased visitation would result in a very small increase in traffic. The increase visitation would have noticeable impacts on traffic volumes between the peak periods, when total traffic volumes are substantially less than during the peak periods.

Analyses of peak hour conditions confirm minimal impact due to the proposed development. As indicated earlier, morning peak hour conditions at the signalized intersection of Kapalama Avenue and School Street may need improvements to mitigate projected over capacity conditions; however, the proposed project is not expected to have any impact to traffic volumes during this time. Traffic impacts beyond the study area are expected to be less than at the intersections listed. The results of the traffic analyses are shown in Table 1.

Table 1
INTERSECTION CONDITIONS

	AM Peak Hour		PM Peak Hour		
	1994	2015 *+	1994	2015 *	2015 +
4-way stop intersection:					
Bernice Street and Kapalama Avenue					
average delay (seconds)	14	20	6	8	8
Intersection LOS	C	D	B	B	B
Signalized intersection:					
Bernice Street and Houghtailing Street					
sum of critical movements	947	1,067	948	1,133	1,137
condition: --- capacity	under	under	under	under	under
Signalized intersection:					
Kapalama Avenue and School Street					
sum of critical movements	1,283	1,445	1,031	1,163	1,167
condition: --- capacity	near	over	under	under	under

* without proposed project + with proposed project

The additional parking spaces would represent an increase of 120% over the existing 255 spaces on the site. For a Family Sunday, with no use of lawn areas for parking, on-site parking would ultimately increase from the present 300 cars to 560 cars; the total number of cars accommodated on site throughout the day is estimated to increase from the present 1,000 to 1,870, which is approximately 80 percent of the total visitor vehicles now attracted on an average Family Sunday. As a result, off-site future parking demands would be less than existing.

With Family Sunday visits remaining the same as existing, as projected by the Bishop Museum, the increased parking provided on site would be able to accommodate most of the parking demand on a Family Sunday. Continued use of Kapalama Elementary School to supplement parking on site will ease parking demands elsewhere in the neighborhood, as illustrated below:

<u>existing</u>	<u>Phase 1</u>	<u>Ultimate</u>	
300*	380	560	on site parking available for public use
1,000	1,270	1,870	on site (daily total)
1,000	1,000	470	at Kapalama Elementary School
<u>340</u>	<u>70</u>	<u>0</u>	elsewhere in the neighborhood
2,340	2,340	2,340	total daily cars (Family Sunday)

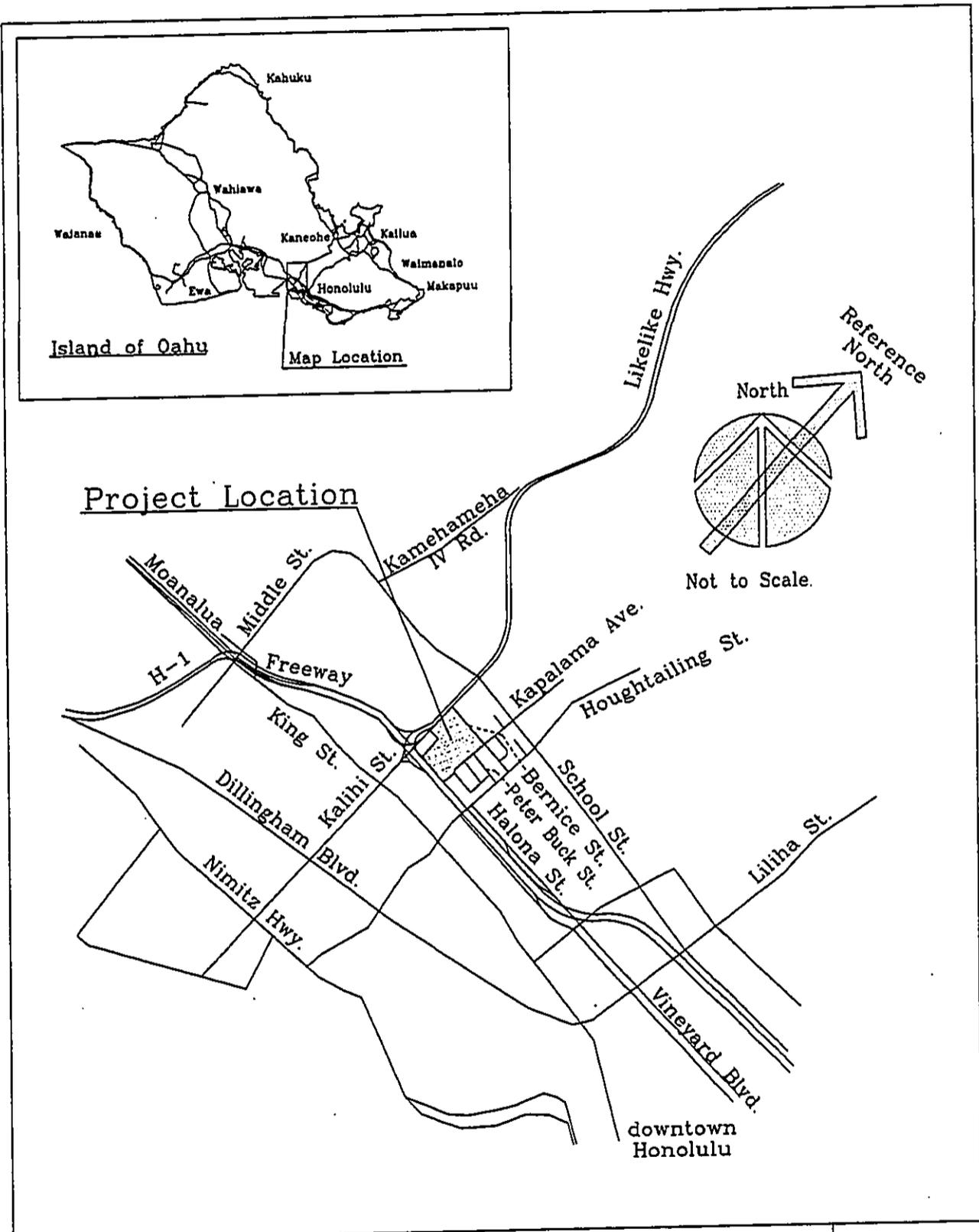
* with use of lawn areas

Conclusions

The proposed implementation of the Development Plan for the Bishop Museum would increase site traffic. However, the increased traffic would occur primarily during midday hours when traffic conditions are not as critical as during morning and afternoon peak periods. The proposed project is not expected to affect morning peak hour traffic conditions; a small increase in afternoon peak hour traffic would not significantly change conditions, which would continue to remain within acceptable ranges.

Because the proposed development is not expected to increase visitation on Family Sunday, traffic impacts due to these monthly events would be minimal. The proposed development, however, would increase the number of parking spaces on the site, thereby easing parking impacts in the neighborhood.

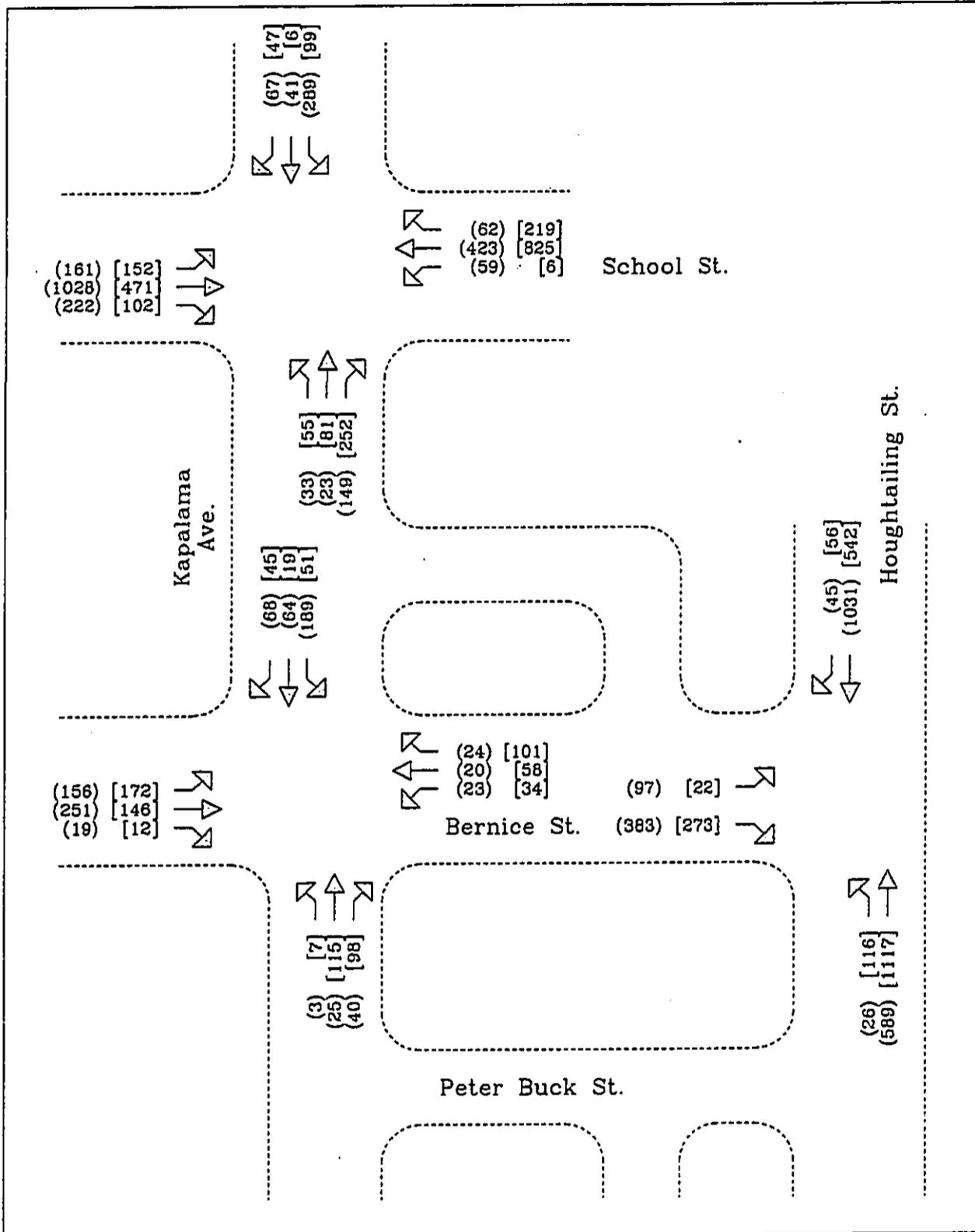
10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100



Traffic Assessment Report Bishop Museum Rezoning	Project Location Map	Figure 1
Prepared for: Media Five, Ltd. Prepared by: Julian Ng, Inc.		Not to Scale November 1994

FIGURES.SKD 11/04/94

FIGURES.SKD 11/04/94



Traffic Assessment Report
Bishop Museum Rezoning

Traffic Assignment
Existing (1994)

Figure

2

Prepared for: Media Five, Ltd.
Prepared by: Julian Ng, Inc.

Not to Scale
November 1994

APPENDIX A - LEVELS OF SERVICE

A qualitative measure used by traffic engineers to describe traffic operational conditions is the level of service (LOS). Six levels have been defined, from LOS A (best operating condition) to LOS F (worst). The *Highway Capacity Manual* describes analysis procedures for different types of facilities.

A Level of service for each approach at an all-way stop controlled intersection is based on estimated average vehicle delays based on volumes on the other approaches. An overall average delay for the intersection is calculated to derive an overall intersection Level of Service. The criteria for levels of service are:

Level of Service	<u>Average Stopped Delay Seconds/vehicle</u>
A	< 5
B	5 - 10
C	10 - 20
D	20 - 30
E	30 - 45
F	> 45

At signalized intersections, a planning analysis based on the number of lanes and turning movements sums the critical conflicting movements to identify the general condition of the intersection relative to capacity. Under capacity conditions indicate adequate laneage; near capacity findings indicates some congestion and a possible need for improvements, while over capacity conditions show a probable need for improvement. The following criteria is used to determine the intersection condition:

<u>Sum of Conflicting Movements</u>	<u>Brief Description of Intersection Condition</u>
≤ 1,200	under capacity
1,201 - 1,400	near capacity
> 1,400	over capacity

References: Transportation Research Board, Transportation Research Circular 373, *Interim Materials on Unsignalized Intersection Capacity*, July 1991.

Transportation Research Board, National Research Council, *Highway Capacity Manual*, Special Report 209, Washington, D.C., 1985.

Appendix B - Simulation of Museum Site Traffic

Traffic count data	January 1994 DTS counts				total 4 way stop	Museum Traffic											
	Bernice St./Kapalama Ave.					Employees				Visitors (weekday)				park occ	Site Traffic		
	WB	EB	NB	SB		In	Out	total	onsite	In	Out	total	onsite		Total	In	Out
12:00 AM - 12:30 AM	9	16	2	3	30										0	0	0
12:30 AM - 01:00 AM	2	11	5	4	22										0	0	0
01:00 AM - 01:30 AM	6	6	3	0	15										0	0	0
01:30 AM - 02:00 AM	2	6	1	2	11										0	0	0
02:00 AM - 02:30 AM	2	7	0	0	9										0	0	0
02:30 AM - 03:00 AM	2	9	3	0	14										0	0	0
03:00 AM - 03:30 AM	4	2	1	2	9										0	0	0
03:30 AM - 04:00 AM	2	10	0	1	13										0	0	0
04:00 AM - 04:30 AM	5	16	0	2	23										0	0	0
04:30 AM - 05:00 AM	0	28	2	3	33										0	0	0
05:00 AM - 05:30 AM	5	58	2	11	76										0	0	0
05:30 AM - 06:00 AM	16	103	7	40	166	6		6	6					6	6	0	
06:00 AM - 06:30 AM	20	146	18	70	254	6		6	12					6	6	0	
06:30 AM - 07:00 AM	21	180	25	123	349	6		6	18					6	6	0	
07:00 AM - 07:30 AM	44	233	41	188	506	24		24	42					24	24	0	
07:30 AM - 08:00 AM	46	240	36	239	561	30		30	72					30	30	0	
08:00 AM - 08:30 AM	41	152	23	98	314	30		30	102					30	30	0	
08:30 AM - 09:00 AM	51	103	19	49	222	18		18	120	8	0	8	8	6%	26	26	0
09:00 AM - 09:30 AM	46	120	25	60	251				120	26	0	26	34	25%	26	26	0
09:30 AM - 10:00 AM	43	94	17	50	204				120	39	1	40	73	53%	40	39	1
10:00 AM - 10:30 AM	45	93	19	48	205				120	26	4	30	95	70%	30	26	4
10:30 AM - 11:00 AM	53	98	12	40	203				120	26	12	38	109	80%	38	26	12
11:00 AM - 11:30 AM	42	100	17	37	196				120	26	23	49	117	82%	49	26	23
11:30 AM - 12:00 PM	51	108	25	40	224				120	39	30	69	121	89%	69	39	30
12:00 PM - 12:30 PM	42	122	26	53	243				120	13	29	42	105	77%	42	13	29
12:30 PM - 01:00 PM	45	123	37	54	259				120	13	28	41	90	66%	41	13	28
01:00 PM - 01:30 PM	57	117	28	40	242				120	13	28	41	75	55%	41	13	28
01:30 PM - 02:00 PM	43	112	32	40	227				120	13	27	40	61	45%	40	13	27
02:00 PM - 02:30 PM	46	178	35	72	331				120	13	20	33	54	39%	33	13	20
02:30 PM - 03:00 PM	57	160	40	66	323				120	5	15	20	44	32%	20	5	15
03:00 PM - 03:30 PM	48	162	46	53	309		6	6	114		13	13	31	23%	19	0	19
03:30 PM - 04:00 PM	69	198	97	58	422		6	6	108		13	13	19	14%	19	0	19
04:00 PM - 04:30 PM	74	196	97	59	426		6	6	102		10	10	8	6%	16	0	16
04:30 PM - 05:00 PM	82	170	124	61	437		24	24	78		6	6	2	2%	30	0	30
05:00 PM - 05:30 PM	105	150	89	51	395		30	30	48		2	2	0	0%	32	0	32
05:30 PM - 06:00 PM	81	136	57	42	316		30	30	18					30	0	30	
06:00 PM - 06:30 PM	64	137	52	44	297		18	18	0					18	0	18	
06:30 PM - 07:00 PM	83	110	39	32	264				0					0	0	0	
07:00 PM - 07:30 PM	71	89	27	21	208				0					0	0	0	
07:30 PM - 08:00 PM	38	50	11	26	125									0	0	0	
08:00 PM - 08:30 PM	37	56	7	18	118									0	0	0	
08:30 PM - 09:00 PM	25	56	8	12	101									0	0	0	
09:00 PM - 09:30 PM	40	55	12	11	118									0	0	0	
09:30 PM - 10:00 PM	12	35	9	13	69									0	0	0	
10:00 PM - 10:30 PM	20	91	9	9	129									0	0	0	
10:30 PM - 11:00 PM	5	52	3	9	69									0	0	0	
11:00 PM - 11:30 PM	9	24	7	2	42									0	0	0	
11:30 PM - 12:00 AM	11	29	2	4	46									0	0	0	
TOTAL	1,722	4,547	1,197	1,960	9,426	120	120	240		260	260	520		760	380	380	

▨ peak traffic hours

Exhibit 1 - Existing Traffic (1994)

Traffic at Bernice St./Kapalama Ave.
Total vehicles per half hour

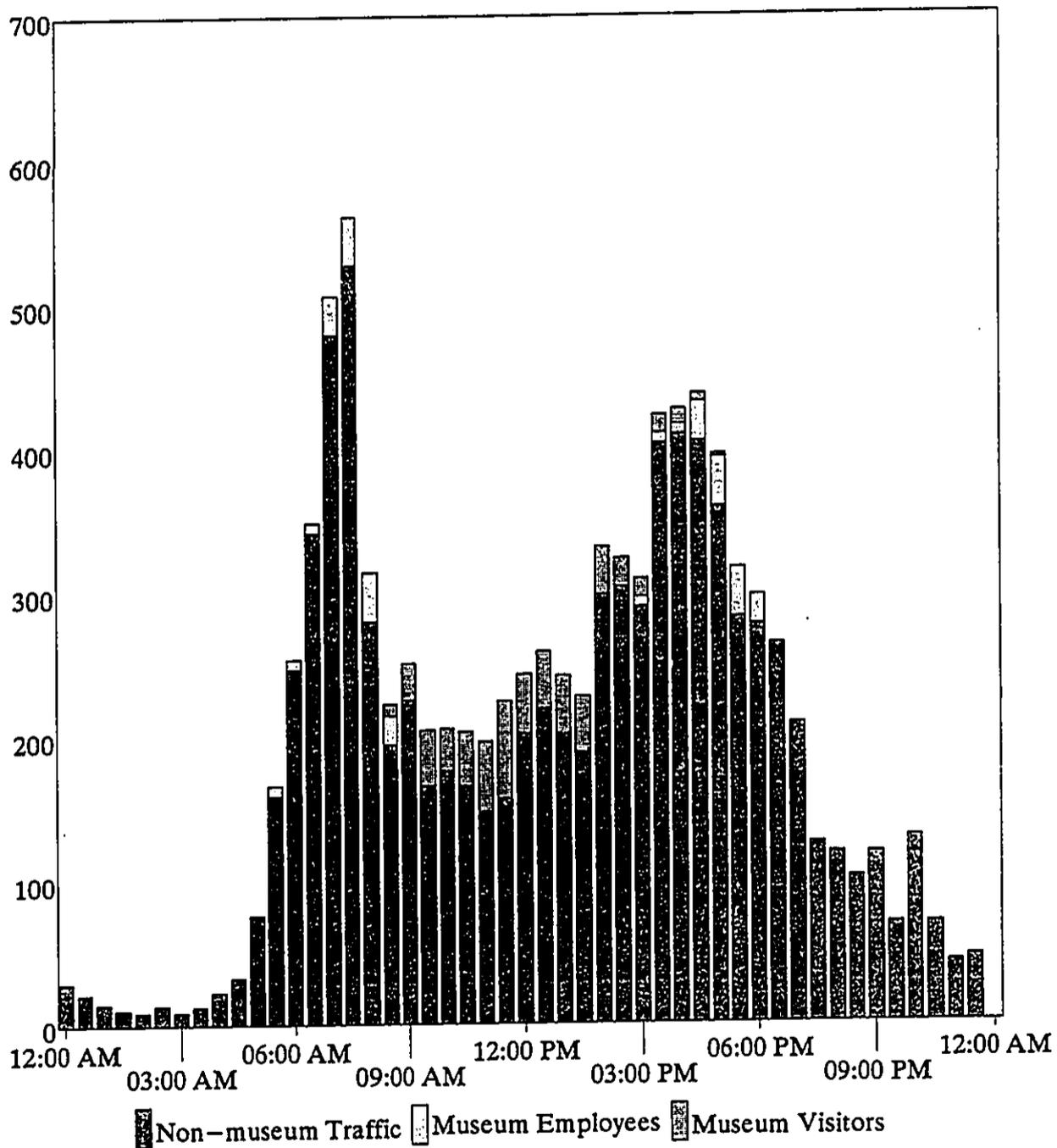
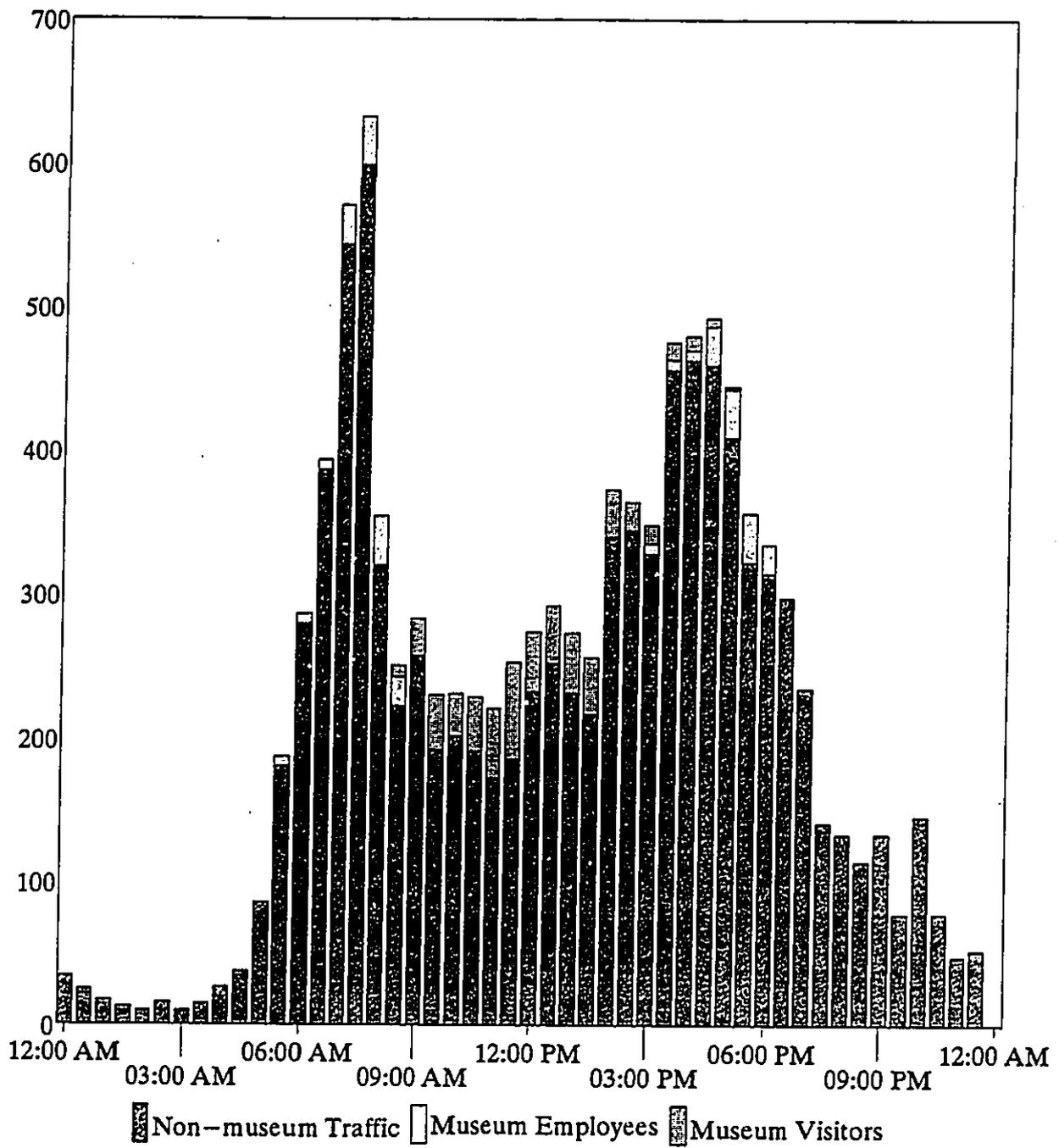


Exhibit 2 – Future Traffic without Museum expansion (2015)

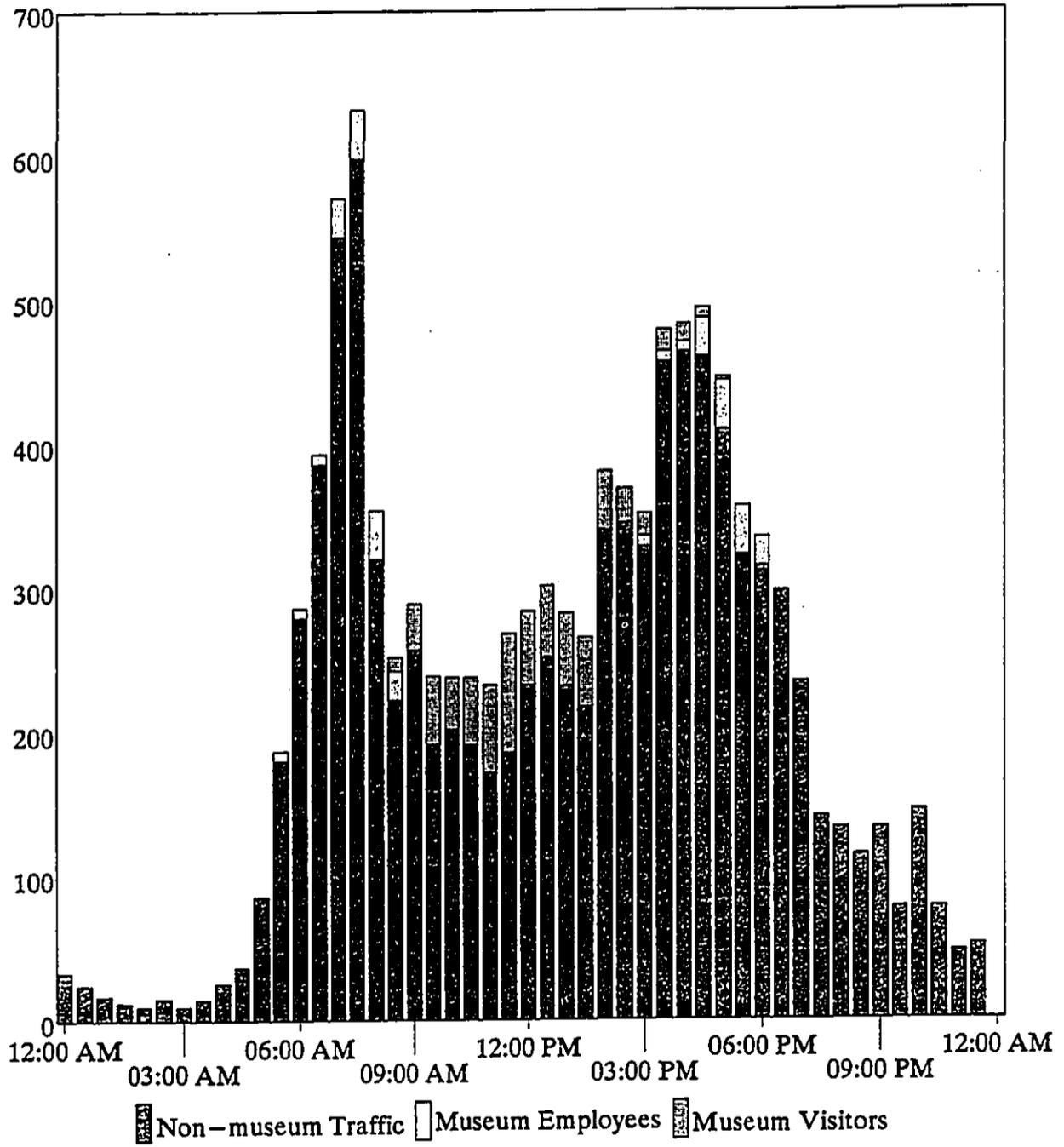
Traffic at Bernice St./Kapalama Ave.
Total vehicles per half hour



Factors applied: 1.1268 1.0000 1.0000 (to 1994 volumes)

Exhibit 3 – Future Traffic with Museum expansion (2015)

Traffic at Bernice St./Kapalama Ave.
Total vehicles per half hour



Factors applied: 1.1268 1.0000 1.2376 (to 1994 volumes)

34. INVOLVEMENT OF ANOTHER FEDERAL AGENCY

The Museum has four endangered plant species growing on campus (see page 25). The Museum's Assistant Director for Research, Dr. Allen Allison, was designated as the non-federal representative for the purpose of consulting with other federal agencies. A Section 7 consultation under the Endangered Species Act was successfully concluded with the U.S. Fish and Wildlife Service on 4 August 1994 (see page 39).

Section 106 of the Historic Preservation Act requires a public hearing on any action in which funding from a federal agency will affect historic preservation. Dr. Allen Allison has been designated by the Department of Energy as the non-federal representative to represent the Science Learning Center project on this matter. A memorandum of agreement to mitigate the effects of demolition of Dorm D, the only historic structure affected by construction of the Science Learning Center, is expected to be finalized and signed by the Museum and relevant government agencies by May 1995.

No other consultation with federal agencies is required.

35. ACTION OF A STATE AGENCY (NEPA Type law)

The Museum is in contact with all appropriate state, and City and County of Honolulu agencies including the Department of Lands and Natural Resources (endangered species, historic preservation), the Office of State Planning (Coastal Zone Management Act), the Board of Water Supply, Department of Wastewater Management, and the Department of Land Utilization regarding the Science Learning Center project.

36. PUBLIC UTILITIES SERVICES

Sewage:

The Museum has consulted extensively with the Department of Wastewater Management (DWWM), City and County of Honolulu. The existing municipal wastewater facilities are inadequate but there is no long term projected increase in sewage from the Science Learning Center project (see page 91) and if necessary mitigative measures can be worked out to accommodate short-term effects.

Water:

The proposed Bishop Museum master plan is projected to increase daily water usage by 4,931 gallons. This increase will be offset by the eventual removal of nineteen homes along Bernice Street and Kapalama Avenue. The net result is no new water demand.

The existing water system serving the Museum campus is more than 60 years old but is adequate to meet the Museum's water needs including fire protection. If required by the Board of Water Supply, the Museum will prepare a Water Master Plan.

Electrical:

The Museum's electrical service was upgraded in December 1991 (2000 A @ 480V). The primary switch gear has 8 spares plus two blanks. Current demand is approximately 250 A. The spare capacity in this system is being reserved for upgrades planned for existing Museum buildings.

Power requirements for the new Science Learning Center are estimated to be 750 KVA based on a ca. 50,000 sq. ft. building and will require an additional transformer. The capacity limitations in the existing electrical switchboard and underground raceway distribution system will require that the new building be connected to a new 480V system. The local electrical grid has ample capacity.

37. DEPLETION OF NON-RENEWABLE RESOURCES

Not applicable.

Appendix 1: Qualifications of Museum Consultants

CURRICULUM VITAE

ALLEN ALLISON

Address:

Research and Scholarly Studies, Bishop Museum, P.O. Box 19000-A, Honolulu, Hawaii 96817. Office:
(808) 848-4145. Internet: allison@bishop.bishop.Hawaii.org.

Education:

B.Sc. (Zoology; high honors) University of California, Davis
Ph.D. (Zoology) University of California, Davis

Professional Appointments:

Teaching Assistant, University of California, Davis, 1972-1973
Research Fellow/Acting Manager, Wau Ecology Institute, Papua New Guinea, 1973-1975
Teaching Assistant/Teaching Fellow, University of California, Davis, 1976-1979
Assistant Director, Wau Ecology Institute, Papua New Guinea, 1979-1982
Director, Wau Ecology Institute, 1982-1983
Research Associate in Zoology, Bishop Museum, Honolulu, 1979-1983
Head, Division of Vertebrate Zoology, Bishop Museum, Honolulu, 1983-1985
Acting Chairman, Department of Zoology, Bishop Museum, Honolulu, 1983-1985
Chairman, Department of Zoology, Bishop Museum, Honolulu, 1985-1993
Acting Chairman, Department of Entomology, Bishop Museum, Honolulu, 1985-1986
Acting Assistant Director (Research), Bishop Museum, Honolulu, October 1990 - June 1991
Assistant Director (Research), Bishop Museum, Honolulu, July 1991 - present
Affiliate Graduate Faculty, Department of Zoology, University of Hawaii, 1987-Present
Affiliate Graduate Faculty, Ecology, Evolution and Conservation Biology Program, University of Hawaii,
1991-Present

Grants and Awards:

Graduate Research Award - Chancellor's Patent Fund.
Papua New Guinea Biological Foundation, Canberra, Australia.
Flora and Fauna Preservation Society, London, 1982.
Private Agencies Collaborating Together (PACT), New York, and International Voluntary Services,
Washington, D.C., 1980-1982.
Evangelische Zentralstelle für Entwicklungshilfe, West Germany, 1982-1983.
New Zealand Aid Programme, 1982-83.
University of California Research Expeditions Program co-PI with R.L. Rudd, 1983.
United State Peace Corps, Canadian University Studying Overseas (CUSO), Japanese Overseas Cooperative
Volunteers (JOCV), 1981-1984.
National Science Foundation-Biological Research Resources, 1983-1987
Institute of Museum Services (includes matching funds raised from the Cooke Foundation), 1987.
Yoshinaga Foundation, 1987.
Cooke Foundation.
New England Biolabs Foundation, Co-PI with Scott Miller, 1988-1990.
John D. and Catherine T. MacArthur Foundation.
National Science Foundation, Co-PI with Scott Miller.

Legislative Experience:

1992 Developed draft legislation for the Hawaii State Legislature designating Bishop Museum as
the Hawaii Biological Survey; worked with key legislators and a variety of interested
organizations to win passage of the resulting bill which became law almost exactly as drafted.

Editorial Experience:

Editor in Charge, Scientific Publications, Wau Ecology Institute, 1983–Present
Chair, Scientific Publications Committee, Bishop Museum, 1993–Present
Associate Editor, Pacific Conservation Biology, 1993–Present

Scientific Societies:

American Association for the Advancement of Science; American Society of Ichthyologists and Herpetologists; American Society of Mammalogists; Association for Tropical Biology; Australian Mammal Society; Cooper Ornithological Society; Herpetologists League; New Guinea Bird Society; Sigma Xi; Societas Europaea Herpetologica; Society for the Study of Amphibians and Reptiles

Service and Extramural Activities:

Wau Ecology Institute, Member, Board of Directors, 1983–Present, Scientific Advisor, 1983–Present
Editor in Charge - Publications Program, 1983–Present
Hawaii Audubon Society, Member, Board of Directors, 1985–1987, 1990–1992, Programs Chair, 1985–1988, Second Vice President, 1987, Grants and Scholarship Committee, 1986–1992
Hawaiian Academy of Science, Member, Board of Directors, 1987–1988, Secretary, 1987–1988
Hawaiian Malacological Society, Honorary Member, Board of Directors, 1987–Present
Honolulu Zoological Society, Member, Board of Directors, 1987–1993, Education Committee, 1987–1993
Pacific Science Association, Chairman, Scientific Committee on Museums and Related Institutions, 1987–Present, Co-Chair, Organizing Committee for Biodiversity Section, Seventeenth Pacific Science Congress, Honolulu, 1991, Organizer, Symposium on the Role of Museums in Biological Surveys, Task Force — Biological Survey of New Caledonia 1990–1993, Task Force—Biodiversity of the Pacific (includes New, Caledonia Biological Survey), Hawaiian Bat Advisory Committee, 1988–Present
Systematics Agenda 2000, Co-chair, Committee on Surveys and Inventories
Organization for Tropical Studies, Member, Board of Directors 1991–Present
Hawaii Conservation Biology Initiative, collaborative organization involving all major federal, state and private agencies in Hawaii concerned with biological diversity conservation, Secretariat — 1989–Present
American Institute of Biological Sciences, Local Organizing Committee— 1992 meeting in Honolulu
Association for Systematics Collections, Board of Directors — 1992–present
National Biological Survey, Systematics Resources Working Group

Field Experience:

Organized and led numerous research expeditions to remote regions throughout New Guinea, including one with more than 100 personnel. Have traveled widely and visited field sites and field stations throughout Australia, Pacific Basin, SE Asia, Asia, including Japan and India, Europe, North and South America.

ROBERT H. COWIE

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Education:

B.A. University of Cambridge, U.K., Natural Sciences.
M.A. University of Cambridge, U.K., Natural Sciences.
Ph.D. University of Liverpool, U.K., Zoology.

Professional Appointments:

1975-1982 Postgraduate research assistant, University of Liverpool, U.K.
1982-1985 Postdoctoral research fellow, University College London, U.K.
1985-1990 Head, Termite Ecology & Control Section, ODNRI, U.K.
1990-date Associate Malacologist, Bishop Museum, Honolulu

Award:

1982 Annual Award of the Malacological Society of London

Grant, Contracts, and Consultancies:

1990 Molecular-genetic, evolutionary and conservation studies on Hawaii's endemic tree snails. Hawaii Bishop Research Institute, Co-P.I.
1990 Phylogeny and speciation in the Neritacea. Hawaii Bishop Research Institute, Co-P.I.
1990 Baseline database and preliminary surveys of land snails in Natural Area Reserves. State of Hawaii, Co-P.I.
1991 Ampullariid freshwater snails in South East Asia. Visits to U.S. Mainland museums to study material and literature. FAO, P.I.
1992 Rehousing an essential land snail collection resource. NSF, P.I.
1992 Land snail survey of the Pohakuloa Training Area, Big Island, Hawaii. TNC Hawaii, P.I.
1992 Identification and analysis of land snail shells recovered from sink hole deposits in the West Beach area of Oahu. Paul H. Rosendahl, Ph.D., Inc., P.I.
1992 Surveys of the partulid snail fauna of American Samoa. USFWS. Consultant
1993 Surveys of Oahu tree snails. TNC Hawaii, P.I.
1994 Freshwater snail surveys in relation to eradication of apple snails with copper sulphate on Kauai. State of Hawaii, P.I.
1994 A survey of the snails, insects and related arthropods in the grounds of the Tripler Army Medical Center, Honolulu, Hawaii. R.M. Towill Corporation. Co-P.I.

Professional Organizations:

American Malacological Union, International Society for Medical and Applied Malacology, Hawaiian Malacological Society, Malacological Society of London, Conchological Society of Great Britain and Ireland, Mollusc Specialist Group of the Species Survival Commission of IUCN, Systematics Association, Genetical Society, British Ecological Society, Pacific Science Association, International Union for the Study of Social Insects (until 1990), International Isoptera Society

Service and Extramural Activities:

1979-1980 Assistant Editor, J. Conchol. and Conchol. Soc. Spec. Pubs.
1983-1986 Council, Malacological Society of London
1985-1988 Honorary research fellow, University College London, U.K.
1989 Editor, 1st Int. Symp. Fungus-growing Termites and the Tropical Environment
1990-date Editorial Assistant, Hawaiian Shell News
1991-date Affiliate Graduate Faculty, University of Hawaii
1991-date Board of Editors, Malacologia
1991-date Board of Reviewers, Malacol. Rev.
1991-date Board of Reviewers, J. Med. App. Malacol.
1992 Editor, The impact of alien species on island ecosystems

1992-date Board of Directors, Hawaiian Malacological Society
1993-date Member, Conservation Committee of the American Malacological Union
1993, 1994 President, Hawaiian Malacological Society
1994 Member, Mollusc Specialist Group of the Species Survival Commission of IUCN
1994 Editor, Tentacle, Newsletter of the IUCN/SSC Mollusc Specialist Group

NEAL L. EVENHUIS

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Education:

B.S. California State Polytechnic University, Pomona (Zoology/Entomology).
M.S. California State Polytechnic University, Pomona (Biology).
Ph.D. University of Hawaii, Manoa (Entomology).

Professional Appointments:

1972-1976 Scientific Illustrator, self employed.
1975-1976 Graduate Teaching Assistant, California State Polytechnic University, Pomona.
1976-1978 Scientific Illustrator, Bishop Museum.
1978-1990 Associate Entomologist, Bishop Museum.
1991-date Entomologist, Bishop Museum.
1994 Lecturer, Department of Entomology, University of Hawaii, Manoa.

Awards, Grants, and Contracts:

1981 Ehrhorn Fund, University of Hawaii, Manoa.
1984-1985 National Geographic Society, "Coevolution of *Trichostema lanceolatum* and its pollinator *Bombylius anthophoroides*."
1984 Distinguished Service Award, Hawaiian Entomological Society.
1985 Visiting Scientist Fellowship, Smithsonian Institution.
1985 Oberly Award Honorable Mention, for the book "An Indexed Bibliography of Bombyliidae," given by the American Library Association.
1986 Williston Research Fund, Smithsonian Institution.
1986 Distinguished Service to the Scientific Community, given by the International Biographical Centre, Cambridge, England.
1987-1989 National Science Foundation-funded, "Catalog of the Diptera of the Australasian and Oceanian Regions," (Scott E. Miller & Neal L. Evenhuis, Co-Principal Investigators).
1989 Canacoll Fellowship, Canadian National Collection
1989 Hermès Research Grant, "*Campsicnemus* of French Polynesia (Diptera: Dolichopodidae)". (with Dr. Daniel J. Bickel)
1989 Elected Fellow, Willi Hennig Society
1992 Thomas Say Award, presented by the Entomological Society of America
1994 Tripler Army Medical Center Invertebrate Survey, R.H. Towill Corp., Honolulu.
1994 *Megalagrion xanthomelas* survey and mitigation, W. Chee Planning Corp., Honolulu.
1994 Mt. Kaala invertebrate survey, NARS, State of Hawaii.

Professional Societies:

Entomological Society of Washington, Royal Entomological Society of London, Hawaiian Entomological Society, Society for the History of Natural History, Pacific Science Association, Willi Hennig Society.

Service and Extramural Activities:

President, Hawaiian Entomological Society (1994)
Editorial Board, *Micronesica* (1994-date)
Steering Committee, Database of World Diptera (1993-date)
Editorial Board, *International Journal of Dipterological Research* (1993-date)
Research Associate, Smithsonian Institution (1990-date)
Chair, Committee for Names of Diptera in Common use (ICZN liaison committee) (1990-date)
Nominating Committee, Hawaiian Entomological Society (1989-1992)
Cooperating Scientist, U.S. Department of Agriculture (1988-date)
Editorial Board, *Occasional Papers of the Bishop Museum* (1985-date)
Liaison Committee, Hawaiian Entomological Society (1985-1988)
Senior Editor, *International Journal of Entomology* (1985)
International Editorial Advisory Board, *Biosystematic Database — Catalog of Flies of the World* (1984-date)
Secretary, Hawaiian Entomological Society (1983-1984)
Co-editor, *International Journal of Entomology* (1982-1985)
Membership Committee, Hawaiian Entomological Society (1982-1984)
Associate Editor, *Pacific Insects Monographs* (1980-1986), *Pacific Insects* (1980-1982), *Insects of Micronesia* (1980-date).

Field Experience:

Extensive biological and collecting activities in the southwest United States and Mexico; collecting on all the main Hawaiian Islands; collecting and biological studies in Australia, Canada, South Africa, England, Netherlands, France, Hungary, and Slovakia.

DERRAL R. HERBST

Address:

U.S. Army Corps of Engineers, P.O.D., Hawaii.

Education:

B.Ed. University of Hawaii, Manoa.

Ph.D. University of Hawaii, Manoa.

Professional Appointments (1971-date):

Environmental Protection specialist, U.S. Army Corps of Engineers, Honolulu, 1992-date.

Supervisory botanist, U.S. Fish & Wildlife Service, Pacific Islands Office, Honolulu, 1977-1992.

Environmental Biologist, U.S. Army Engineer Division, Honolulu, 1976-1977.

Assistant Researcher, Harold L. Lyon Arboretum, Honolulu, 1973-1976.

Staff botanist, National tropical Botanical Garden, 1971-1973.

Professional Societies:

International Association for Plant Taxonomy, Sigma Xi, Hawaiian Botanical Society, American Society of Plant Taxonomists, Economic Botany society, Association of Pacific Systematists.

Service and Extramural Activities:

Consultant for Time-Life Books, *The American Wilderness, Hawaii*; the Honolulu Botanic Gardens; and the Waimea Arboretum. Advisor for NSF Student-oriented Studies Program for the Waihoi Valley and the Hana Forest Reserve projects. Taxonomist for McIntire-Stennis project 674: an ordination of natural forest communities on the island of Hawaii. completed numerous botanical surveys for environmental impact statements, natural areas management plans, and others. President, Vice-president, Treasurer, and director of Hawaiian Botanical society, and Trustee of the Society's Neal-Miller Fund. Member or past-member of the Natural Areas Reserve System commission, Moanalua Garden Foundation Board of Directors, State Technical Advisory Committee on Noxious Weeds, North American Plant Specialist group of the species survival Commission for North America, international Union for Conservation of Nature and Natural Resources (IUCN), Scientific Advisory Committee and Plant Advisory Group of The Nature conservancy of Hawaii, Hawaii Council of Botanical Gardens and Arboreta, center for Plant Conservation's Priority Region Task force for Hawaii, Honolulu Botanic Gardens Collections Advisory Committee, and others.

Field Experience:

Guam, Philippines, Hawaiian Islands (including the northwestern Hawaiian chain), Gilbert, Marianas, Caroline, Marshall, northern Line and Samoan islands.

CLYDE T. IMADA

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Education:

B.A. University of Hawai'i at Manoa, Geography.
B.S. UH Manoa, Horticultural Technology.

Professional Appointments:

1988–date Research Assistant III, Department of Botany, Bernice P. Bishop Museum.
1987–1988 Collections Technician, Department of Botany, Bernice P. Bishop Museum.
1984–1986 Collections Assistant, Department of Botany, Bernice P. Bishop Museum.
1983–1984 Gardener, Greg Boyer Hawaiian Landscapes, Kahalu'u, O'ahu.
1982–1983 Laboratory & Field Assistant, Department of Horticulture, University of Hawaii at Manoa, Honolulu, Hawai'i.

Field Experience:

Extensive botanizing and plant collecting on Kaua'i, O'ahu, Moloka'i, Maui, and Hawai'i, 1974–present.
Field botanist with Char & Associates, 1985–present, assisting on botanical surveys for environmental assessments (11 projects in 1990 in Kaua'i, O'ahu, Moloka'i, and Hawai'i. Field assistant, Guam, golf course assessment, August 1990; 'Eua, Tonga, vegetation assessment for proposed national park, June 1990; 'Eua, Tongatapu, and Vava'u, Tonga, ethnobotanical studies, July 1988; Ta'u, American Samoa, vegetation assessment, January 1991.
Botanist, The Nature Conservancy Kamakou Preserve Annual Botanical Survey, Moloka'i, summer 1985, 1986, 1987.
Field assistant, Bishop Museum Botany Dept. plant collecting trips to Kaua'i, Maui, and Hawai'i, March–April 1988; botanist on Bishop Museum surveys for Mo'omomi sand-mining project (Moloka'i, 1987), Puna District 69 KV transmission corridor (Hawai'i, 1987), Kalihi Valley pipeline and reservoir survey (O'ahu, 1988), vegetation assessment for Greenwell Ethnobotanical Garden (Kealakekua, Hawai'i, 1990), Halawa Valley Botanical Assessment (O'ahu, 1994).
Trail guide: Bishop Museum, Lyon Arboretum, Hawai'i Nature Center.

PAUL CHRISTIAAN KLIEGER

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Education:

B.A. Anthropology	University of Montana, Missoula.
M.A. Asian Religions	University of Hawaii, Honolulu.
M.A. Anthropology	University of Hawaii, Honolulu.
Ph.D. Anthropology	University of Hawaii, Honolulu.

Professional Appointments:

1991-date	Associate Anthropologist, Anthropology Department, Bishop Museum, Honolulu, Hawai'i.
1990-1991	Regional Director (Montana), Tibetan-U.S. Resettlement Project.
1990-1991	Consultant--U.S. Tibet Committee, Regional Office, Missoula, Montana.
1990	Acting director, Tibetan Buddhist and Cultural Center, Missoula, Montana.
1989	Visiting Lecturer--anthropology, University of Pittsburgh, Pittsburgh.
1988	Lecturer, Department of Anthropology, University of Hawaii, Honolulu.
1985-1988	Anthropology lecturer, Department of Behavioral Sciences, Chaminade University, Honolulu.

Grants, Fellowships, and Contracts:

Native Hawaiian Culture and Arts Program/National Park Service grant, 1994.
County of Maui, Lahaina Restoration Foundation Research Contract, 1992-1994.
G.S.O. Travel Grant 1988.
Sigma Xi Grant-in-Aid Fellowship 1987-1988.
Pacific-Asian Scholarship, University of Hawaii 1985-1986.
Graduate Division Scholarship, UH 1987-1988.

Field Experience:

Archaeological and ethnohistory studies in Hawaii, India, China (Tibet), Nepal, and western United States.

SCOTT EVERETT MILLER

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scottm@bishop.bishop.hawaii.org.

Education:
B.A. Biology University of California, Santa Barbara.
Ph.D. Biology Harvard University, Cambridge, Massachusetts.

Professional Appointments:
1993-date Chairman, Department of Natural Science, Bishop Museum, Honolulu, Hawaii.
1986-1993 Chairman, Department of Entomology, Bishop Museum, Honolulu, Hawaii.
1987-1994 Acting Assistant Director for Research, Bishop Museum, Honolulu, Hawaii, 1-2 months annually.
1987-date Affiliate Graduate Faculty, Dept. of Entomology, University of Hawaii, Honolulu.
1987-date Research Associate, National Museum of Natural History, Smithsonian Inst., Wash., DC.
1983-1987 Collaborator, National Museum of Natural History, Smithsonian Inst., Wash., DC.
1978-date Research Associate, Santa Barbara Museum of Natural History, Santa Barbara, CA.
1975-1978 Staff Associate, Santa Barbara Museum of Natural History, Santa Barbara, CA.
1977-date Research Associate, Natural History Museum of Los Angeles County, Los Angeles, CA.

Grants, Fellowships and Contracts:
National Science Foundation (NSF), Curatorial Support Grants,
DEB 9423814 (PI 1995-1997) [entomology]
BSR 8913871 and supplements (PI 1990-1994) [entomology]
BSR 8912364 and supplement (PI 1993-1994) [botany]
BSR 8706426 (PI 1987-1989) [entomology]
BSR 8511669 (PI 1986-1987) [entomology]
NSF, Ecology Grant, DEB 9407297 (PI 1994-1996)
Hawaii Bishop Research Institute grant (1990-1991)
The Nature Conservancy, Santa Cruz Island Research Fund, 1989
New England Biolabs Foundation, New Guinea canopy insects, 1989
NSF, Catalog of Diptera of Australasian and Oceanic Regions,
BSR 8313189 (PI 1988-1989)
MacArthur Foundation, Hawaii Invertebrate Survey Pilot, 1987-1988
New England Biolabs Foundation, New Guinea canopy insects, 1987
Space Biospheres Ventures, insect ecology contract, 1986- date
Smithsonian Institution, Graduate Student Fellowship, 1984
NSF, Dissertation Improvement Grant, 1984
Bache Fund Grant, National Academy of Sciences, 1983
Harvard University, Graduate Fellowship, 1981-1986
American Philosophical Society Grant, 1979
Smithsonian Institution, Short-term visitor grant, 1979

Field Experience:
Brazil; British Virgin Islands; Costa Rica; Hawaii; Malaysia; Mexico; North America, especially California; Papua New Guinea; Peoples Republic of China.

ROBERT L. PYLE

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Education:

Swarthmore College

New York University - B.S. (Meteorology)

University of California, Los Angeles - M.A. (Meteorology)

University of Washington, Seattle - Ph.D. (Meteorology)

Professional Appointments:

- | | |
|-----------|---|
| 1984-date | Curatorial Assistant for Birds, Department of Natural Sciences (Zoology section), Bishop Museum, Honolulu, HI. [Additional 40% time (volunteer) devoted to data collection and research on Occurrence and Status of Birds in Hawaii.] |
| 1975-1984 | Manager, Satellite Field Services Station, National Oceanographic and Atmospheric Administration, U.S. Department of Commerce, at Honolulu Airport. |
| 1960-1975 | Technical Assistant to the Director, National Environmental Satellite Service, Washington, DC. |
| 1966-1969 | Field Director, Pacific Ocean Biological Survey Program, U.S. Smithsonian Institution, in Honolulu. |

Other Experience:

Bird watching and bird study since 1940.

Active member of Hawaii Audubon Society: President in 1955, 1977, and 1983, and have held other offices during periods of residence in Hawaii. Active in other Audubon Societies when located elsewhere.

Active bird-bander since 1950. Participating currently with Dr. O.W. Johnson in banding study of Lesser Golden Plovers wintering in Hawaii.

Consultant and coordinator for Hawaiian Islands region for the American Ornithologists' Union "Check-List Committee" during preparation of 6th Edition (1983), which incorporated Hawaiian Islands for the first time.

TRACY LEO TAM SING

Address:
Department of Anthropology, University of Hawaii, Honolulu, Hawaii 96822. Office: (808) 422-4425

Education:
currently Anthropology Major, University of Hawaii, Honolulu.

Professional Appointments:

1993-date	
1994	Field Assistant, Department of Anthropology, Bishop Museum, Honolulu.
	Teacher's Assistant, Field School, Department of Anthropology, University of Hawaii, Honolulu
1993	Field Director, Department of Anthropology and Geology, Chaminade University, Honolulu
1993	Mapping Supervisor, Department of Anthropology and Geology, Chaminade University, Honolulu
1993	Excavation Crew Member, Department of Anthropology, Bishop Museum, Honolulu.
1992	Excavation Crew Member, State Historic Preservation Division, Hawaii State Department of Land and Natural Resources, Honolulu
1992	Excavation Crew Member, Department of Anthropology, Bishop Museum, Honolulu.