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MARK YONAMINE, P.E.
DIRECTOR

HAKU MILLES, P.E.
DEPUTY DIRECTOR

807720

March 20, 2020

MEMORANDUM

TO: RECORD

FROM: DEPARTMENT OF DESIGN AND CONSTRUCTION

SUBJECT: **DETERMINATION OF COMPLIANCE WITH CHAPTER 343, HRS FOR PROPOSED COASTAL WETLANDS AVIARY AT THE HONOLULU ZOO – PORTION OF TAX MAP KEY: [3] 1-043:001**

Project Title: Honolulu Zoo Hawaii Islands Exhibit (Phase I) Wetlands Aviary

The Department of Design and Construction (DDC) is planning to implement site improvements at the Honolulu Zoo, as proposed in the Honolulu Zoo Master Plan. The proposed action is to construct a "*Coastal Wetlands Aviary*" as an updated design for the previously proposed "*Hawai'i Biome*" project. The new design is intended to reflect modern priorities of the Zoo's education, conservation, and animal welfare programs by highlighting unique features of Hawaiian topography, landscape, and culture.

A portion of the proposed project site falls within the Special Management Area, and therefore require compliance with Chapter 343, Hawaii Revised Statutes (HRS). An Environmental Assessment (EA) was prepared for the Honolulu Zoo Master Plan in 2000 and was issued a Findings of No Significant Impact for all proposed site improvements within the Honolulu Zoo. The enclosed memorandum and supporting documents have been prepared by Belt Collins Hawaii on behalf of DDC to discuss the proposed action's consistency with the Honolulu Zoo Master Plan and Environmental Assessment. The memorandum also addresses potential impacts of climate change that were not previously discussed in the EA.

Pursuant to the discussion provided in this memorandum, titled "Determination of Compliance with Chapter 343, Hawaii Revised Statutes", DDC has determined that the proposed action is consistent with the existing Findings of No Significant Impact (FONSI), and therefore may proceed without further Chapter 343, HRS, environmental review [§11-200.1-11, Hawaii Administrative Rules (HAR)].

FOR Mark Yonamine, P.E., Director
Department of Design and Construction

Date: MAR 19 2020

MY:ln

cc: Belt Collins Hawaii
Department of Enterprise Services

Enclosures (7)

Memorandum: "Determination of Compliance with Chapter 343, Hawai'i Revised Statutes"
Appendix A – The Updated Honolulu Zoo Master Plan (Excerpt)
Appendix B – Coastal Wetlands Aviary Concept Plans
Appendix C – Environmental Assessment for Honolulu Zoo Master Plan
Appendix D – Draft Archaeological Literature Review and Field Inspection Report
Appendix E – "Honolulu Zoo Master Plan 2019" Priorities Update
Appendix F – FEA / FONSI, Environmental Notice Publication

MEMORANDUM

TO:	FROM:
ATTN: John Condrey, Project Manager Mark Yonamine, P.E., Director Department of Design and Construction	Crystal Rogers, Planner Belt Collins Hawai‘i
COMPANY:	DATE:
City and County of Honolulu	February 24, 2020
SUBJECT:	JOB NUMBER/REFERENCE NUMBER:
Determination of Compliance with Chapter 343, HRS for the Honolulu Zoo “*Coastal Wetlands Aviary*” Portion of Tax Map Key: [3] 1-043:001	2019710100

DETERMINATION OF COMPLIANCE WITH CHAPTER 343, HAWAI‘I REVISED STATUTES
FOR THE HONOLULU ZOO “COASTAL WETLANDS AVIARY”
PORTION OF TAX MAP KEY: [3] 1-043:001

INTRODUCTION

In 1984, the City and County of Honolulu (CCH) developed the first Master Plan for the Honolulu Zoo to be used as a resource for both daily and long-term decision making; the overarching goal was to “broaden the recreational and educational experience encountered by visitors and expand the on-site breeding and research facilities.” The Master Plan included three new exhibits, the *Hawai‘i Biome*, *Tropical Forest Biome*, and *Tropical Islands Biome*, with the purpose to immerse visitors within a unique experience of Hawaii’s native flora and fauna. In 2000, an Environmental Assessment (EA) was prepared to evaluate the potential impacts of site improvements proposed within the Honolulu Zoo (Figure 1: Tax Key Map). The three “Biomes” were included in this assessment. Specific details were provided for the *Tropical Forest Biome*, while the *Hawai‘i Biome* and *Tropical Islands Biome* remained conceptual. The EA concluded that no significant adverse impacts were anticipated.

The Honolulu Zoo has since undergone multiple shifts in administration that have impacted the prioritization of funding and scheduling for Master Plan site improvements. In result, Zoo improvements are being updated over time to reflect new administrative goals and improved standards for animal management. The Proposed Action is intended to reflect new priorities of the Zoo’s education, conservation, and animal welfare programs (Appendix A). The purpose of this statement is to introduce the updated design for the *Hawai‘i Biome* concept and confirm its consistency with the existing EA.

PROPOSED ACTION

The CCH Department of Design and Construction (DDC) has secured funding to develop a *Coastal Wetlands Aviary* as an updated design for the *Hawai'i Biome* concept described in the Honolulu Zoo Master Plan. The *Coastal Wetlands Aviary* will be constructed as "Phase One" of a three-phase exhibit called the *Honolulu Zoo: Hawai'i Islands Exhibit* (Figure 2: Project Site). "Phase Two" and "Phase Three" are future projects that will consist of a *Mountain Rainforest Aviary* and *Dry Forest & Grassland Aviary*, respectively. The uniting theme, "We ARE Hawai'i," will highlight unique features of Hawaiian topography, landscape, and culture through the display of native flora and fauna.

The Proposed Action is to initiate construction of the *Coastal Wetlands Aviary*. "Phase Two" and "Phase Three" are concepts for future consideration and are not being evaluated as part of the Proposed Action.

CONSISTENCY WITH THE HONOLULU ZOO MASTER PLAN

The *Coastal Wetlands Aviary* is proposed as an updated design for the *Hawai'i Biome* project in the Honolulu Zoo Master Plan. The objectives of this project are to introduce visitors to tropical ecosystems, environmental education, and discovery themes encountered during their Zoo experience as a "gateway" exhibit to the Honolulu Zoo. Although the design has evolved, the proposed project maintains consistency with the objectives and impacts previously proposed for the *Hawai'i Biome*.

The *Hawai'i Biome* was described as "an ahupua'a, [that] will take the visitor uphill through a series of microhabitat gardens and back down through a lava tube to brackish marshes and an 'ōhi'a rain forest. The visitor will leave Hawaii's 'ōhi'a rain forest through a cave leading to the next geographic region." The exhibit was intended to "largely consist of birds and insects, as there are few mammals or reptiles native to the islands."

Similarly, the *Coastal Wetlands Aviary* is designed to take visitors along an enclosed boardwalk featuring a series of water systems, observation platforms, and educational stations that highlight the unique flora and fauna of a Hawaii's wetland ecosystems. Upon entering the enclosure, visitors will begin their journey up to an "Aviary Overlook" for a "bird's-eye" view of the coastal wetland habitat. After leaving the platform, visitors will have the opportunity to descend a "Lava Slide" through a fern forest, or continue through an interactive "Lava Tube" with features of *ki'i pōhaku* (native Hawaiian stone carvings), native bird and wildlife fossils, and geological formations (Appendix B). The proposed project will be used to house and rehabilitate native bird species, such as the Hawaiian Coot (*'Alae ke'oke'o*), Hawaiian Duck (*Kōloa maoli*), Hawaiian Moorhen (*'Alae 'ula*), Hawaiian Stilt (*Ae'o*), and Laysan Duck (*Anas laysanensis*).

The Honolulu Zoo Master Plan identified the *Hawai'i Biome* as a "gateway" exhibit intended to attract and introduce visitors to Hawaii's unique ecosystems. The project site was originally proposed along Monsarrat Avenue, adjacent to the *Makai Open Space*, so that it would be a visible from the Zoo entrance (Figure 3: Master Plan Proposed Zoo Layout). The Zoo entrance has since been relocated to the corner of Kāpahulu Avenue and Kalākaua Avenue. In result, the Project Site has also been relocated to the area previously proposed for the *Tropical Islands Biome* in order to maintain a "gateway" presence in the updated Zoo layout (Figure 4: Proposed Relocation). The *Coastal Wetlands Aviary* will replace the existing *Duck Pond* located inside the Zoo's new entrance (Figure 5: Existing Zoo Layout).

CONSISTENCY WITH THE ENVIRONMENTAL ASSESSMENT

An Environmental Assessment for the Honolulu Zoo Master Plan was prepared in 2000 to evaluate potential impacts and mitigative measures for site improvements proposed across the entire Honolulu Zoo (Appendix C). The EA anticipated short-term impacts related to construction activities and long-term impacts related to increased utilities, increased visitors, and associated increases in traffic and parking requirements. No significant impacts were anticipated for the physical, biological, and socioeconomic environments, and no significant changes have been made to these conditions since the time of assessment. The *Coastal Wetlands Aviary* will be constructed on approximately 0.79 acres of the 42.5-acre Zoo parcel, and therefore remains within the total footprint and potential impacts evaluated for the 1.4-acre *Hawai'i Biome*.

Due to the proximity of State Inventory of Historic Places (SIHP) # 50-80-14-7208, Makee Island, reccomended mitigation was limited to on-site archaeological monitoring for all future construction activities "in the vicinity of the Honolulu Zoo's entrance area or parking lot" (Figure 6: Reccomended Archaeological Monitoring Area). The Proposed Action will incorporate an on-site monitoring program consistent the Hawai'i State Historic Preservation Division (SHPD) recommendation per Hawai'i Administrative Rules (HAR) §13-275. The *Archaeological Literature Review and Field Inspection Report* prepared for the Proposed Action confirms this determination (Appendix D).

The long-term impacts described in the 2000 EA have not occurred due to a decrease in visitors and exhibits over the past 20 years. Potential impacts were evaluated in the EA using a projection of 1,650,000 annual visitors to the Zoo by 2010. However, records from the Hawai'i State Data Book show that annual visitation has actually declined since the EA was completed. In result, the demand on infrastructure (e.g., traffic, parking, water, wastewater, power, etc.) has also decreased. Based on the trends and projections provided, it is determined that current and future impacts of Honolulu Zoo site improvements remain within the scope of the existing EA.

EVALUATION OF MASTER PLAN PROJECT IMPLEMENTATION

The Honolulu Zoo Master Plan was developed as a living document to guide future projects and activities at the Honolulu Zoo. The original Master Plan site improvements were antcitipated to be completed between 2000 to 2010 (Figure 7: Master Plan Proposed Zoo Improvements). Over the past 20 years, new priorities have been identified by Zoo administration that continue to impact the Master Plan implementation strategy and timeline (Appendix E). Delays in the project implementation schedule have included lack of funding, turnover of Zoo Directors, changes in animal inventory, modernization of Zoo practices, and reevaluation of existing conditions and needs. An updated status of the Master Plan project history is summarized as follows:

Proposed Project	**Status**	**Relevance to Proposed Action**
Tropical Forest Biome	Completed.	Not applicable to the Proposed Action.
Hawai‘i Biome	Modified.	The Proposed Action is intended to update the previous concept of *Hawai‘i Biome*.
Tropical Islands Biome	Postponed.	Not applicable to the Proposed Action. This project remains conceptual and additional funding will need to be identified in the future.
Commissionary	Completed.	Not applicable to the Proposed Action.
Maintenance	On-Going.	Maintenance activities are on-going across the Honolulu Zoo. Specific site improvements are completed on a case-by-case basis to accomodate changing facility needs.
Plantings	Completed.	Planting improvements were completed in part during construction of the *African Savanna*.
Entrance Complex	Completed.	Related to the Proposed Action’s “gateway” objective. The *Coastal Wetlands Aviary* will be located adjacent to the new Zoo entrance complex.
Veterinary Clinic	Completed.	Not applicable to the Proposed Action.
Administration	Completed.	Not applicable to the Proposed Action.
Hale Kokua	Outdated.	Not applicable to the Proposed Action.
Mauka Open Space	Modified.	The project was replaced by the existing *Picnic Lawn*.
Zoo Perimeter Parking	On-Going.	The Proposed Action is supported by future improvements to the Zoo parking infrastructure. The Proposed Action is not dependent on the completion of this project.

Source: Environmental Assessment for Honolulu Zoo Master Plan; Honolulu Zoo Administrative Records

In addition to the afformentioned projects, the Master Plan discussed a series of improvements to the nonpotable water system. The following improvements were implemented as part of the *African Savanna* exhibit:

- Installation of a hydropneumatic tank for water storage and reduce pump cycling.
- Replacement of the Well A pump.
- Installation of a pressure sensor and programmable pump controller, with remote terminal units communicating by radio transmission for system operation.
- Removal of the existing control valves and strainers, and installation of one new control valve to limit drawdown in Well 2.

The nonpotable water system will not be utilized for the Proposed Action, and therefore requires no further evaluation.

Infrastructure improvements specific to the *Coastal Wetlands Aviary* will include a shallow body of potable water and new utility building. Potable water will be supplied by existing infrastructure. The water feature will be serviced by a closed filtration system that recirculates water through a pressure filter to effectively reduce the demand on water and wastewater at the project site. Electrical conduits exist within the vicinity of the new exhibit, and will be utilized to operate the filtration equipment. Water will be pumped through the filter, treated, and discharged directly to the on-site sewer system. Backwash operations will be scheduled to avoid peak flows in the sewer system, thus the existing infrastructure will have adequate capacity for these operations. Overall, minimal improvements will be required to accomodate the Proposed Action and remain within the parameters of the existing EA.

Additional impacts related to climate change and sea level rise that were not addressed in the EA are discussed below.

EVALUATION OF CLIMATE CHANGE IMPACTS

The Proposed Action is consistent with the policy and procedures set forth in the CCH's Directive No. 18-2, *City and County of Honolulu Actions to Address Climate Change and Sea Level Rise*, in accordance with the findings and recommendations of the City Climate Change Commission and *State of Hawai'i Sea Level Rise Vulnerability and Adaption Report*.

Potential impacts of climate change have been evaluated based on a 3.2 feet (ft) scenario of sea level rise, and the associated impacts of erosion, flooding, and wave inundation. According to the Hawai'i Sea Level Rise Viewer, the proposed project area would not be directly impacted by a 3.2 ft sea level rise exposure area (Figure 8: Sea Level Rise Exposure Area). However, it is understood that intermittent flooding is likely to increase around coastal areas due to rising impacts of climate change. The Proposed Action will incorporate several design features and best management practices to mitigate potential impacts at the

project site, including self-sustaining irrigation and planting features, natural biofiltration, and improved drainage systems.

The Proposed Action will not require substantial energy consumption or carbon dioxide emissions. Equipment required to operate the exhibit will be limited to water pumps and filtration, lighting features, and heating lamps. These features are consistent with those previously assessed for the *Hawai'i Biome*. All other conditions and impacts of the Master Plan site improvements have been discussed in the EA; no significant impact was anticipated, and no further mitigation was recommended.

CONCLUSION

The *Coastal Wetlands Aviary* is determined to be consistent with the *Hawai'i Biome* project proposed in the Honolulu Zoo Master Plan. The project does not anticipate any impacts that have not already been identified and evaluated in the existing EA. New concerns related to climate change and sea level rise have been considered and anticipate no additional impact. Therefore, we recommend that DDC proceeds with a determination that the Proposed Action is consistent with the existing Findings of No Significant Impact (FONSI) (Appendix F) and no additional environmental reivew is required to comply with Chapter 343, Hawai'i Revised Statutes.

FIGURES

APPENDICES

REFERENCES

Belt Collins Hawai'i (2000). *Environmental Assessment for Honolulu Zoo Master Plan, Waikiki, O'ahu, Hawai'i.* Prepared for City and County of Honolulu Department of Design and Construction.

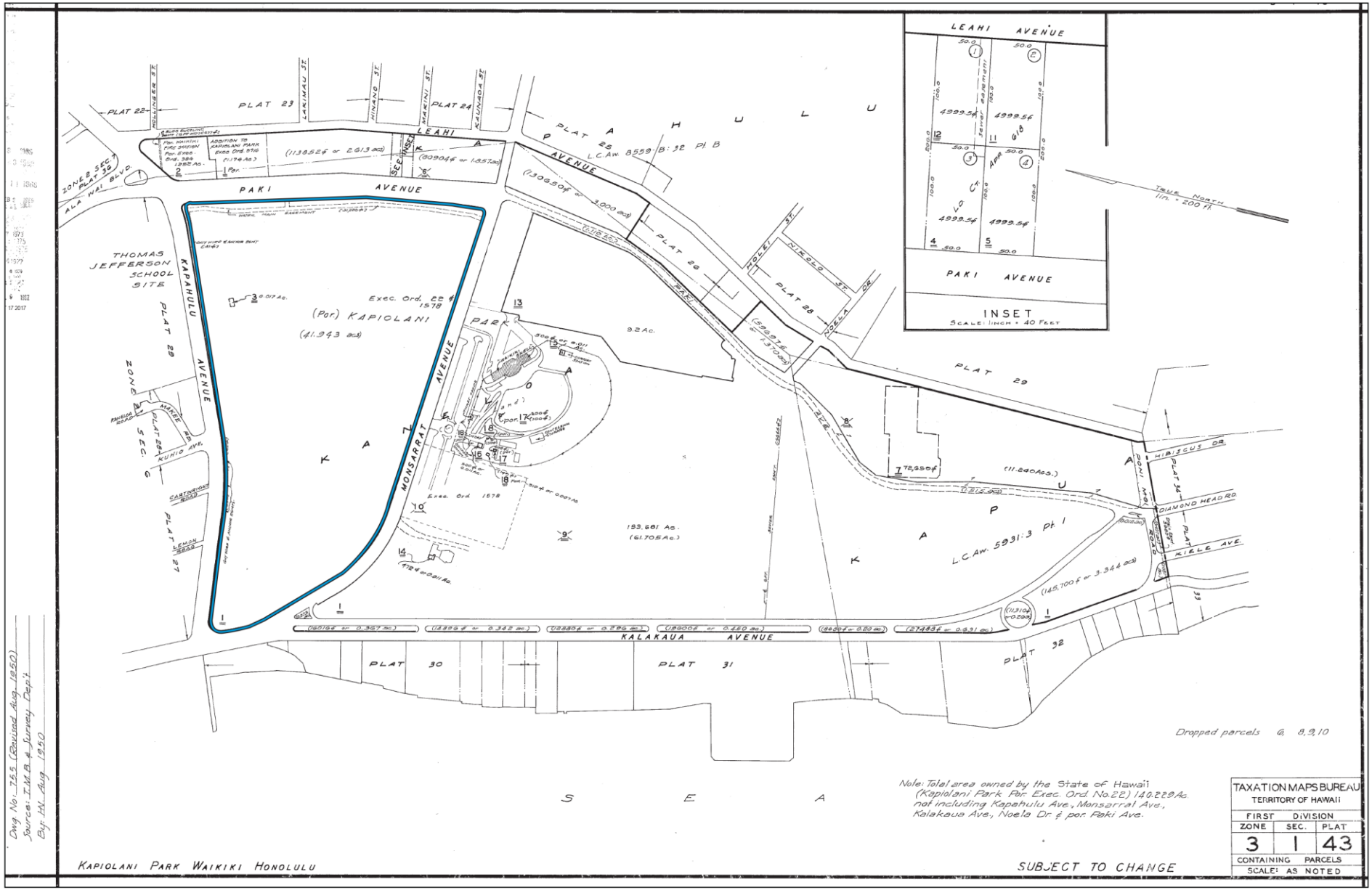
Brong, Mary (1993). *Updated Honolulu Zoo Master Plan "A Vision for the Future."* Prepared for City and County of Honolulu Department of Parks and Recreation.

City and County of Honolulu Directive No. 18-2. (2018). *City and County of Honolulu Actions to Address Climate Change and Sea Level Rise*.

Cultural Surveys Hawai'i (2019). *Draft Archaeological Literature Review and Field Inspection Report in Support of Consultation with the SHPD for the Honolulu Zoo Native Birds Exhibit Project, Waikīkī Ahupua'a, Honolulu District, O'ahu TMK: [1] 3-1-043:001 por.* Prepared for Belt Collins Hawai'i.

Tetra Tech, Inc. (2017). *Hawai'i Sea Level Rise Vulnerability and Adaptation Report*. Prepared for Hawai'i Climate Change Mitigation and Adaptation Commission.

FIGURE 1: Tax Map Key



Dropped parcels @ 8.9.10

Note: Total area owned by the State of Hawaii (Kapiolani Park Por. Exec. Ord. No. 22) 140.229 Ac. not including Kapahulu Ave., Monsarrat Ave., Kalakaua Ave., Noela Dr & por. Paki Ave.

TAXATION MAPS BUREAU TERRITORY OF HAWAII		
FIRST DIVISION		
ZONE	SEC.	PLAT
3	1	43
CONTAINING PARCELS		
SCALE: AS NOTED		

Dwg No. 755 (Revised Aug. 1950)
Source: T.M.B. & Survey Dept.
By: HK Aug. 1950

KAPIOLANI PARK WAIKIKI HONOLULU

SUBJECT TO CHANGE

LEGEND

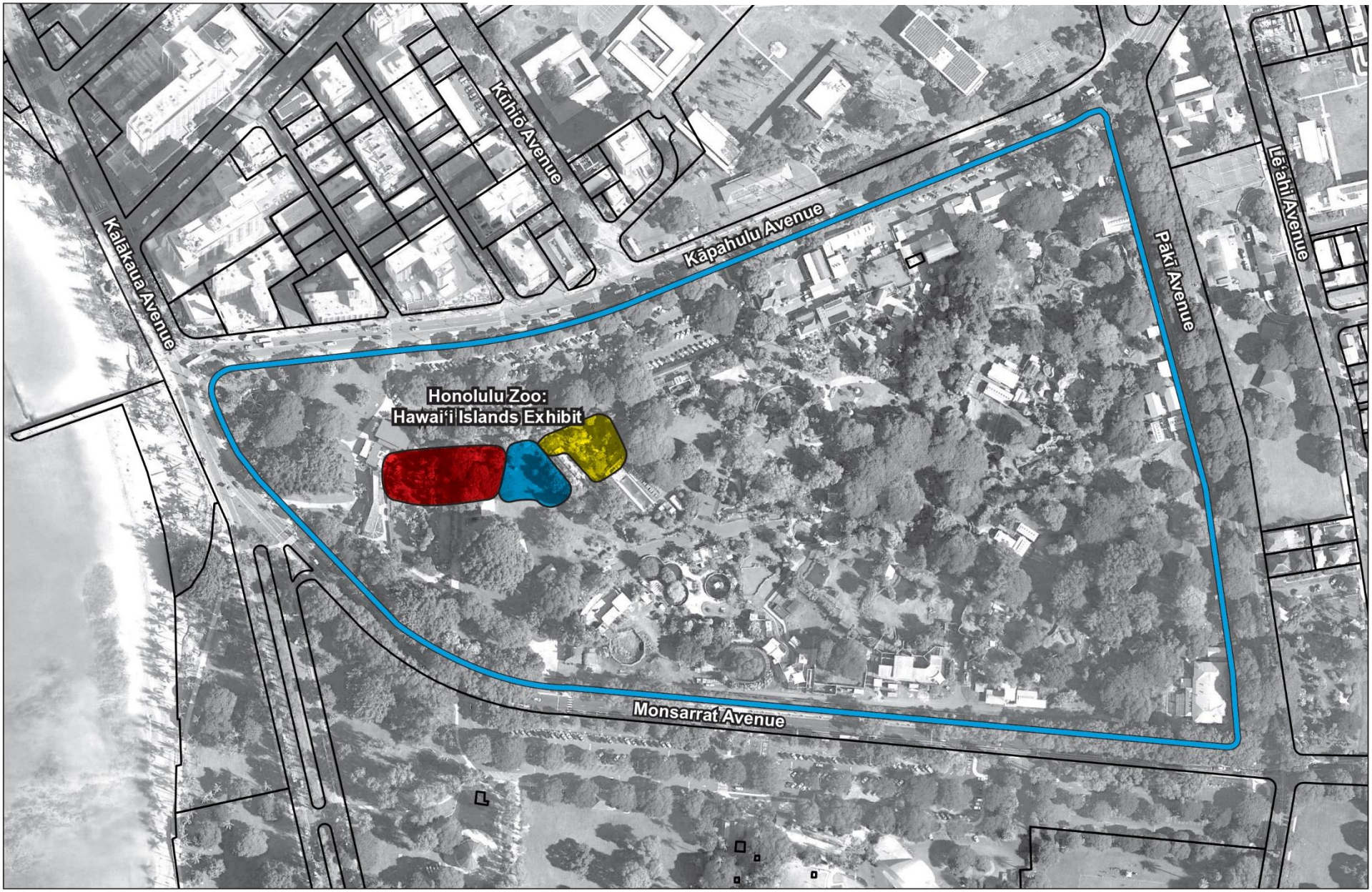
Honolulu Zoo

BELT COLLINS

NORTH

NOT TO SCALE

FIGURE 2: Project Site



BELT COLLINS

NORTH

0 100 200 300
SCALE IN FEET

LEGEND

- Honolulu Zoo
- Phase 1 – Coastal Wetlands Aviary
- Phase 2 – Mountain Rain-forest Aviary
- Phase 3 – Dry Forest & Grassland Aviary

FIGURE 3: Master Plan Proposed Zoo Layout

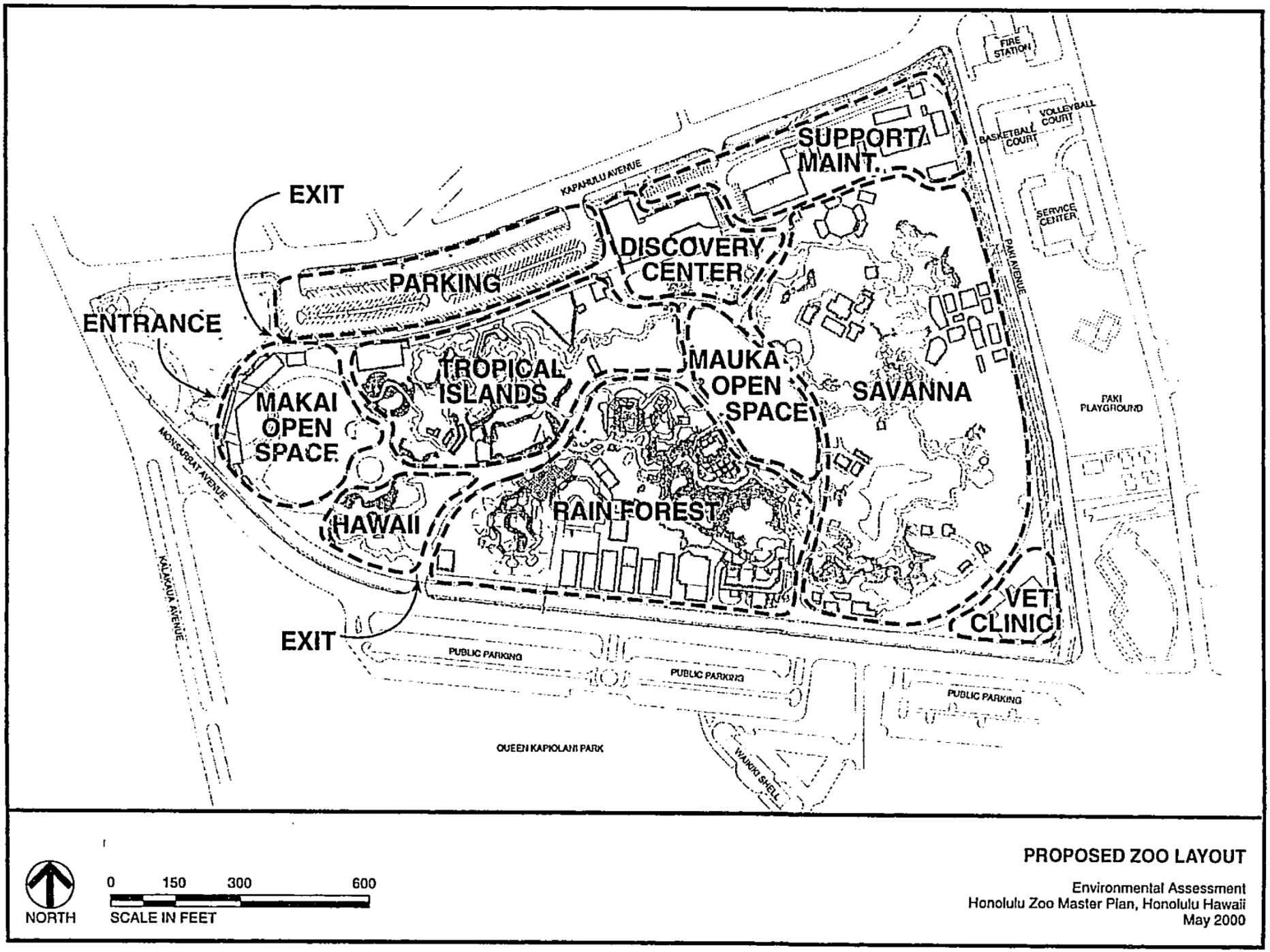


FIGURE 4: Proposed Relocation

BELT COLLINS

NORTH

0 100 200 300

SCALE IN FEET

LEGEND

- Honolulu Zoo
- Phase 1 – Coastal Wetlands Aviary
- Phase 2 – Mountain Rain-forest Aviary
- Phase 3 – Dry Forest & Grassland Aviary

FIGURE 5: Existing Zoo Layout

FIGURE 6: Recommended Archaeological Monitoring Area

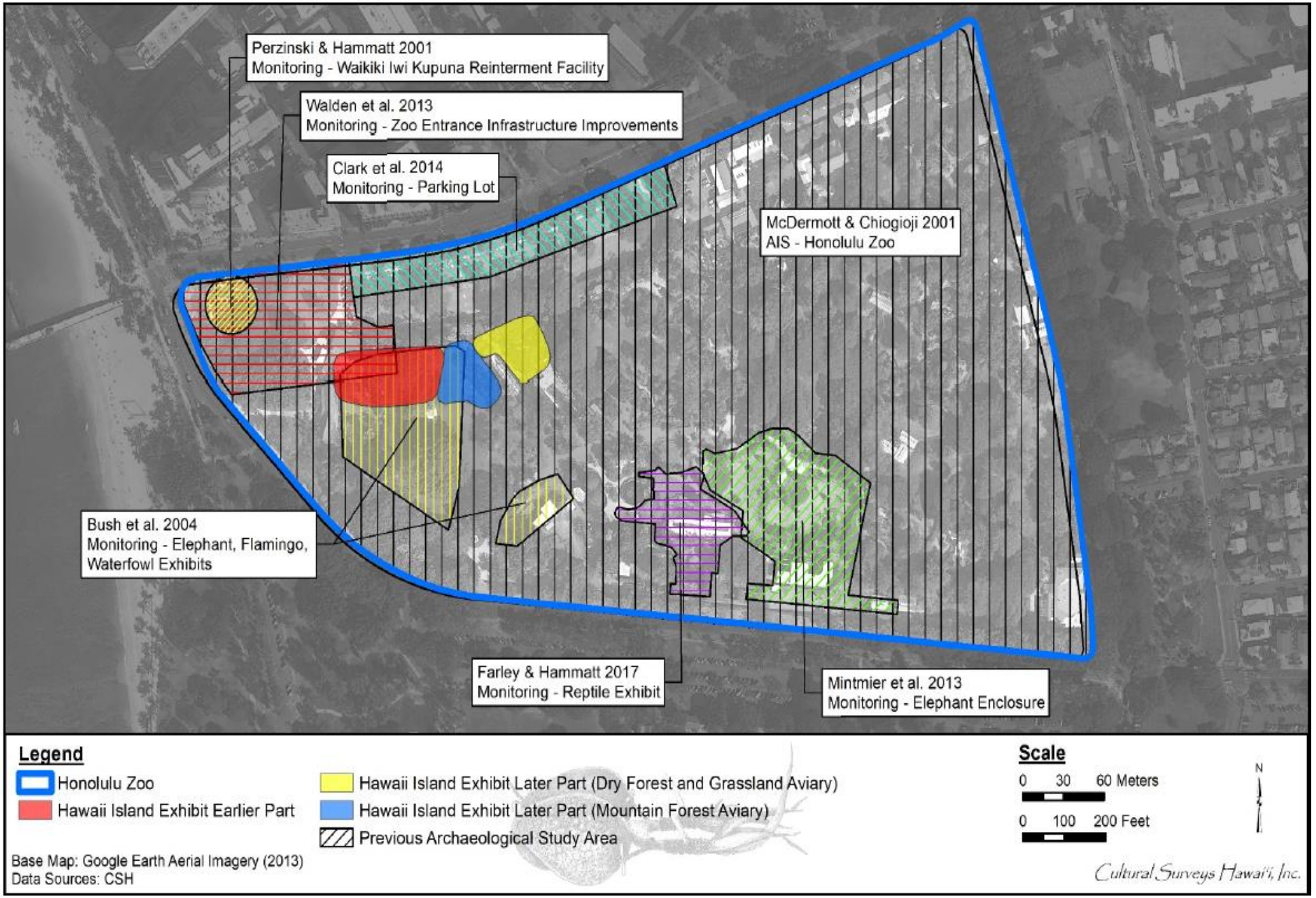


FIGURE 7: Master Plan Proposed Zoo Improvements

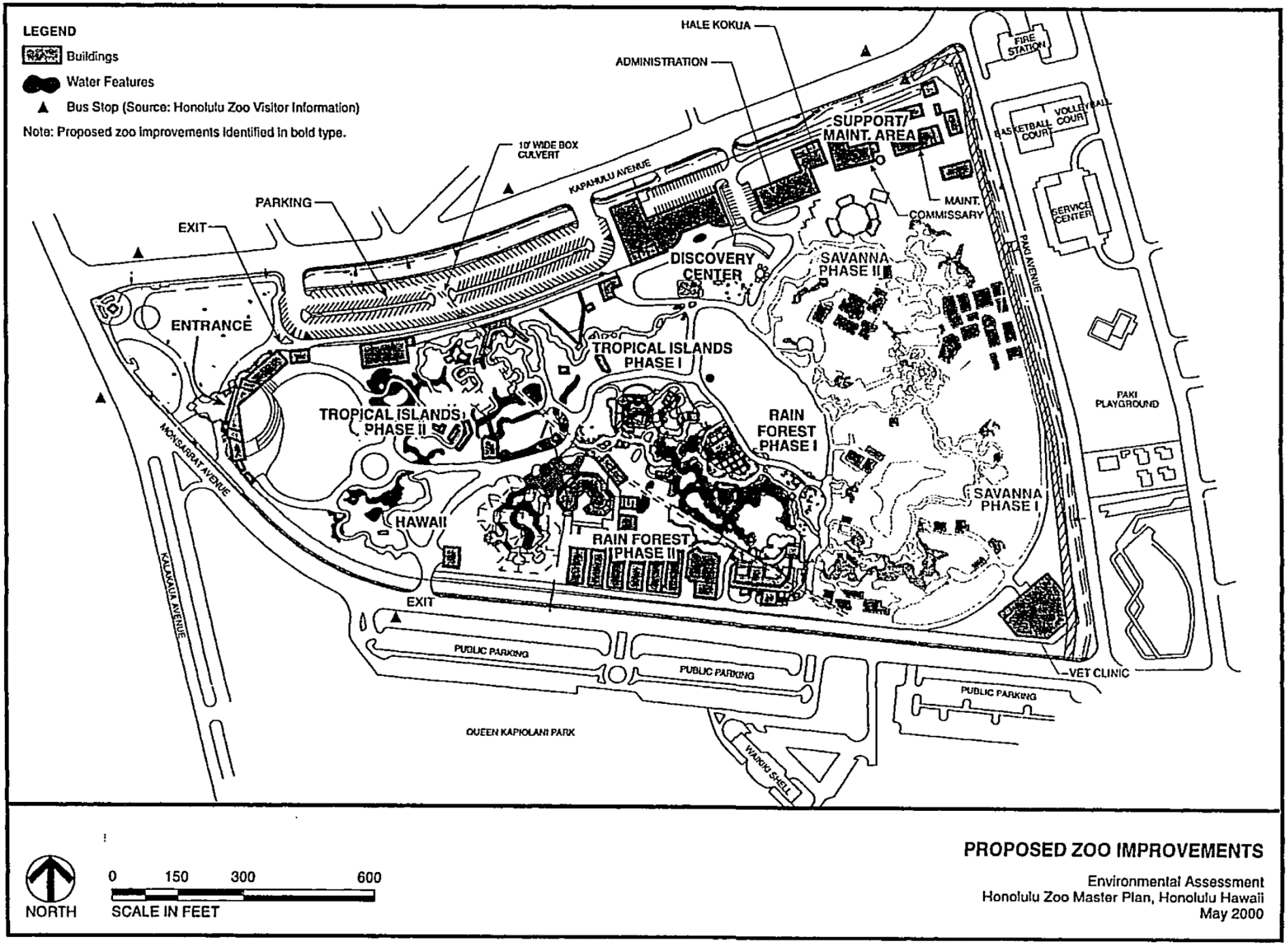


FIGURE 8: Sea Level Rise Exposure Area

BELT COLLINS

NORTH

0 100 200 300

SCALE IN FEET

LEGEND

- Honolulu Zoo
- Phase 1 – Coastal Wetlands Aviary
- Phase 2 – Mountain Rain-forest Aviary
- Phase 3 – Dry Forest & Grassland Aviary
- Sea Level Rise - Exposure Area 3.2 ft
- Coastal Erosion Line 3.2 ft

APPENDIX A

The 1993 Updated Master Plan (Excerpt)
Mary Brong (1993)

UPDATED

HONOLULU ZOO MASTER PLAN

"A Vision for the Future"

Prepared for:
CITY & COUNTY OF HONOLULU
DEPARTMENT OF PARKS AND RECREATION

1993

Prepared by:
Mary Brong, Zoo Design Consultant

V. The 1993 Updated Master Plan

Introduction

The updated Honolulu Zoo Master Plan is a multifarious design which integrates an educational story line with visitor services and staff support needs. The story or message that the Zoo imparts begins as the visitor enters the Zoo. The thematic layout in Figure 4, shows the direction of visitor flow and the linear progression of educational concepts. The Zoo exhibits consist of three life zones: "Islands", "The Rain Forest" and "The African Savanna" where visitors see animals in naturalistic habitats. The visitors zoo experience begins and ends in the "Islands" ecosystem as a transition to and from the other global life zones in the Zoo. Though visually connected, the "Islands" life zone is educationally two separate entities, "Hawaii" and "Tropical Islands". "Hawaii", a microcosm of the Hawaiian islands begins the zoo experience with an intimate view of Hawaiian habitats. "Tropical Islands" on the other hand, explores the broad concepts of island ecology, ending the zoo experience in the Polynesian Islands. It is appropriate to begin the experience in "Hawaii" and end it in the Polynesian Islands since the visitor is literally in Hawaii and on a Polynesian island which provides intellectual congruity and a smooth transition as the scene is set for the story.

As visitors walk through the Zoo, information builds slowly forming an overall picture of tropical ecosystems, revealing the three life zones' commonalities and differences. Since the story begins in "Hawaii", the first exhibit, the baseline information will be Hawaiian. Therefore, visitors will be comparing Hawaii to other tropical life-zone systems as they walk through the Zoo. The "New Discovery Center" will tie these habitats together by reiterating educational concepts from another point of view. Instead of naturalistic exhibits, it will function as a children's museum with fun, hands-on, interactive exhibits for all ages. Visitor services will be addressed throughout the Zoo and will visually integrate into the story-line. Staff support

facilities are behind the scenes and will not interfere with the thematic layout. The Master Plan attempts to meld the story line with all other zoo functions so that visitors leave the Zoo with a clear message as intended by the Zoo Mission Statement.

Thematic Layout of the Master Plan

Figure 4

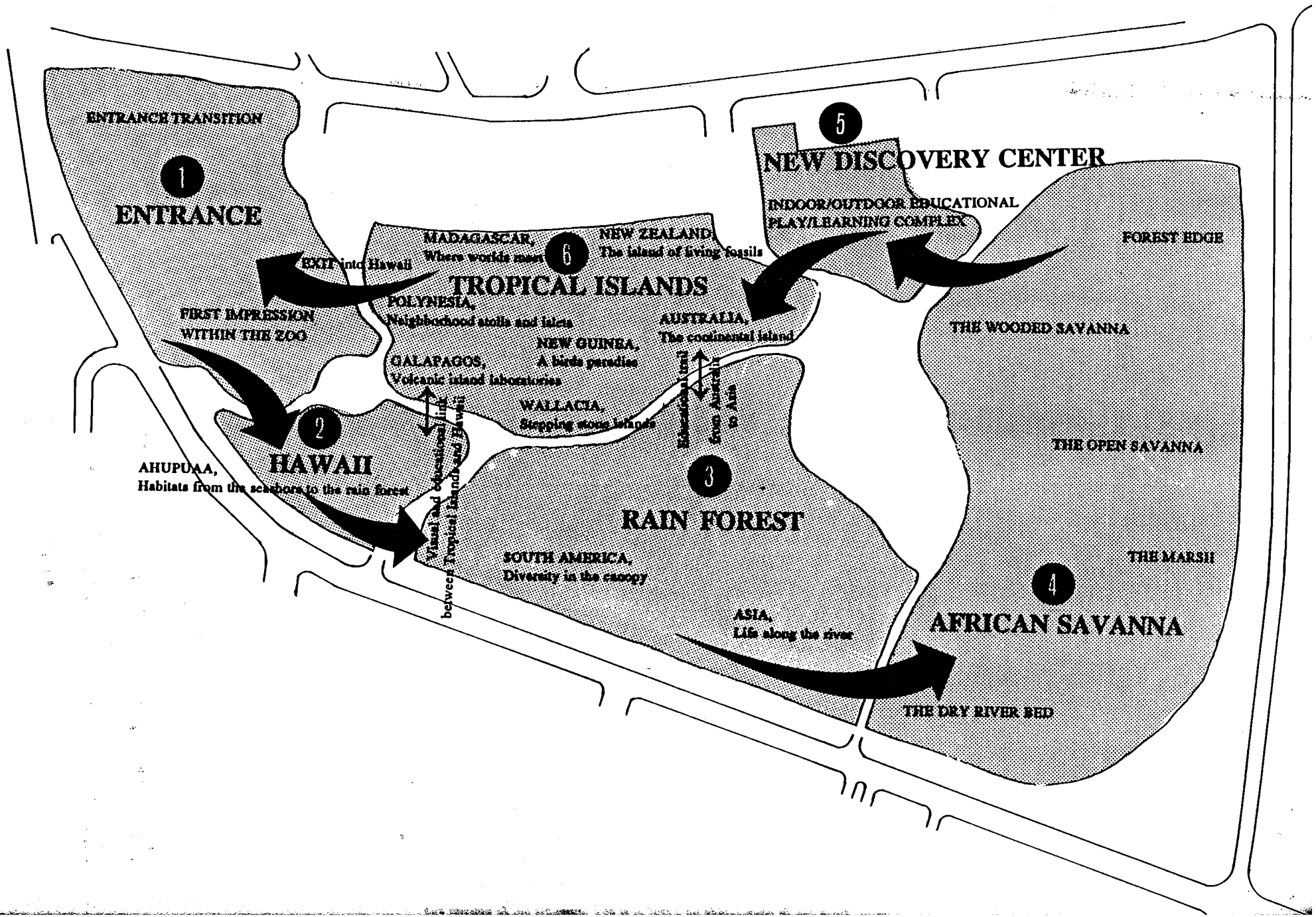


Exhibit Scenarios

The following exhibit scenarios were written after many brainstorming sessions and follow-up meetings with the zoo staff and local experts. These scenarios are simply examples of how the Zoo can integrate its educational goals with interesting animals. Both the public's benefit and the proliferation and protection of many vulnerable species were taken into consideration when writing the scenarios. There are other scenarios that could be designed but the following examples were used to determine future layout and infrastructure requirements.

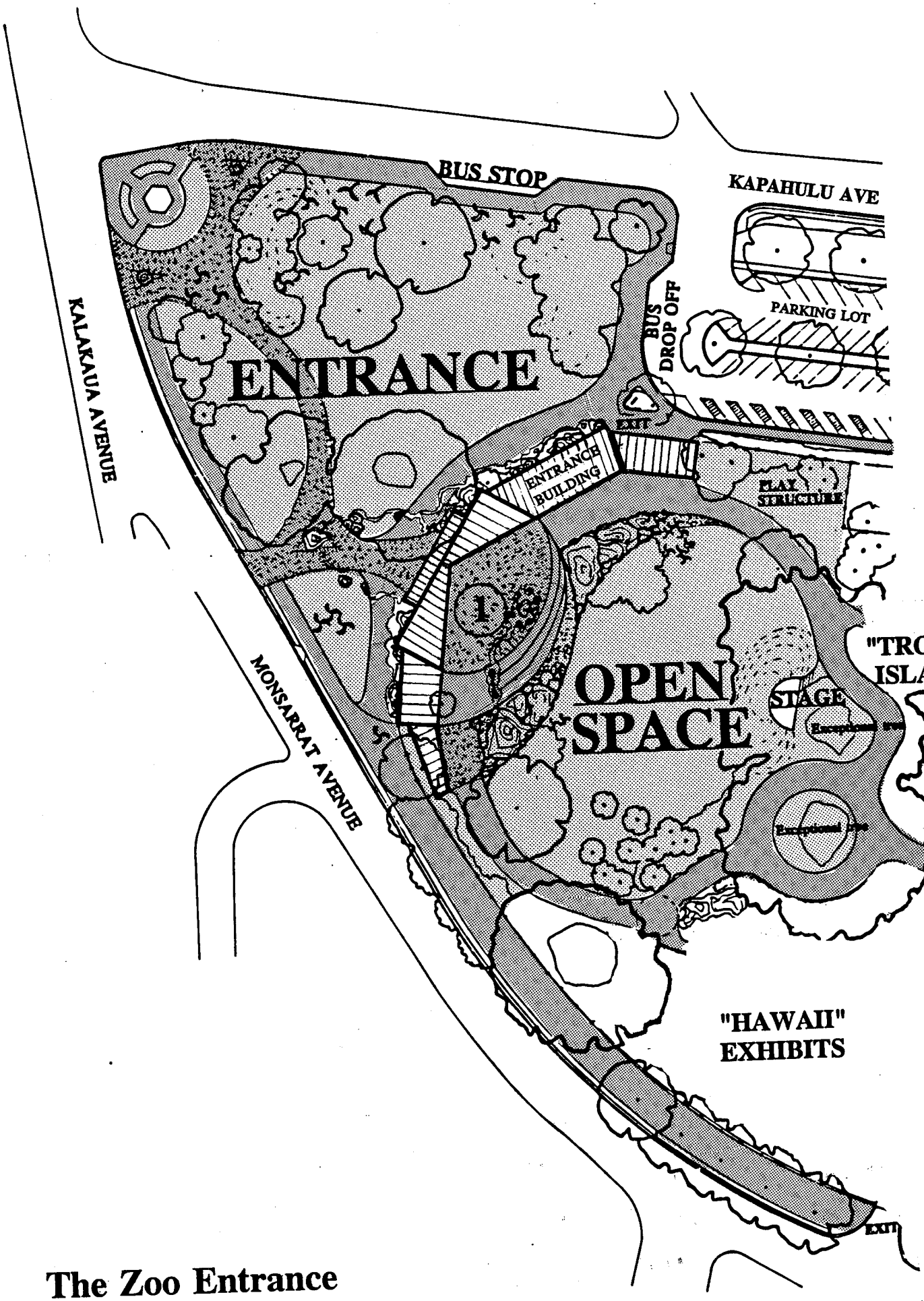
The "Zoo Entrance"

First and last impressions are extremely important in forming visitor attitudes about zoos. The entrance/exit, being the first and last experience, can immediately tell the visitor what the zoo experience is about, what they can expect to see inside and reinforce what they saw as they leave. This particular entrance is not only the entrance to the Honolulu Zoo but also serves as the entrance to the entire Kapiolani Park. Therefore, this entrance must serve as a transition area for the park, the ocean and Waikiki into the Zoo proper. The entrance structure itself needs to be more visible and must also tastefully blend into the park atmosphere to suit the character of the other structures in the Kapiolani Park Master Plan which project a Victorian flavor. Most importantly, it must create the first "wow" experience for the visitor.

As people enter into the Zoo they should get their second "wow" experience. Visitors enter a truly unique and beautiful landscape where they are prepared for their zoo visit. This highly attractive entry plaza not only prepares the visitor emotionally but also immediately provides for the necessary entrance functions such as: membership entrance booths, wheelchairs, strollers, umbrellas, washrooms, lockers, security, phones, an information booth, seating, a Zoo map, and a gift booth with film, suntan lotion, sun glasses and many other visitor needs for a pleasant zoo experience. The major zoo gift shop will be here so that as visitors enter they realize they can purchase items as they leave rather than carry articles through the Zoo. The gift shop can also be used by people not visiting the Zoo that day, as they do now. These relatively noisy

experiences are all addressed within this entrance plaza so as the visitors enter the first animal exhibit in "Hawaii" they can experience by contrast a quiet intimate encounter with nature.

To prevent a congested feeling at the entrance plaza, as the visitors get their bearings and to make full use of the visitor services, the plaza will open up onto a large extremely attractive and dynamic vista. This open space will be used for zoo special events and daily programmed activities. A stage and sound system will face out of the Zoo, so the noise does not effect the exhibit experience. Adjacent to the space is a small area for playground equipment keeping children occupied while adults picnic on the grass and listen to music. A small concession and unobtrusive seating will also be provided for visitors who would like refreshments at these events or while waiting for their groups at the gift shop and "Entrance". This open area will visually form a transition and lead you from the "Entrance" to the first exhibit, Hawaii.



Waikiki Beach

The Zoo Entrance

Figure 5

"Hawaii, Paradise of the Pacific"

"Hawaii is the first live animal exhibit the visitor will encounter in the Zoo. It will be the third "wow" experience. Here visitors will see what Hawaii's natural areas really look like as opposed to alien plants people perceive as Hawaiian. The "Hawaii" complex will consist almost totally of birds since there are only two mammals, the bat and monk seal, and two reptiles, the sea snake and sea turtle, native to Hawaii. Hawaiian insects and other invertebrates will also be displayed. Some of the more delicate insects, birds, and plants will have to be exhibited in climate controlled conditions if they cannot tolerate the hot micro-climate of Waikiki. The native plant communities and Hawaiian culture will also be an integral part of the exhibit. The visitor will be taken through a series of intimate and beautiful micro-habitat gardens. Habitat reclamation techniques will be used to recreate as closely as possible the plant and animal communities found naturally in the Hawaiian Islands. This naturalistic design provides for the subtlety and beauty of Hawaiian flora and fauna which has to be seen to be appreciated and protected.

"Hawaii" will serve as the basis for the following zoo experience. The education story line begins in "Hawaii". Concepts such as succession, plant adaptations, animal co-evolution, speciation, diversity and ecosystem vulnerability are all basic concepts that can be easily tied into the other ecosystems in the Zoo in an enjoyable way. For example "Hawaii" could be designed along the "Ahupuaa" concept of landownership which consists of a slice of land from the shore to the mountains. The visitor experience will begin at the sea. As visitors slowly walk up hill, they will experience the many different habitats that are found as land rises in elevation. The story begins at the sea with the "Kumulipo", the Hawaiian legend of creation. From there, visitors are introduced to the beauty of succession as life slowly found its way to the most isolated island on earth. As the visitors pass through the sea bird aviary and head up toward the dry forest they are introduced to "Hawaii's" many unique strategies for survival including an anchialine pool. In the alpine meadow habitat, nene geese nestle far from the water below. Farther along visitors discover the cool koa forests where hawks, crows and bats flourish. At the summit they find jewel-box exhibits of the native rain forest birds of Hawaii.

As the visitors turn downhill, they pass through a lava tube where they see unusual forms of life found in a lava tube and the remains of extinct species. Exiting the tube, there is evidence of ancient man's presence and his relationship with nature, including taro farming. As visitors descend, fish culturing is found near the brackish marsh. Here visitors learn how important marshes are and the effects of introduced species on native flora and fauna. Entering into a sheltered area, visitors learn through graphic and hands-on experiences about the insects and unique wonders of Hawaiian natural history. They learn what makes Hawaii so fragile and the only place on earth where life of its kind exists. The entire "Hawaii" experience ends in a climate-controlled ohia forest with its tree fern understory and magical songs of the native honeycreepers flitting about the visitors heads.

APPENDIX B

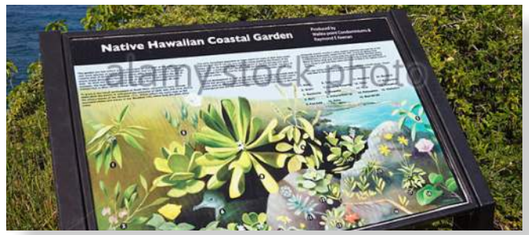
Coastal Wetlands Aviary Concept Plans
Belt Collins Hawai‘i (2019)

Note: The Areas Shown are Approximate for Reference Only

BELT COLLINS

COASTAL WETLANDS AVIARY
Revised Concept Plans

CONCEPT PHASING DIAGRAM

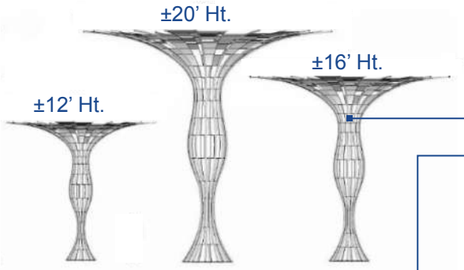


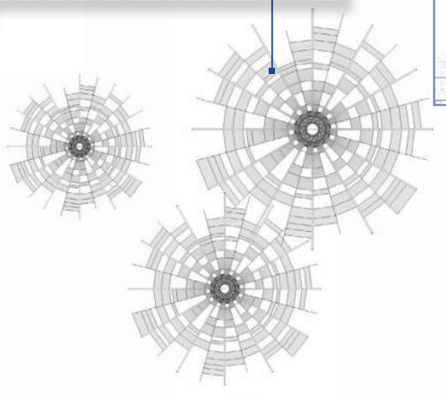
COASTAL WETLANDS AVIARY
Revised Concept Plans

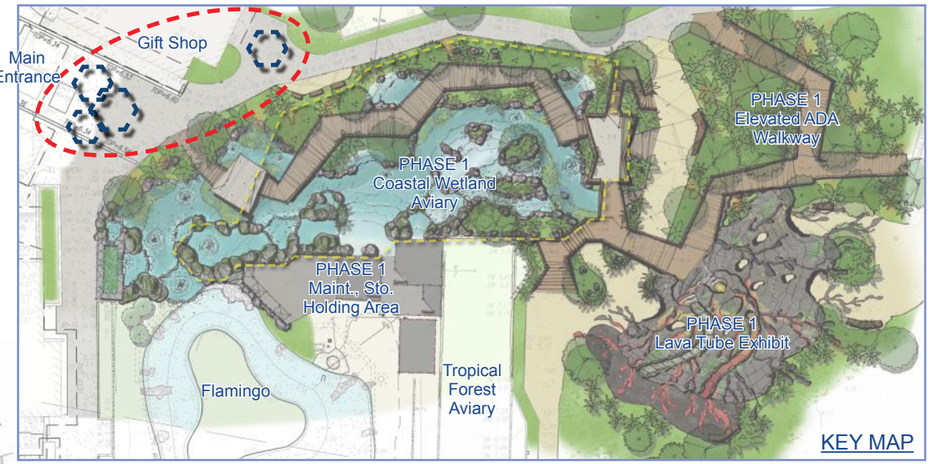
SHADE ELEMENTS, BOARDWALK, ELEVATED EXPERIENCE, & LAVA TUBE

BELT COLLINS

Inspirational Imagery

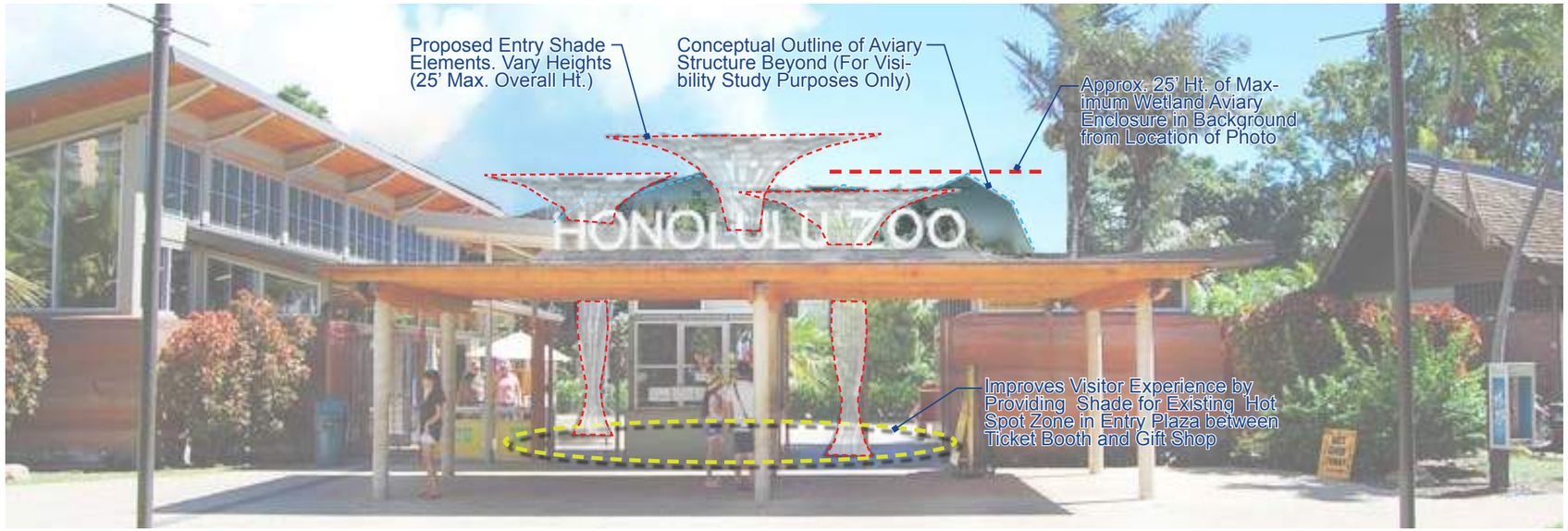






Conceptual Form with Culturally Themed Motif Creating Ground Shadow Patterns:

1. Provides Shade and Respite from Harsh Sun Exposure at the Main Arrival Plaza Beyond Ticket Station in Open Area.
2. Visible from Outside and is an opportunity for an Iconic Sculptural Statement and Composition with Existing Building Architectural Forms.
3. Obscures/Screens View to Aviary Cage Structure Providing a "Hide & Reveal" Design Experience Technique.
4. Could Integrate Climbing Vines for "Softening" and Lighting for Additional Dramatic Impact.



Aviary & Shade Element Entry Conceptual Visibility Study at Main Entrance

CONCEPTUAL SHADE ELEMENTS

GIFT SHOP

Special Management Area Boundary (approximate)

SLOTH

AUSTRALIAN BIRDS

Existing Path

Start of Elevated Path ADA Compliant Ramp

L1 - Aviary Exit Vestibule ±0.4
L2 - Aviary Overlook ±9.5

Themed Shade Features

Educational Station - Cultural, Flora, & Fauna Signage & Graphics

MAIN ENTRANCE

TICKETS

L2 Aviary Overlook Stair Vestibule (Up & In Only)

L2 Aviary Overlook Upper Vestibule (In & Out Access)

Wetland View Path Under Elevated Walkway

Pathway underpass with 7' minimum head clearance

Access to Lawn or Elevated Pathway & Future Connection to PHASE 2

Start of Coastal Wetland Aviary Exhibit

Aviary Entry Vestibule (One Way Exhibit)

Sloped "Beach" Access & Terraced Bird Areas

Sloped "Beach" Access

Rest Area w/ Seating & Shade Elements

Lava Tube Entry/Exit

Lava Flow Paving Design

High Access Pen

Low Access Pen

Food Prep, Storage & Staging

(See Maintnence, Storage & Holding Area Concept Drawings)

Aviary Cage Access

Landscape Buffer to Screen Vulture Cage

Depressed connection path under elevated walkway to viewing area

Mechanical/ Pump Pad

Existing Path

FORMER MAIN ARRIVAL

FLAMINGO

TROPICAL FOREST AVIARY

Lava Tube Entry/Exit

Interactive Element - -Fern Forest Climb (Slide Return)

Interactive Element - -"Lava Slide" in Fern Forest

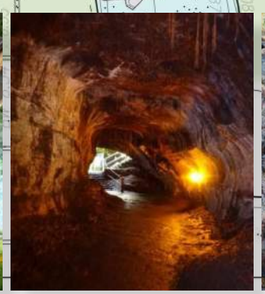
Rest Area w/ Seating & Shade Elements

STAGE LAWN

Scale: 1"=20'-0"

North

0 5 10 20 40



BELT COLLINS

COASTAL WETLANDS AVIARY
Revised Concept Plans

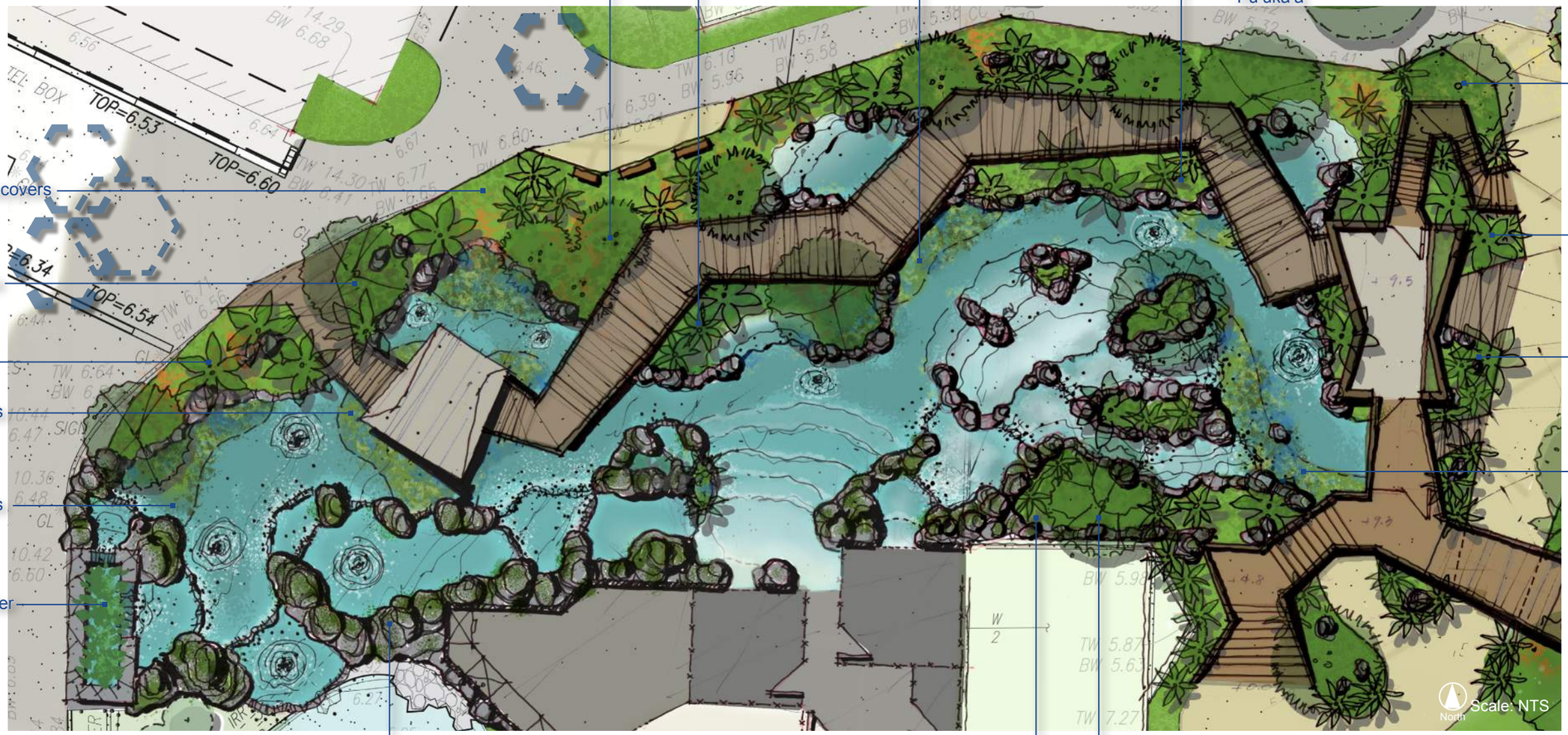
PHASE 1 PROPOSED CONCEPT PLAN

Medium Shrubs
-‘Akiohala
- Koki‘o ke‘oke‘o

Med Accent Palms
- Loulu

Pond Container Plants
- ’Ahu‘awa (L)
- ‘Aka‘akai (L)

Low Shrubs & Groundcovers
- ‘Uki‘uki
- Kupukupu
- ‘Akulikuli
- Pu’uka’a



Low Shrubs & Groundcovers
- ‘Uki‘uki
- Kupukupu
- ‘Akulikuli

Sm-Med Accent Trees
- Hala
- Kou

Med Accent Palms
- Loulu

Pond Container Plants
- ’Ahu‘awa (L)
- ‘Aka‘akai (L)
-‘Akiohala

Pond Container Plants
- Kaluhā (M)
- Pu’uka’a (M)
- Makaloa (S)

Feature Cultural Planter
- Kalo
- ‘Ihi‘ihi

Sm-Med Accent Trees
- Hala
- Kou

Med Accent Palms
- Loulu

Feature Cultural Planter
- Kalo
- ‘Ihi‘ihi
- Pili

Pond Container Plants
- Kaluhā (M)
- Pu’uka’a (M)
- Makaloa (S)

Wet Rock Pocket Plants
- ‘Ae‘ae
- Palapalai
- ‘Akulikuli
- ‘Ihi’ihi

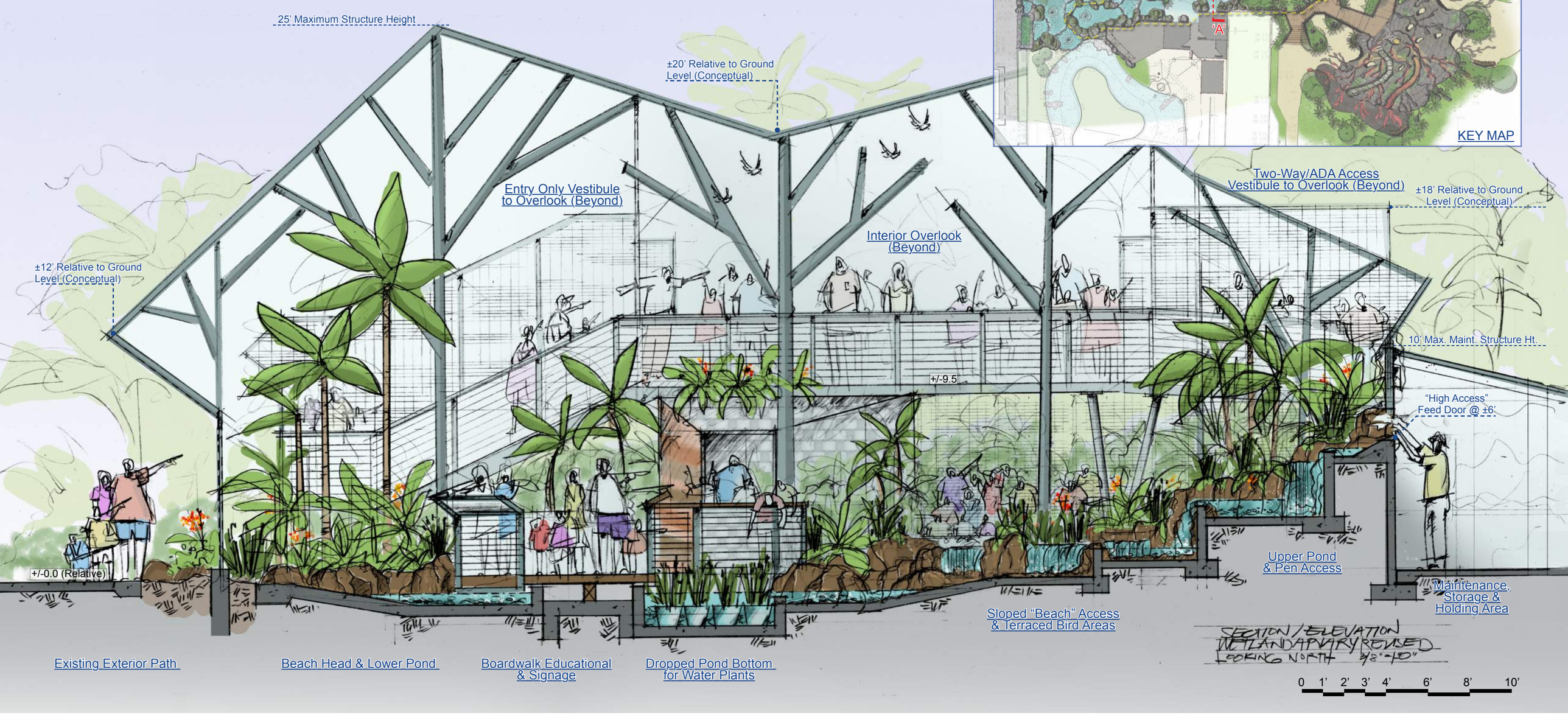
Buffer Planting Areas
- Neke
- ’Ahu‘awa
- Pu’uka’a
- ’Ape
- Ko
- ‘Uki

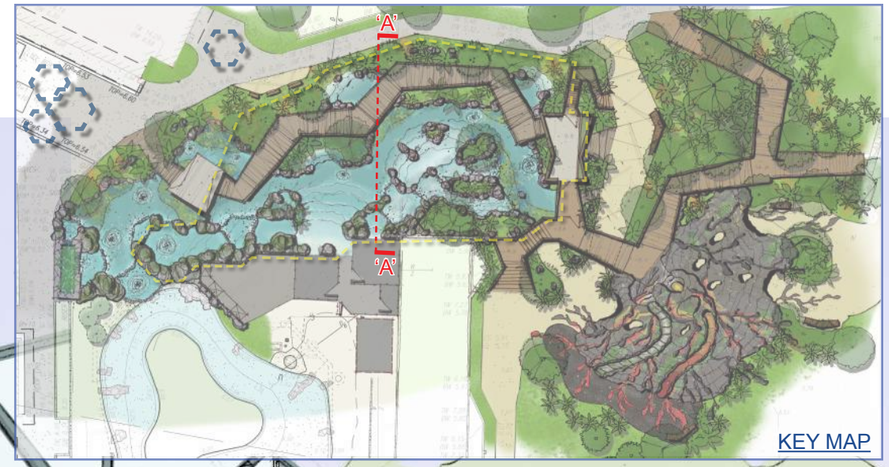
Sm-Med Trees
- Hau
- Hala

BELT COLLINS

COASTAL WETLANDS AVIARY
Revised Concept Plans

PHASE 1 CONCEPT PLANTING PLAN

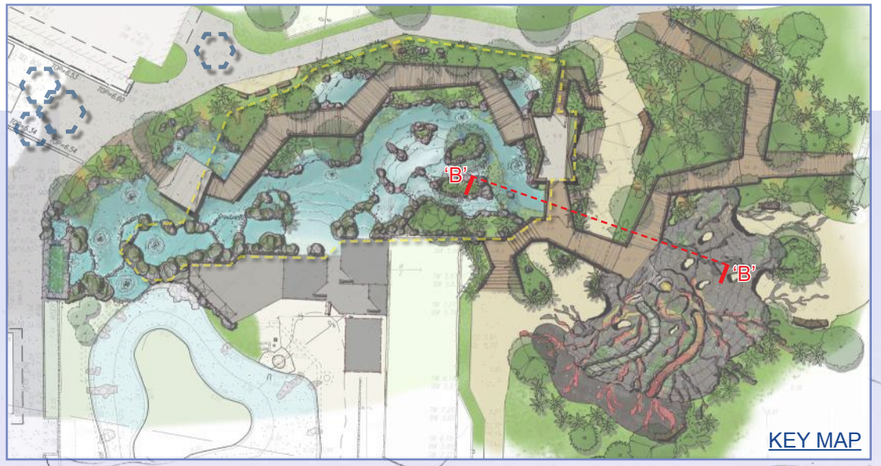




BELT COLLINS

COASTAL WETLANDS AVIARY
Revised Concept Plans

CONCEPTUAL SITE SECTION/ELEVATION - 'A'



KEY MAP

25' Maximum Structure Height

Stair to Tropical America & Landing Viewing Point

±18' Relative to Ground Level (Conceptual)

Overlook Vestibule

'Fly-Over' Bridge

Lava Tube Slide

±12' Relative to Ground Level (Conceptual)

Natural Light Shaft

+/-8.0

+/-9.5

+/-0.0 (Relative)

Lava Tube Exhibit

Path to Tropical America & Stage Lawn

Lower Pond

Depressed Wetland Viewing Area (Aviary Exterior)

Shallow Trickling Waters

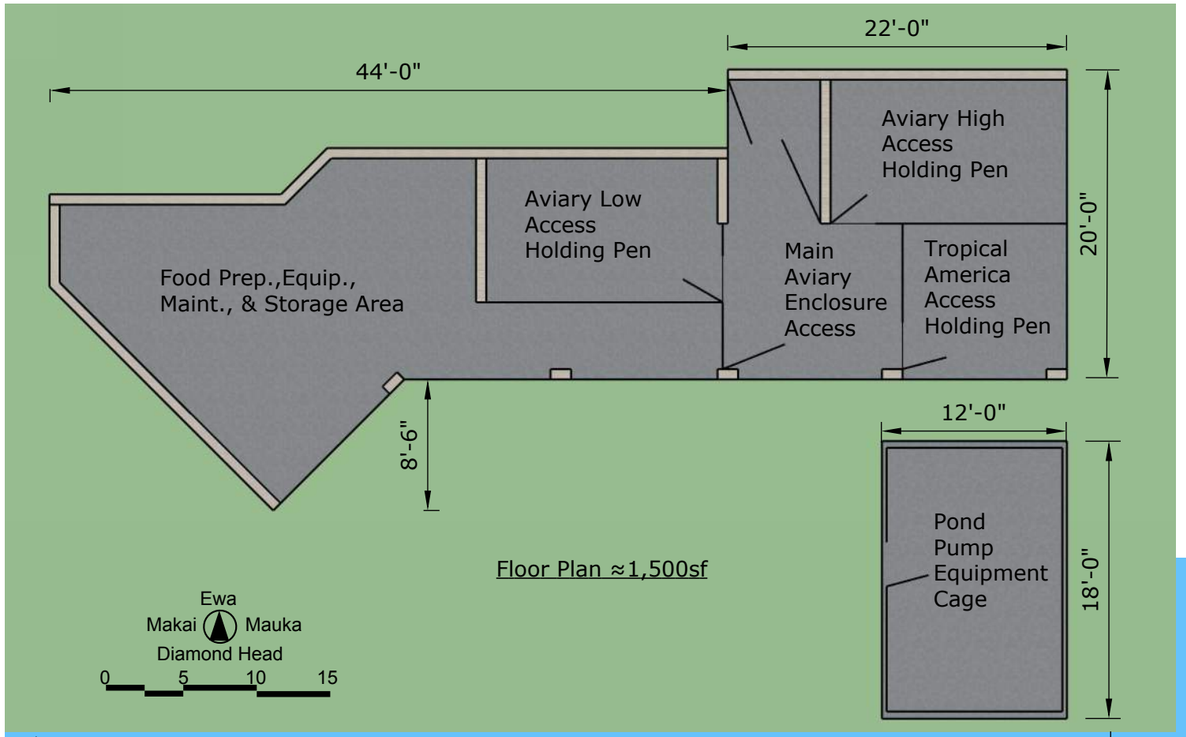
Wetland Aviary (Interior)

0 1' 2' 3' 4' 6' 8' 10'

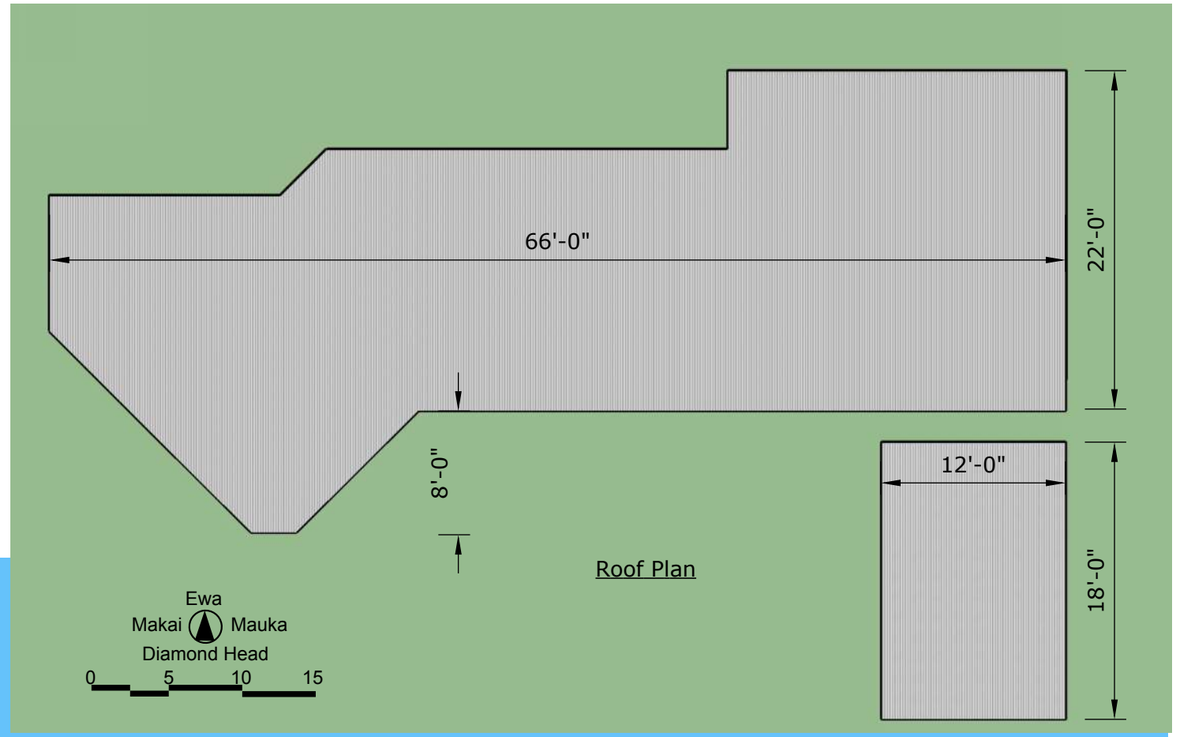
BELT COLLINS

COASTAL WETLANDS AVIARY
Revised Concept Plans

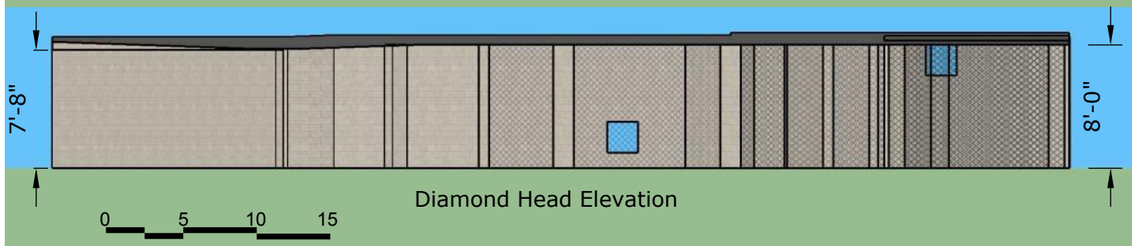
CONCEPTUAL SITE SECTION/ELEVATION - 'B'



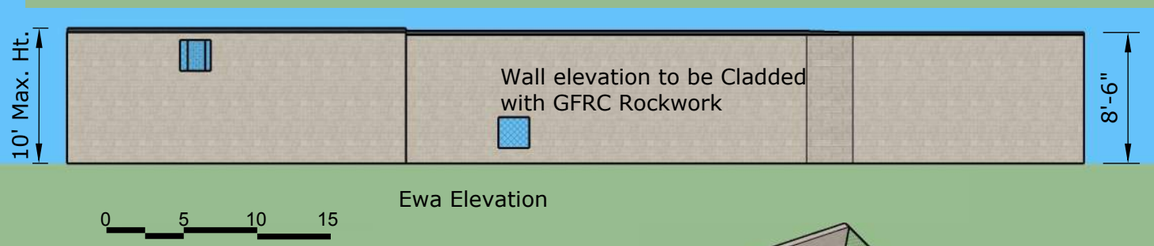
Floor Plan ≈1,500sf



Roof Plan

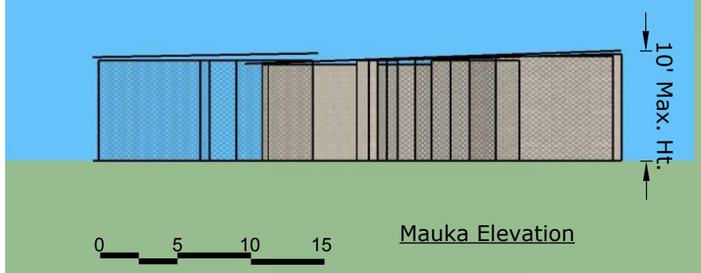


Diamond Head Elevation

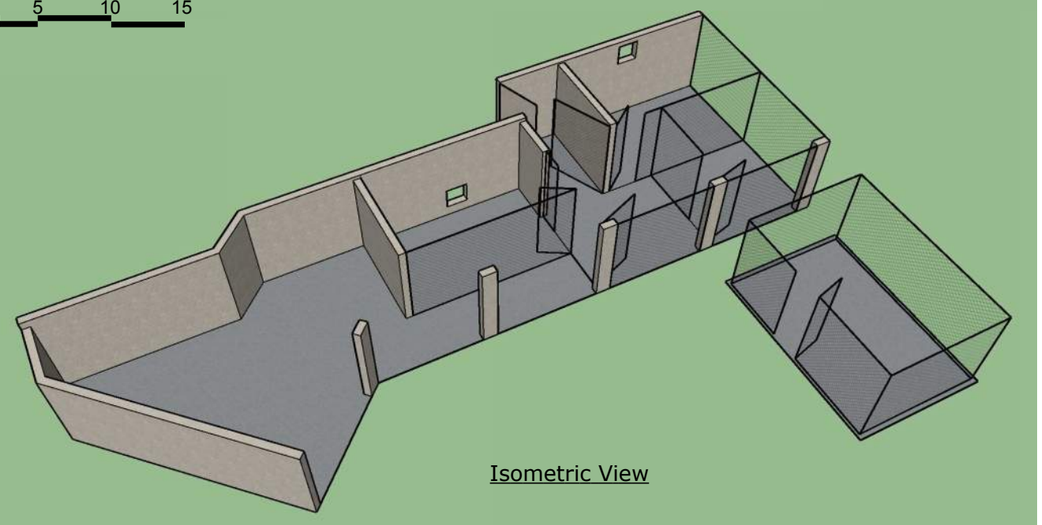


Ewa Elevation

Makai Elevation



Mauka Elevation

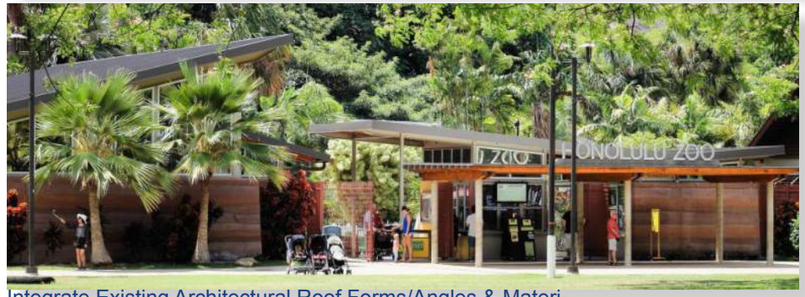


Isometric View

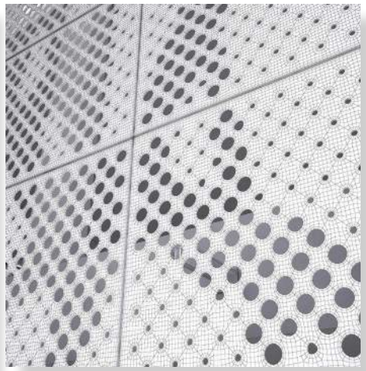
BELT COLLINS

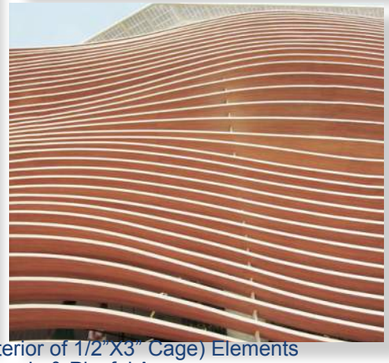
COASTAL WETLANDS AVIARY
Revised Concept Plans

MAINTENANCE, STORAGE & HOLDING AREA



Integrate Existing Architectural Roof Forms/Angles & Materials to Proposed Aviary Vestibule and Cage Structure.



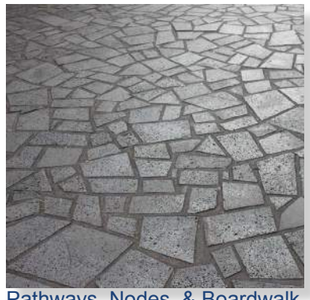


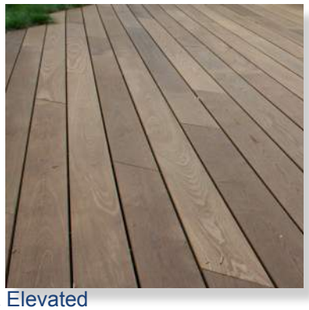
Cage Materials with Sculptural “Skin” (Exterior of 1/2”X3” Cage) Elements to Enhance Visitor Experience with a Dynamic & Playful Appearance.

Conceptual Aviary Entry/Exit Vestibule with Contemporary Form with Existing Architectural Detail Accents such as Roof Pitch, Materials, and Earthen Wall.

Integrate Interesting & Playfully Modern Elements with Existing Architectural Language

Playful, Contemporary, & Interesting, Themed Furniture Coordinated with Aviary Design Language.





Pathways, Nodes, & Boardwalk, & Elevated Experience Walking Surface Material

CONCEPTUAL DESIGN MOTIFS & IMAGERY

Kou
(Cordia subcordata)

Hau
(Hibiscus tiliaceus)

‘Ae’ae
(Bacopa monnieri)

Kaluha
(Bolboschoenus maritimus)

‘Uki
(Cladium jamaciense)

‘Uki‘uki
(Dianella sandwicensis)

Hala
(Pandanus tectorius)

Loulu
(Pritchardia spp.)

Kalo
(Colocasia esculenta)

Neke
(Cyclosorus interruptus)

‘Ahu‘awa
(Mariscus javanicus)

Kupukupu
(Nephrolepis cordifolia)

‘Ihi’ihilaukea
(Marsilea villosa)

‘Aka‘akai
(Schoenoplectella tavernae-montani)

‘Akulikuli
(Sesuvium portulacastrum)

‘Akiohala
(Hibiscus furcellatus)

Ko
(Saccharum officinarum)

Makaloa
(Cyperus laevigatus)

Pu‘uka‘a
(Cyperus trachysanthos)

‘Aki’aki
(Sporobolus virginicus)

Koki‘o ke‘oke‘o
(Hibiscus arnottianus subsp. Punaluuensis)

APPENDIX C

Environmental Assessment for Honolulu Zoo Master Plan
Belt Collins Hawai‘i (2000)

2000-06-08-OA-FEA-

ENVIRONMENTAL ASSESSMENT

FOR

HONOLULU ZOO MASTER PLAN
WAIKIKI, OAHU, HAWAII

TMK 3-1-43:1 - Portion of Kapiolani Regional Park

PREPARED FOR:

CITY AND COUNTY OF HONOLULU
DEPARTMENT OF DESIGN AND CONSTRUCTION

PREPARED BY:

BELT COLLINS HAWAII

MAY 2000

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EXISTING CONDITIONS

CHAPTER 5
RELATIONSHIP OF PROPOSED ACTION TO LAND USE PLANS, POLICIES, AND CONTROLS

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LIST OF TABLES

APPENDICES

EXECUTIVE SUMMARY

The Department of Design and Construction of the City and County of Honolulu has embarked on a plan to reorganize the basic layout of the Honolulu Zoo (Zoo). This plan will broaden the recreational and educational experience encountered by visitors and expand the on-site breeding and research facilities. Conceptual descriptions of the Zoo reorganization plans are provided in Section 2.0 of this document and, in further detail, in the *Updated Honolulu Zoo Master Plan* (M. Brong, 1993a).

Chapter 343 HRS states that an environmental assessment (EA) must be performed for projects meeting certain criteria. Two such criteria include the use of State or County lands and the use of State or County funds. This EA has been prepared because the proposed project uses State land and County funds. The approving agency for the EA determination is the Mayor or the delegated agency—in this case, the Department of Design and Construction.

This EA provides information regarding the project's consistency with land use plans and the project's potential to create adverse environmental impacts. Agencies contacted while preparing this EA are listed below.

City and County of Honolulu:

Board of Water Supply
Department of Land Utilization
Department of Parks and Recreation
Department of Public Works
Transportation Services Department
Oahu Metropolitan Planning Organization

State of Hawaii:

Department of Education
Department of Health
Department of Land and Natural Resources
Department of Transportation

CONSISTENCY WITH LAND USE PLANS

The proposed Zoo improvements (the Project) are consistent with City and County and State land use plans and policies. The City's Department of Planning and Permitting identifies the Zoo as a "public use," as defined in Section 21-10.1 of the Land Use Ordinance. Because public uses are permitted in all zoning districts, improvements to the Zoo will not require a Conditional Use Permit. A small area of Zoo property (near the entrance) is located within a Special Management Area (SMA); therefore, any activities occurring in the SMA will require a SMA Use permit. This project is consistent with the Waikiki Master Plan, which encourages enhancement of the financial viability of Waikiki's visitor industry by enhancing the physical environment of Waikiki, the City and County of Honolulu's General Plan, which includes providing a wide range of recreational facilities (including zoological parks) and services that are readily available to all residents of Oahu, and the Primary Urban Center Development Plan which identifies the area of the Zoo for park and recreational uses. Finally, because the Zoo is located within the Kapiolani Regional Park, a Minor Special District Permit will be required prior to the implementation of improvements.

POTENTIAL FOR ADVERSE ENVIRONMENTAL IMPACTS

Anticipated short term adverse impacts on the existing environment due to construction activities may include the temporary loss of vegetation, increased noise, and fugitive dust. Anticipated long term impacts include a greater demand on utilities, an increase in number of visitors, and associated increases in traffic and parking requirements.

Mitigation measures will be employed to minimize potentially adverse short-term and long-term effects. Such mitigation measures include implementing water use plans and dust controls and promoting the use of mass transportation by the City and County of Honolulu.

DETERMINATION

The contents of this EA should provide sufficient information to determine whether or not an Environmental Impact Statement (EIS) is warranted. Based on the information presented herein, there is insufficient reason to expect significant adverse impacts from the proposed Zoo improvements, and a Negative Declaration is recommended.

CHAPTER 1
INTRODUCTION

1.1 PURPOSE OF DOCUMENT

This Environmental Assessment (EA) has been prepared on behalf of the Department of Design and Construction, City and County of Honolulu, for the Honolulu Zoo (Zoo) improvement project in accordance with Hawaii Revised Statutes (HRS), Section 343-5. In accordance with this law, this EA has been prepared because the proposed project uses State land and County funds. Proposed Zoo improvements have been assessed for their potential environmental and socio-economic impacts. Potential project impacts resulting from the African Savanna developments (Phase I and II) have not been assessed in this EA because their impacts have been assessed in a previous EA, entitled *Honolulu Zoo African Savanna and Learning Center* (Jones and Jones, *1986*).

1.2 SUMMARY OF PROPOSED PROJECT

The proposed project will provide the visitor with an educational story line consisting of four main ecological environments (biomes): Hawaii, Tropical Forest, African Savanna (not assessed in this EA), and Tropical Islands. The Project design will maximize visitors' educational experience since they will be totally immersed in each of the ecological environments and will be able to experience the difference between each environment as they proceed through the Zoo.

New facilities to be constructed as part of the Project and covered by this EA total 41 buildings, four open-sided structures, 11 aviaries, seven restroom facilities, a restaurant, operational/ support facilities, and a greenhouse. New facilities have been designed to accommodate the projected number of visitors (652,314 in fiscal 1991-1992, to 1,650,000 in fiscal 2000-2001) and staff (132 in fiscal 1992-1993, to 207 in fiscal 2000-2001), including full-time and part-time employees and volunteers. In general, most exhibits will be established and maintained outdoors, eliminating the need for large, complex buildings. All structures will be designed to be compatible with the exhibits and surrounding landscape, and an overall unity of character throughout the Zoo will be maintained. Whenever possible, materials will be primary—wood, stone, or concrete; highly finished or processed materials will be minimized. Materials will be relatively maintenance free and will be designed to encourage attachment by vines or covering vegetation. Roof forms will generally consist of low corrugated metal, flat sod- or vine-covered roofs, pitched roofs with low eaves, and irregular outlines, so as not to dominate the skyline, unless a particular design is needed to accomplish the immersion effect. All public concession areas will be carefully integrated into the character of the surroundings, and support facilities will be carefully screened to minimize view by the public, both inside and outside of the Zoo. The entrance structure will be designed not only to be fitting as a modern tourist attraction, but also to blend appropriately

with the surrounding environment, recognizing the Hawaiian Victorian era theme of Kapiolani Regional Park, the Hawaiian heritage of Waikiki, and the ocean shoreline environment.

Proposed Zoo improvements will, for the most part, be constructed within the existing fenceline of the Zoo. Exceptions include improvements associated with the Zoo entrance, art area, utilities, and landscaping. While some improvements may occur outside of the existing fenceline, all improvements will be located within the property boundaries of the Zoo. Proposed Zoo improvements are illustrated on Figure 1-1. These improvements can be compared with the existing Zoo design presented in Figure 3-1.

1.3 PROJECT ALTERNATIVES

The proposed project, as presented in Section 1.2, presents the ideal plan that was selected from all of the Project alternatives documented in the Master Plan (Jones and Jones, 1984). Alternatives presented in this EA as required by Chapter 343 HRS, include the following:

- Make improvements in only those areas of the Zoo that require critical attention.
- Expand the proposed project (the preferred alternative) described in Section 2. Further enhancements would include additional interpretive and education centers, along with a more diverse animal collection, emphasizing rare and endangered animal conservation research and breeding, as well as maintaining popular existing collections.
- No action.

Other alternatives were presented but not considered further in the Master Plan (PBRA/JJ, 1983). One such alternative was to relocate the Zoo. Because significant funds have already been spent to develop the recently completed Savanna area, relocating the Zoo is not an appropriate or practical alternative.

1.4 RELATIONSHIP TO MASTER PLAN

The purpose of the Master Plan (PBRA/JJ, 1984; updated Brong, 1993a) is to guide the Zoo's future management, maintenance, programming, and renovation activities. As of June 1994, the Master Plan has been updated to reflect the current community and staff goals. For the most part, the original long-term plans presented in the 1983 Master Plan have not changed and have been carried over and incorporated into the current document. However, the updated Master Plan (Brong, 1993a) focuses and refines the concept of gradual reorganization of the basic Zoo layout, emphasizes the use of modern animal management and display principles, and is consistent with the current proposed Zoo improvements. The new design focuses on tropical habitats and species, which are most economical to maintain in Hawaii's climate.

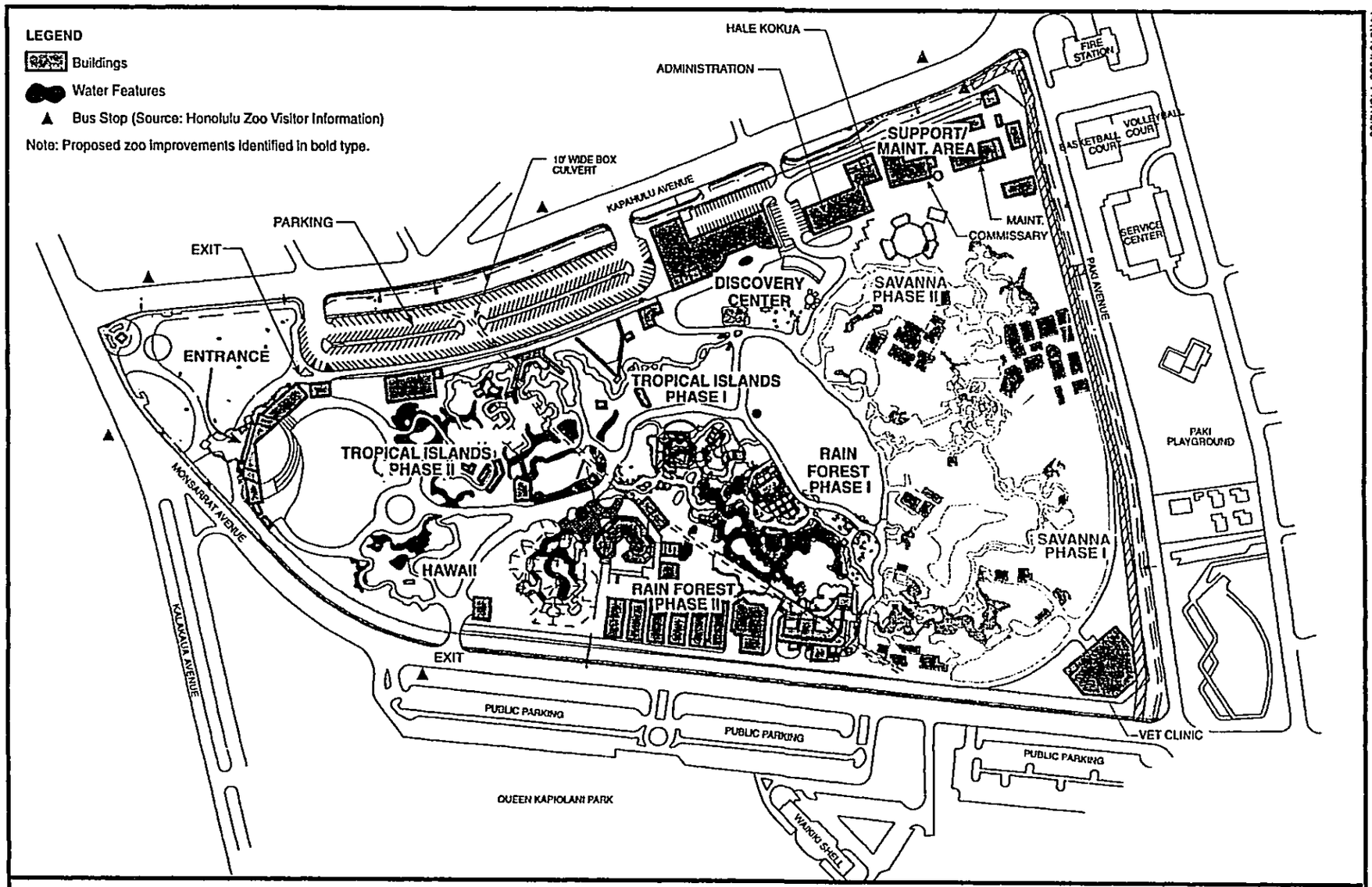

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Figure 1-1
PROPOSED ZOO IMPROVEMENTS

Environmental Assessment
Honolulu Zoo Master Plan, Honolulu Hawaii
May 2000

The African Savanna, Phase I, which opened in 1992, was the first component of the new Zoo design. Construction of the remainder of the new design (with the exception of the Savanna Phase II and the Discovery Center, which were covered under a previous Environmental Assessment) is the proposed action covered by this EA.

The updated Master Plan covers the Zoo improvements from the year 2000 through year 2010, when specific Zoo improvements are planned for completion. This EA assesses the potential for environmental impacts from the proposed Zoo improvements.

1.5 PURPOSE AND NEED

Redevelopment of the Zoo supports the City and County's General Plan objective to provide a wide range of recreational facilities and services that are readily available to all residents of Oahu. In particular, the proposed project facilitates and supports the development of an awareness and appreciation of the natural environment. By implementing an integrated development plan for the Zoo in phases, the resulting zoological park will provide a representation of natural habitats and thus enhance recreational and educational experiences as well as encourage an appreciation of the natural environment.

1.6 REQUIRED PERMITS

The following permits will be required for the proposed project:

- Minor Special District Permit
- Special Management Area Use Permit (minor if cost of improvements within the SMA is less than $125,000)
- Height Variance
- Grading Permit
- Building Permit

Permit applications will be submitted to the City and County in conjunction with each development phase.

CHAPTER 2
DESCRIPTION OF PROJECT

2.1 LOCATION AND LAND OWNERSHIP

The Honolulu Zoo is located at the northern end of Kapiolani Regional Park in the Waikiki/Diamond Head area of Oahu (TMK 3-1-43:1). The entire area of Kapiolani Regional Park is owned by the Kapiolani Park Trust and managed by the City and County of Honolulu under the auspices of the Honolulu City Council, whose members serve as the Park's trustees. The Zoo's 42.5 acres are bordered by Kapahulu, Kalakaua, Monsarrat, and Paki Avenues. North of the Zoo are hotels, businesses, and apartments of Waikiki, the State's primary tourist destination. South of the Zoo, across Monsarrat Avenue, is the remainder of Kapiolani Regional Park, including special function components such as the Waikiki Shell and community and neighborhood park areas. Kuhio, Kapiolani, and Queen's Surf beaches are located west of the Zoo, and Paki Community Park is to the east (Figure 2-1).

2.2 PROPOSED PROJECT SCHEDULE

Proposed Zoo improvements are projected over a period of 10 years. Construction of the most recently developed design, the Tropical Forest, will occur over a five-year period. Table 2-1 presents the Project schedule.

2.3 PROPOSED EXHIBITS

Three new ecosystems (biomes) and related exhibits are proposed: Hawaii, Tropical Forest, and Tropical Islands. The proposed overall layout of the Zoo is designed to immerse the visitor in one ecological environment at a time and to provide logical transitions between the various environments. The proposed layout of the Zoo is provided in Figure 2-2.

The Tropical Forest Biome is currently under design, while other biomes and facilities are conceptual only. Specifics regarding exhibit structures and infrastructure layout are therefore available only for the Tropical Forest Biome. The utility requirements for the entire Zoo, including potable water, nonpotable water, wastewater and electrical distribution, have been assessed and are addressed in individual master plan documents.

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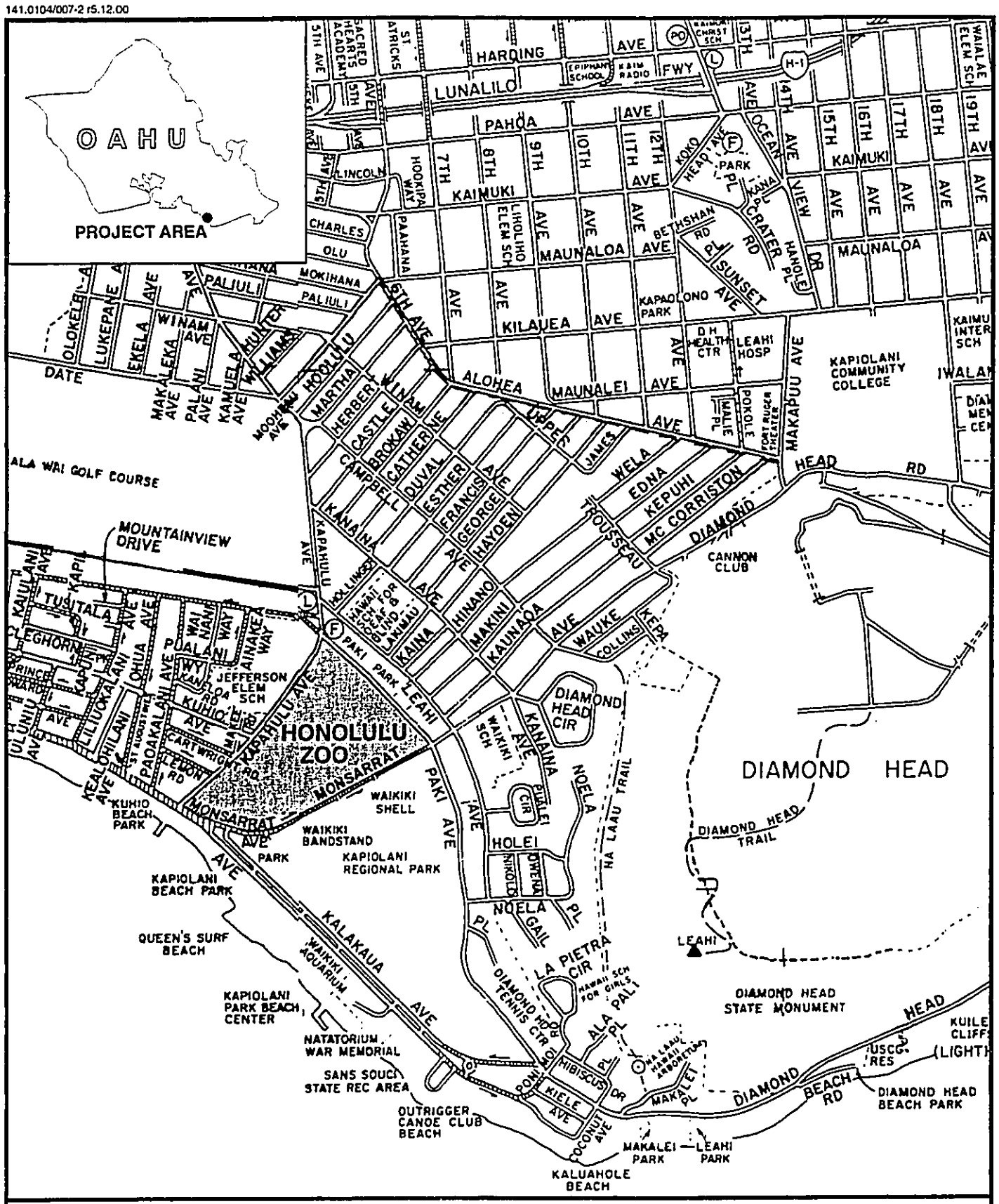

Figure 2-1
LOCATION MAP

NORTH

0 1000 2000
SCALE IN FEET

Environmental Assessment
Honolulu Zoo Master Plan, Honolulu Hawaii
May 2000

Table 2-1: Project Schedule

BIOME/FACILITY	Development Cost	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Tropical Forest IA Tropical Forest IB Tropical Forest IC Tropical Forest II	$2.5 million $4.7 million $2.8 million $9.4 million	construct	construct	construct	construct						
Hawaii	$7.5 million		plan			construct					
Tropical Islands I Tropical Islands II	$6.5 million $8.5 million				plan plan			construct construct			
Commissary	$1.0 million		plan			construct					
Maintenance	$1.0 million		plan				construct				
Plantings	$0.5 million		plan				construct				
Entrance Complex	$0.8 million			plan				construct			
Veterinary Clinic	$1.2 million					plan			construct		
Administration	$0.6 million					plan			construct		
Hale Kokua	$0.5 million					plan				construct	
Mauka Open Space	$0.2 million							plan			construct
Zoo Perimeter Parking	$0.2 million							plan			construct

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Figure 2-2
PROPOSED ZOO LAYOUT

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2.3.1 Hawaii Biome

The first ecosystem encountered by the visitor will be the 1.4-acre Hawaii Biome, located along Monsarrat Avenue southeast of the makai open space. The Hawaii Biome will consist largely of birds and insects, as there are few mammals or reptiles native to the islands. This biome, designed to replicate an ahupua'a,[1] will take the visitor uphill through a series of microhabitat gardens and back down through a lava tube to brackish marshes and an ohia rain forest. The visitor will leave Hawaii's ohia rain forest through a cave leading to the next geographic region. Before exiting, there will be an opportunity to purchase native Hawaiian gifts and other items at the Hawaiian Interpretive Center.

2.3.2 Tropical Forest Biome

The 6.9-acre Tropical Forest Biome will include both Asian and South American ecosystems and will be located east of the Hawaii Biome. It will be visually separated from Monsarrat Avenue by several behind-the-scene bird breeding complexes. Figure 2-3 illustrates the proposed layout of the Tropical Forest Biome.

The visitor will enter the Tropical Forest and immediately encounter a South American rain forest bird aviary. The transition from the Hawaiian to the South American rain forest will encourage the visitor to compare the two rain forests. A treetop "scientific research center" to be built on a platform in the Morton Bay fig tree will serve to demonstrate how creatures high in the rain forest canopy are studied. The proposed "scientific research center" is one example of an interactive exhibit that emphasizes the "immersion" theme of the Zoo. Throughout the South American rain forest, visitors will be surrounded by exhibits of mixed primates, capybara, sloths, small cats, macaws, parrots, softbills, and toucans. A separate pavilion will house reptile and amphibian exhibits. A path will lead the visitor past a snack hut before exiting the South American rain forest and passing to the Tropical Forest.

The first exhibit encountered in the Tropical Forest will be an aviary containing softbills, hornbills, pheasants, reptiles and amphibians, small deer, and fruit bats. Visitors will continue walking through a bamboo grove while viewing exhibits containing sun bears, otters, tigers, and monkeys, and will view ancient ruins along the way to a river populated by gibbons, gharials, deer, and elephants.

[1] Ahupua'a is a land division usually extending from the uplands to the sea.

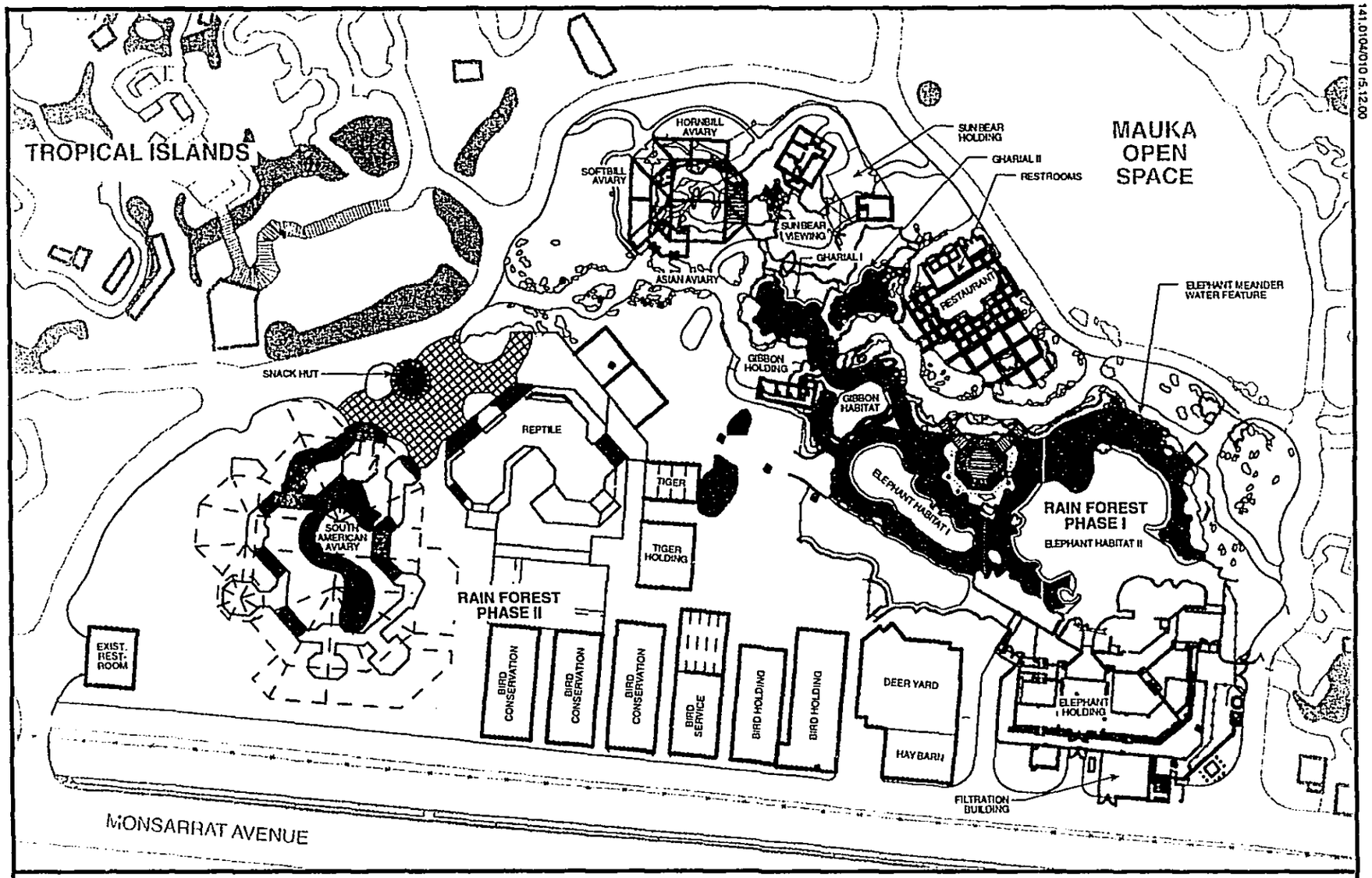

Figure 2-3
PROPOSED LAYOUT OF TROPIC FOREST BIOME

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2.3.3 Tropical Islands Biome

The Tropical Islands Biome will be located ewa of the Tropical Forest and west of the Discovery Center; the ewa side will abut the Kapahulu visitor parking area. This 5.0-acre biome will cover four geological types of islands (Ancient Continental, New Continental, Volcanic, and Low Limestone Islands) and will have exhibits comparing and contrasting seven different islands. The exhibits will focus on the influence of geography, geologic history, and the evolution of island species and plants.

The first ecosystem, "Ancient Continental Islands" (Phase I), will show how Australia split away from Pangea before placental mammals evolved. Australian exhibits will feature emu, wallabies, kangaroos, wombats, koalas, tortoises, tuatara kea, echidna, Tasmanian devils, and many more reptiles and amphibians.

Visitors will leave the Australia exhibit by crossing water, just as animal species must (but within their contained exhibits), to arrive on the "New Continental Islands" (Phase II) of Wallacia, New Guinea, and Madagascar exhibit. This exhibit will include orangutans, barbarusa, black ape, and komodo dragons from Wallacia; birds of paradise, bower birds, brush turkey, tree kangaroos, cassowary, reptiles, and amphibians from New Guinea; and tevreks, ringtailed lemurs, forest lemurs, tortoises, and other reptiles and amphibians from Madagascar. Another bridge will take visitors to replicas of the isolated volcanic islands of the Galapagos, where exhibited species will include giant tortoises, land iguana, flightless birds, migratory birds, small cats, reptiles, and amphibians. Finally, the visitor will enter the limestone islets and atolls of Polynesia to observe common sea birds, softbills, bats, salt water crocodile, geckos, skinks, and invertebrates.

2.4 PROPOSED LANDSCAPING

Landscape development will include planting vegetation; designing open spaces; installing water features, earthforms (artificial rock forms and earthworks), and exterior furnishings; and paving visitor pathways. All landscaping elements will be appropriate to their geographic, geologic, or ecologic scenarios, will be durable, and will be non-harmful to visitors and animals.

2.4.1 Vegetation

Vegetation will be selected and planted to minimize maintenance requirements while adequately performing the intended function (e.g., shade, screening). Turf will be planted in passive recreation zones such as picnic areas. Where heavy shade prevents vigorous turf growth, materials such as lava cinder or gravel will be substituted. Intensive use areas, such as the entry plaza, will be paved to avoid turf-maintenance problems.

Vegetation will be limited to species that are characteristic of the represented biomes. Trees planted along the streets will be species chosen from an approved tree list from the City and County of Honolulu's Department of Planning and Permitting (per the requirements for areas within the Diamond Head Special District). In an effort to control landscape and maintenance costs, commonly available vegetation will be used. When possible, some vegetation will be grown on-site in a greenhouse located in the northeast corner of the Zoo (along Paki Avenue). Use of flowering and attractive plant materials appropriate to the biome will be encouraged. Plant materials will also be selected with consideration of their maintenance requirements relative to costs, visitor comfort, and animal safety.

2.4.2 Open Spaces

The existing mauka and makai open spaces will be maintained but modified with some minor changes to landscaping. Open spaces are illustrated on Figure 2-2. Changes to these areas could include the installation of a fountain, design of transition areas between the open space and the adjacent exhibit areas, design of flower beds, and the installation of necessary related irrigation.

The 1.9-acre makai open space near the entrance will continue to be used for Zoo events. It will include a stage and sound system, a small playground and concessions area, and a picnic seating area. The makai open space will visually transition the visitor from the entry concession area to the first biome, Hawaii, and serve as a transition from the last biome, the Tropical Islands, to the gift shop and entrance/exit building.

The mauka open space, also approximately 1.9 acres, will offer visitors access to all biomes, the Discovery Center, and concession stands. This area will have an open view of Diamond Head and will provide a park-like setting enjoyed by children and adults.

2.4.3 Water Features

An expansive and seemingly continuous system of interconnected water bodies will be developed to add visual and topographic continuity throughout the Zoo grounds. However for reasons of animal health and hygiene, these water bodies will not generally be interconnected; rather, water will be contained and recirculated within each exhibit zone. Intake and discharge points will be carefully obscured from public view through strategically placed landscape. Water features are illustrated in Figure 1-1.

To conserve potable water, nonpotable water has been and will continue to be used in animal exhibits and water features wherever possible. In contrast to the Savanna exhibits, which operate on a "dump and fill" basis (complete water change), proposed exhibits will use recycled water to satisfy daily requirements. Water will be used for filling, for continuous make-up water at the exhibits, and for backwash of filtration systems. Supply and filtration systems will operate

automatically. An extensive water use schedule will be implemented to ensure the necessary water capacity to service the specific features. Water features identified in the Master Plan (updated Brong 1993a) are described below.

- **Entrance:** The entrance water feature will be a fountain. Water (estimated at 64,000 gallons) will be filtered and recycled, and be fully replaced on a monthly or bi-monthly basis as required to maintain the water's aesthetic quality.

- **Hawaii Water Features:** There will be two water features in the Hawaii Biome. The larger one at the sea bird exhibit, about 171,800 gallons, will be refilled monthly. The smaller marsh bird exhibit will hold approximately 67,000 gallons and be refilled on a weekly basis if necessary. Filtration and recirculation of the water will be undertaken to remove wind-blown dirt and debris and to control algal growth.

- **Tropical Forest Water Features:** The South American and Hornbill aviaries and the reptile and tiger exhibits will contain relatively small ponds. These ponds will be operated on a dump and fill basis with potable water because they are the birds' drinking water source. The sunbear exhibit will have small nonpotable waterfalls with a collecting pool. Water will flow through the pool and be discharged to the elephant exhibit. The elephant exhibit, complete with a river-like setting, will include two approximately 300,000-gallon pools. Water will be recycled in this exhibit and nonpotable water will be used to backwash filters and refill the water feature semi-annually. Finally, the gharial exhibit will contain two approximately 20,000-gallon water features supplied with potable water. This water will be disposed weekly. Due to the potential for disease transmission, reuse of the gharial exhibit water will not be done.

- **Tropical Islands Water Features:** Five exhibits in this biome will have water features. Nonpotable water will be used for monthly refills of the planned 217,000-gallon cassowary pool, the 220,000-gallon tortoise pool, the 57,000-gallon reptile pool, and the 157,000-gallon orangutan pool. It will also be used for the weekly refill of the 8,000 gallon fountain. Water will be recycled to meet daily demands; filters, and possibly disinfecting agents, will be used to protect animal health.

2.4.4 Earthforms

Earthforms will be constructed to create barriers and to form views into the exhibit areas for visitors. Soil and natural rock will be imported from pre-approved sources for use in plant beds. Approval of sources is required to protect animal health.

2.4.5 External Furnishings

External furnishings include benches, tables, trash receptacles, drinking fountains, information kiosks, and signs. Furnishings will be generally standardized as to type, size, and character needed to provide overall visual continuity and easy recognition throughout the Zoo. Color and finish will vary among locations, in accordance with the character of each biome or activity area. Furnishings will be simple and functional and not visually distracting; materials will be "primary" and natural in appearance (stone, iron, wood, concrete simulated earth) rather than highly manufactured or artificial (e.g., plastic, stainless steel, glossy enamel paint), to the extent practicable.

2.4.6 Pathways

The Zoo will be structured for two levels of visitor flow. The primary visitor pathway will be a relatively direct path from the entrance to the mauka open space. All exhibits and the Zoo exit can be accessed from this lighted, asphalt path, which will be built in accordance with Americans with Disabilities Act (ADA) requirements, and will be wide enough (16'-20') to accommodate a fire truck in case of emergency.

The secondary system of pathways is within the exhibits. Secondary paths will be designed for directional pedestrian flow and will all exit to the primary path. These paths will be six to eight feet wide and ADA accessible.

2.5 VISITOR FACILITIES

Additional visitor facilities must be provided with the Zoo improvements. Because these improvements are anticipated to result in an increase in visitors, adequate numbers of entryways, concessions, restrooms, and parking must therefore be provided. Proposed visitor facilities are described in this section.

2.5.1 Entry, Exit, and Perimeter Areas

The entrance building will be relocated nearer to the corner of Kalakaua and Kapahulu Avenues. Design of the entrance will be consistent with the Hawaiian Victorian theme of Kapiolani Regional Park. Entrance improvements are planned to increase the public's awareness of the Zoo by making it more visible to streetside travelers. Once visitors enter the Zoo, they will immediately be provided with visitor services and conveniences such as lockers, phones, wheelchairs, strollers, an information booth, membership services, restrooms, and a gift shop. These relatively noisy areas will be concentrated at the entrance, so that the exhibit areas will not be disrupted. The entrance area will also include the large makai open space, which will be used for organized Zoo events.

Other entrances will be available for various groups. School groups will use a separate entrance near the Discovery Center. Staff will enter and exit the Zoo adjacent to the administration building, east of the school group entrance.

The main exit will be located on the north side of the entrance building, leading to the Kapahulu Avenue parking area. A second exit will open to Monsarrat Avenue from the south side of the Hawaii Biome.

The Zoo perimeter area will be enhanced with directional signs, plantings, bike paths, sidewalks, and an art display area on Monsarrat Avenue. Details for this area are not available at this time but will be developed in conjunction with community groups.

2.5.2 Concessions and Gift Shops

The main concession stand will be located west of the mauka open space, in an outdoor garden located in the Tropical Forest area. This facility will be designed to serve up to 500 people per hour.

A smaller concession stand and a gift shop will be located at the main entrance. The gift shop will be accessible by persons not entering the Zoo. A second gift shop will be located near the school groups' entrance and the Discovery Center. Native Hawaiian items and gifts will be sold within the Hawaiian Interpretive Center, located in the Hawaii Biome. A drink concession will be located in the Savanna, and food carts will be set up for special events.

2.5.3 Restrooms

Restrooms will be designed to accommodate the projected daily volume of 4,000 to 5,000 visitors; toilet facilities will be installed in accordance with the current *Uniform Building Code* and the ADA requirements. To accommodate the projected number of visitors, 53 stalls, 23 urinals, and 32 sinks will be available (currently, 17 stalls, 6 urinals, and 14 sinks are available) (Brong, 1993b).

The largest restrooms will be located at the entrance, at the main food concession stand adjacent to the mauka open space (halfway through the Zoo), and at the Discovery Center near the auditorium and Zoo exit. Smaller restrooms, each containing 3 toilets, one urinal, and two sinks, will be located in each of the biomes. Diaper changing areas will also be available.

2.6 ADMINISTRATIVE, MAINTENANCE, AND SUPPORT FACILITIES

Additional administrative, maintenance, and support facilities will be needed to help operate the expanded Zoo. Administration and maintenance facilities—including the commissary, warehouse, garage, greenhouse, and refuse collection area—will be located east of the proposed Discovery Center at the northeast corner of the Zoo, along Kapahulu Avenue. Support facilities, including animal holding areas and the veterinary clinic, will be situated behind the Savanna Biome along the Monsarrat and Paki Avenue corner. The keepers' building (offices) will be along Paki Avenue, behind the Savanna Biome.

2.6.1 Administration

A 17,000-square-foot, two-story, air-conditioned administration building will include a reception area, storage areas, offices for 18 persons, a lunch room and kitchenette, restrooms, conference space, a library, and a registrar's room. Connected to this building will be Hale Kokua, a facility for approximately 60 keepers and operations personnel. It will include rooms, restrooms with staff showers and lockers, and a small outdoor use area. Two small rooms above Hale Kokua will be designated as temporary living quarters for scientific visitors.

2.6.2 Maintenance

The maintenance building will be east of the commissary in the northeast corner of the Zoo. This building will be constructed in accordance with current *Uniform Building Code* requirements for maintenance facilities. It will include a carpentry station with air compressor and unisaw, a plumbing section, a welding section, an electrical section, a masonry section, a graphics section with computers, and a storage area for flammable materials. The maintenance area will also include garages (for parking and charging electric maintenance vehicles), a vehicle wash-down area, gas pumps and above-ground gas storage tanks, a 30-cubic-yard garbage compactor, a partially air-conditioned greenhouse with a work station, and a storage yard.

2.6.3 Animal Holding, Breeding, and Treatment Facilities

A substantial on-site breeding program will be implemented at the Zoo, as avifauna of the Pacific region and many reptiles cannot be obtained from other zoos or from the wild. Breeding facilities will be hidden from view behind the Tropical Forest exhibit and will be accessible by a service road. Five buildings will comprise the breeding facility.

The veterinary clinic will be constructed in the southeast corner of the Zoo, behind the Savanna. The clinic will be equipped to perform animal treatment, surgery, radiology, necropsy, research, holding, intensive care, isolation, nursery, and quarantine functions. It will be equipped with

permanent eye wash stations, walk-in cooler, autoclave, and incinerator for medical wastes. Outdoor spaces for quarantine and animal holding will also be provided.

The commissary will provide food storage and preparation areas for animals. It will be a one story, air-conditioned facility at the northeast edge of the Zoo, near the Kapahulu Avenue entrance and the maintenance facilities. The commissary will be capable of serving approximately 2,000 animals daily. It will include a feed storage area, dry storage processing, cold room for seeds, two walk-in coolers, one walk-in freezer, a food preparation area, a commercial dishwasher, a rodent breeding room, an insect breeding room, a loading dock, and a warehouse section. All food stuffs will be delivered to this building and then stored, frozen, thawed, washed, chopped, bagged, and picked up daily by keeper staff. Some areas will need to be hosed down and will include floor drains. Hay used to feed animals will be stored in a shed located behind the Tropical Forest, next to the elephant exhibit. This shed will have an approximate capacity of 2,000 hay bales. Lastly, the warehouse portion of the building will be used to store all bulk, non-food supplies (paper towels, boots, plastic bags, etc.).

2.7 INFRASTRUCTURE

A number of infrastructure improvements will be required to support the proposed project. In general, all utilities will be designed in each phase to facilitate the Zoo improvements. Access points to utilities will be located in vegetated areas near pathways or in the pathways themselves. To prevent injury to animals or damage of equipment by animals, no major access points will be located in animal areas. All exposed hookups will be well screened from viewing and public areas.

2.7.1 Electricity and Telephone

Currently, the Zoo is serviced by a primary metered 2.4 kV, 1-phase distribution system, and a secondary metered 480 volt, 3-phase distribution system. The 2.4 KV system, which enters the site on Kapahulu Avenue (opposite Thomas Jefferson School), feeds the older facilities and is stepped down with pad-mounted transformers located at the various facilities. The 480 volt system, which enters the site on Monsarrat Ave, feeds the new African Savanna and the well pumps across Paki Avenue. To accommodate the expected threefold increase in electrical demand, the existing 2.4 kV distribution system will be phased out and two 480-volt, 3-phase systems (switchboards) will be installed. The Tropical Forest will be provided with a new 480-volt, 3-phase switchboard from Monsarrat Avenue. The switchboard serving this area will be used to extend service westward to the Tropical Islands and Hawaii exhibits, the Veterinary Clinic, and the entrance. The Discovery Center, administration, commissary, and maintenance areas will be served by a second 480-volt/277-volt, 3-phase switchboard. With the addition of this second switchboard, loads for the Savanna will be consolidated and the existing transformer

for the Savanna area will be removed. Emergency backup generators will be provided in the event of a power failure for facilities such as the bird breeding complex and hay storage building.

The existing telephone system consists of two services. One is located overhead across Kapahulu Avenue and serves the Savanna, maintenance area, and office buildings. The second one, located underground across Monsarrat Avenue, serves the buildings near the Zoo entrance. To accommodate the projected twofold increase in usage, the service across Kapahulu Avenue will be extended to accommodate the proposed Discovery Center, administration, commissary, and maintenance areas. The telephone service located under Monsarrat Avenue will be extended to serve the Tropical Islands and Hawaii Exhibit, the Veterinary Clinic, and the entrance. An existing telephone cable, owned and operated by the U.S. Army will be relocated from the proposed Tropical Forest area to the service road area so as not to interfere with the planned exhibits.

2.7.2 Water Supply

The Zoo uses water for human consumption, animal consumption, water features, irrigation, and maintenance. Both potable and nonpotable (brackish) water are used to satisfy demand. For the period from January 1998 to January 2000, the amount of water used in the Zoo was approximately 641,000 gallons per day (gpd). The demand represents an average of 591,000 gpd of potable water and 50,000 gpd of nonpotable water. Potable water use was averaged from water meter readings. Nonpotable water was estimated from exhibit water feature volumes and frequency of change. Whenever possible, nonpotable water will continue to be used in animal exhibits in an effort to conserve potable water.

2.7.2.1 Potable

Potable water is provided to the Zoo by the City and County of Honolulu Board of Water Supply distribution system. The main source is a 16-inch water main along Monsarrat Avenue. To accommodate the projected potable water demands for the Savanna area, downstream of the 16-inch water main, two 8-inch potable lines between Kapiolani Regional Park and the Zoo were abandoned and replaced with a single 12-inch line. This 12-inch line enters the Zoo near Monsarrat, just south of the Savanna. These modifications are expected to accommodate the potable water demands of the proposed project.

With the brackish well system installed as part of Savanna I, the potable water supply demand for the proposed Zoo improvements will increase about 5 percent over existing usage. The future potable water demand is based on water use projections for three main applications: irrigation, water features, and remaining Zoo use (animal holding areas, public and employee facilities). The estimated irrigation demand is 130,000 gpd. Water features (e.g., decorative bodies of water, fountains) planned as part of Zoo improvements are estimated to require an average of 30,000 gpd of potable water. The estimated average daily flow requirement for potable water in

the remaining areas of the Zoo (total minus water features and irrigation) is 431,000 gpd. These requirements are associated with human and animal consumption, cleaning, and restroom facilities.

In addition to the potable water demands described above, potable water will also be used to satisfy fire fighting requirements. Three additional fire hydrants will be needed to meet the fire protection requirements of 2,000 gpm (for 2 hours) for future development phases (Belt Collins; 1993d).

2.7.2.2 Nonpotable

Three existing wells providing nonpotable water to the Zoo have a combined capacity of 350 gpm or 504,000 gpd. These well locations are illustrated in Figure 2-4. There is also an existing nonpotable well within the current gharial exhibit that will be located within the new elephant exhibit of the Tropical Forest. There are currently no plans to activate the well, but it is available for use in the future, if required.

The current nonpotable water demand for the Savanna exhibits is about 50,000 gpd. The nonpotable water demand is expected to increase due to the proposed Zoo improvements. However, the expected daily use will remain below 504,000 gpd with proper water management (water use scheduling and recycling) and no well system expansion will be required.

To accommodate the proposed exhibits, nonpotable water distribution lines will be installed and the well control system improved. The proposed nonpotable distribution system will be an extension of the existing system. There will be two main legs (consisting of 6-inch lines), one serving the second phase of the African Savanna and Discovery Center and the other serving the remaining exhibits.

Improvements to the non-potable water delivery system will also be made. The existing system is regulated by flow control valves, which do not permit optimum delivery from the three wells served by it. The proposed improvements to the system include:

- Installation of a hydropneumatic tank for water storage and reduce pump cycling.
- Replacement of the Well A pump.
- Installation of a pressure sensor and programmable pump controller, with remote terminal units communicating by radio transmission for system operation.
- Removal of the existing control valves and strainers, and installation of one new control valve to limit drawdown in Well 2.

The hydropneumatic tank will provide about 600 gallons of water storage under pressurized conditions to meet low flow demands without activating a well pump. The tank will be about 30 inches in diameter and be about 74 inches tall, located along the Monsarrat Avenue fence near Paki Avenue. The tank will allow proper pump cycling to keep the pump's start/stop time within manufacturer recommendations.

Replacement of the Well A pump is necessary to achieve optimum use of this well and in turn, limit the use of Well 2, which appears to experience excessive drawdown. The replacement pump for Well A was selected to allow it to be the "jockey" pump for the system, being the first on and the main delivery pump.

The new pressure sensor and pump controller will be used to activate the various pumps into service based on water use demands as monitored through the system pressure. The new well sequencing will be Well A, Well 1, and Well 2. The signal from the sensor/controller to the wells will be by an FM-VHF/UHF radio transmitter/receiver pair. No additional underground utility installation will be required for the change on operation other than 120-volt power for the pump controller sensor at the hydropneumatic tank.

With the change in the control system, and installation of a new control valve at Well 2, the existing control valves will no longer be needed. The new control valve at Well 2 will allow more accurate pumping and prohibit excessive well drawdown. For Well A and Well 1, there is no need to limit delivery, since the salinity of the water is not a concern.

As previously mentioned, the existing nonpotable water supply of 504,000 gpd is sufficient to meet the needs of the proposed Zoo activities when water management practices are employed (e.g., water use schedule and water recycling). Daily nonpotable water use, consisting of backwash, make-up, and filling of exhibits requiring daily water turnover, will be about 43,000 gpd. The remaining 461,000 gpd will be available to the other exhibits with less frequent turnover requirements (Belt Collins, 1993a).

The implementation of a water use schedule is necessary to ensure that the Zoo's nonpotable water needs are met, and that the system operates most efficiently. The success of the scheduling relies on established controlled rates of fill at the exhibits. Flow control devices have been recommended to prevent significant deviation from these specific fill rates that could affect concurrent uses. The Zoo water use schedule can be found in the Non-Potable Water Master Plan.

A water recycling program will be implemented to satisfy the daily requirements for nonpotable water in the Tropical Forest, Tropical Islands, Hawaii exhibit, and the water features at the entrance. The water in each feature will be recycled through a filtration system. Using such a system will have a less negative effect on the municipal collection and treatment system by

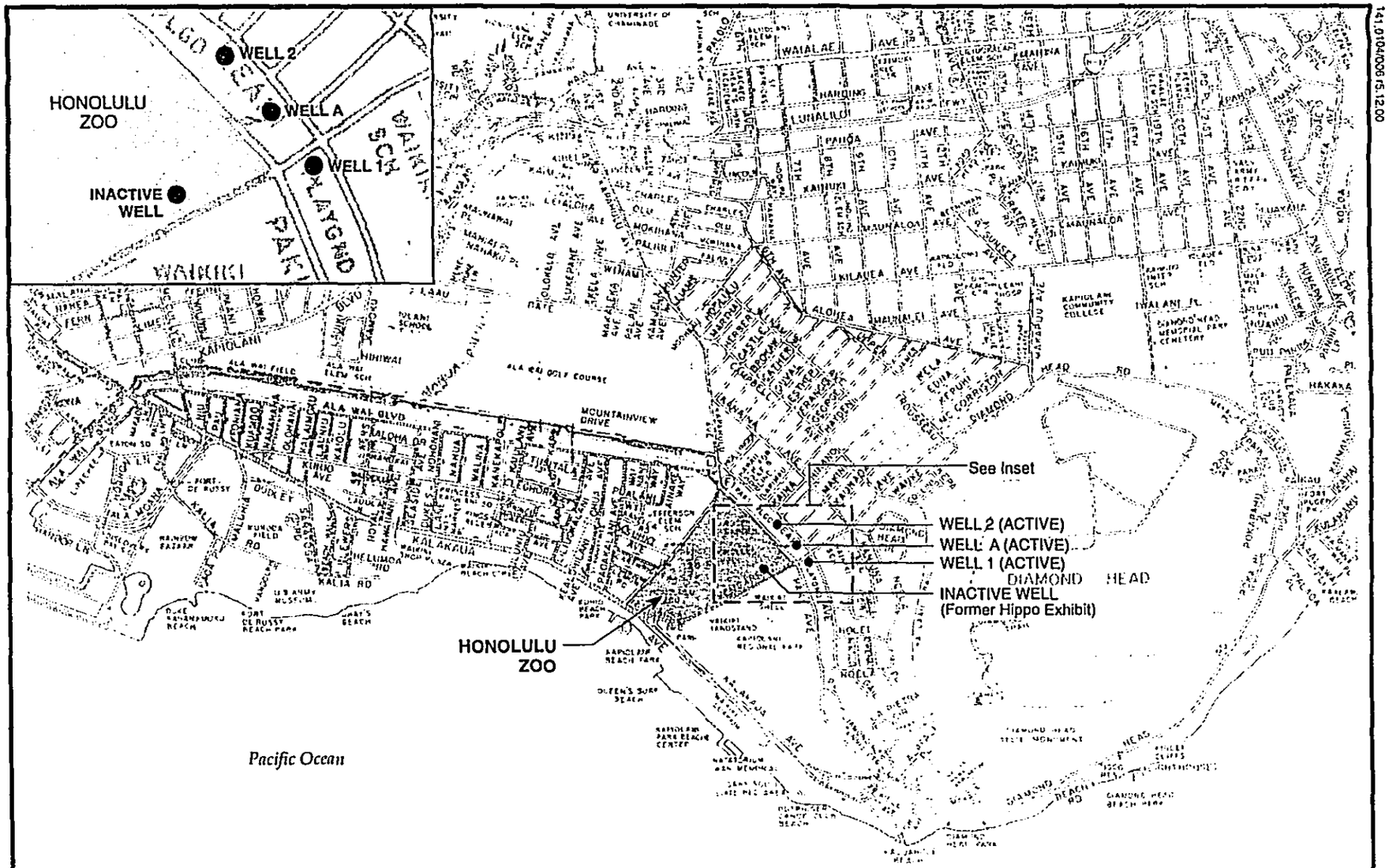

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Figure 2-4
LOCATIONS OF NONPOTABLE WELLS

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reducing the volume of water discharged. New nonpotable water will be used only to backwash the filters and to maintain a constant water level in the exhibit. This practice will allow complete water changes ("dump and fill") to occur less frequently.

2.7.3 Wastewater and Sewage Disposal

The Zoo's on-site sewer system connects to the City and County wastewater system at six points (Figure 2-5). Wastewater from on-site Pump Station No. 1 (point 1 of 6) is conveyed via a 6-inch-diameter force main across Monsarrat Avenue to a 12-inch-diameter municipal gravity line (a line whose contents flow solely upon the forces of gravity), ultimately discharging into the off-site municipal pump station ("Public Baths"—one of two municipal pump stations servicing the Zoo). Wastewater from on-site Pump Station No. 2 (point 2 of 6) is connected to the municipal system by a 4-inch-diameter force main under Paki Avenue.

In addition to these two connections, there are four Zoo gravity lines (points 3, 4, 5, and 6 of 6). There is an 8-inch-diameter gravity line exiting the Zoo near the entrance (point 3 of 6) that crosses under Monsarrat Avenue. This 8-inch-diameter line connects to a 10-inch-diameter City and County main, eventually discharging to Public Baths pump station. A 6-inch-diameter line exits the Zoo about 300 feet south of the Zoo entrance (point 4 of 6), crosses beneath Monsarrat and Kapahulu Avenues, connecting into the 10-inch-diameter main in front of Kapiolani Beach Park. A 12-inch-diameter gravity line (point 5 of 6) from the Zoo near the Monsarrat Avenue exit also connects into the 10-inch-diameter main serving Pump Station No. 1. The other point of gravity connection (point 6 of 6) is an 8-inch-diameter line exiting the Zoo on Kapahulu Avenue. Flow from this line eventually joins that from Pump Station No. 2 at the City and County's off-site "Beachwalk" Pump Station. Wastewater is transported to the East Mamala Bay Sewage Treatment Plant on Sand Island from the two City and County pump stations.

The estimated average wastewater flow from the existing Zoo facilities is 588,700 gpd, including dry weather infiltrations. Since there are no meters installed at the Zoo's pump stations, the existing wastewater flow was approximated from the water meter readings. It was estimated that 80 percent of the water eventually enters the sewer, along with all nonpotable water used in the exhibits. Approximately 60 percent of the wastewater is discharged to the Public Baths Pump Station, with the remainder directed to the Beachwalk facility. Currently, portions of the off-site gravity lines that receive discharge from both municipal pump stations (Public Baths and Beachwalk) do not have adequate capacity between 5:00 and 8:00 PM to support the peak flows discharged by the Zoo. Because of these constraints, the Zoo must drain exhibit water features during the Zoo's visiting hours (sewer off-peak hours) rather than at the time of Zoo closing.

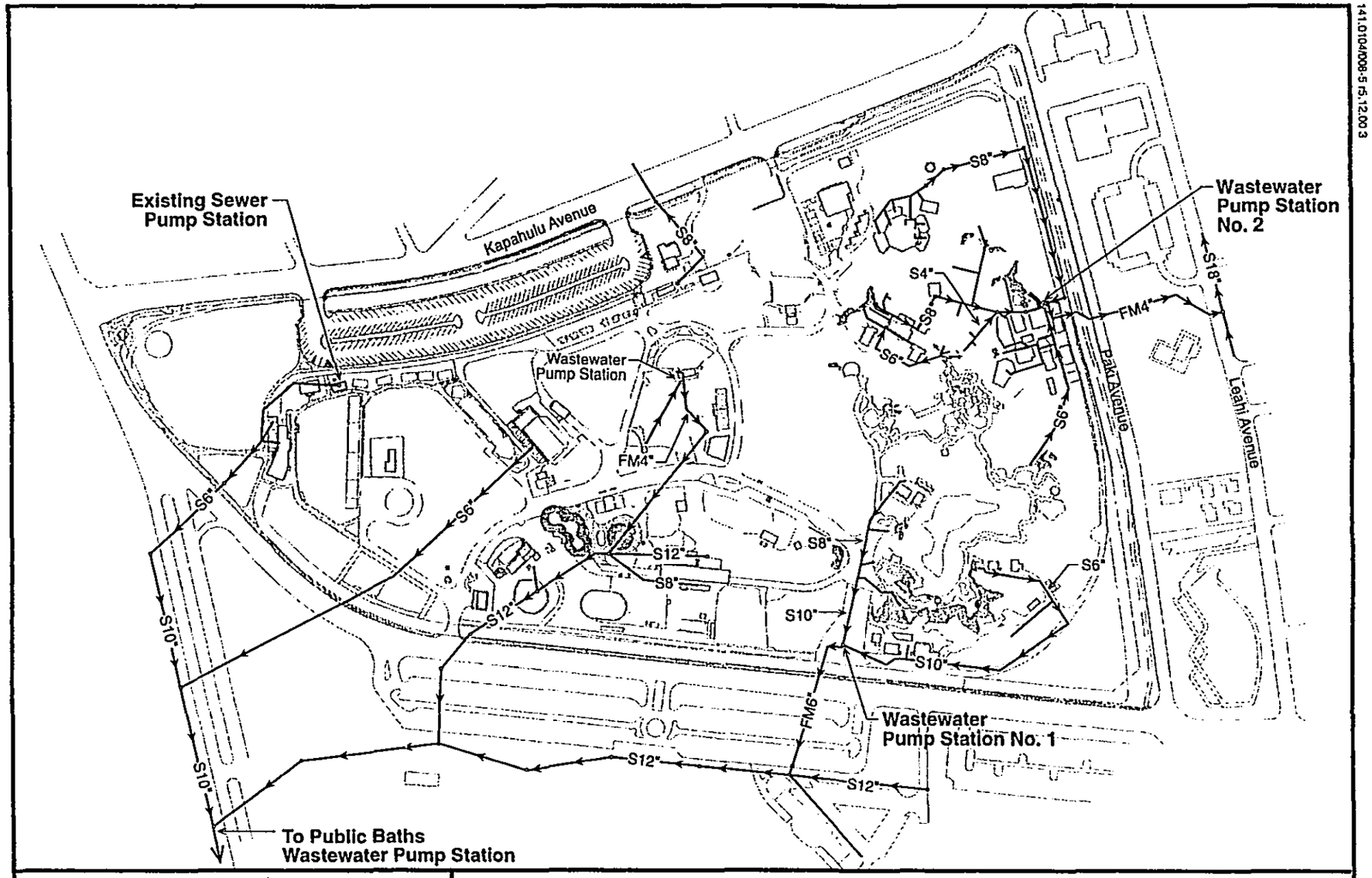

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Figure 2-5
EXISTING SANITARY SEWER SYSTEM

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The improved Zoo is expected to generate an average dry weather flow of 663,000 gpd of wastewater. For the purpose of on-site sewer line sizing, wastewater flows for the master planned Zoo improvements were developed based on designed or anticipated plumbing fixtures within each biome (Belt Collins, 1993b). This method of projecting wastewater flows assesses the maximum flow from various buildings for the purpose of pipeline sizing in accordance with the *Uniform Plumbing Code*. To assess discharges to the City and County's wastewater system, the Design Standards of the Department of Design and Construction (DDC) are used.

Based on design documents, wastewater from the Tropical Forest will be directed to Pump Station No. 1, currently discharging to the Public Baths Pump Station and eventually discharging to Beachwalk Pump Station. The eventual discharge to Beachwalk Pump Station will be through the existing 15-inch-diameter gravity sewer line on Leahi Avenue. Under the Tropical Forest Phase IB construction, Pump Station No. 1 will be replaced in its same general location. A new 8–inch-diameter discharge force main to be installed in the internal service road paralleling Monsarrat Avenue will convey flows through the Zoo. This force main is proposed to exit the Zoo property across from the existing Queen Kapiolani Rose Garden parking lot. The force main will be aligned beneath Paki Avenue, through the Rose Garden parking, and connect into the existing 15-inch-diameter sewer line at a manhole connection. Upon placing the new force main in service, use of the existing 6-inch-diameter force main connecting Pump Station No. 1 to Public Baths Pump Station will be discontinued and the pipeline will be abandoned in-place. The rate and times of discharge from the new Pump Station No. 1 to the Leahi Avenue gravity sewer will be coordinated with the other DDC Divisions as is currently the case for discharge to the Public Baths Pump Station.

Wastewater from the Tropical Islands and Hawaii Biomes, as proposed in the Sanitary Sewer System Master Plan, would also be directed to the Public Baths Pump Station through gravity sewers within the Zoo and Kapiolani Regional Park. The discharge of wastewater from these future biomes to the Public Baths Pump Station will, however, need to be evaluated at the time of their design to determine the most cost effective means of connection and operation.

The City's Department of Planning and Permitting (DPP, formerly the Planning Section of the Department of Wastewater Management) has indicated that after the planned improvements to the Public Baths pump station, all of the wastewater discharges from the Zoo, as proposed in the Sanitary Sewer System Master Plan, cannot be handled under wet weather (peak) conditions. The projected peak wastewater discharge under the Master Plan would be 2.3 million gallons per day (mgd). This discharge considers the limit in future Public Baths pump station sizing (limit of 0.5 mgd to Public Baths) (Application for Connection filed by DDC with DPP, February 2000).

Additional information received from the DPP indicated that segments of sewers interconnecting the Zoo to either the Public Baths or Beachwalk Pump Stations, and from these pump stations to their recipient basins, are at capacity (Final East Mamala Bay Facilities Plan, December 1993 and

Communication with DPP personnel, February 2000). The inadequacy of the existing 10-inch sewer segment in Kalakaua Avenue, connecting Zoo discharge points 1, 3, 4, and 5, was addressed by limiting discharge from the Zoo to that sewer line. The City and County has improvement projects programmed for some of the other segments flowing to Beachwalk that handle the Zoo wastewater discharges, which will be incrementally completed between 2002 and 2006. Programming of the improvements to support the planned Zoo improvements have been requested of the DPP by the DDC (communication with DDC personnel, February 2000).

The discharge from specific exhibits will thus be dependent on the off-site system improvements completed at the time of sewer connection. Given that discharges to the sewer can be controlled by the Zoo through draining of water features, the off-site sewer system capacity will not restrict development. Rather, the operation and maintenance activities of the Zoo will need to be adjusted to conform to the sewer system constraints as is currently done.

2.7.4 Stormwater Disposal

Currently, stormwater (rain water) drains by sheet flow and accumulates in small pools or discharges to drywells in the Savanna. While there is a box culvert that traverses the Zoo, the inlets have been sealed to preclude fecal contamination from exhibits and open areas where local birds congregate. Runoff conveyed in this box culvert flows through the municipal stormwater drains leading to Kuhio Outfall and eventually to the Pacific Ocean. High coliform counts in the effluent discharge led to sealing of inlets within the Zoo.

Under the Master Plan, stormwater will drain to drywells or planned water features within exhibit areas. This improved drainage will be accomplished through strategic site grading. Once the stormwater reaches the intended destination (either drywells or water features), the stormwater will either evaporate, percolate through the soil (filtering out bacteria and breaking up organic material along the way), or be treated and disposed of through the water feature treatment system.

2.7.5 Solid Waste Disposal

Activities associated with the proposed Zoo improvements are expected to generate approximately 36 cubic yards of solid waste daily, approximately three times the existing rate. Solid waste will consist, as it does now, primarily of feces, solid hay, organic plant trimmings, and non-recyclable concession discards (plastic, aluminum, and paper). Wastes will be separated into fecal (organics), compostable, and non-recyclable trash and kept in short-term storage areas prior to off-site transport. The veterinary clinic produces hazardous wastes consisting of needles and animal parts. Needles (or any sharp materials) are disposed of in specific dispensers as part of a disposal kit that sterilizes and wraps the disposed items. The disposal kit is then hauled away by the contractor currently handling the solid wastes. Any infectious wastes are autoclaved

and disposed of with solid wastes. Fecal material will be taken to a container near the elephant holding area and will be trucked to Ho'omaluhia Botanical Garden for composting. Other compostable materials, primarily landscape waste, will be stockpiled and hauled away by a contractor for processing. Non-compostable solid waste will be taken to a 30 cubic-yard capacity trash compactor in the support area (along Paki and Kapahulu Avenues). All waste materials will be picked up by contractors six days per week (Asai, 1994). Refuse storage areas will have concrete pads with floor drains discharging to the sanitary sewer system.

2.7.6 Hazardous Waste

Hazardous waste will continue to be generated by maintenance operations and veterinary services activities. Maintenance will continue to generate small amounts of paint residue from minor painting activities. Leftover paint and solvents are currently kept in used containers and stored on-site. As obligated under the law, Zoo management will ensure the delivery of such wastes to an off-site disposal facility.

2.7.7 Service Roads and Pathways

With the proposed improvements, the total length of service roads and pathways will be 2.9 miles, an increase of just under a quarter mile (1,300 lineal feet [LF]) over existing service roads and pathways. The result will be improved access for firefighting vehicles, maintenance vehicles, and service vehicles, as well as improved pedestrian circulation.

2.7.8 Fire Protection

Fire protection is essential to protect both the public and animals. Smoke-detection systems will be installed in the improved areas to provide warning to humans without panicking animals. Indoor building sprinkler systems and additional fire hydrants will be installed as required by the current *Uniform Building Code* and *Uniform Fire Code*. Access for fire apparatus, water supply, and building construction will be in conformance to existing codes and standards. In addition, fire protection services will be provided by Waikiki and McCully engine companies with ladder service.

2.8 PARKING

Currently, staff parking along Coral Road (see Figure 3-1) accommodates approximately 40 vehicles. With implementation of the Zoo improvements, two staff parking areas will be provided west and northwest of the administration building, adjacent to the Discovery Center. The two parking areas will accommodate 32 and 14 cars, respectively.

Visitor parking must be evaluated in light of the projected increase of Zoo visitors from 652,314 (Fiscal 1991-1992) to 1,650,000 (Fiscal 2000-2001). The Kapahulu Avenue parking lot currently provides 234 visitor parking spaces (including 7 handicap). Overflow parking is available around Kapiolani Regional Park. The number of parking stalls at Kapiolani Regional Park is approximately 817. Parking in this area is shared by users of the Kapiolani Regional Park Beach area, Waikiki War Memorial Park, Paki Community Park, Waikiki Shell, Queen Kapiolani Garden, Diamond Head Tennis Center, and other beaches in the vicinity (Brong, 1994).

Additional parking for the projected increase in Zoo visitors is not planned. However, alternative transportation methods such as mass transportation are feasible and consistent with the Oahu Metropolitan Planning Organization's (OMPO) transportation goals and objectives to manage increased projections in overall traffic (OMPO; June 1991). Currently, six bus routes stop at the Zoo—#19, #20, #22, #47, #58, and #14. Bus routes can transport visitors to the Zoo from as far away as Pearl Ridge, the Honolulu Airport, Waipahu, Waimanalo, and St. Louis Heights.

CHAPTER 3
EXISTING CONDITIONS

3.1 PHYSICAL ENVIRONMENT

Existing physical environment conditions are presented and described in this section. The existing layout of the Zoo is illustrated in Figure 3-1.

3.1.1 Topography and Drainage

The topography of the Zoo is relatively flat. Surface elevations generally range from 4 to 6.5 feet above mean sea level (msl). The highest relief is observed in the Savanna, where improvements have created a maximum elevation of about 13.5 feet msl. Figure 3-2 illustrates the location of the Zoo in relation to surrounding topographical features such as Diamond Head. Local ponding of stormwater in open areas or in exhibits is common in many areas of the Zoo. Stormwater within the Savanna drains to drywells.

3.1.2 Geology

Bedrock in the Zoo area consists of calcareous reef deposits overlain by a thin layer of volcanic tuff (rock formed from volcanic ash). The latter is material that was ejected from the Diamond Head vent when it blasted through existing reef deposits. Board of Water Supply (BWS) borings for caprock wells in the vicinity of the Zoo encountered Diamond Head tuff overlying calcareous reef formation; tuff thickness increased towards Diamond Head. The weathered ejected volcanic material is not more than six feet thick at the first well (BWS, nd).

Borings taken in the Savanna Phase I site encountered coralline bedrock at depths of 7 to 26 feet below ground surface (bgs), with the greatest depth to bedrock in the southern portion of the area (Geolabs, 1987).

3.1.3 Soils

Waikiki was originally a swamp consisting of sediment, generally less than a few feet thick, overlying the underlying reef formation. A substantial portion of the Zoo and Kapiolani Regional Park consists of fill imported to reclaim wet areas. The Soil Conservation Service has identified the soil at the site as mostly Kawaihapai clay loam, 0 to 2 percent slopes, with moderate permeability, slow runoff, and no more than a slight erosion hazard. The soil makai of the Zoo entrance building is Jaucas calcareous sand, which has very rapid permeability, very slow runoff, and slight erosion hazard.

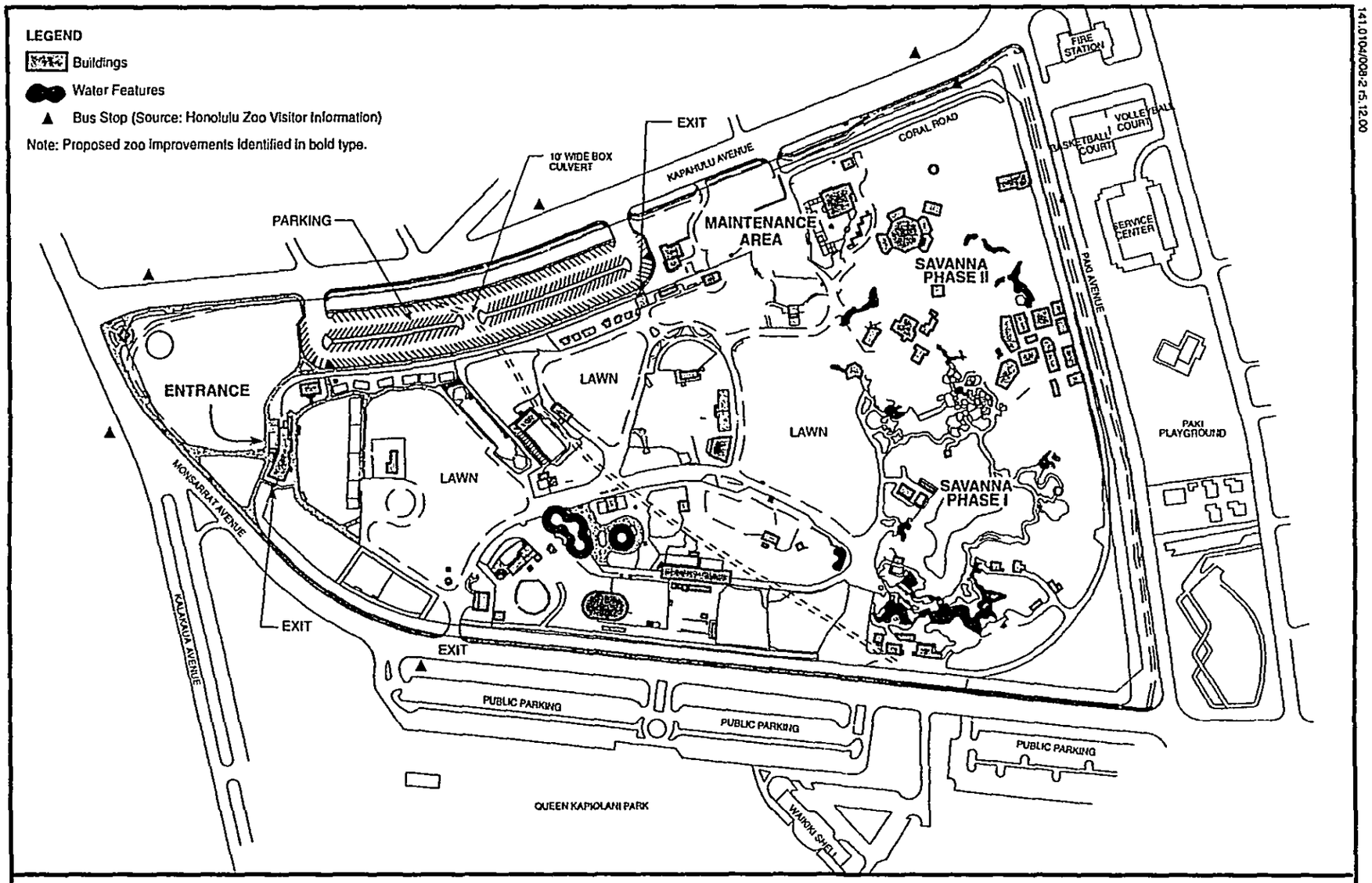


Figure 3-1
EXISTING ZOO DESIGN

Environmental Assessment
Honolulu Zoo Master Plan, Honolulu Hawaii
May 2000

141.0104/007-1 r5.12.00

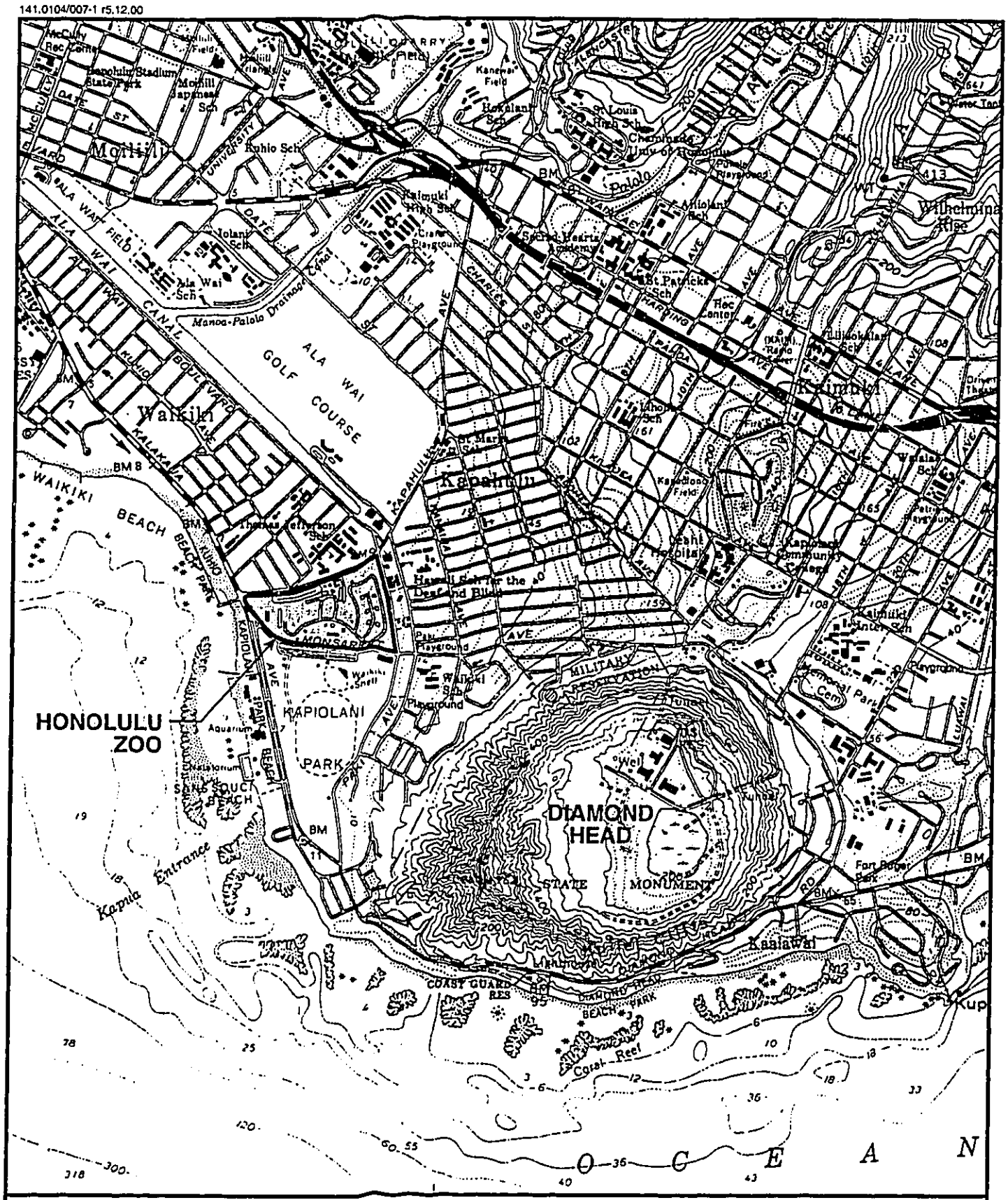
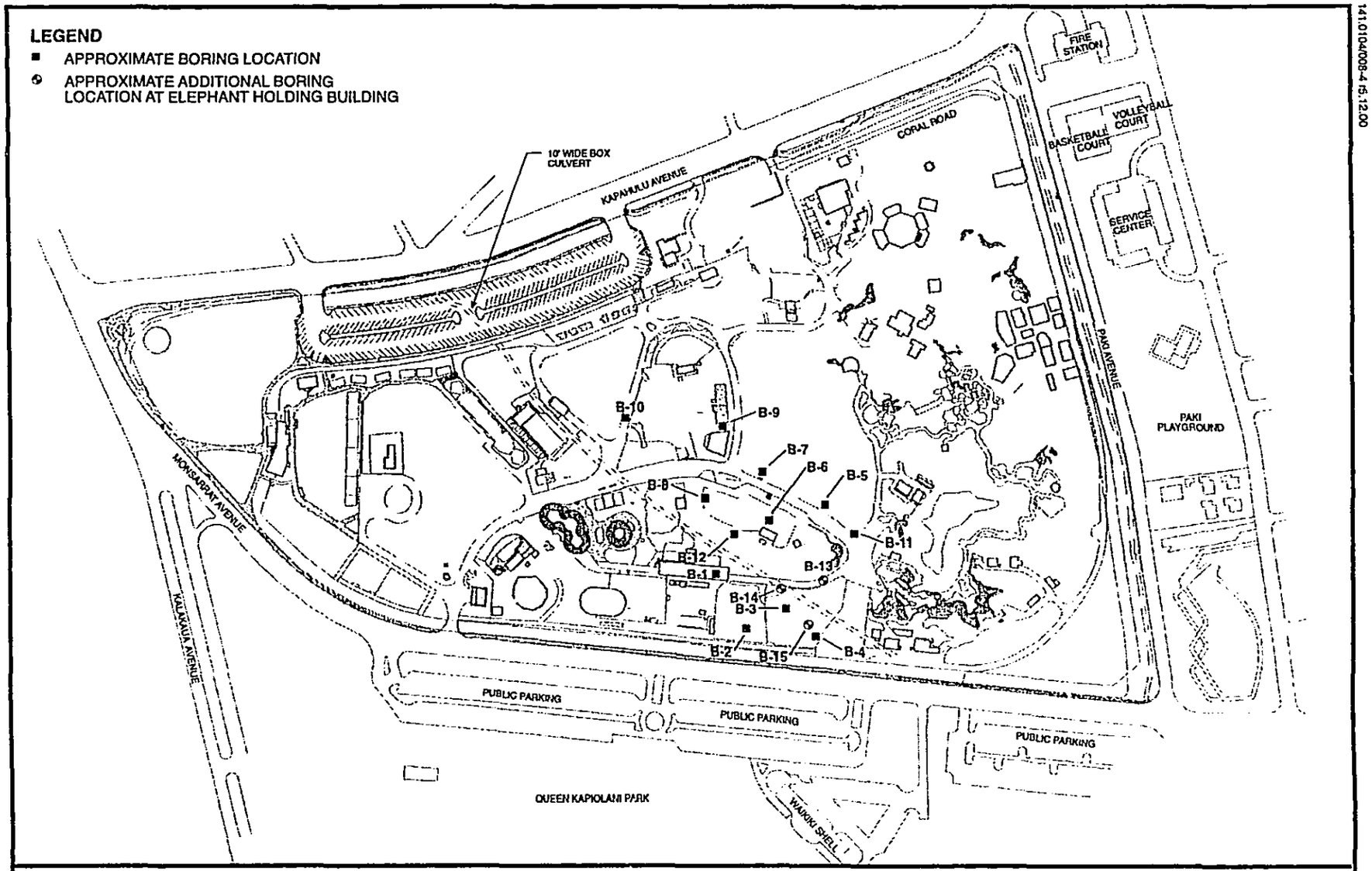


Figure 3-2
TOPOGRAPHICAL FEATURES SURROUNDING ZOO

NORTH

0 1000 2000
SCALE IN FEET

Environmental Assessment
Honolulu Zoo Master Plan, Honolulu Hawaii
May 2000



141\0104\008-4 15:12.00

Source: Geolabs-Hawaii, August 1993

NORTH

0 150 300 600

SCALE IN FEET

Figure 3-3
LOCATIONS OF EXPLORATORY BORINGS

Environmental Assessment
Honolulu Zoo Master Plan, Honolulu Hawaii
May 2000

Ten borings for Savannah Phase I encountered one to four feet of fill (silty clay to dense gravelly sand), volcanic cinders (dense black sand locally cemented), and interbedded weathered tuff (sandy silt to silty clay) overlying about three feet of very soft lagoonal silty clay with local organic lenses. Beneath this highly compressible upper layer is another 7 to 16 feet of very soft to very loose coralline silty sands and sandy silts (Geolabs, 1986, 1987).

3.1.4 Groundwater

The aquifer beneath the Zoo is classified as Honolulu sector, Palolo system. The Palolo system is characterized by an unconfined caprock (sedimentary) aquifer above a confined basal aquifer in basalt. The caprock aquifer is classified as potentially useful, moderately brackish water (between 1000 and 5000 parts per million [ppm] chloride) that is neither potable nor ecologically important. The basal aquifer is currently used for drinking water and has less than 250 ppm chloride (Mink and Lau, 1990). The Zoo is underlain by a basal water table located at or near ground level. Borings performed over the proposed Tropical Forest area determined that groundwater was encountered between 2.5 to 6 feet bgs (below ground surface) (Geolabs, 1993). Groundwater levels measured in various borings at the Zoo ranged from 4.2 feet bgs to 6.5 feet bgs (Geolabs, 1986). Locations of exploratory borings are illustrated on Figure 3-3.

The water quality in the groundwater underlying the Zoo is considered brackish or saline.

Four exploratory wells installed by BWS in the 1980s had original chloride contents of 180 to 600 ppm; a fifth well had 1,300 ppm chloride (Belt Collins, 1993). Tidal water is suspected to infiltrate caprock in the vicinity of the Zoo via a buried canal extension, which was dredged into the limestone. This may explain the higher salinity in water from the Paki Playground exploratory well (BWS, no date).

The Zoo is in the Honolulu Groundwater Control Area (Jones & Jones, 1986). This is an area requiring management of the ground or surface water resource or both, pursuant to Hawaii Revised Statutes and Administrative Rules of the State Water Code, Chapter 174C.

3.1.5 Surface Water

Besides the ocean to the west, no natural sources of surface water are present within a quarter-mile radius of the Zoo. The manmade Ala Wai Canal is located approximately one-eighth of a mile to the north.

Based on ocean water quality samples taken by the Division of Environmental Quality of the City and County's Department of Environmental Services, fecal contamination found at the Kuhio Beach Outfall was suspected to originate from the Zoo. Subsequently, the inlets to the box culvert were sealed and discharge discontinued. Fecal contamination continued to occur, with bird

droppings from Kapiolani Regional Park and the surrounding area being conveyed in stormwater runoff the likely source. Nonetheless, no future connections to the culvert from the Zoo are proposed.

3.1.6 Wetlands

Neither the U.S. Army Corps of Engineers nor the U.S. Fish and Wildlife Service identifies the Zoo as a wetland area (Jones & Jones, 1986).

3.1.7 Climate and Air Quality

Hawaii is located in the subtropical zone. Characteristics of a subtropical zone include frequent rainfall and warm temperatures. Climatological records for the Honolulu Zoo ("Waikiki Station") indicate an average temperature range from 71.9%F to 80.6%F (*Data Book,* 1992 and 1993). Rainfall in the area averages approximately 25 inches per year, with the least rainfall in summer and the greatest in winter. Average daily maximum relative humidity recorded at the Honolulu Airport is 72 percent (8 AM); average daily minimum relative humidity is 56 percent (2 PM).

Present air quality in the area is good because of northeast tradewinds that prevail throughout the year. Climatological records indicate that the average wind speed measured at the Honolulu Airport, approximately seven miles to the northwest of the Zoo, is 11.4 miles per hour. These tradewinds act to disperse and carry inland emissions and other air pollutants out to sea. National standards for criteria pollutants (carbon monoxide, oxides of nitrogen, oxides of sulfur, particulate matter, lead, and ozone) have been met. In recent years (1988-1990), the State of Hawaii air quality standards for carbon monoxide (CO) and ozone have been exceeded a few times (DOH, no date). Monitoring data collected at the Waikiki station, located at 2131 Kalakaua Avenue, indicate that concentrations of CO exceeded the State standard one time throughout the 1988 through 1990 monitoring period.

3.1.8 Natural Hazards

Natural hazards are indicative of those found on a volcanic island. The near coastal location makes Zoo facilities potentially subject to hurricane damage. The potential for earthquakes is present but the risk of earthquakes at the Zoo is considered to be minimal. The Island of Oahu is within Seismic Zone 2, in which damage would be minor in the event of an earthquake (International Conference of Building Officials, 1994).

The National Flood Insurance Program Flood Insurance Rate Map (FIRM) shows that the Zoo is outside the 500-year flood plain, in "Zone X-Other Areas" (Federal Emergency Management Agency, 1987). Approximately one-third of the area of the Zoo (westernmost portion) falls within the tsunami evacuation area based on Civil Defense maps. This area is defined as "within

1,000 feet inland of Waikiki Beach or two blocks inland of Kalakaua Avenue" (Jones & Jones, 1986). However, the entire Zoo is outside the coastal flood zone based on the FIRM maps. As such, no flood-proofing of structures within the Zoo is required.

3.2 BIOLOGICAL ENVIRONMENT

The existing biological environment is described in this section. Because the Zoo area has been extensively landscaped and most indigenous animal species have been displaced throughout the history of the Zoo, this section is brief.

3.2.1 Flora

The Zoo has been extensively landscaped in its 44-year history, so that little or no original plant species remain on Zoo grounds. "Exceptional trees" identified under City and County Ordinance Number 78-91 include an earpod tree in the makai open space and monkey pod trees outside the fence line.

3.2.2 Fauna

Common feral animals in the vicinity of the Zoo include pigeons, cats, mongoose, and rodents. These animals are not considered to be exclusively dependent upon the habitat found at the Zoo.

3.2.3 Listed Threatened and Endangered Species

According to the U.S. Department of Fish and Wildlife, no listed threatened or endangered animal species have been identified at or in the immediate vicinity of the Zoo (PBRA/JJ, 1984), other than in the exhibits.

3.3 SOCIOECONOMIC ENVIRONMENT

The existing socioeconomic environment is described in this section. Socioeconomic conditions are influenced by the following factors: historical and cultural resources, scenic resources, population, traffic, nuisances, and economy. These factors are discussed in the following subsections.

3.3.1 Historical and Cultural Resources

Kapiolani Regional Park is registered on the State of Hawaii Register of Historic Places and is eligible for the National Register of Historic Places. The Zoo itself is not listed on either the state or the federal Register of Historic Places and is considered to be a non-contributing site to the historic significance of the park, pursuant to the criteria presented in National Register Bulletin

No. 36, page 16. No specific cultural resources have been identified on Zoo property, but there is the possibility of subsurface resources existing beneath the fill on what was once Makee Island (Ogata, 1996). An archaeological survey of the Zoo area was conducted for this EA and is included as an appendix to this document.

3.3.2 Scenic Resources

The view of Diamond Head from the Zoo has been identified as a major scenic resource. Ordinances have been established to preserve these existing views. See the discussion of Diamond Head Historical, Cultural, and Scenic District in Section 5.2.6.

3.3.3 Population

Population in the vicinity of the Zoo consists of residents, employees, and visitors. Surrounding population districts include Waikiki, Oahu's major tourist destination, and the Diamond Head area. Based on 1990 census data, the residential and visitor populations for the Waikiki area were 19,768 and 76,538, respectively (*Data Book*, 1992 and 1993). The number of people estimated to work in Waikiki is greater than 38,000 according to the Department of General Planning of the City and County of Honolulu (Waikiki Master Plan, July 1992). The Diamond Head area residential population is 17,877 (*Data Book*, 1992 and 1993). Population data encompasses areas of 500 and 1,519 acres for the Waikiki and Diamond Head areas, respectively (*Data Book*, 1992 and 1993).

Based on the residential populations and acreage, the population densities for the Waikiki and Diamond Head areas are 40 and 12 persons per acre, respectively. Because the visitor population is unique to the Waikiki area and is a significant contributor to the population density in Waikiki, its influence has been considered. Including the visitor population in the population density, the population densities for the Waikiki and Diamond Head areas are approximately 193 and 12 persons per acre, respectively.

3.3.4 Traffic

A Master Plan for the Honolulu Zoo has been prepared to accommodate 1.65 million annual visitors, an increase of 161 percent over the then current Fiscal Year 1997-1998 visitation of 632,000. A traffic study was completed in February 2000 to evaluate existing traffic conditions, identify the impact of the Zoo and park activities on traffic conditions, estimate future traffic due to the Zoo and park activities, and evaluate future traffic conditions. It is attached as an appendix to this EA.

The Master Plan for Kapiolani Regional Park is currently under revision. Earlier plans indicate that existing activities are expected to continue at approximately the same levels and no significant changes in the number, type, or intensity of activities are expected. The Master Plan revision may include new locations for the various activities, changes to vehicular circulation patterns, and new parking areas to replace existing parking that may be displaced.

The traffic study included a review of existing activities at the Honolulu Zoo and in Kapiolani Regional Park, and the expected use of the restored Natatorium. The study related the activities to traffic volumes on the streets near the park.

3.3.4.1 Existing Traffic Conditions

The Honolulu Zoo and Kapiolani Regional Park are located at the south end of Waikiki, at the base of Diamond Head crater. The 42-acre Honolulu Zoo site is bounded by Kapahulu Avenue, Paki Avenue, Monsarrat Avenue, and Kalakaua Avenue. The Honolulu Zoo's neighbors to the north across Kapahulu Avenue are hotels, shops, residential apartments, and Thomas Jefferson Elementary School. To the east across Paki Avenue are the Waikiki Fire Station, the Paki Community Park, and the Queen Kapiolani Rose Garden. The Waikiki Shell and the remainder of Kapiolani Regional Park are located south of Monsarrat Avenue.

The main part of Kapiolani Regional Park (87± acres) is bounded by Monsarrat Avenue, Paki Avenue, Poni Moi Road, and Kalakaua Avenue. Other park activities are located west of Kalakaua Avenue and east of Paki Avenue. The Waikiki Playground and Paki Hale (Winstedt House) are located between Paki Avenue and Leahi Avenue. Waikiki Elementary School and residential uses are located across Leahi Avenue to the east. The City's plant nursery, the Diamond Head Tennis Center, and archery ranges are located east of Paki Avenue at the southern end of the park; the Hawaii School for Girls (La Pietra) is the neighbor to the east. Residential apartments are located to the south across Pono Moi Road. The War Memorial (Natatorium) and other park-type uses, such as the Kapiolani Beach area, the Waikiki Aquarium, and Sans Souci Beach are located west of Kalakaua Avenue. Residential apartments, resort hotels, shops, the Outrigger Canoe Club facility, and the Elks Club lodge are also located west of Kalakaua Avenue.

The main part of Kapiolani Regional Park includes the Waikiki Shell, the Kapiolani Bandstand, tennis courts, picnic areas, and fields for team sports (soccer, softball, and rugby). Two soccer fields are located in the area between the Waikiki Shell and Paki Avenue, which was once a golf driving range. Activities within Kapiolani Regional Park include scheduled games and practices for organized team sports, events at the Waikiki Shell and at Kapiolani Bandstand, picnics and festivals, tennis matches, and other activities.

The streets serving the park are under the jurisdiction of the City and County of Honolulu Department of Transportation Services. The street system operates as an extension of the one-way couplet in Waikiki, where southbound traffic is served primarily on Kalakaua Avenue and northbound traffic on Ala Wai Boulevard. Paki Avenue, while it serves two-way traffic from Poni Moi Road to Kapahulu Avenue, feeds northbound traffic into Ala Wai Boulevard. The makai half of Kalakaua Avenue between Monsarrat Avenue and Poni Moi Road serves southbound traffic, while the mauka half (northbound) is functionally a parking lot for Kapiolani Regional Park. Monsarrat Avenue and Poni Moi Road serve as one-way links between the major couplet roads.

Kapahulu Avenue serves two-way traffic, and between Kalakaua Avenue and Paki Avenue, generally has one lane for traffic and one lane for parking or loading in each direction. A second eastbound (maukabound) lane between Kuhio Avenue and Paki Avenue is available when parking is prohibited during the peak period (3:30 PM to 5:30 PM) on weekday afternoons.

Monsarrat Avenue serves one-way traffic eastbound from Kalakaua Avenue to Paki Avenue. The street is striped for two lanes of traffic and parallel parking is allowed, without any time restrictions, on both sides of the street. A major bus stop and terminus for the City's *The Bus* system is located on Monsarrat Avenue near the Queen Kapiolani Bandstand. Other buses (tour buses and limousines, school buses) also use Monsarrat Avenue near Paki Avenue as a staging and parking area.

Paki Avenue varies in width and section, from two paved lanes in an uncurbed cross-section between Poni Moi Road and Noela Street to three lanes (curbed) between Monsarrat Avenue and Kapahulu Avenue. Parking is not permitted on the paved portions of Paki Avenue. Poni Moi Road between Kalakaua Avenue and Paki Avenue is one-way eastbound (maukabound) and links Kalakaua Avenue to Diamond Head Road.

Kalakaua Avenue between Monsarrat Avenue and Poni Moi Road west (makai) of the grassed median is a one-lane southbound roadway with marked, unmetered parking parallel to the right (makai) curb. Mauka of the median, a parking lot for Kapiolani Regional Park has angled parking (metered or reserved) along the mauka curb and serves northbound traffic. A bike lane is provided west (makai) of the single traffic lane on each side of the median. Six openings in the median provide access between the makai street and the mauka parking lot.

The City and County of Honolulu, Department of Transportation Services has collected traffic count data at various locations in the area. Daily count totals and peak hour volumes from the City and County counts were supplemented by manual turning movement counts which were collected as part of a parking study for Honolulu Zoo and Kapiolani Regional Park by Belt Collins Hawaii Ltd. The count data is appended to this report. The peak hour traffic movements from the manual counts are shown in the study's Exhibit 2. Count data for east-west (mauka-

makai) roadways and for north-south (ewa-diamond head) roadways are shown in Table 1 and Table 2, respectively, of the attached traffic study.

Approximately one-quarter of the Zoo visitors who arrive by car parked their vehicle in Kapiolani Regional Park other than in the metered lot between the Zoo and Kapahulu Avenue. The nearest parking locations are the parking lot fronting the Waikiki Shell and along Monsarrat Avenue. These vehicles would affect traffic on Monsarrat Avenue, so conditions at the intersection of Monsarrat Avenue and Paki Avenue were evaluated. The impact of Zoo traffic on Kapahulu Avenue would be the greatest at its intersection with Paki Avenue and conditions at that intersection were also considered.

Both of these intersections are signalized and operate in two phases. Capacity analyses of these intersections were done using the Planning Method described in Chapter 9 of the *Highway Capacity Manual—Third Edition* (Updated December 1997). For the volumes shown in Exhibit 2, both intersections operated at desirable "under capacity" condition, with estimated delays rated at an acceptable Level of Service D or better (results are summarized in Table 4 of the traffic report attached).

The traffic counts were taken in February, 1998. Zoo attendance data indicate that peak visitation occurs in March and in August, with attendance as much as 37 percent higher than in February. A review of the traffic data indicates that 24-hour traffic volumes on the roadways are generally higher during summer months, but peak hour volumes do not vary significantly. Traffic conditions during peak months, therefore, were estimated for volumes that are 15 percent higher than the counted volumes. The capacity analyses show increased saturation and delays, with unchanged levels of service (D or better).

3.3.4.2 Existing Traffic Generated by the Honolulu Zoo

Traffic generated by Zoo employees and service vehicles were estimated and all of these trips were assigned to the roadway system. The highest volumes of Zoo-related traffic occur during the midday hours, predominantly between 9:30 AM and 3:30 PM, when traffic on the surrounding streets are lower than during the typical peak hours.

The hour with the highest volumes on a typical weekday morning (AM Peak Hour) occurs between 6:15 AM and 8:30 AM, during which the only traffic generated by the Zoo is due to employees arriving for work. The contribution of the Zoo to traffic volumes at the intersections considered is limited to 20 vehicles in the peak hour traveling westbound (makai) on Kapahulu Avenue making the through movement at the Paki Street intersection. The Zoo traffic is 3 percent of the total volume making this movement in the AM Peak Hour.

The hour with the highest volumes in the weekday afternoon (PM Peak Hour) occurs between 3:30 PM and 6:00 PM; during this time, the Zoo contributes traffic from employees leaving work, visitors who have completed their visit to the Zoo, and service vehicles leaving the Zoo. Traffic leaving the Zoo is estimated to be 35 vehicles traveling eastbound (mauka) on Kapahulu Avenue in the through movement across the Paki Avenue intersection and 5 vehicles turning left from eastbound Monsarrat Avenue to northbound Paki Avenue, then turning right from Paki Avenue to eastbound Kapahulu Avenue. These volumes represent 2 percent to 3 percent of the total volumes of each movement in the PM Peak Hour.

On weekends, the Zoo generates more traffic as the number of Oahu residents visiting the Zoo is larger than on weekdays. Traffic volumes on roadways near the Zoo do not have the pronounced commuting peak patterns that are typical of weekday traffic. Volumes are moderately high throughout the day, as indicated by the manual counts at the intersection of Paki Avenue and Monsarrat Avenue. While the peak hourly volumes were recorded between 1:45 PM and 2:45 PM, traffic flows at the intersection were at least 85 percent of the peak rates for much of the daylight hours.

The effects of Zoo traffic, therefore, were evaluated assuming a concurrent peak hour. The traffic attracted by the Zoo is estimated to be 95 vehicles per hour westbound on Kapahulu Avenue moving through the Paki Avenue intersection and 5 vehicles per hour on northbound Paki Avenue moving through the Monsarrat Avenue intersection and turning left onto Kapahulu Avenue. Vehicles leaving the Zoo include 45 vehicles per hour on Kapahulu Avenue traveling eastbound through the Paki Avenue intersection, 5 vehicles per hour turning right from eastbound Kapahulu Avenue to Paki Avenue and proceeding southbound across Monsarrat Avenue, and 10 vehicles per hour turning left from eastbound Monsarrat Avenue to northbound Paki Avenue and then right onto eastbound Kapahulu Avenue.

Of the existing through traffic during the day on weekends, Zoo traffic is as much as 23 percent of the westbound and 6 percent of the eastbound volumes on Kapahulu Avenue at Paki Avenue. Zoo traffic is less than 10 percent of the existing traffic volume at the other locations.

3.3.5 Parking

The Honolulu Zoo parking lot contains 230 parking spaces, 217 of which are unreserved. A detailed parking study of Honolulu Zoo and Kapiolani Regional Park was conducted for this EA and is included as an appendix. The study included a survey to analyze existing parking demand at the Zoo. The survey found that only about 61 percent of the vehicles in the Zoo parking lot during the hours of Zoo operations are due to Zoo visitors. The remainder appears to be associated with other area activities. Field observations indicated that persons with destinations in Waikiki, beachgoers, and other park users often use the Zoo parking lot. Peak parking demand

during the days surveyed were estimated to be 150 parking spaces on weekdays and 210 spaces on weekends.

3.3.6 Nuisances

Animals and their waste products necessarily generate some noise and odor. These effects seem be to minimal and localized based on the lack of noise and odor complaints received by the Zoo from nearby residents and businesses. According to staff (Dennis Asai, July 1994), the Zoo has not received any official noise or odor complaints from nearby Waikiki residents or businesses in the last five years. In addition, their effects are probably further negated by the presence of heavy vehicular and bus traffic along the surrounding streets of Kapahulu Avenue, Paki Street, and Monsarrat Avenue.

3.3.7 Economy

The economy in the Zoo area is heavily supported by the tourist industry. In recent years, a decline in the tourist industry has affected local business. Because the Zoo operates from the City and County's General Fund, it is not directly affected by any losses in ticket sales due to the decline in tourism. An evaluation of ticket sales also indicates that Zoo revenues are not directly dependent upon fluctuations in the tourist industry. The percentage of ticket sales from tourists has increased over a five-year period (38% in fiscal years 1985-1989 and 50% in fiscal 1992-1993), while the number of visitors to Hawaii has reportedly declined. However, because the General Fund is supported by local taxes and ticket sales from local residents, the Zoo's operating budget is indirectly affected by conditions in the tourist industry.

CHAPTER 4
POTENTIAL ENVIRONMENTAL CONSEQUENCES AND MITIGATION MEASURES

Potential impacts and mitigation measures can be divided into short-term or temporary impacts (generally related to construction activities) and long-term impacts resulting from the existence of the improved portions of the Zoo. This chapter discusses both temporary and long-term impacts of the actions necessary for the development of the master planned facilities at the Honolulu Zoo.

4.1 PHYSICAL ENVIRONMENT

Components that make up the physical environment will be discussed in this section. Environmental components that could be affected by the proposed Zoo improvements include water, soils, and air.

4.1.1 Topography and Drainage

The current topography of the Zoo is such that short-term ponding of rainwater occurs naturally. Accumulation of the rainwater has not resulted in long-term ponding because evaporation rates are usually greater than rainfall rates. Pan evaporation along the coastal plain is 36 inches per year (Belt Collins, 1993e), while rainfall is 25 inches per year.[2] Rainwater that does not evaporate percolates through the surface soil or collects in drywells for groundwater recharge.

Runoff from roof drains and exhibit, visitor, and staff areas will drain to water features, landscaped areas, or drywells for ultimate disposal through evaporation and percolation. This direction of runoff will occur by strategic grading of the land. Based on the proposed stormwater runoff disposal practices and continued use of standard procedures to minimize on-site pollution, potential contamination of water resources from Zoo drainage discharges will be highly unlikely in the future.

Temporary Effects: Short-term ponding of rainwater is likely in areas under construction where vegetation is sparse or excavation is being conducted. Ponding of rainwater is expected to be more evident when vegetation is cleared in preparation of construction activities.

Long-term Effects: None.

[2] Pan evaporation rates reflect the potential for water loss through evaporation and transpiration.

Mitigation: None required.

4.1.2 Geology and Soils

The soil material used for fill underlying the Zoo is not suitable for supporting relatively heavy structures (Geolabs; 1993). Because of the presence of compressible soils and high groundwater levels, differential settling of soils could occur if conventional shallow foundations are used to support heavy structures.

Temporary Effects: None.

Long-term Effects: Differential settling of soil underlying proposed structures.

Mitigation: In-situ densification of soils or use of suitable construction methods to circumvent soil settling will be employed.

4.1.3 Groundwater

No discharges of water occurring on Zoo property will be allowed to adversely impact groundwater. All discharges will be routed to the municipal treatment facility or in the case of stormwater, routed to drywells or existing water bodies in the Zoo. Stormwater that is routed to drywells is not expected to adversely impact groundwater, as the only contaminant in the water is expected to be fecal contamination which will be removed via percolation through the soils.

Temporary Effects: None.

Long-term Effects: None.

Mitigation: None required.

4.1.4 Surface Water

No natural surface water bodies are located at the Zoo. The nearest natural surface water body is the ocean. The nearest off-site, manmade surface water body is the Ala Wai Canal, approximately 1/8-mile to the north of the Zoo. The only potential source of surface water contamination is via the Zoo's box culvert which leads to the Kuhio Beach Outfall and ultimately to the ocean. Stormwater discharge originating from the Zoo's exhibit, animal holding, and open areas is no longer discharged into the ocean via the Kuhio Beach Outfall because the box culvert is now sealed. This discharge was eliminated because of the potential for contamination from Zoo runoff.

Temporary Effects: None.

Long-term Effects: None.

Mitigation: None.

4.1.5 Air Quality

Construction activities that may result in air emissions include earthmoving and the operation of combustion equipment. Heavy equipment, trucks, and automobiles associated with construction will emit nitrogen oxides, carbon monoxide, oxides of sulfur, and particulate matter. Based on the short-term nature of the construction activities, the existing air quality, and the meteorological conditions in the area, these sources are not expected to significantly adversely impact air quality.

Long-term activities which could affect the air quality include the operation of stationary and mobile combustion sources. Stationary sources (e.g., medical incinerator and generators) will need an operating permit from the Department of Health (DOH) and will need to demonstrate that their emissions will not cause adverse health effects or adverse impacts to air quality. Backup generators are exempt from the permit process and are not considered a source of *significant emissions*.

Temporary Effects: Fugitive dust from earthmoving construction activities.

Long-term Effects: Air pollutants from on-site combustion sources such as the medical waste incinerator.

Mitigation: Dust control measures will be minimized as required under HAR 11-60.1. Regular watering during construction will minimize short-term emissions. All long-term combustion sources of emissions are subject to DOH regulation. The permitting process will ensure that no adverse health effects to the public will occur. Mitigation measures will be identified if the emissions from the combustion sources are of potential concern to human health and welfare.

4.1.6 Natural Hazards

The Zoo facilities are potentially subject to seismic activity and hurricane damage. Approximately one-third of the facilities fall within the tsunami evacuation area, but the entire Zoo is outside the coastal flood zone.

Temporary Effects: None.

Long-term Effects: Seismic and/or hurricane-related structural damage.

Mitigation: The Zoo building will be designed in accordance with the current *Uniform Building Code*, as amended locally, to withstand the potential natural hazards in the area. The structural design will account for seismic loading and hurricane winds. No flood-proofing within the Zoo is required.

4.2 BIOLOGICAL ENVIRONMENT

The biological environment includes flora and fauna. Because this project introduces wild animals into a highly populated area, public safety is also addressed. Potential project impacts on the biological environment are presented in the following subsections.

4.2.1 Flora

Proposed project improvements will require some removal of vegetation. The contractor will, however, be required to take all measures possible to preserve the existing vegetation during construction. Removal of flora will not affect indigenous species nor those trees protected under the City and County of Honolulu's Exceptional Tree Ordinance. Any short-term losses of flora will be outweighed by the long-term benefits of increased quantities and diversity of species which will inhabit the Project site.

Temporary Effects: Short-term effects will include the loss of some flora due to the construction of Zoo improvements.

Long-term Effects: None.

Mitigation: Removal of vegetation will be minimized during construction. Indigenous flora, monkeypod, and earpod trees will not be removed. Replanting will result in a greater diversity and quantity of vegetation.

4.2.2 Fauna

The Zoo improvements are being designed in the best interests of the exhibit animals. Improvements will be designed to protect the health and safety of the animals. For example, while animal exhibits near the proposed entranceway were originally thought to encourage Zoo visitors, this plan was rejected because the higher levels of human activity and interaction would place too much stress on the animals. Construction activities will be conducted in a manner to minimize the effects on exhibit animals. Wild birds, ferals, and rodents may be disrupted by construction activities, but because they use other areas off Zoo property for their habitat, their temporary relocation is not expected to produce long-term adverse effects. In the long run, the improvements will make the Zoo a more attractive habitat for these non-exhibit animals.

Temporary Effects: Exhibit animals will be temporarily relocated, and wild birds, feral cats, and rodents will be temporarily displaced.

Long-term Effects: None.

Mitigation: None required.

4.2.3 Public Safety

Exhibit animals will be contained by natural looking or invisible barriers such as berms, walls, and water. This design may prompt concerns for public safety as animals may not appear restricted to their manmade habitats. Conventional enclosed cages, designed with only the protection of humans in mind and without the consideration of the well-being of the exhibit animal, may provide the perception of greater safety to the public. However, this is not necessarily the case and such designs have become obsolete. With an increased understanding of animal behavior and psychology, zoo designs in recent years have focused on providing near-natural habitats. Incorporated in these designs are natural-looking barriers without evidence of steel bars.

All barriers between exhibit animals and the public and Zoo staff have been and will be designed by an experienced zoo design consultant, based on existing and proven protective measures used at other zoos. Barriers at the Zoo will be designed to protect not only the exhibit animals from escaping, but also small children from making physical contact with the animals.

During construction, the proposed Zoo improvements will result in the increased handling of animals and potentially more opportunity for animal escapes. In the past, several animals have escaped from the confines of their habitats in the Savanna areas. In all cases, the animals were captured and contained.

Temporary Effects: Increased handling of animals during the construction period could result in an increased risk of exhibit animal escapes.

Long-term Effects: There is a minimal risk of exhibit animals escaping from their enclosed habitats.

Mitigation: Future risks of animal escapes are minimal; however, mitigation measures will be employed as necessary. Mitigation measures which have been employed to prevent future escapes have included removing problem animals (e.g., male Pata monkey and hyrax) from exhibit, adding electrical wires around exhibits or overhangs on walls, and clipping birds' feathers.

4.3 SOCIOECONOMIC ENVIRONMENT

Potential socioeconomic impacts are presented in the following subsections.

4.3.1 Historical and Cultural Resources

According to the April 2000 study, the present Zoo parcel is situated on former marshlands that included two ponds divided by a sand spit. Thus, the vast majority of the Zoo parcel was underwater or marshy in pre-contact times and subsequently was heavily impacted by historic developments. These portions of the Zoo are unlikely to yield significant cultural deposits.

Temporary Effects: None.

Long-term Effects: There is a potential for disruption or destruction of subsurface resources in the southwestern corner of the Zoo property.

Mitigation: Historical evidence for the presence of Kupalaha *heiau* in an area immediately west of the Zoo parcel and the results of three archaeological profiles on the west side of the Zoo suggest a strong possibility of significant subsurface cultural deposits in the southwestern portion of the Zoo parcel. The area of concern corresponds roughly to the area between the main Zoo entrance and the banyan tree located just east of the Zoo exit to Monsarrat Avenue. Monitoring of this area is recommended during any significant subsurface impacts in the southwestern area discussed above. No monitoring or further archaeological study is recommended for the remainder of the Zoo parcel owing to the pre-contact character of these lands and the subsequent historic disturbance.

4.3.2 Scenic Resources

The Zoo is located in the core area of the Diamond Head Special District. As such, construction activities must comply with the restrictions designed for this Special District (see Section 5.2.6). The proposed Zoo design will conform to these restrictions, although variances will be requested for structures greater than 0 feet in height. No proposed structures will significantly diminish views of Diamond Head. Although the specific heights of proposed structures have not been determined yet, the proposed structures will not exceed the height of existing structures and/or structures to be demolished and/or replaced.

Temporary Effects: None.

Long-term Effects: None.

Mitigation: None required.

4.3.3 Population

The Zoo staff increase from 130 persons (68 full-time, 7 part-time, and 55 volunteers), in FY 1992-1993, to 218 persons (114 full-time, 12 part-time, and 92 volunteer) is not expected to impart a significant impact over the Master Plan period. However, the additional number of Zoo visitors, from 652,314 (FY 1991-1992) to 1,650,000 (FY 2000-2001), is significant and should be addressed in traffic/transportation management plans. No effects on the residential population are expected in the vicinity of the Zoo.

Temporary Effects: None.

Long-term Effects: There will be an increase in visitors to the Zoo.

Mitigation: None required.

4.3.4 Traffic

Base Case for Evaluation of Future Traffic

The long-range land transportation plan for Oahu indicates that traffic in the vicinity of the Project can be expected to increase from 1990 levels by approximately 16 percent by the year 2020. The traffic count data shown in Tables 1 and 2 of the attached traffic report indicate that traffic volumes in the area have been stable over the last 10 years. The roadways serving the Honolulu Zoo and Kapiolani Regional Park are not expected to have significant increases due to increased population or other new development in the area.

A future condition which assumes no change in the level of activity at Honolulu Zoo or in Kapiolani Regional Park, or a "base case" condition, would have volumes that are equal to existing volumes. The previously discussed peak month condition in which volumes were 15 percent higher than those counted would be the future base case.

The capacity analyses show that the existing roadways would be adequate, with increased average delays at the signalized intersections; worst conditions, however, remain at Level of Service D, which is acceptable for urban intersections.

Future Traffic Generated by the Honolulu Zoo

The Honolulu Zoo Master Plan has been prepared for a significant increase in the number of visitors, from an annual total of 632,000 in FY1997-1998 to 1,650,000 per year. As part of the parking study, an evaluation of the existing parking and the expected increase in parking demand found that the parking demand and traffic generated by the Zoo would be related not to the total

visitation, but to the visitation by Oahu residents. Even considering increased visits by residents, the 30 percent increase in population that is used for regional planning would limit the growth in traffic and parking demand generated by the improved Zoo.

Using the simulation that was developed to identify existing parking and traffic generated by the Zoo, estimates of the increases in traffic demand were made to describe the traffic impact of implementing the Master Plan for the Zoo. The recommendations for providing parking from the parking study were also used to assign the new traffic to the roadway system. Table 3 of the attached traffic report shows the results of the estimate of traffic impacts.

These volumes represent increases of 10 percent or less of base case traffic, except for the Kapahulu Avenue westbound through movement at Paki Avenue, where the increase is 27 percent of the base case volume.

The master planning for Kapiolani Regional Park is ongoing and it will review the locations of playing fields and other facilities. However, no significant changes in the number of such facilities and their use have been identified. The restoration of the Waikiki Natatorium will allow it to be used for events that may attract significant numbers of participants and observers. Any activity at the Natatorium would be coordinated with other activities within the Kapiolani Regional Park so that parking and other infrastructure requirements are not overburdened. Total peak hour traffic due to activities at Kapiolani Regional Park, therefore, are not expected to change.

The results of the capacity and level of service analyses are shown in Table 4 of the attached traffic report.

The analyses were done for increases in traffic at the intersections where the Project will have the greatest impact. The results of the analyses show that the increased traffic will have at most a small effect on average delays at the intersections during the peak hours and existing levels of service will not change. The intersections would continue to operate at acceptable levels of service.

Summary

The implementation of the Honolulu Zoo Master Plan will accommodate greater numbers of visitors. The increases in traffic volumes are expected to have the greatest impacts at the existing signalized intersections of Paki Avenue with Kapahulu Avenue and Paki Avenue with Monsarrat Avenue. Existing peak hour conditions at these intersections are acceptable, with conditions described by Level of Service C or Level of Service D.

The increased traffic in the vicinity of the Kapiolani Regional Park that would result from implementation of the Honolulu Zoo Master Plan ranges from less than 10 percent of existing traffic to nearly 30 percent of existing traffic. These increases do not have major impacts to average delays at the intersections and peak hour conditions are expected to continue to be acceptable.

Temporary Effects: Possible short-term traffic delays due to proposed Zoo construction.

Long-term Effects: Possible increase in traffic delays without use of mass transportation and/or implementation of road improvements.

Mitigation: Short-term traffic impacts will be minimized by the use of a flag person to direct traffic around construction-related activities. In addition, activities that affect traffic flow around the Zoo will be conducted during off-peak traffic hours.

Long-term effects will be mitigated by increasing the public's use of mass transportation through specific promotional/incentive programs and improvements in the current mass transportation systems. The Oahu Metropolitan Planning Organization and the City and County of Honolulu have proposed measures to mitigate the projected increases in vehicular traffic in the Honolulu and Waikiki areas. These efforts should aid in mitigating the projected traffic impacts associated with the proposed project.

4.3.5 Parking

Based on the findings of the parking study, an additional 175 parking spaces will be needed to accommodate increased visitation to the Honolulu Zoo. Of that number, it is recommended that the existing Zoo parking lot be expanded to add 45 additional spaces and that 130 additional parking spaces be provided within Kapiolani Regional Park.

The addition of 45 new parking spaces to the existing Zoo parking lot could be accomplished by implementing the following changes:

- Add 20 stalls by widening the parking aisle closer to Kapahulu Avenue, narrowing the parking lot entrances, removing or relocating existing parking meters, and restriping existing parking stalls;

- Add 5 stalls by converting 5 existing employee stalls to public parking; and

- Add 20 stalls by increasing the size of the parking lot by extending it 50 feet in the mauka direction with a relocation of the entry along Kapahulu Avenue. (Note: The expansion of the parking lot would affect the space available in the support/maintenance area of the Zoo.

Relocation of the proposed classroom building to accommodate the parking lot expansion would eliminate nearly 20 of the new staff parking spaces located along the access road. To offset that loss, a small parking deck could be constructed over the larger staff parking lot to provide a sufficient number of spaces to replace those that would be lost. The new deck could also improve access to the upper level of the adjoining building.

The addition of 130 new parking spaces to Kapiolani Regional Park could be accomplished by relocating a portion of the curb along a selected portion(s) of the median of Kalakaua Avenue between Poni Moi Road and Monsarrat Avenue. In other words, reduce the width of a portion of the existing 30–foot-wide median by 15 feet and repave to provide space for diagonal parking. The areas where parking would encroach into the median could be selected to minimize any impacts to the existing ironwood trees located along the makai third of the 30-foot-wide median. Adding diagonal parking to the median would require the replacement of the northbound bike lane with a bike path in the park to eliminate potential conflicts between bicycles and motorists backing out of parking spaces.

Temporary Effects: Possible short-term traffic delays and temporary closure of parallel parking stalls in the immediate vicinity of impacted areas due to construction of parking improvements.

Long-term Effects: None.

Mitigation: Short-term impacts will be minimized by the use of a flag person to direct traffic around construction-related activities.

4.3.6 Nuisances

Potential nuisances resulting from the proposed Project include dust, odor, and noise. The lack of complaints about existing Zoo activities indicates that these are not critical issues. During construction, the transfer of existing and additional animals in the Zoo could cause animals to create additional noises; however, there is no reason to believe that the additional noise would be a nuisance to the nearby public. Construction equipment wili generate additional noise, but these noise levels are not expected to be significantly above existing background levels.

Long-term activities at the improved Zoo could potentially increase the levels of noise and odor.

Temporary Effects: There is a potential for increased noise levels caused by the movement of Zoo animals and construction equipment, as well as increased dust during construction activities.

Long-term Effects: There is a potential for increased animal odors from additional exhibit animals.

Mitigation: Dust will be controlled during construction through water spraying and early establishment of final plantings. No noise mitigation measures are required. Potential odors will be mitigated through regular animal waste disposal and collection practices (i.e., daily removal of waste material from exhibit areas and daily collection [six days per week] of wastes in storage areas scheduled for contract pickup).

4.3.7 Economy

The proposed Zoo improvements may assist the local economy during all phases of the project. During construction, additional jobs will be created for local contractors and construction workers. During the operational phase of the completed project, additional employees will be needed to adequately staff the improved Zoo. However, because the additional employees resulting from the Zoo improvements will be supported by the City and County of Honolulu's General Fund, an additional strain on the General Fund budget may occur if Zoo ticket sales are insufficient to offset the cost of additional employees (an increase of staff by approximately 45 *full-time and/or part-time employees over the 10-year Master Plan implementation is projected*).

The proposed Zoo improvements are expected to result in indirect and positive economic benefits to local businesses. The Zoological Society will benefit from any additional revenue made through Zoo concessions and gift shops. Nearby attractions and businesses surrounding the Zoo may also benefit from the increased Zoo visitors, as potential customers will be directed to their vicinity.

Temporary Effects: None.

Long-term Effects: Potential indirect and positive economic benefits will accrue to local businesses.

Mitigation: None required.

CHAPTER 5
RELATIONSHIP OF PROPOSED ACTION TO LAND USE PLANS, POLICIES, AND CONTROLS

The relationship of the proposed Project to land use plans, policies, and controls is presented in this section. Land use related issues are presented under two main sections: State of Hawaii and City and County of Honolulu.

5.1 STATE OF HAWAII

State land use laws and plans are presented in the following subsections.

5.1.1 State Land Use Law

The 1961 State of Hawaii Land Use Law (Chapter 205, HRS) and its implementing regulations (Section 15-15, HAR) are intended to preserve, protect, and encourage the development of lands for those uses to which they are best suited. Four land use districts were established by the State Land Use Commission: Urban, Rural, Agricultural, and Conservation, the latter being most restrictive to development. The Land Use Law specifies certain uses permitted for each district. The Zoo is located in an area designated Urban. Under this designation, the Land Use Law specifies that counties may determine permissible uses of the land. Operation of the Zoo on Urban land is allowed under an Existing Use permit granted in 1986 by the City and County Department of Land Utilization.

5.1.2 Hawaii State Plan

The purpose of the Hawaii State Plan is to provide a guide for the future long-range development of the State; identify the goals, objectives, policies, and priorities for the State; provide a basis for determining priorities and allocating limited resources, such as public funds, services, human resources, land, energy, water, and other resources; improve coordination of State and County plans, policies, programs, projects, and regulatory activities; and establish a system for plan formulation and program coordination to provide integration of all major State and County activities.

The relevant objective and supporting policies for Zoo improvements are provided in Hawaii Revised Statutes (HRS), Section 226-23, and include:

Objective (a): *The achievement of the objective of the adequate provision of resources to accommodate diverse cultural, artistic, and recreational needs for present and future generations.*

Policy (2): *Provide a wide range of activities and facilities to fulfill the cultural, artistic, and recreational needs of all diverse and special groups effectively and efficiently.*

Policy (3): *Enhance the enjoyment of recreational experiences through safety and security measures, educational opportunities, and improved facility design and maintenance.*

The refurbishment of the Zoo supports this objective and associated policies by providing an enhanced facility that accommodates not only the recreational needs of present and future generations, but also provides an educational experience for the Zoo visitor.

5.1.3 State Functional Plans

The twelve functional plans set forth in Section 2 of the Hawaii State General Plan include the policies, programs, and projects designed to implement the objectives of a specific field of activity. The State Functional Plans for Conservation, Recreation, and Tourism include objectives and policies applicable to redevelopment of the Zoo. These objectives and policies include:

State Conservation Functional Plan (1991):

Objective IIC: *Enhancement of natural resources*

Policy IIC(2): *Expand and enhance outdoor recreation opportunities and other resource uses.*

State Recreation Functional Plan (1991):

Objective IVA: *Promote a conservation ethic in the use of Hawaii's recreational resources*

Policy IVA (1): *Emphasize an educational approach, in coordination with enforcement efforts, to promote environmental awareness.*

Objective VA: *Properly maintain existing parks and recreation areas*

Policy VA (1): *Improve the maintenance of existing parks.*

State Tourism Functional Plan (1991):

> ***Objective:*** *Development and maintenance of well-designed visitor facilities and related developments which are sensitive to the environment, sensitive to neighboring communities and activities, and adequately serviced by infrastructure and support services.*

The proposed action supports all of these objectives by promoting environmental awareness and enhancing the Zoo's educational value. The new Zoo is designed to improve the visitor's experience, thus making it more attractive to the resident and visitor population.

5.2 CITY AND COUNTY OF HONOLULU

The City and County of Honolulu's long-term land use goals and objectives are established in the General Plan and implemented via a series of Development Plans, zoning regulations, and various special district controls.

5.2.1 General Plan

Pursuant to HRS Chapter 226, each county within the State of Hawaii is mandated to implement the Hawaii State Plan through the adoption and implementation of a County General Plan (General Plan). The Oahu General Plan sets forth long-term policies and objectives for the growth and development of the island of Oahu.

The General Plan includes the following objective and supporting policies applicable to redevelopment of the Zoo:

> ***Objective D:*** *Provide a wide range of recreational facilities and services that are readily available to all residents of Oahu.*
>
> ***Policy 2:*** *Develop and maintain a system of regional parks and specialized recreational facilities.*
>
> ***Policy 4:*** *Encourage public and private botanical and Zoological parks on Oahu to foster an awareness and appreciation of the natural environment.*

Redevelopment of the Zoo is consistent with this objective and supporting policies. By emphasizing natural habitats, increasing educational programs, and developing a collection of rare and endangered species, the Zoo will provide the public with the opportunity to become familiar with and appreciate the natural environment and its native fauna.

5.2.2 Development Plan

The objectives and policies of the County General Plan are implemented by a system of land use and controls set out in the County Development Plans (DPs). The DPs are relatively detailed guidelines for the physical development of the island of Oahu over a 20-year period. Each DP consists of two principal sections: Common Provisions (applicable to all eight of Oahu's DP areas) and Special Provisions for each DP area. Each DP also includes two official maps: a Land Use Map and a Public Facilities Map. The Land Use Map gives land use classifications for existing built-up areas as well as for projected development areas and for public and quasi-public facilities. The Public Facilities Map shows existing public and quasi-public facilities as well as planned facilities.

The Honolulu Zoo is located in the Primary Urban Center area of Oahu. The DP for this area designates the Zoo site for parks and recreation use. Since the proposed action does not alter the current use of the site, and the use is in an appropriately designated area, no amendment to the Development Plan will be necessary.

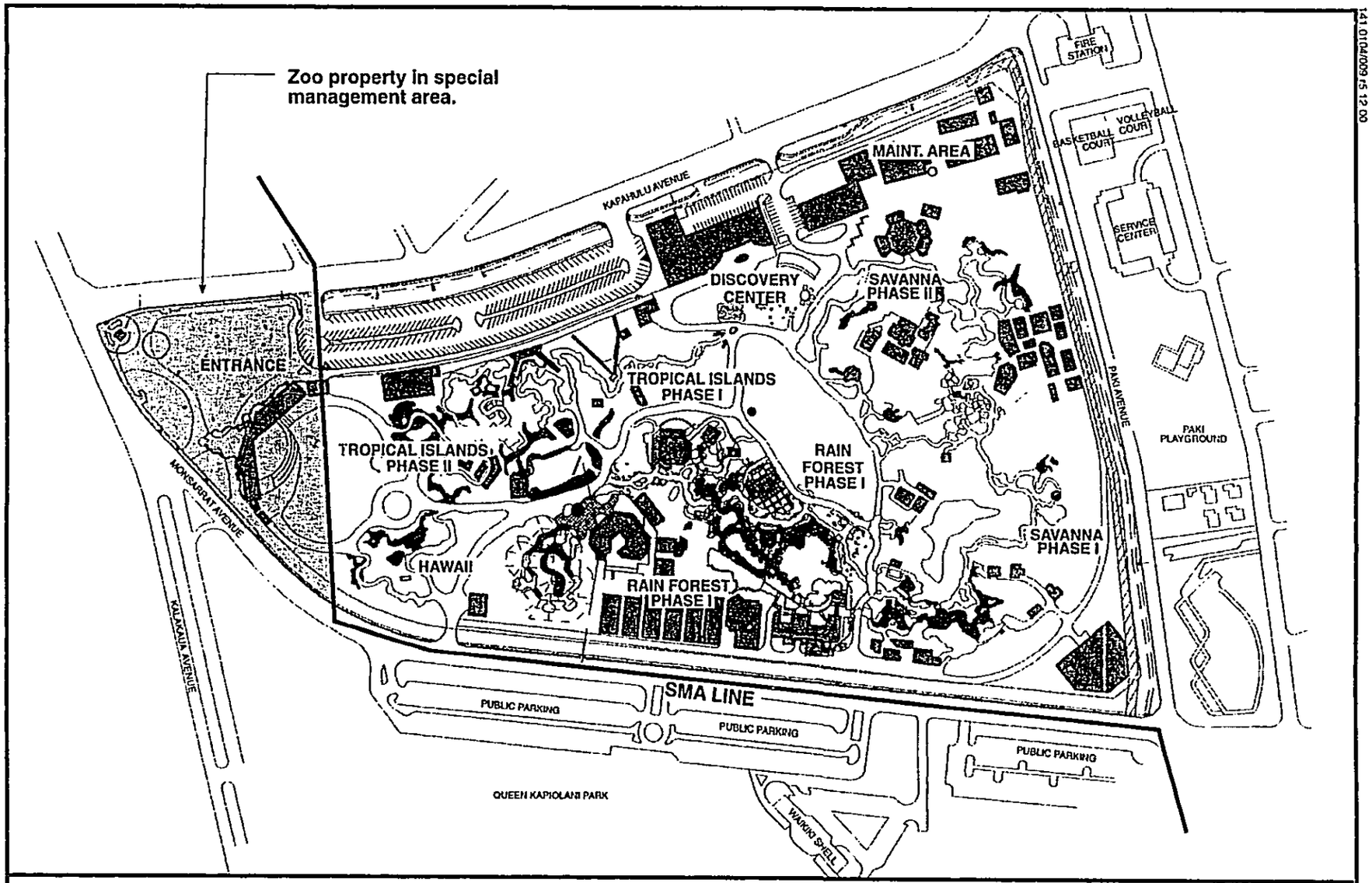
5.2.3 Zoning

Development Plan designations are implemented via zoning districts and various zoning maps, as established by the 1990 Land Use Ordinance (LUO), as amended. The LUO indicates permitted uses and structures, development standards, and height controls for twelve zoning districts. The Zoo is located on land zoned General Preservation, P-2; this designation is intended to preserve and manage major open space, recreation lands, and lands of scenic and other natural resource value.

Zoos are not classified as a principal use activity within areas zoned P-2; however, Zoo activities may be allowed under a Conditional Use Type 2 permit. In the case of the Honolulu Zoo, which operated at this site before adoption of the LUO, Zoo activities are allowed under an Existing Use permit which was granted in 1986.

5.2.4 Special Management Area

The State of Hawaii has identified the coastal regions of all the islands as Special Management Areas (SMAs), in which development is regulated by the Department of Planning and Permitting (DPP). Development or construction within an SMA requires a permit from the DPP and an environmental assessment. The majority of the Zoo is mauka of the SMA boundary; however, the entrance and surrounding area are within the SMA and will require a Special Management Area Use Permit. Figure 5-1 illustrates the Zoo areas within the SMA.



141 0104/009 45 12 00

Figure 5-1
SPECIAL MANAGEMENT AREA

Environmental Assessment
Honolulu Zoo Master Plan, Honolulu Hawaii
May 2000

5.2.5 Exceptional Trees Ordinance

The City and County has enacted an Exceptional Trees Ordinance to preserve exceptional trees within the City and County of Honolulu. Exceptional trees on or near the Zoo parcel are the monkey pod trees near the Paki Avenue boundary between Kapahulu and Monsarrat (just outside the Zoo), and the earpod tree next to the stage area in the Zoo. It is unlawful to remove or otherwise destroy any of these trees without approval from the City Council (Jones & Jones, 1986). The proposed action will in no way impact these significant trees.

5.2.6 Diamond Head Historical, Cultural and Scenic District

The 1990 Land Use Ordinance also established six Special Design Districts, including the Diamond Head Special District. Because the Special District designations were implemented to protect or enhance the physical and visual aspects of certain areas for the benefit of the community as a whole, their development guidelines are generally more restrictive and supersede zoning guidelines. Design guidelines for the "core" area of each district are even more restrictive; most actions proposed for the core areas are subject to Minor or Major Special District Permits from the DPP. Major permits require in addition a presentation to the neighborhood board, a public hearing, and a review and recommendation from the Special District Advisory Committee.

Several of the activities associated with the proposed action will require a major or minor permit. These activities are described in Table 5-1.

Table 5-1: Required Special District Permits

Activity	Required Permit
Tree removal over 6" in diameter	Minor
Major exterior repair, alteration, or addition to all structures	Major
Minor exterior repair, alteration, or addition to all structures, which does not adversely change the character or appearance of the structure	Minor
Major above-grade infrastructure improvement not covered elsewhere, including new roadways, road widenings, new substations, new parks, and significant improvements to existing parks	Minor
New buildings, not covered above	Major

The Zoo is located in the core area of the Diamond Head Special District, established to preserve existing views of Diamond Head (a State and National Monument) from prominent public vantage points. Guidelines for the district include the following restrictions:

- All fences or walls exceeding 36 inches in height shall be set back a minimum of 18 inches along all street frontages and landscaped with vine, hedge or other approved planting on the street side.

- Street trees shall be provided at a minimum two-inch caliper. Species and spacing shall be chosen from an approved tree list on file with the Building Department. In the event that there are no feasible locations for street trees, substitute landscaping may be permitted upon approval by the Director of Planning and Permitting.

- The exterior facades of all structures and structural forms shall be designed to have architectural scale, exterior finish, material, colors, components, and features that relate in a compatible manner to nearby existing structures, particularly small scale development.

- Materials, finishes, and colors, including roofs, shall be nonreflective and subdued in nature.

- Height limitation in the core area is 0 feet; however, a variance may be granted if the proposed construction would not substantially diminish any significant views.

The Zoo improvements will conform to these building guidelines, with the exception of height restrictions. No new structures or exhibits will exceed the height of current structures and exhibits. Two 30- to 35-foot-high aviaries designed for the Tropical Forest are not expected to significantly alter the views of Diamond Head, since they will be constructed of a mesh suspended from steel framing. In addition, earthforms and some structures may be placed on sites where the elevation has been slightly increased.

5.2.7 Executive Order 22

On July 1, 1913, the property generally identified as Kapi'olani Park, including the current area of the Honolulu Zoo, was set aside by Governor W.F. Frear, "for the purposes of a public park and recreation ground under the direction of the City and County of Honolulu...", pursuant to Executive Order 22.

As a matter of background according to the archaeological assessment prepared for this EA,

> "Kapi'olani Park was established by a private corporation whose stockholders were chiefly interested in developing an exclusive residential retreat. The intention was not to create a site for public recreation. For its first two decades, the park

> was operated by the Kapi'olani Park Association...The Association was founded at a meeting on 8 November, 1976, with a two-fold purpose: (1) building residences for its stockholders along the ocean at Waikiki and on the slopes of Diamond Head and (2) laying out a first-class horse-racing track as the focal point of this new suburb." (Weyeneth, *Kapi'olani Park: A Victorian Landscape of Leisure,* 1991:4).

As discussed in the archaeological assessment, by the time the park was transferred to the City and County of Honolulu under the auspices of Executive Order 22, the idea of adding an aviary to the park to house imported birds was already over 20 years old, having been first proposed by the Kapi'olani Park Association in an Executive Committee report dated 1890. As also discussed in the assessment, a variety of birds and animals had been imported informally onto the park grounds since the 1880s. According to Weyeneth,

> "Building a zoo became a priority soon after the city began managing Kapi'olani Park. During 1915 and 1916, acquisition of animals and the construction of cages and bird houses established a "zoological garden." So delighted were officials that they filled the park report of 1916 with photographs of animals and added a detailed list of new park acquisitions that included two lions, twelve monkeys, two bears, one tortoise, four elk, four deer, twelve horses, seven donkeys, forty-six ducks, and an African elephant."

The animal cages were set among the islands and the pathways at the northwest end of the park. It was not until 1948 that the City and County of Honolulu began construction of a modern zoo on the drained and filled former waterscape upon which the Zoo rests today. Forty-four years later, Kapi'olani Park, including the Zoo site, was placed on the Hawai'i Register of Historic Places.

Given these facts, it is evident that the construction and operation of a public zoo within the park was consistent with the desired recreational character of the park. Because the current Master Plan is intended to further improve the existing Zoo facility, it is in compliance with the original intent of Executive Order 22 to establish a public park and recreation ground.

CHAPTER 6
PROJECT ALTERNATIVES

The following project alternatives are presented pursuant to Chapter 343 HRS. Project alternatives presented in the Honolulu Zoo Master Plan (Jones and Jones, 1984) include the following:

1. Improve the current Zoo on an exhibit-by-exhibit basis rather than redesigning the entire layout. Implement minimal changes with the focus on improving only those areas of the Zoo that are in need of the critical improvements.

2. Redesign the Zoo layout to immerse the visitor into each animal's habitat and to maximize the visitor's educational and recreational experience by providing additional interpretive and education centers. In addition, provide a more diverse animal collection, emphasizing rare and endangered animal conservation research and breeding.

3. No action.

The distinctions between the proposed project and the first two alternatives above are in their emphasis on three considerations: (1) zoo user; (2) zoo context; and (3) zoo program.

6.1 ALTERNATIVE 1

Alternative 1 would result in relatively little change to the overall plan of the Zoo. Existing needs related to maintaining the health, safety, and welfare of the animals, keepers, and visitors would be addressed when required. Some exhibits would be changed to meet minimum standards for zoo animal care. This alternative would neither promote zoological education nor stimulate additional revenues or economic growth. Impacts associated with this alternative would be similar to those associated with the existing state of the Zoo. Alternative 1 is not considered to be a desirable option.

6.2 ALTERNATIVE 2

Alternative 2 assumes the optimal development of the Zoo. It emphasizes activities associated with rare and endangered animal conservation research and breeding. Additional educational and interpretive exhibits, beyond that planned for the proposed project, would be included. Alternative 2 has some constraints in that some of the rare and endangered species would not be allowed in the State of Hawaii or would be difficult to import. This alternative would also be more costly and is not viewed as necessary nor a significantly better option. Potential impacts are expected to be similar to those associated with the proposed project. Additional impacts

could arise if further design developments were to proceed. Alternative 2 is considered to be an optimal Zoo design but not necessarily cost-effective.

6.3 ALTERNATIVE 3

Alternative 3 is the no action alternative. The no action alternative would leave the Zoo with some exhibits unable to meet minimum standards for zoo animal care. This alternative would fail to address existing needs to improve health, safety, and welfare of animals, keepers, and visitors. No further impacts, beyond those currently in existence, are expected from this alternative. This is currently not a satisfactory alternative.

CHAPTER 7
DETERMINATION

Based on the results of the foregoing analysis and on the significance criterion contained in HRS Chapter 343 and the Hawaii Administrative Rules (HAR) Title 11, Chapter 200, the proposed project is judged to have no significant adverse effects on the environment. This determination is based primarily on the following:

- The Project does not involve a loss or destruction of any natural or cultural resource.

- The Project does not curtail the range of beneficial uses of the environment. The Project is contained within the existing property boundaries and does not change the existing use of the property.

- The Project does not conflict with the State's long-term goals or guidelines as expressed in Chapter 343, HRS. Consistency with such goals and guidelines is presented in Chapter 5 of this environmental assessment.

- The Project does not substantially or adversely affect the economic or social welfare of the community or state;

- The Project does not involve substantial secondary effects such as population changes or infrastructure demands. While the Project is anticipated to attract more visitors and residents, no residential population density changes are anticipated. The Project does involve infrastructure improvements as mentioned above, and also involves increased demands on certain utilities, but these demands are judged not to be substantial;

- The Project does not involve a substantial degradation of environmental quality;

- The Project is phased over a period of 10 years, but its cumulative impacts described in the EA were deemed not to have a substantial effect on the environment. Rather, the Project may result in environmental improvements through the construction of various infrastructure improvements;

- The Project does not affect a rare, threatened, or endangered species or its habitat. The Project actually enhances habitats constructed to exhibit rare and endangered species.

- The Project is not anticipated to detrimentally affect public health, air or water quality, or ambient noise levels. Infrastructure improvements could actually result in an improvement to water quality and public health.

CHAPTER 8
AGENCY COMMENTS

A copy of the draft environmental assessment for this proposed action was transmitted to the following agencies for comment. The agencies that responded are indicated below. Comments from these agencies have been incorporated into this Final Environmental Assessment.

ADDRESS	RESPONSE RECEIVED	ADDRESS	RESPONSE RECEIVED
Office of Environmental Quality Control State of Hawaii 220 South King Street, 4th Floor Honolulu, Hawaii 96813	yes	Police Department City and County of Honolulu 1455 South Beretania Street Honolulu, Hawaii 96813	yes
Department of Land & Natural Resources State of Hawaii 1150 Punchbowl Street Honolulu, Hawaii 96813	yes	Fire Department City and County of Honolulu 3375 Koapaka Street Honolulu, Hawaii 96819	yes
State Historic Preservation Division Department of Land & Natural Resources 33 S. King Street, 6th Floor Honolulu, Hawaii 96813	yes	Diamond Head / Kapahulu / St. Louis Heights Neighborhood Board c/o Neighborhood Commission 530 South King Street, Room 400 Honolulu, Hawaii 96813	yes
Department of Health State of Hawaii 1251 Punchbowl Street Honolulu, Hawaii 96813	yes	Hawaiian Electric Company Environmental Review 900 Richards Street Honolulu, Hawaii 96813	yes
Department of Transportation State of Hawaii 869 Punchbowl Street Honolulu, Hawaii 96813	yes	Department of Business, Economic Development, and Tourism 220 South King Street, 11th Floor Honolulu, Hawaii 96813-4541	verbal
Office of Planning State of Hawaii 250 South Hotel Street, 4th Floor Honolulu, Hawaii 96813	no	Department of Transportation Services City and County of Honolulu 650 South King Street Honolulu, Hawaii 96813	yes
U.S. Army Corps of Engineers Pacific Ocean Division Building 230 Fort Shafter, Hawaii 96858	yes	Department of Public Works City and County of Honolulu 650 South King Street Honolulu, Hawaii 96813	yes
Fish and Wildlife Services U.S. Department of the Interior P.O. Box 50156 300 Ala Moana Boulevard Honolulu, Hawaii 96850	yes	Department of Land Utilization City and County of Honolulu 650 South King Street Honolulu, Hawaii 96813	yes
Department of General Planning City and County of Honolulu 650 South King Street Honolulu, Hawaii 96813	yes	Department of Wastewater Management City and County of Honolulu 650 South King Street Honolulu, Hawaii 96813	no

ADDRESS	RESPONSE RECEIVED	ADDRESS	RESPONSE RECEIVED
Board of Water Supply City and County of Honolulu 630 South Beretania Street Honolulu, Hawaii 96843	yes	Councilmember Andy Mirikitani City Council City and County of Honolulu 530 South King Street Honolulu, Hawaii 96813	no
Councilmember John DeSoto City Council City and County of Honolulu 530 South King Street Honolulu, Hawaii 96813	no	Councilmember Duke Bainum City Council City and County of Honolulu 530 South King Street Honolulu, Hawaii 96813	no
Councilmember John Henry Felix City Council City and County of Honolulu 530 South King Street Honolulu, Hawaii 96813	yes	Councilmember Mufi Hannemann City Council City and County of Honolulu 530 South King Street Honolulu, Hawaii 96813	yes
Councilmember Steve Holmes City Council City and County of Honolulu 530 South King Street Honolulu, Hawaii 96813	no	Councilmember Donna Mercado Kim City Council City and County of Honolulu 530 South King Street Honolulu, Hawaii 96813	yes
Councilmember Rene Mansho City Council City and County of Honolulu 530 South King Street Honolulu, Hawaii 96813	yes	Councilmember Jon Yoshimura City Council City and County of Honolulu 530 South King Street Honolulu, Hawaii 96813	no
Waikiki-Kapahulu Public Library 400 Kapahulu Avenue Honolulu, Hawaii 96815	no		

DEPARTMENT OF LAND UTLIZATION
CITY AND COUNTY OF HONOLULU
650 SOUTH KING STREET
HONOLULU, HAWAII 96813 • (808) 523-4432

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JEREMY HARRIS
MAYOR

PATRICK T. ONISHI
DIRECTOR

LORETTA K.C. CHEE
DEPUTY DIRECTOR

96-06308(ST)

January 23, 1997

Ms. Cheryl Vann
Belt Collins Hawaii
680 Ala Moana Boulevard, First Floor
Honolulu, Hawaii 96813-5406

Dear Ms. Vann:

Draft Environmental Assessment (EA) For
Honolulu Zoo Master Plan
Waikiki, Oahu, Hawaii
Tax Map Key: 3-1-43: 01

We have reviewed the subject Draft EA transmitted by the Department of Parks and Recreation's (DPR's) letter dated September 23, 1996, and have the following comments:

1. Chapter 1 of the Final EA should be revised to include a list of all permits that are necessary to implement this Zoo Master Plan. This section of the Final EA should also disclose the timing of these approvals (concurrently, incrementally, etc.) and whether this Master Plan replaces the one previously submitted to us, or just modifies it.

2. The Final EA should provide more detailed information on the anticipated heights of the proposed structures, setbacks, fence screening, etc. This additional information would allow a determination to be made on whether waivers for height, building area and setbacks are applicable. Cost estimate information should also be provided for each stage/increment of development.

3. The Final EA should discuss how the proposed Master Plan and its components conform with the terms and/or conditions of Executive Order (E.O.) 22.

4. The Final EA should also clarify that the Zoo is part of Kapiolani Regional Park and part of the Kapiolani Park Trust, as well as how the DPR will comply with obtaining the Trust's approval.

Should you have any questions, please contact Steve Tagawa of our staff at 523-4817.

Very truly yours,

PATRICK T. ONISHI
Director of Land Utilization

PTO:ks

cc: Department of Parks and Recreation

g:\96\06308.ltr

BELT COLLINS

May 12, 2000
141.0105/00P-094

Mr. Randall K. Fujiki, Director
Department of Planning and Permitting
City and County of Honolulu
650 South King Street
Honolulu, Hawaii 96813

Dear Mr. Fujiki:

Draft Environmental Assessment for
Honolulu Zoo Master Plan, Waikiki, Oahu, Hawaii

We are responding to Mr. Patrick Onishi's letter of January 23, 1997 regarding the Draft EA (DEA) for the proposed Honolulu Zoo improvements. Our responses to his comments are as follows:

1. Chapter 1 of the Final EA will be revised, as requested, to include a list of all permits that are necessary to implement the Honolulu Zoo Master Plan, and will disclose the timing of these approvals. The current master plan updates the 1984 master plan.

2. The EA addresses a master plan that is largely conceptual in nature and detailed construction plans have not been prepared. However, we will provide information on maximum heights and building areas in the text, as well as order-of-magnitude costs by increment.

3. Executive Order 22 states that Kapiolani Regional Park land be set aside, "for the purposes of a public park and recreation ground under the direction of the City and County of Honolulu." The Zoo Master Plan complies with Executive Order 22. We will make a note of this is the Final EA. A copy of the executive order is attached.

4. The Final EA will, as requested, clarify that the Zoo is part of Kapiolani Regional Park and is part of the Kapiolani Regional Park Trust. The members of the City Council, in their capacity as trustees of the park, were sent copies of the Draft EA and were asked to provide comments. In a letter dated July 28, 1999, the trustees responded that they have no comments on the DEA.

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We trust our responses have adequately addressed the comments.

Sincerely yours,

BELT COLLINS HAWAII LTD.

Cheryl Palesh

CP:LS:lf

Attachment

Executive Order No. 22.

Setting Aside Land for Public Purposes.

J. Walter F. Frear, Governor of the Territory of Hawaii, by virtue of the authority vested in me by the last paragraph of Section 5 of the Act of Congress approved May 27, 1910, entitled "An Act to Amend An Act Entitled 'An Act to Provide a Government for the Territory of Hawaii,' approved April Thirtieth, Nineteen Hundred" and Act 103 of the Laws of 1913 of the Territory of Hawaii and every other authority me hereunto enabling, do hereby order that the following described land be and the same is hereby set aside for public purposes, to-wit, for the purposes of a public park and recreation ground under the direction of the City and County of Honolulu:

All of the real and personal property comprising the Kapiolani Park conveyed this day to the Territory of Hawaii by the Honolulu Park Commission, subject, however, to all existing leases of, and to all public and private rights in, the same or any part or parts thereof, and to the trusts set forth in said Act 163.

In Witness Whereof, I have hereunto set my hand and caused the Great Seal of the Territory of Hawaii to be affixed.

Done at the Capitol at Honolulu this 1st day of July, Nineteen Hundred and Thirteen.

(Sgd.) W. F. FREAR.

By the Governor,

(Sgd.) S. A. HOTT-SMITH,
Secretary of Hawaii.

KAPIOLANI PARK PRESERVATION SOCIETY

RECEIVED

P.O. BOX 90183, HONOLULU, HAWAII 96835

January 22, 1997

FACILITIES
PARKS & RECREATION
C & C OF HONOLULU

Ms. Cheryl Vann
Belt Collins Hawaii
680 Ala Moana Boulevard, 1st Floor
Honolulu, Hawaii 96813-5406

Dear Ms. Vann:

Subject; Draft Environmental Assessment (EA)
for Honolulu Zoo Master Plan,
Waikiki, Oahu, Hawaii
Tax Map Key: 3-1-43: 1

The Kapiolani Park Preservation Society is pleased to have the opportunity to submit our comments/concerns of the Environmental Assessment for the subject project.

We must question your failure to identify THE KAPIOLANI PARK TRUST as the fee owner of the subject property, and that the subject property is the private property of THE KAPIOLANI PARK TRUST. Moreover, the park facility, known as the Honolulu Zoo, is only a portion of Kapiolani Park, the entirety being the trust entity and the Park as provided for by this charitable trust. As clarified by various court orders, the City and County of Honolulu's only position is the responsibility for the day to day management of the park, while the elected trustees retain their full powers and responsibilities as outlined in Act 53 of the session laws of 1896.

We must question your denial of the fact that all of Kapiolani Park is registered on the State of Hawaii Register of Historic Places and eligible for and soon to be placed on the National Register of Historic Places.

In light of the above stated facts, we additionally question the appropriateness of submitting a segmented Environmental Assessment, when, as we have been persuaded, it is mandated by law, that an all inclusive Master Plan for the entire park be adopted. Additionally, that any and all projects for any portion of the park are subject to a full Environmental Impact Statement and Section 106 review to insure compliance of the Master Plan and the intent of the National Historic Preservation Laws.

We find your segmented Environmental Assessment to not only be sketchy, but inadequate for review. Therefore, we must reserve our further comments and concerns until such time when we are presented a full and comprehensive Environmental Impact Statement that includes the entire park and this proposed Honolulu Zoo project is included in an approved and adopted Master Plan for all of Kapiolani Park.

Very truly yours,
KAPIOLANI PARK PRESERVATION SOCIETY

Allan Voronaeff

Allan Voronaeff, President

BELT COLLINS

May 12, 2000
141.0105/00P-095

Mr. Don Bremner, President
Kapiolani Park Preservation Society
P.O. Box 90183
Honolulu, Hawaii 96835

Dear Mr. Bremner:

Draft Environmental Assessment for
Honolulu Zoo Master Plan, Waikiki, Oahu, Hawaii

We are responding to Mr. Allan Voronaeff's letter dated January 22, 1997 regarding the Draft EA for the proposed Honolulu Zoo improvements. Our response to his comments is as follows:

1. We will clarify in the Final EA that the Kapiolani Park Trust is the fee owner of the subject property, and that the Zoo is a portion of Kapiolani Regional Park, which is a trust entity.

2. We will also clarify in the Final EA that the Kapiolani Regional Park is registered on the State of Hawaii Register of Historic Places, and eligible for the National Register of Historic Places.

3. We disagree with your assertion that the Draft EA is segmented. When the environmental assessment for the savanna was completed, other Zoo improvements for the future were not yet envisioned. The current Draft EA addresses all phases of the proposed project in the master plan (including the savanna). The estimates included in the Draft EA are cumulative numbers for full build-out.

   A comprehensive master plan for the Honolulu Zoo has been prepared and is summarized in Section 1.4 of the EA. The current EA assesses the potential impacts resulting from implementation of the master plan and includes by reference as allowable under Section 11-200-13 Hawaii Administrative Rules, the previous EA prepared for the savanna project. A claim of segmentation might be appropriate if each of the master plan's elements were implemented under the auspices of separate environmental assessments, but that is clearly not the case here. The current EA addresses the entire master plan.

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4. We have sought guidance from the Advisory Council on Historic Preservation regarding your assertion that a Section 106 review is required. As noted in their attached response, since no Federal funds are being utilized and no Federal permits are required for the project, no Section 106 review is required.

5. Regarding your request that a full Environmental Impact Statement (EIS) be completed, it is the City's determination that there is insufficient reason to expect significant adverse impacts from the proposed improvements.

6. The City is presently working on a master plan for Kapiolani Regional Park which will include provisions of the Honolulu Zoo Master Plan.

We trust our response has adequately addressed your concerns.

Sincerely yours,

BELT COLLINS HAWAII LTD.

Cheryl Palesh

CP:LS:lf

Attachment

Advisory Council On Historic Preservation

The Old Post Office Building
1100 Pennsylvania Avenue, NW, #809
Washington, DC 20004

Reply to: 12136 West Bayaud Avenue, #330
Lakewood, Colorado 80226

July 20, 1997

Cheryl Palesh
Belt Collins Hawaii LTD
680 Ala Moana Boulevard
First Floor
Honolulu, HI 96813-5406

RE: *Honolulu Zoo Master Plan, Waikiki, Oahu, Hawaii*

Dear Ms. Palesh:

The Council received your letter on June 24, 1997, in which you requested the Council's opinion on whether or not the referenced project is subject to review under Section 106 of the National Historic Preservation Act (NHPA). The Council's regulations for implementing Section 106, *36 CFR Part 800: Protection of Historic Properties,* describes the process that Federal agencies must follow to take into account the effects of their actions on historic properties.

Section 800.2 of the Council's regulations defines an undertaking that is subject to review under Section 106 as, "any project, activity, or program that can result in changes in the character or use of historic properties, if any such properties are located in the area of potential effects. **The project, activity or program *must* be under the direct or indirect jurisdiction of a Federal agency or licensed or assisted by a Federal agency."** Since you indicated in your letter that the proposed Honolulu Master Plan utilizes State land, County funds that have not been delegated from any Federal sources, such as Community Development Block Grants, and does not require the use of any Federal permits or liscense, it does not appear that the referenced plan is subject to review under Section 106 of NHPA.

If you have any questions, or would like to discuss this matter further, please contact Jane Crisler in our Denver Office at (303) 969-5110.

Sincerely,

Jane M Crisler

for Don L. Klima
Director
Office of Planning and Review

KAPIOLANI PARK ADVISORY COUNCIL
PAKI HALE
3840 Paki Avenue
Honolulu, Hawaii 96815

January 23, 1997

RECEIVED
'97 JAN 23 P4:21
PARKS & RECREATION
C & C OF HONOLULU

Mr. John D'Araujo, Director
Department of Parks and Recreation
650 South King Street, 10th Floor
Honolulu, Hawaii 96813

Mr. Dan Takamatsu, Administrator
Facilities Development Division
Department of Parks and Recreation
650 South King Street, 9th Floor
Honolulu, Hawaii 96813

Mr. Gary Gill, Director
Office of Environmental Quality Control
State Office Tower, Suite 702
235 South Beretania Street
Honolulu, Hawaii 96813

Ms. Cheryl Vann, Project Planner
Belt Collins, Hawaii
680 Ala Moana Boulevard, 1st Floor
Honolulu, Hawaii 96813

Subject: Draft Environmental Assessment for a Honolulu Zoo Master Plan

Dear Ms. Vann and Gentlemen:

Please find attached our response to the Draft Environmental Assessment for the proposed Honolulu Zoo cumulative development. We hope that the information provided in this response will assist you in understanding Kapiolani Park's historical significance; Trust ownership and charitable trust provisions; Court findings of fact, decisions and orders; and applicable respondents concerning proposals pertaining to Kapiolani Park, of which the Honolulu Zoo is plainly a portion.

You will find that our questions and comments focus on the Draft Environmental Assessment's absence of data on historical significance and landscape features, and the proposed development's segmentation, promotion of commercialism, visitor density and parking impact, surface water impact, etc. As there appears to be sufficient reason to expect significant adverse impacts from the magnitude of this proposed cumulative development, we request that a full Environmental Impact Statement be provided if the Applicant seriously intends to pursue proposing this development for this location. Otherwise, we strongly recommend that the Applicant consider relocating the proposed development to a more appropriate area.

We look forward to your response on the attached questions, comments and concerns, and to future discussions pertaining to the future of the Honolulu Zoo in Kapiolani Park.

Very truly yours,

Michelle Spalding Matson, Chairperson

cc: Kapiolani Park Trustees

KAPIOLANI PARK ADVISORY COUNCIL

DRAFT ENVIRONMENTAL ASSESSMENT

for the

HONOLULU ZOO MASTER PLAN

QUESTIONS AND COMMENTS

The Kapiolani Park Advisory Council sincerely appreciates the opportunity to respond to the Draft Environmental Assessment for the Honolulu Zoo Master Plan (DEA), and the time extension granted for review and comments in light of the extensive development proposed for this portion of Kapiolani Park. In addition, we have provided copies of the DEA to the Honolulu Zoological Society and Kapiolani Park Preservation Society through their respective presidents, as we discovered that these key responding organizations were without copies of the DEA at the time the KPAC received this document in mid-October.

Project Location

Kapiolani Park - including the Zoo area - is governed by the provisions of the Kapiolani Park Trust, which is a public charitable trust. The U.S. Supreme Court decreed in 1819 that public charitable trust provisions supersede government mandates, in that government is neither to legislate nor promulgate alterations to charitable trust provisions. See: Dartmouth College vs Woodward, U.S. Supreme Court, 17 U.S. 518 (1819).

The Honolulu Zoo currently encompasses 42 acres situated on a historically significant portion of the Kapiolani Park within the boundaries of the 200-acre Trust lands. However, the language used in the DEA to describe the location of the Zoo appears to oddly place Kapiolani Park proper and various areas within Kapiolani Park as "remainder," "special function components" and "neighborhood park areas" subsidiary and ancillary to the Zoo (DEA @ 2-1).

Project Magnitude

Nearly one century following the passage of Act 53 in 1896, the State Supreme Court ruled on several findings of fact in substantiation of Act 53 pertaining to the provisions of the Kapiolani Park Trust. Among these findings the Court found that Trust lands are to be used only for Park purposes within the terms of the Trust, and commercial and municipal uses are not permitted within Kapiolani Park Trust property. See: Kapiolani Park Preservation Society vs City and County of Honolulu, et al, Hawaii State Supreme Court, 69 Haw. 569 (1988); and City and County of Honolulu vs Hawaii State Attorney General and Kapiolani Park Preservation Society, Hawaii State Circuit Court, S.P. 89-0015 (1991).

However, the DEA presents a matter of considerable concern by boldly emphasizing the proposed development's commercialism and promoting consistency with the Waikiki Master Plan to "encourage enhancement of the financial viability of Waikiki's visitor industry by enhancing the physical environment of Waikiki." The DEA glowingly describes the "opportunity to purchase" from the proposed development's entry concession; entry concessions, makai; Hawaiian gifts; Hawaiian concessions; Savanna drink concession; concession stands, mauka; main concession stand, mauka west ("designed to serve 500 people per hour"; snack huts; entry/exit gift shop ("accessible by persons not entering the Zoo"); school group entrance gift shop; etc. Table 2-1 defines additional construction, including an "entrance complex" with a paved "intensive-use" entry plaza with a "commercial environment" and a 1.9-acre "zoo events area" with a "stage and sound system." (DEA @ 2-1, 2-6, 2-7 and 2-9.)

The DEA thus places commercialism as precedent over Act 53, wherein it is provided that products sold in Kapiolani Park shall be such "as may be incidentally produced in the management thereof;" and that there shall be no authority to "compel the payment of an entrance fee as a condition to the admission of any one to the grounds of... the said Park or any part thereof... "

Given such concentrated commercialism at the Zoo, we question whether this facility, as proposed, would be at all appropriate at this location any longer. Is not such high-volume commercialism in direct conflict with the provisions of the Trust under Act 53?

Compliance with Land Use Laws, Policies and Objectives

Historic Register

Kapiolani Park, including the Honolulu Zoo portion, was registered on the State Register of Historic Places in 1992, and further recommended by the Board of Land and Natural Resources for nomination to the National Register of Historic Places. The DEA mentions nothing about Kapiolani Park's historic character and significance in this regard. Non-disclosure of such pertinent information, inadvertent or otherwise, places an indelible flaw on the assessment.

Moreover, the proposed cumulative development would appear to require not simply an Environmental Assessment, but a full Environmental Impact Statement for this recognized historic property. Additionally, any such development impacting the historic character and integrity of a registered historic site, with its inclusive eligibility for the National Register, would be subject to the federal Section 106 review process by virtue of its standing.

Cumulative Development

The State Supreme Court has ruled that cumulative environmental impacts of the larger project must be addressed. See: Hawaii's Thousand Friends vs City and County of Honolulu, State of Hawaii Circuit Court, S.P. 91-0457 (1991).

However, possibly in order to diminish any perception of cumulative adverse impacts of the proposed project in its entirety, the DEA avoids the precedent disallowance of segmenting portions of the larger development:

a) The DEA assumes the posture of acting in accordance of Hawaii Revised Statutes (HRS), Section 343, and references features of the African Savanna project as being one of the development's "four main ecological environments...";

b) However, the African Savanna's Phases I and II are carefully excluded from the assessment as having been covered by a previous EA (DEA @ 1-1).

c) The DEA later correctly states that the "African Savanna... was the first component of the new Zoo design... implementing an integrated development plan for the Zoo in phases" resulting in a "Zoological park" (DEA @ 1-2 and 1-4).

d) The DEA states that "a number of infrastructure improvements will be required to support the proposed project" (DEA @ 2-11), but the DEA retreats from its obligations by excusing specifics on structure and infrastructure from all components except the Rain Forest segment, which is currently "under design," while other components (biomes and facilities) "are conceptual only" and therefore apparently dismissed from the assessment's consideration (DEA @ 2-3).

Thus, the DEA flagrantly ignores the cumulative impacts of the larger project.

In order to rectify this breach, we respectfully request that the environmental assessment for the proposed Zoo development be revised to include each and every phase of the cumulative development, and the associated impacts thereof.

Scope of Development

The proposed development is planned within the Core Area of the Diamond Head Special Design District, and is within the boundaries of Kapiolani Park with a designated zero-foot (0') height limit. However, significant administrative maintenance and support structures required for the proposed development are described as follows:

a) A 17,000 sq. ft. two-story administration building with conference space, a library, offices for 18 persons, restrooms, registrar's office, storage areas, and lunch room/kitchenette;

b) A "Hale Kokua" personnel facility for 60 keepers and operations personnel with rooms, showers, lockers, and two temporary living quarters for scientific visitors);

c) A maintenance complex with a maintenance building (including carpentry, plumbing, welding, electrical, masonry, computer/graphics sections; and storage for flammable materials) and a maintenance area (including garages with vehicle wash-down, gasoline pumps and above ground storage tanks; garbage compactor; storage yard; and greenhouse);

d) A five-building breeding facility;

e) A veterinary clinic and quarantine area;

f) A commissary and warehouse serving 2,000 animals daily.

Further, feature planned to be integrated into the Zoo portion of Kapiolani Park include "Ancient Continental Islands" and "New Continental Islands," which are planned to be comprised of "volcanic islands... limestone islets... water features... earthforms." Although the DEA notes the height of the existing African Savanna exhibit as being 9.5 to 7 feet above grade, the DEA fails to mention the dimensions and heights of the proposed development's volcanic islands and earthforms constructed to create "barriers and to form views into exhibit areas" with pathways "structured for two levels of visitor flow." (DEA @ 2-1, 2-3, 2-6, 2-7, 2-8 and 3-1.) Additionally planned is construction of "ancient ruins," and a "treetop 'scientific research center'...to be built on a platform in the Morton Bay fig tree," and is planned (DEA @ 2-3 and 2-6).

With the exception of the administration building, building and earthform sizes are undisclosed in the DEA. However, the DEA points out that substantial excavation and earthmoving, dewatering and filling, compaction and foundation work are proposed for the development in that existing "soil material used for fill underlying the Zoo is not suitable for supporting relatively heavy structures... Because of the presence of compressible soils and high groundwater levels, differential settling of soils could occur if conventional shallow foundations are used to support heavy structures." (DEA @ 4-1 [4.1.2], 4-2 [4.1.5] and 4-3.)

Therefore, we believe that the following information is seriously lacking and therefore must be provided:

A. An explanation pertaining to the reasoning behind the decision to propose this complex development for the environmentally and historically sensitive Kapiolani Park Trust lands;

B. A complete description of dimensions pertaining to each building and earthform structure's height, footprint, and area in square feet

C. Justification of how the size and use of each building would be permitted to be commercial, industrial or agricultural in nature in lieu of conforming with the restricted residential scale and use represented in the surrounding Special Design District;

D. Definition of the reasoning applied to placement of an operations support yard and trash compactor contiguous to a high-visibility entrance of Kapiolani Park: Paki Avenue's panoramic boulevard lined with majestic monkeypods listed as Exceptional Trees (DEA @ 2-17).

Existing Use Permit (1986)

It is represented that the DEA "provides information regarding the project's consistency with land use plans..." However, this effort falters in presuming consistency with land use laws by relying on an Existing Use Permit (EUP) wherein "no special restrictions were imposed" in 1986. This EUP is outdated and precedes several court rulings on cumulative development, the Kapiolani Park Trust, and the City's subordinate custodial position thereto. See: Kapiolani Park Preservation Society vs City and County of Honolulu, et al, Hawaii State Supreme Court, 69 Haw. 569 (1988); City and County of Honolulu vs Hawaii State Attorney General and Kapiolani Park Preservation Society, Hawaii State Circuit Court, S.P. 89-0015 (1991); and Hawaii's Thousand Friends vs City and County of Honolulu, State of Hawaii Circuit Court, S.P. 91-0457 (1991).

Preservation Parkland

The DEA states that the proposed "Zoo improvements will, *for the most part*, be constructed within the existing fenceline of the Zoo." (DEA @ 1-2.)

What portions of the proposed development are anticipated or envisioned to extend past the existing fenceline of the Zoo? Please define the expected impact on the following:

a. the parkland area encompassing the Kapahulu/ Kalakaua/Monsarrat Avenue street frontage;

b. the fenceline known as the art exhibit area along Monsarrat Avenue, up to the Paki intersection;

c. the parkland picnic area between the Bandstand and the Shell;

d. the Waikiki Shell parking lots, both along Monsarrat Avenue and at the intersection of Monsarrat and Paki Avenues, and the Honolulu Zoo parking lot along Kapahulu Avenue;

e. the Queen Kapiolani Botanical Garden on Paki Avenue;

f. Paki recreation and picnic area, Paki recreation center, and Paki playground;

g. the historic building currently known as the Kapiolani Park service center;

h. the newly constructed and illuminated basketball/volleyball courts recently transferred into the Kapiolani Park Trust by court order in 1996;

i. the centrally-located Waikiki Fire Station;

j. the listed Exceptional Monkeypod Trees framing both sides of Paki Avenue between Kapahulu Avenue and Monsarrat Avenue.

k. any other areas in the vicinity of the existing Honolulu Zoo that are envisioned, anticipated or planned to be utilized for the proposed development and/or its operations.

Development Planning Process

The DEA emphasizes that the proposed project is consistent with the General Plan in "providing a wide range of recreational facilities as services that are readily available to all residents of Oahu" and "refurbishment... accommodates recreational needs of present and future generations... provides an educational experience... expand(s) and enhance(s) outdoor recreation opportunities..." (DEA @ 1-4, 5-2, and 5-3.)

Aside from monies previously spent on Zoo facilities, what precludes the applicant from more properly relocating the proposed development to one of several more appropriate and centrally-located agricultural/industrial areas on Oahu?

Zoo Master Plan

The DEA refers to the 1984 Zoo Master Plan, which was developed with the benefit of public review and comment. However, apparently this approved Master Plan was privately updated in 1993, and the DEA states that "as of June 1994, the Master Plan has been updated to reflect community and staff goals... the updated Master Plan focuses and refines the concept of gradual reorganization of the basic Zoo layout... " (DEA @ 1-2.)

However, so far as is known, neither were the Board of Directors of the Honolulu Zoological Society nor the elected members of the Diamond Head/Kapahulu/St. Louis Heights Neighborhood Board, whose organizations are represented on the KPAC by some of the same, nor was the contiguous affected community, ever presented with an updated Zoo Master Plan for review and comment between the years of 1990 and 1996.

Therefore, how can the DEA represent that the "updated Zoo Master Plan" reflects "community... goals"? (DEA @ 1-2.)

In addition, although the Honolulu Zoo is part and parcel within Kapiolani Park Trust lands, the Zoo Master Plan has never been incorporated into the publicly-approved Kapiolani Park Master Plan, either in form or by reference.

Further, the DEA describes the updated 1993 Zoo Master Plan to be "gradual reorganization of the basic Zoo layout... *consistent with* the current proposed Zoo improvements." (DEA @ 1-2.) Therefore, it appears that the proposed cumulative development has now been prioritized to supersede any Master Plan, either the 1884 publicly-reviewed plan or a 1993 privately-commissioned plan.

Operations Impacts and Infrastructure

Visitor Increase Impact

The DEA establishes the current daily visitor count at 1,797, and projects that the expanded Zoo development will attract 1,650,000 annual visitors, or 4,546 visitors daily within the 42 acres of Kapiolani Park which the Zoo now occupies. However, these visitors will be confined to only 2 acres of pathways surrounding the open exhibits. This appears to promote potential serious overcrowding in a limited area.

In addition, there is a question of what effect such a mass of humanity would have on the animals and their well-being. The DEA substantiates that an original proposal to place exhibits near the entranceway (under existing visitor conditions) was rejected because... the elevated levels of human activity and interaction would place too much stress on the exhibit animals. If there are 96,500 residents and visitors on 500 acres in Waikiki (193 persons per acre), and 5000 visitors on 2 acres of pathways at the Zoo (2,500 persons per acre over 4 hours), it would seem that the visitors would rather be on the streets of Waikiki than bogged down on pathways at the Zoo. (DEA @ 3-8.)

The DEA overlooks the fact that Kapiolani Park is currently an over-burdened regional recreational park of which the sustainable capacity is increasingly exceeded. Also absent from the DEA is any evaluation of the potentially serious adverse impact of a proposed 175% escalation in the Zoo visitor count, and associated adverse impacts on the Park's Trust lands and surrounding areas pertaining to increases in traffic, parking, and decreasing non-potable surface water.

Yet, the DEA notes that "the anticipated long term impacts include a greater demand on utilities, an increase in the number of visitors, and associated increases I(sic) traffic and parking requirements." The DEA further advocates across-the-board, high-cost major infrastructural improvements, i.e., revised City and County water use plans, wastewater and sewerage infrastructure improvements, regional mass transportation plans, and road improvements be undertaken to support this development to enable the Zoo "to develop its proposed master planned facilities." (DEA @ ES-2, 2-12, 2-15 and 2-17.)

However, the DEA declares that "based on the information presented herein, there is insufficient reason to expect significant adverse impacts from the proposed Zoo improvements, and a Negative Declaration is recommended." (DEA @ ES-2.) Given the extensive City infrastructure improvements recommended to develop and sustain the proposed Zoo facilities, the KPAC recommends that a full Environmental Impact Statement be conducted to ascertain the cumulative impact of the proposed development on the Kapiolani Park Trust lands, the contiguous residential community, the adjacent Waikiki and Kapahulu commercial sectors, the City and County of Honolulu, and ultimately, the people of Oahu.

Available Parking

A total of 1,051 existing parking stalls, limited by Court order, are reserved for Park users only in Kapiolani Park. The DEA states that "additional parking for the projected increase in Zoo visitors is not planned," but acknowledges that one of the potential adverse impacts is "associated increases in traffic and parking requirements." (DEA @ ES-2 and 2-18.) However, the DEA evaluates visitor parking to accommodate the proposed daily increase of 3,200 Zoo visitors by merely stating that "overflow parking is available around Kapiolani Regional Park". There is complete absence of research into the existing crowded usage conditions within the Park - with its attendant overflow parking requirements for current use spreading over a multi-block radius into the neighborhoods outside the Park on weekends and holidays.

Surely, with the over-burdened and over-crowded usage conditions within the surrounding 158 acres of Kapiolani Park, whose capacity is increasingly exceeded, the applicant does not expect that the Zoo's 42-acre portion of the Park will monopolize all 1,051 of Kapiolani Park's parking spaces confirmed by the Court as being specifically designated for recreational Park users?

However, Table 2-1 additionally defines planning and construction of "Zoo perimeter parking" during years seven and eight of the development schedule, and the DEA states that the proposed "Zoo improvements will, *for the most part*, be constructed within the existing fenceline of the Zoo." (DEA @ 1-2 and 2-1.)

As no additional park land or airspace has been authorized by the courts for consumption by parking surface in Kapiolani Park (see: City and County of Honolulu vs Hawaii State Attorney General and Kapiolani Park Preservation Society, Hawaii State Circuit Court, S.P. 89-0015, 1991), please provide the following:

A. An analysis of existing parking conditions in Kapiolani Park;

B. Analyses and projections of anticipated parking impacts associated with the proposed Zoo development;

C. Any proposals or alternatives to eliminate this impact, as mere mitigation would appear to be insufficient. (It should be noted here that statistics show that, while overall daily-commuter traffic congestion may be relieved by ambitious mass transportation goals, tourist and family transportation will assuredly continue in private vehicles.)

Environmental Impacts

Geologic, Historic and Cultural Resources

The DEA makes a grave error by stating that the "Zoo is not listed on either the state or federal Register of Historic Places. Indeed, Kapiolani Park, including the Zoo, was listed on the Hawaii State Register of Historic Places in 1992 and is eligible to be placed on the *National Register. The proposed Zoo development is therefore subject to the provisions* mandated under the National Act for Historic Preservation, including a full Environmental Impact Statement and Section 106 Review. There is no historical data *presented, although all available historical data should have been thoroughly researched and included in the* DEA. (DEA @ 3-7.)

The DEA states that "no specific cultural resources have been identified" within the Zoo, "hence, no adverse impacts to these types of resources are anticipated." Yet, the DEA acknowledges that "there is a possibility of subsurface resources existing beneath the fill on what was once McKee(sic) Island..." and that there is a potential for "Possible disruption or destruction of subsurface resources... An inventory survey will be undertaken.. for archaeological sites... data recovery or monitoring *may* be recommended" The DEA relies merely on "data recovery" and "monitoring," while ignoring potential significant site preservation practices, especially with regard to properties listed on the Register of Historic Places. The footnote pertaining to "personal communication" with a State Historic Preservation Division Archaeologist remains unsubstantiated and undocumented. (DEA @ 3-7, 4-5 and 4-6.)

The geologic composition underlying the Zoo area of Kapiolani Park is approximately 6 feet of volcanic tuff over up to 20 feet of coralline bedrock in calcareous reef deposits. Waikiki was once laced with lagoons, and there is a great potential for historic and cultural investigation of the Zoo area as it contains characteristics that would have been ideal for early settlement when the first colonization appeared over 2,000 years ago. Such characteristics include fresh water stream features, proximity to the shoreline, and ocean access. Areas adjacent to the Zoo were originally large ponds created by drainage from Diamond Head and, in the 1850's, a portion of this area was filled. About the 1920's, Makee Island inlets were filled further to expand the Park. However, the DEA does not quantify which areas were filled, and only notes 1 to 4 feet of fill in the African Savanna exhibit area. Therefore, the DEA is seriously flawed in avoidance of researching the historic significance of this area. (DEA @ 3-1.)

Historic Landscape and Exceptional Tree Ordinance

As cited above, the DEA ignores the fact that the Kapiolani Park Trust lands and landscape features, including the Zoo and its contiguous perimeter, are listed on the Historic Register. In addition, the DEA fails to consider that many trees within the Zoo portion of Kapiolani Park are historic trees and an integral part of the historic landscape of Kapiolani Park, even though they currently have not been made part of the Exceptional Tree Ordinance.

Specifically, the DEA misrepresents that "little or no original plant species remain on Zoo grounds" that have been "extensively landscaped in its 44-year history" and discloses that "an *approved tree list from the City and County of Honolulu's Building Department" will be* used for trees "planted along the streets." (DEA @ 2-7 and 3-7.)

In reality, several trees within the existing Zoo grounds, including ironwoods and banyans, are part of the original Kapiolani Park landscape and delineate the configuration of Makee Island and other historic features of the original Park plan. In addition, the streets around the Zoo display mature monkey pods on Paki Avenue (listed as "Exceptional Trees"), banyans on Kalakaua Avenue (planted in the early 1920's), a double row of ficus on Monsarrat, and many more monkey pods on Kapahulu Avenue.

Further, the applicant appears to be proposing that remaining trees will be replaced by miscellaneous trees on the Building Department's list, along with "commonly available vegetation" (DEA @ 2-7). In fact, an alarming precedent to this occurred when the City destroyed many of the historic date palms within the Zoo to make way for the recently completed African Savanna.

Specifically, the DEA states the following:

a) That "...removal of some flora will occur...Removal of flora will not affect indigenous species or those trees protected under the City and County of Honolulu's Exceptional Tree Ordinance. Trees protected by this ordinance include (certain) monkeypod and earpod trees. Any short-term losses of flora will be outweighed by the long-term benefits of increased quantities and species which will inhabit the project site." (DEA @ 4-4.)

   Note: This is inconsonant with the Kapiolani Park Master Plan and the Park's historic landscape plan dating back to the 1800's.

b) That "in the event there are no feasible locations for street trees, substitute landscaping may be permitted upon approval by the Director of Land Utilization." (DEA @ 5-6.)

   Note: Tree removal in the Diamond Head Special District merely requires a "Minor" permit issued at the discretion of the Director of the DLU. Further, as noted above, Special District guidelines provide only that "All fences or walls exceeding 36 inches in height shall be set back a minimum of 18 inches along all street frontages... "

c) That "Street trees shall be provided at a minimum 2-inch caliper. Species and spacing shall be chosen from an approved tree list on file with the Building Department." (DEA @ 5-6.)

Therefore, although "Zoo improvements will, for the most part, be constructed within the existing fenceline of the Zoo" (DEA @ 1-2), there appears to be an open opportunity for removal of existing mature trees within the historic landscape of Kapiolani Park, expansion of the fenceline to within eighteen inches of street frontage, and replacement of the mature trees with "substitute landscaping" subject to one individual's discretionary approval.

Is it indeed the applicant's intention that the proposed development is planned to expand the Zoo to the point of consuming Kapiolani Park's historic landscape within the Zoo, as well as along the streets around the Zoo, instead of honoring and enhancing the precedent landscape plantings such as ironwoods, monkeypods, Indian banyans and royal date palms in order to be compatible with the existing historic landscape?

Park Water Sources

The DEA fails to research nearby natural sources of surface water. The Ala Wai Canal is located approximately 1/8 mile to the north, and, although manmade, it is the receiving body for natural sources of surface water from both the Manoa and Palolo Streams. In addition, a natural wetlands exists parallel to the historic double row of royal date palms adjacent to the Waikiki Shell's mauka side. This is the remaining portion of the natural drainage area receiving runoff from the slopes of Diamond Head, and it flows directly into the subterranean channel through the Zoo. However, the DEA simply states that "neither the U.S. Army Corps of Engineers nor the U.S. Fish and Wildlife Service identifies the Zoo as a wetlands area." (DEA @ 3-4 and 3-6.)

Combining additional non-potable water requirements for the proposed development, 288,000 gallons per day or 8,784,000 gallons per month would be required to support the proposed cumulative development. However, the DEA states that "Three existing wells... have a combined capacity of 350 gpm" (gallons per month) and further states that "the existing nonpotable water supply is 504,000 gpd (gallons per day)... " (DEA @ 2-13).

The DEA states that the "non-potable water demand is expected to increase due to the proposed Zoo improvements... but will remain below the existing non-potable water supply of 504,000 gallons per day (from three existing active wells) *with proper water management.*" The DEA further states that "daily non-potable water use... will require about 170,000 gallons per day," leaving 330,000 gallons per day for "other exhibits with less frequent turnover requirements" (DEA @ 2-12 and 2-13).

The DEA also states that "flow control devices have been recommended to prevent significant deviation from the specific fill rates that could affect concurrent uses." However, given the repair and maintenance hardships encountered with other water feature systems constructed under bid contract in and around Kapiolani Park, the reliability of such water flow control devices may be subject to careful scrutiny, and the usage caveat presented in the DEA must be seriously considered. (DEA @ 2-13 and 3-4.)

As the DEA is vague and confusing, and as there is potential of enormous consumption of Kapiolani Park's non-potable supply by the proposed development, we believe that the sustainable yield of the non-potable water supply must be defined clearly in terms of quantities, locations, and capacities of each respective water source for Kapiolani Park, accompanied by engineering data, charts and tables.

Five non-potable water wells were drilled into the caprock aquifer in the 1980's to access Kapiolani Park's "useful, moderately brackish water supply." The DEA at 3-4 states that this water is not "ecologically important." However, in the future this water should replace potable water now being consumed by the high irrigation requirements of Kapiolani Park, and is so stated as belonging to the Park in the Kapiolani Park Trust Deed of 1913. See: Honolulu Park Commission to the Territory of Hawaii, Deed of 1913, Liber 392, Page 408.

Therefore, there is some concern that the proposed cumulative development could very well have an adverse impact on the area's water table and on Kapiolani Park's non-potable water supply in its entirety. In fact, the DEA's Determination of Significant Impact excludes the significance criterion "Affects an environmentally sensitive area", i.e., fresh water, ground water, coastal waters. (DEA @ 7-1.)

Conclusion

In conclusion, there appears to be sufficient reason to expect significant adverse impacts from the proposed Zoo development. A full Environmental Impact Statement should be required if the Applicant seriously intends to pursue an attempt to expand and upgrade the existing Zoo facility at its present location.

The requirement for an Environmental Impact Statement will help to ensure review of this proposal at both City and State levels, as the Kapiolani Park Trust is the fee landholder, the State Attorney General is the parens patriae for all matters pertaining to Kapiolani Park Trust provisions, and all nine members of the City Council of Honolulu are designated by the Court as Individual Trustees for the Kapiolani Park Trust in matters pertaining to use of Trust lands.

Therefore, the KPAC recommends that a full Environmental Impact Statement be conducted to ascertain the full cumulative impact of the proposed development on the Kapiolani Park Trust lands, the contiguous residential community, the adjacent Waikiki and Kapahulu commercial sectors, the City and County of Honolulu, and ultimately, the people of Oahu.

BELT COLLINS

May 12, 2000
141.0105/00P-096

Ms. Michelle Spalding Matson
Chairperson
Kapiolani Park Advisory Council
Paki Hale
3840 Paki Avenue
Honolulu, Hawaii 96815

Dear Ms. Matson:

Draft Environmental Assessment for
Honolulu Zoo Master Plan, Waikiki, Oahu, Hawaii

Thank you for your letter dated January 23, 1997 regarding the Draft EA for the proposed Honolulu Zoo improvements. Our response to your comments is as follows:

1. Project Location

   The purpose of Section 2.1 is to identify the location of the project area. Your observation that various areas within Kapiolani Regional Park were described as ancillary to the Zoo may be accurate, since the Zoo, being the project area, is the focal point in this paragraph.

2. Project Magnitude

   The purpose of the Zoo is public education and recreation, not commercialism. Charging admission to the park is acceptable as long as the funds are used to support the Zoo. The food, drink, and gift stands proposed for the Zoo are for the convenience of Zoo visitors, and therefore do not contradict Act 53, which does not permit commercial or municipal uses within Kapiolani Park Trust property.

   Relocating the Zoo to another location is out of the scope of this EA for the following reasons: 1) the objective of the master plan is to enhance the *existing* environment and recreational experience of the Zoo in its current location by creating a more realistic/humane environment for the animals, making improvements for visitors, and initiating education programs; and 2) expansion of the Zoo beyond its existing boundary is not proposed. Relocating the Zoo out of Kapiolani Regional Park is not considered to be a practical alternative due to excessive costs.

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3. Compliance with Land Use Laws, Policies, and Objectives

   A. Historic Register

   We respectfully disagree with your assertion that the Zoo is located on an historically significant portion of Kapiolani Regional Park. The nomination application which placed the park on the star register of historic places identifies the period of the park's significance as 1877-1942 and states that the property is significant because "it is associated with events that have made a significant contribution to the broad patterns of our history." The application states that the Zoo was established at its current site in 1948. This was approximately 20 years after construction of the Ala Wai Canal cut off the natural surface drainage that fed the ponds and lagoon that characterized the Waikiki end of the park. Thus, the Zoo is considered to be a non-contributing resource to the historic significance of the park because it did not exist during the identified period of significance. While the text of the application states that the park is significant for its past association with indigenous Hawaiian culture and royalty, the application's statement of significance limits the categories of significance to "entertainment/recreation" and indicates that cultural affiliation is not applicable. This is not to say that Kapiolani Regional Park is not significant, but rather to point out that the Zoo property does not contribute to its significance.

   The Section 106 review does not apply in this case because no Federal funds are being used for the project planning or implementation and no Federal permits are involved. This was confirmed by Mr. Don Klima from the Advisory Council on Historic Preservation in Colorado.

   We have conducted a short initial archaeological survey, as recommended by the State Historic Preservation Division, in order to gather historical information on former land uses at the site, and to gather detailed information of the nature and depth of fill soils. The assessment concludes that the majority of the Zoo parcel was underwater or marshy in pre-contact times, and is unlikely to yield significant cultural deposits. However, there is a possibility that significant subsurface cultural deposits may exist in the southwestern portion of the Zoo parcel. Monitoring of this area is recommended during construction, but no monitoring or further archaeological study is recommended or warranted for the remainder of the Zoo parcel.

   Regarding your request that a full Environmental Impact Statement (EIS) be completed, it is the City's determination that there is insufficient reason to expect significant adverse impacts from the proposed improvements.

B. Cumulative Development

We disagree with your assertion that the Draft EA is segmented. When the environmental assessment for the savanna was completed, other Zoo improvements for the future were not yet envisioned. The current Draft EA addresses all phases of the proposed project in the master plan (including the savanna). The estimates included in the Draft EA are cumulative numbers for full build-out.

A comprehensive master plan for the Honolulu Zoo has been prepared and is summarized in Section 1.4 of the EA. The current EA assesses the potential impacts resulting from implementation of the master plan and includes by reference as allowable under Section 11-200-13 Hawaii Administrative Rules, the previous EA prepared for the savanna project. A claim of segmentation might be appropriate if each of the master plan's elements were implemented under the auspices of separate environmental assessments, but that is clearly not the case here. The current EA addresses the entire master plan.

C. Scope of Development

Since the development is planned within the Core Area of the Diamond Head Special Design District and is within the boundaries of Kapiolani Regional Park with a designated zero-foot height limit, the Zoo will apply for a height variance from the City's Department of Planning and Permitting (DPP).

Exact dimensions of all buildings and earthforms within the proposed development are not mentioned in the Draft EA because the master plan is at a conceptual stage; exact dimensions will be determined at a later date. We will, however, revise the text to indicate maximum heights (e.g., one-story or two-story) if this information is available.

The Zoo operations support yard and trash compactor will not be placed at the entrance of the Zoo, but rather near the back of the facility. These are necessary support functions for a Zoo and cannot be omitted just because the Zoo is located in historic Kapiolani Regional Park. Screening and barriers will be used to mitigate adverse visual impacts.

D. Existing Use Permit (1986)

DPP has determined that the Zoo is a "public use," as defined in Section 21-10.1 of the Land Use Ordinance. Public uses are permitted in all zoning districts. Therefore, the Zoo, as a land use, is consistent with the land use classifications of the park.

E. Preservation Parkland

Only the utility and infrastructure improvements (utility and driveway connections) will extend past the existing fence line.

F. Development Planning Process

See our response under #2, above, regarding why the EA does not consider the alternative of relocating the proposed development.

G. Zoo Master Plan

The comment that the Master Plan was privately updated in 1993 and was not distributed is an out of scope comment for the EA.

It is acknowledged that the Zoo Master Plan has never been incorporated into the Kapiolani Regional Park Master Plan. However, the Kapiolani Regional Park Master Plan has not been updated recently. When the Park Master Plan is updated, as it will be shortly, the information from the Zoo Master Plan EA will be incorporated.

4. Operations Impacts and Infrastructure

A. Visitor Increase Impact

In reply to the concern that the improvements will promote overcrowding in a limited area and impact the well-being of Zoo animals, the proposed action will improve the condition of the Zoo animals and should therefore increase their well-being. In some cases, improvements will allow greater distances between the animals and visitors, which would diminish impacts on the animals.

Kapiolani Regional Park may be an over-burdened regional recreational park, and its sustainable capacity may be exceeded with increasing frequency. However, Kapiolani Regional Park is an open public area, meant for recreational use.

Regarding the potentially serious adverse impact of a proposed 175% escalation in Zoo visitor count, water supply, traffic, and parking conditions have all been addressed in the Final EA in detail. The use of non-potable water from the caprock aquifer for the Zoo and Kapiolani Regional Park was

identified by the City's Board of Water Supply (BWS) as a means of conserving potable water resources. Therefore, use of non-potable groundwater is consistent with the water conservation goals of the City. Based on the study conducted for the BWS, there is no threat to potable groundwater aquifers through withdrawal of brackish groundwater in the Kapiolani Regional Park area. A total of five wells were installed by the BWS. Use of only three wells is proposed under the Zoo master plan, thereby leaving two wells for use in irrigation of Kapiolani Regional Park.

See above, #3A, for our response to your request that we complete a full EIS.

B. Available Parking

A parking analysis has been conducted for the project and its findings are included in the Final EA. With regard to the City and County of Honolulu vs. Hawaii State Attorney General and Kapiolani Park Preservation Society, Hawaii State Circuit Court, S.P. 89-0015, 1991, the City's Corporation Counsel has determined that the court did not make any ruling that providing additional parking will violate the Kapiolani Park Trust. Also, that the court ruled that the existing parking (including metered parking) did not violate the Trust if it was identified for park users and a reasonable fee was charged.

5. Environmental Impacts

A. Geologic, Historic, and Cultural Resources

The text will be revised to read that the Zoo, as part of Kapiolani Regional Park, is listed on the Hawaii State Register of Historic Places and is eligible to be placed on the National Register. The failure to mention this in the Draft EA may result from the personal communication with the State Historic Preservation Division, which informed us that the Zoo is not a historic site. It is true that none of the buildings at the Zoo are historic, yet the Zoo is part of Kapiolani Regional Park, which is on the Historic Register.

The National Historic Preservation Act of 1966 applies to federal agencies and federal actions. Therefore, it is not applicable to the proposed project.

As requested by the Department of Land and Natural Resources (DLNR) State Historic Preservation Division (SHPD), an initial survey of the site was conducted. Its findings are presented in the Final EA, and are discussed above under Section 3A.

The footnote pertaining to the "personal communication" with Muffet Jourdane, Historic Preservation Division Archaeologist, is neither unsubstantiated nor undocumented. As noted in the text on page 4-6, the conversation took place on August 27, 1996.

B. Historic Landscape and Exceptional Tree Ordinance

Very few trees will be affected. Mature trees and landscaping will be preferred for the Zoo improvements, so retaining existing trees will be a priority, even if they are not listed in the Exceptional Tree Ordinance list.

C. Park Water Sources

Nearby natural sources of surface water were not researched since surface water will not be affected by the proposed action. Further, no new water sources will be required since established infrastructure will be used.

The area referred to as a natural wetlands exists outside the project boundary and will therefore not be affected by the proposed action.

The text will be clarified to state that the water demand can be met by the production capacity. The use demand is projected to be 8.7 million gallons per month, and the production capacity is 350 gallons per minute (15.1 million gallons per month). No new sources of water are required to support the master planned development and improvements.

In regards to the concern that flow control devices may experience repair and maintenance hardships, please be advised that flow control is routine in the industry. It does not constitute an unreasonable or undue hardship on the system operation and maintenance.

You requested detailed information on the sustainable yield of the non-potable water supply. The proposed use for the project is a sustainable use. Water studies have been completed with the goal of minimizing water use by the Zoo and maximizing water use by Kapiolani Regional Park. Concern was also expressed that cumulative development could adversely impact the area's water table and Kapiolani Regional Park's non-potable water supply. Existing wells already in service are being used as a source for non-potable water. The future demand will be within the sustainable yield of these wells. Further, the use of non-potable water sources preserves the area's potable water supply for other uses.

We trust our response has adequately addressed your concerns.

Sincerely yours,

BELT COLLINS HAWAII LTD.

Cheryl Palesh

CP:LS:lf

DIAMOND HEAD/KAPAHULU/ST. LOUIS HEIGHTS NEIGHBORHOOD BOARD NO. 5

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CITY & COUNTY OF HONOLULU

January 23, 1997

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680 Ala Moana Boulevard, 1st Floor
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Subject: Draft Environmental Assessment for a Honolulu Zoo Master Plan

Dear Ms. Vann and Gentlemen:

Enclosed please find our response to the Draft Environmental Assessment for the proposed Honolulu Zoo cumulative development.

You will find that our questions and comments focus on the notification process, project magnitude, absence of data on the historic and Trust significance, community involvement, project viability and sustainability, operations impacts, traffic impacts, parking impacts, agricultural/industrial impact on parkland within a residential community, major infrastructural improvements required, environmental impacts, impacts on domestic water and surface water supplies, etc.

As there appears to be sufficient reason to expect significant adverse impacts from the magnitude of this proposed cumulative development, we request that a full Environmental Impact Statement be provided for the entire cumulative development if the Applicant intends to pursue proposing this development for this location.

We look forward to your response on the attached questions, comments and concerns.

Very truly yours,

Kenneth C.C. Chang, Chairperson

cc: Kapiolani Park Trustees

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DIAMOND HEAD/KAPAHULU/ST. LOUIS HEIGHTS NEIGHBORHOOD BOARD NO. 5

c/o NEIGHBORHOOD COMMISSION • CITY HALL, ROOM 406 • HONOLULU, HAWAII 96813

DRAFT ENVIRONMENTAL ASSESSMENT
for the
HONOLULU ZOO MASTER PLAN

QUESTIONS AND COMMENTS

Notification Process

Through past correspondence, presentations and informal communication, the Diamond Head/Kapahulu/St. Louis Heights Neighborhood Board #5 recognizes that the applicant for the proposed Zoo development, the Department of Parks and Recreation (DPR), is well informed, and the Department of Transportation Services (DTS) and the Department of Land Utilization (DLU) are also demonstrably aware, that the Honolulu Zoo is located within the jurisdictional district boundaries under City Councilmember Duke Bainum and those under the Diamond Head/Kapahulu/ St. Louis Heights Neighborhood Board. However, the Draft Environmental Assessment (DEA) was instead delivered for review and comment to the Waikiki Neighborhood Board and to Councilmember Andy Mirikitani.

The DEA was received following request by the directly-affected Neighborhood Board, #5, only ten days before the comment deadline, on October 14, 1996, and the deadline for comments was October 23. Consequently, the Neighborhood Board would have been unable to receive presentations, review and comment on the DEA given sunshine law requirements.

QUESTION #1: Please provide explicit information on the misrouting of the DEA for review and comment, and the absence of the appropriate Neighborhood Board and Councilmember on the list of commenting agencies contacted, as shown on pages 8-1 and 8-2 of the DEA.

Project Location

Kapiolani Park, which includes the Honolulu Zoo on approximately 1/5 of the parkland, is governed by the provisions of the Kapiolani Park Trust. According to the U.S. Supreme Court, charitable trust provisions supersede government intervention. (See: Dartmouth College vs. Woodward, U.S. Supreme Court, 17 U.S. 518, 1819.)

QUESTION #2: Please explain why the Trust provisions are not mentioned in the DEA, and the Trustees of Kapiolani Park not prioritized ahead of state and city agencies listed on pages 8-1 and 8-2 of the DEA, in which mention of neither the Trust nor the Trustees is not present?

Oahu's Neighborhood Board System - Established 1973

Project Magnitude

The DEA describes the proposed $60,000,000 Zoo Master Plan development as "refurbishment" or "reorganize(ation of) the basic Zoo layout... to expand the on-site breeding... complexes" (DEA ❷ ES-1, 1-2, 2-11) and veterinary/research facilities... a maintenance complex with a maintenance building (including carpentry, plumbing, welding, electrical, masonry, computer/graphics sections; and storage for flammable materials) and a maintenance area (including garages with vehicle wash-down, gasoline pumps and above ground storage tanks; garbage compactor; storage yard; and greenhouse); a five-building breeding facility; a veterinary clinic and quarantine area; and a commissary and warehouse serving 2,000 animals daily. (DEA ❷ 2-10 and 2-11.)

QUESTION #3: Please provide explicit information, evaluation and studies showing valid reasons, other than "significant funds" being spent previously on a display segment of this project, that the above proposed facilities are not being more properly located and developed within areas classified by Land Use laws as "Agricultural" and "Industrial", as are becoming available within close proximity to each other in the Ewa Plain.

Compliance with Land Use Laws, Policies and Objectives

Historic Register

The DEA states, "The Zoo is not listed on either the state or federal Register of Historic Places..." (DEA ❷ 3-7). Yet, as the State Office of Historic Preservation and the City Department of Parks and Recreation are well aware, Kapiolani Park, including the Honolulu Zoo, were indeed listed on the State Register of Historic Places in 1992. Therefore, Kapiolani Park, including the Zoo, is eligible to be listed on the National Register of Historic Places, for which it was recommended by the Board of Land and Natural Resources for nomination.

QUESTION #4: Would not the absence of such imperative information preclude the DEA from further consideration, and would not the historic classification of Kapiolani Park, including the Honolulu Zoo, require a full Environmental Impact Study (EIS) under the federal National Historic Preservation Act and Section 343, Hawaii Revised Statutes (HRS)?

Cumulative Development

The DEA continues the City's wrongful practice of segmenting portions of the larger development in order to diminish perception of the cumulative adverse impacts of the whole project. This flies in the face of the State Supreme Court ruling that cumulative environmental impacts of the larger project must be addressed. See: Hawaii's Thousand Friends vs City and County of Honolulu, State of Hawaii Circuit Court, S.P. 91-0457 (1991). While the DEA assumes the posture of acting in accordance of Hawaii Revised

Statutes (HRS), Section 343, and references features of the African Savanna project within the DEA as being one of "four main ecological environments (biomes): Hawaii, Rain Forest, African Savanna (not assessed in this EA), and Tropical Islands" - it blatantly excludes the African Savanna, Phases I and II, from the assessment as having been covered by a previous EA (DEA ❷ 1-1). However, the DEA later correctly states that the "African Savanna... was the first component of the new Zoo design... Implementing an integrated development plan for the Zoo in phases" resulting in a "Zoological park" (DEA ❷ 1-2 and 1-4).

QUESTION #5: Please demonstrate how the DEA escapes being fatally flawed by so flagrantly ignoring the cumulative impacts of the larger project, as shown above.

Special Design District

The DEA acknowledges that the "Zoo is located in the core area of the Diamond Head Special District, established to preserve existing views of Diamond Head (a State and National Monument) from prominent public vantage points..." and the "view of Diamond Head from the Zoo has been identified as a major scenic resource. As a result, ordinances have been established to preserve these existing views."

Although the proposed development is planned within the Core Area of the Diamond Head Special Design District, and is within the boundaries of Kapiolani Park with a designated zero-foot (0') height limit, the DEA claims that low roof lines have been designed "so as not to dominate the skyline... unless a particular design is needed to accomplish the immersion effect." (DEA ❷ 1-1.)

However, significant administrative maintenance and support structures required will include a 17,000 sq. ft. two-story administration building with conference space, a library, offices for 18 persons, restrooms, registrar's office, storage areas, and lunch room/kitchenette); a "Hale Kokua" personnel facility for 60 keepers and operations personnel (including rooms, showers, lockers, and two temporary living quarters for scientific visitors); a maintenance complex with a maintenance building (including carpentry, plumbing, welding, electrical, masonry, computer/graphics sections; and storage for flammable materials) and a maintenance area (including garages with vehicle wash-down, gasoline pumps and above ground storage tanks; garbage compactor; storage yard; and greenhouse); a five-building breeding facility; a veterinary clinic and quarantine area; and a commissary and warehouse serving 2,000 animals daily.

With the exception of the administration building, building sizes are undisclosed in the DEA. However, the DEA indirectly points out that substantial excavation and earthmoving, dewatering and filling, compaction and foundation work is proposed for the development in that existing "soil material used for fill underlying the Zoo is not suitable for supporting relatively heavy structures. Because of the presence of compressible soils and high groundwater levels, differential setting of soils could occur if conventional shallow foundations are used to support heavy structures."(DEA ❷ 4-1 [4.1.2], 4-2 [4.1.5] and 4-3.)

Features planned to be integrated into the Zoo portion of Kapiolani Park include Ancient Continental Islands and New Continental Islands, which are planned to be comprised of "volcanic islands... limestone islets... water features... earthforms." Although the DEA notes the height of the existing African Savanna exhibit as being 9.5 to 7 feet above grade, the DEA fails to mention the dimensions and heights of the proposed development's volcanic islands and earthforms constructed to create "barriers and to form views into exhibit areas" with pathways "structured for two levels of visitor flow." (DEA @ 2-1, 2-3, 2-6, 2-7, 2-8 and 3-1.) A "treetop 'scientific research center' is planned to be built on a platform in the Morton Bay fig tree," and construction of "ancient ruins" is planned (DEA @ 2-3 and 2-6).

QUESTION #6: Please define the dimensions of all buildings and "earthforms" within the proposed development, including height, total square feet and footprint.

The Director of the Department of land Utilization states the following in a letter of April, 1996: "The parcel is located within the "core area" of the Diamond Head Special District and all development must comply with the objectives of the district in accordance with the Land Use Ordinance, Section 7.40. These objectives were established to preserve existing prominent public views and the natural appearance of Diamond Head. Thus, projects which are not consistent with the design objectives, or that diminish these resources, must be modified to preserve and enhance the park-like character of the immediate slopes of the Diamond Head monument, including Kapiolani Park."

QUESTION #7: Typically for improvements within Kapiolani Park, the DLU has relied only on a "Minor" permit for "Major above-grade infrastructure improvement not covered elsewhere, including new roadways, road widening, new substations, new parks, and significant improvements to existing parks." This Minor Permit is issued simply at the discretion of the Director, thereby avoiding public hearings required for other "Major" permits, i.e., "Major exterior repair, alteration, or addition to all structures" and "New buildings, not covered above," which also apply to this proposed development.

Please specify whether public hearings will be scheduled under the permitting process for "Major Permits", and which major permits will apply.

Area of Zoological Park Expansion

The DEA states that the proposed "Zoo improvements will, for the most part, be constructed within the existing fenceline of the Zoo." Special District guidelines provide only that "All fences or walls exceeding 36 inches in height shall be set back a minimum of 18 inches along all street frontages... " (DEA @ 1-2 and 5-6.)

QUESTION #8: Please specify to which points outside the Zoo area surrounded by the existing fenceline, and the size of the area that is envisioned to be required, the Zoo development might or will be expanded, as follows:

Frontage area along Kalakaua Avenue between Kapahulu Avenue and Monsarrat Avenue;

Area between the Kapiolani Park Bandstand and the Waikiki Shell;

Up to 18 inches along all Kapahulu, Kalakaua, Monsarrat and Paki Avenue street frontages;

Waikiki Fire Station and basketball court, service center and Paki playground;

Any other areas adjacent to the Zoo area that are planned, anticipated, or envisioned to be used for the purpose of the proposed Zoo development.

Zoo Master Plan

The 1984 Zoo Master Plan, which was developed with the benefit of public review and comment. Apparently the publicly-approved Master Plan was privately updated in 1993, and the DEA states that "as of June 1994, the Master Plan has been updated to reflect community and staff goals... the updated Master Plan focuses and refines the concept of gradual reorganization of the basic Zoo layout... " (DEA @ 1-2.) As highlighted in the eight chapters of the DEA, *the proposed $60,000,000 development jumps afar from a mild "focus and refinement."* Further, the DEA describes the updated Zoo Master Plan as "gradual reorganization of the basic Zoo layout... consistent with the current proposed Zoo improvements." (DEA @ 1-2.)

QUESTION #9: A) Is it the obligation of a privately developed, publicly-undisclosed major restructuring of an existing Master Plan to be "consistent with " with currently-proposed developments? B) Or is it not the obligation of any such proposed developments to be consistent with a publicly-disclosed and -approved Master Plan?

Project Magnitude

The DEA describes the proposed $60,000,000 Zoo Master Plan development as "refurbishment" or "reorganize(ation of) the basic Zoo layout... to expand the on-site breeding... complexes" (DEA @ ES-1, 1-2, 2-11) and veterinary/research facilities... a maintenance complex with a maintenance building (including carpentry, plumbing, welding, electrical, masonry, computer/graphics sections; and storage for flammable materials) and a maintenance area (including garages with vehicle wash-down, gasoline pumps and above ground storage tanks; garbage compactor; storage yard; and greenhouse); a five-building breeding facility; a veterinary clinic and quarantine area; and a commissary and warehouse serving 2,000 animals daily. (DEA @ 2-10 and 2-11.)

QUESTION #10: A) Please provide explicit information, evaluation and studies showing valid reasons, other than "significant funds" being spent previously on a display segment of this project, that the above proposed facilities are not being more properly located and developed within areas classified by Land Use laws as "Agricultural" and "Industrial", as are becoming available within close proximity to each other in the Ewa Plain. B) What percent of the Zoo development will be research oriented? C) What percentage of the Zoo development area will be breeding facilities?

Project Viability

Commercial Aspects

The DEA describes the following commercial expansion proposals for the Honolulu Zoo (DEA @ 2-3, 2-7, 2-9, 2-10):

entry concession
entry concessions, makai
Hawaiian concessions
Hawaiian gifts
Savanna drink concession
concession stands, mauka
main concession stand, mauka west "designed to serve 500 people per hour"
snack huts
entry/exit gift shop "accessible by persons not entering the Zoo"
school group entrance gift shop... etc.

QUESTION #11: Given such concentrated and contained sales activity, please list and describe specific studies and evaluations performed to support the DEA's conjecture that "nearby attractions and businesses surrounding the Zoo are expected to also benefit from the increased Zoo visitors as potential customers will be directed to their vicinity... " (DEA @ 4-8.)

Sustainability

The proposed Master Planned development is designed to attract up to 5,000 visitors daily within the 42 acres of Kapiolani Park which the Zoo occupies. However, these visitors will be confined to only 2 acres of pathways surrounding the open exhibits. If there are 96,500 residents and visitors on 500 acres in Waikiki (193 persons per acre), and 5000 visitors on 2 acres of pathways at the Zoo (1,250 persons per acre over 4 hours taken to cover the new Zoo development), there appears to be a serious potential to overcrowd a limited area. Thus, it would seem that visitors would be discouraged from returning, and not so eager to stay. (DEA @ 3-8.)

QUESTION #12: Please specify, cite and describe short-range and long-range studies, evaluations, and accounting analyses based on specified sources of revenue which support the cost of this development and would carry the Honolulu Zoo to a financially self-sustaining level. Such information would include a) verification of attendance sustainability, b) annual, 5-year, 10-year and 20-year revenue projections (including pro-forma balance sheets for gross revenue anticipated to be generated, operations expenses, debt service, etc.), and c) a business plan format of relevant assumptions.

Operations Impacts and Infrastructure

The DEA states that "the anticipated long term impacts include a greater demand on utilities, an increase in the number of visitors, and associated increases f(sic) traffic and parking requirements."

The major goal of the proposed development is to attract up to 5,000 visitors to the Zoo - an increase of approximately 175%. Associated impacts include proportionately increased traffic, parking, display water use, wastewater volume, and extraction of non-potable surface water.

Further, the DEA advocates across-the-board, high-cost major infrastructure improvements, i.e., revised City and County water use plans, regional mass transportation plans, and road improvements to support this development; and recommends that major City wastewater and sewerage infrastructure improvements be undertaken to enable the Zoo "to develop its proposed master planned facilities and allow unrestricted discharge of its flows." There is a projected 200% increase in telephone service usage, a 200% increase in wastewater disposal, and a projected 300% increase in solid waste disposal (36 cubic yards per day). (DEA @ ES-2, 2-12, 2-15 and 2-17.)

QUESTION #13: How is there, then, justification for the DEA's dauntless declaration that "there is insufficient reason to expect significant adverse impacts from the proposed Zoo improvements, and a Negative Declaration is recommended"? (DEA @ ES-2.)

Traffic Increase Impact

The DEA notes that the "Zoo is located at the southern end of the heavily impacted Waikiki corridor. The (City's Planning Department) has noted that 'transportation to and within Waikiki is difficult.' In 1992 more than 160,000 vehicles were estimated to enter and leave Waikiki, an area of approximately 500 acres, on a daily basis. Annual vehicular increases were estimated to be at least three percent (3%)." Therefore, to the already heavily impacted Waikiki corridor, there is a current projected annual increase of 4,800 vehicles - plus 1,000 to 2,500 more vehicles accessing the Zoo.

QUESTION #14: How does situating the proposed Zoo development within such existing conditions demonstrate sensible planning practice?

Further into the DEA we discover somewhat more realistic conclusions that "Long-term impacts on traffic flow are expected to be significant, based on the projected increases in Zoo visitors. Transportation plans must be implemented to accommodate these additional visitors... Regional plans should also be developed to mitigate the projected increases in vehicular traffic... Long-term effects: Possible increase in traffic delays without use of mass transportation and/or implementation of road improvements... "the additional number of Zoo visitors (up to 5,000 per day) is significant and should be addressed in (City and County) traffic/transportation management plans. (DEA ❷ 3-8, 4-6 and 4-7.)

QUESTION #15: Although the DEA references some effort as being exerted in attempting to address imminent traffic impacts of the new Convention Center on the opposite end of Waikiki, there is no evidence that additional vehicular traffic generated by the proposed Zoo development has been or will be addressed. Why has this not been done?

Available Parking

The DEA skims over evaluation of visitor parking to accommodate the proposed daily increase of 3,200 Zoo visitors simply by stating that "overflow parking is available around Kapiolani Regional Park", where there are a total of 1,051 existing parking stalls. Overflow parking requirements spread over a multi-block radius into the neighborhoods outside the Park on weekends and holidays during regularly-scheduled sports league tournaments.

QUESTION #16: Does the applicant presume that the proposed Zoo development, on 1/5 the acreage of Kapiolani Park, will monopolize all 1,051 of Kapiolani Park's parking spaces?

Questionably, the DEA states that "additional parking for the projected increase in Zoo visitors is not planned" and relies on up to 5,000 visitors and residents opting to take City-promoted bus service to visit the Zoo from "as far away as Pearl Ridge, the Honolulu Airport, Waipahu, Waimanalo, and St. Louis Heights" (the latter is actually in the Zoo's neighborhood board district). (DEA ❷ 2-18.)

However, statistics show that, while overall daily-commuter traffic congestion may be relieved by ambitious mass transportation goals, tourist and family transportation will assuredly continue in private vehicles.

Therefore, the DEA falls flat and fails due to absence of responsible research into the current parking conditions within and around the Kapiolani Park, and any subsequent impact of up to 2,500 additional vehicles requiring parking for the proposed Zoo development.

QUESTION #17: Why is the existing parking usage of Kapiolani Park and the impact of the proposed Zoo development parking requirements on such parking areas not considered in the DEA? Please provide the following:

a) a study of existing parking conditions in Kapiolani Park

b) related analyses of projected parking impacts attributable to the proposed Zoo development.

Wastewater and Sewage Disposal

The DEA states that there will be 400,000 gallons per day of wastewater generated by the proposed Zoo development, which is a 200% increase over 1991 (pre-Savanna) discharge. The DEA further states that existing sewage lines servicing the Zoo "do not have adequate excess capacity to support the peak flows generated by the Zoo from 5:00 to 8:00 p.m." and therefore the Zoo must drain exhibit water features during Zoo visitor hours and sewer off-peak hours (DEA ❷ 2-15).

Question #18: Why is the Zoo development being proposed without adequate and reliable wastewater infrastructure being in place?

The DEA recommends that major City infrastructure improvements be undertaken to enable the Zoo "to develop its proposed master planned facilities and allow unrestricted discharge of its flows." Such infrastructure improvements include construction of sewer relief lines along Kalakaua Avenue and between Kaneloa Street and Kuhio Avenue, and installation of on-site pumps. (DEA ❷ 2-15.)

QUESTION #19: What is the status of the City and County's wastewater system improvements mentioned in the above caveat? Please provide diagrams plotting locations, alignments, pumping stations, pipelines, capacities, level of treatment, and ultimate discharges of both existing and proposed sewerage requirements pertaining to the Zoo and any subsequent development.

Environmental Impacts

Historic Landscape and Exceptional Tree Ordinance

The DEA benignly states that "...removal of some flora will occur...Removal of flora will not affect indigenous species or those trees protected under the City and County of Honolulu's Exceptional Tree Ordinance. Trees protected by this ordinance include (certain) monkeypod and earpod trees. Any short-term losses of will be outweighed by the long-term benefits of increased quantities and species which will inhabit the project site... Trees planted along the streets will be species chosen from an approved tree list from the City and County of Honolulu's Building Department... commonly available vegetation will be used." (DEA ❷ 2-7, 3-7 and 4-4.)

The DEA states, "In the event that there are no feasible locations for street trees, substitute landscaping may be permitted upon approval by the Director of Land Utilization." (DEA @ 5-6.) Tree removal in the Diamond Head Special District merely requires a "Minor" permit issued at the discretion of the Director of the DLU. Further, as noted above, Special District guidelines provide only that "All fences or walls exceeding 36 inches in height shall be set back a minimum of 18 inches along all street frontages... " (DEA @ 5-6.)

Therefore, although "Zoo improvements will, for the most part, be constructed within the existing fenceline of the Zoo," there appears to be an open opportunity for removal of existing mature trees consistent with the historic landscape of Kapiolani Park, expansion of the fenceline to within eighteen inches of street frontage, and replacement of the mature trees with "substitute landscaping" subject to one individual's discretionary approval. (DEA @ 4-4, 5-4 and 5-6.)

QUESTION #20: Is it the applicant's plan that this development is proposed to expand the Zoo to the point of consuming Kapiolani Park's historic landscape flora (whether or not indigenous) not listed on the Exceptional Tree list?

Storm Water Disposal, Surface Runoff and Drainage

A box culvert which traverses the Zoo which serves the Kapiolani Park wetlands that receive runoff from the slopes of Diamond Head. Runoff conveyed in the box culvert flows through the municipal stormwater drains leading to Kuhio Outfall and to the ocean. As high coliform counts were detected in the effluent discharge, inlets to the culvert from the Zoo area "have been sealed to preclude fecal contamination from exhibits and open areas where birds congregate." (DEA @ 2-15, 2-17 and 3-4.) However, the DEA also states that "stormwater discharge originating from the Zoo's exhibit, animal holding, and open areas will no longer be discharged into the Pacific Ocean via the Kuhio Beach Outfall because the box culvert will be sealed. This will eliminate the potential for contamination from Zoo runoff... No significant impacts on surface waters are expected from the project after the box culvert is sealed." (DEA @ 4-2.)

QUESTION #21:
a) Has the box culvert been completely sealed?
b) Has the box culvert been partially sealed?
c) Is the box culvert expected to be sealed in the near future?
d) Is the box culvert expected to be sealed in the distant future?

The DEA describes the "overall total length of service roads and pathways" to be 2.9 miles, an increase of just under 1/4 mile over existing service roads and pathways. Additional impermeable surfacing to be constructed within the proposed development includes roof surface area of significant structures as described above, and pathways planned to be 6 to 8 feet wide to accommodate two levels of visitor flow.

Such expanded impermeable surface area will lead to the proportionate generation of additional runoff. The DEA presumes that this will be handled by percolation through drywells or treatment and disposal through planned water features within exhibit areas. The DEA assures that "only roof runoff will be... connected to the culvert... and directed to the municipal storm drain system. However, while admitting that groundwater has been located between 2 1/2 feet and 6 feet below grade within the proposed Rain Forest exhibit area, the DEA ignores the ongoing impacts of contaminated effluent from cesspools and animal waste

which continues to "percolate through the soil... filtering out bacteria and breaking up bacteria along the way" and yet somehow manages to contaminate Waikiki's nearby renown shoreline. (DEA @ 2-17 and 3-4.)

QUESTION #22: Please show how the applicant can guarantee that contaminated effluent from animal waste from the Zoo area will not continue to "percolate through the soil... filtering and breaking up bacteria along the way" and yet manage to contaminate Waikiki's nearby shoreline.

The DEA notes that the proposed Zoo development is within the Honolulu Ground Water Control Area, and must comply with management requirements of the ground or surface water resource or both, pursuant to the Administrative Rules of the State Water Code, Chapter 174C, Hawaii Revised Statutes.

QUESTION #23: Why does the DEA fail to mention that the proposed Zoo development is subject to the National Pollutant Discharge Elimination System regulations under a federal NPDES permit issued by the state invoking Best Management Practices for public developments? Please indicate under what NPDES permit the proposed development would be governed? Please list the NPDES permit number if currently available.

Hazardous Wastes

The on-site "breeding complexes" are initially planned for birds, reptiles, rodents and insects. Veterinary/research facilities include surgery, radiology, necropsy, holding, intensive care, isolation, nursery and quarantine. The DEA states "hazardous wastes will be generated by veterinary services activities..." Long-term effects include "Criteria and hazardous air pollutants from on-site combustion sources such as the medical waste incinerator... Long-term activities which could affect the air quality include operation of stationary and mobile combustion sources. Stationary sources (e.g., medical incinerator and generators) will need an operating permit from the Department of Health (DOH) and will need to demonstrate that their emissions will not cause adverse health effects or adverse impacts to air quality... All long-term combustion sources will be permitted. This process will ensure that no adverse health effects to the public will occur before operation can begin." Mitigation measures "will be identified..." (DEA @ 2-11, 2-17, and 4-3.)

QUESTION #24: What are the hazardous wastes, chemicals, and biologic elements anticipated to be generated within the proposed Zoo development?

QUESTION #25: Where will solid waste disposal from the Zoo development terminate, and will the animal waste be analyzed for parasites, bacteria, virus, etc. prior to disposal?

QUESTION #26: What is the degree of combustion determined to be generated from on-site combustion sources, and how often is this expected to occur?

QUESTION #27: Why is the proposed Zoo development not located in the Campbell Industrial Park or Barbers Point area with like kinds of emissions operations, rather than in a high-density residential, visitor, and recreation area?

Health, Safety and Nuisance Factors

The DEA notes that "animals and their waste products necessarily generate some noise and odor." Long-term effects include "Potential for increased animal odors from additional exhibit animals..." and... "Because the project introduces wild animals into a highly populated area, public safety is also addressed... In the past, several animals have escaped from the confines of their habitats... Future risks of animal escapes are minimal; however, mitigation measures will be employed as necessary." (DEA ❶ ES-1, 2-3, 2-11, 2-17, 3-8, 4-3, 4-5, 4-7 and 5-2.)

QUESTION #28: It is common knowledge among residents and visitors that the odor pollution from the Zoo area extends from the central section of Kapiolani Park to the hotels along Kapahulu Avenue, and from Leahi Avenue to Kuhio Beach. Why are no odor-elimination applications, such as contained exhibits and filtered exhaust systems addressed in the DEA to accommodate existing and anticipated increased animal population odor impacts?

Further, one must question the inclusion of fruit bats within the Asian Forest Exhibit given the recent spread of a virus carried by them and proven to be fatal to humans and horses in a recent Australian epidemic. (DEA ❶ 2-6.)

QUESTION #29: Although a quarantine facility is planned to be provided on the site of the proposed Zoo development (DEA ❶ 2-11), how can the applicant guarantee that airborne viruses carried by introduced exotic animals will not be carried into the surrounding neighborhoods and primary visitor area?

Water Supply

The DEA describes "an expansive and seemingly continuous system of interconnected water bodies, with contained and recirculated water within each zone operating with "recycled water to satisfy daily requirements," as opposed to the "dump and fill" Savanna exhibits. Yet, "an extensive water use schedule... to ensure necessary water capacity" is planned to be imposed (DEA ❶ 2-7). Water usage is identified as follows (DEA ❶ 2-8):

Entrance fountain	Monthly replacement of 64,000 gallons (potable)
Hawaii sea bird exhibit	Monthly replacement of 171,800 gallons (potable)
Hawaii marsh bird exhibit	Weekly replacement of 67,000 gallons (potable) (268,000 gallons per month)
Rain forest elephant exhibit	Semi-annual refill of 600,000 gallons (non-potable)
Rain forest aviaries	Daily "dump and fill" of undisclosed capacity (potable)
Rain forest reptile exhibit	Daily "dump and fill" of undisclosed capacity (potable)
Rain forest tiger exhibit	Daily "dump and fill" of undisclosed capacity (potable)
Rain forest gharial exhibit	Weekly replacement of 20,000 gallons (potable)
Tropical islands exhibits	Monthly replacement of 651,000 gallons (non-potable)
Tropical islands fountain	Weekly replacement of 8,000 gallons (non-potable)

Using these figures, the annual use of potable water from the domestic water supply totals over 7,005,600 gallons, or over 583,800 per month and over 19,193 gallons per day. The annual use of non-potable from the brackish aquifer under Kapiolani Park totals 9,396,000 gallons, or 783,000 gallons per month and 25,743 gallons per day. However, the DEA states that 170,000 gallons per day, or 5,185,000 gallons per month, will be required. Therefore, the daily "dump and fill" of the aviary, reptile and tiger exhibits is actually 144,328 gallons per day.

Although the DEA acknowledges that "restroom capacities have been designed to accommodate the projected daily volume of 4,000 to 5,000 visitors," the DEA omits water consumption projections for the 53 stalls (200% increase), 23 urinals (283% increase), and 32 sinks (128% increase). At an average of 2.6 gallons per visitor, this equates to at least an additional 8,320 gallons per day. Therefore, the potable water consumption, including additional drinking fountains would average at least an additional 9,120 gallons per day, or 78,160 gallons per month and 3,337,920 gallons per year.

The Zoo's pre-Savanna water usage approximated 200,000 gallons per day of potable water. The Savanna exhibits added an "estimated" 27,300 gallons per day of potable water and 48,700 gallons per day of non-potable water (DEA ❷ 2-12). Interestingly, the DEA also states that "current non-potable water demand for the Savanna exhibits is about 118,000 gallons per day." (DEA ❷ 2-12 and 2-13).

However, the DEA states that "the potable water supply demand for the proposed Zoo improvements will remain at about the current level... for irrigation (362 gpm), water features (24 gpm), and remaining Zoo use (animal holding areas, public and employee facilities - 1,785 gpm)." The DEA also states that the "non-potable water demand is expected to increase due to the proposed Zoo improvements... but will remain below the existing non-potable water supply of 504,000 gallons per day (from three existing active wells) with proper water management." The DEA further states that "daily non-potable water use... will require about 170,000 gallons per day," leaving 330,000 gallons per day for "other exhibits with less frequent turnover requirements" (DEA ❷ 2-12 and 2-13).

Yet, combining the additional potable water requirements of the proposed development, 661,960 gallons per month would be required to support the proposed development. The cumulative impact on the domestic water supply will total 689,260 gallons per month, or 22,599 gallons per day. This translates to an increase of 345% in potable water requirements for the proposed cumulative development.

Further, combining the additional non-potable water requirements of the proposed development, 288,000 gallons per day or 8,784,000 gallons per month would be required to support the proposed cumulative development. However, the DEA states that "Three existing wells... have a combined capacity of 350 gpm" (gallons per month) and further states that "the existing nonpotable water supply is 504,000 gpd (gallons per day)... "

QUESTION #30: The DEA is vague and confusing in the matter of water use determined to be necessary for the proposed Zoo development. As there is potential of enormous consumption of both potable and non-potable water supplies, the sustainable yield must be defined in a professional manner with clear definition of quantities, locations, and capacities of each respective water source accompanied by engineering data, charts and tables. Please provide these.

The DEA states that recycled non-potable water in the Rain Forest, Tropical Islands, and Hawaii exhibits and the entrance water features "will have a positive effect on the municipal collection and treatment system by reducing the volume of water discharged. This appears to be an oxymoron in that the overall non-potable water usage volume is calculated to increase by 29,541 gallons per day, and 901,000 gallons per month with the proposed development, but since much of this is anticipated to be recycled, this would serve to have a less negative effect on the municipal system. (DEA ❷ 2-13.)

QUESTION #31: Please show, for each individual non-potable water use within the proposed Zoo cumulative development, the incremental variables at which extraction of the non-potable water source is determined to affect the caprock aquifer, and the total affect of these variables over one day, one month, one year, five years, ten years, twenty years.

Alternatives

Project alternatives are insufficiently evaluated and appear to be construed in an exaggerated fashion to compliment the DEA's conclusion that the proposed development is "the ideal plan." The alternatives are outlined as follows:

A. "Making improvements in only those areas of the Zoo that require critical attention... Improving the current Zoo on an exhibit-by-exhibit basis rather than redesigning the entire layout. Minimal changes would be implemented with the focus on improving only those areas of the Zoo that are in need of critical improvements... This alternative would not promote zoological education nor stimulate additional revenues or economic growth in the area... (and) is not considered to be a desirable option."

   QUESTION #32: What are these areas and what improvements will satisfy the term "critical attention" ?

   QUESTION #33: What is the projected annual return on investment after debt service for the proposed cumulative development? (Please provide the breakdown of all anticipated revenue sources, their respective anticipated gross and net revenue yields, and breakdowns of all expected operations costs including debt service, inflation factors and cost of money projections.)

B. "Expanding the proposed project (the preferred alternative)... (with) further enhancements... Redesigning the Zoo layout and immersing the visitor into each animal's habitat to maximize the visitor's educational and recreational experience... (which) would be further enhanced... (through) additional interpretive and educational centers... " and a "more diverse animal collection emphasizing rare and endangered animal conservation research and breeding... This alternative emphasizes... animal conservation research and breeding. Additional educational and interpretive exhibits... would be included."

   (It must be noted here that expanded concepts can be easily created in order to frame a proposal of a slightly lesser degree in a more attractive and acceptable light.)

C. No action... would leave the Zoo with some exhibits unable to meet minimum standards for zoo animal care... (and) would fail to address existing needs to improve health, safety, and welfare of animals, keepers and visitors. This is currently not a satisfactory alternative."

However, the DEA ignores other areas on Oahu which would be less afflicted with the proposed development's size, density, and uses and banally dismisses relocating the Zoo with the conundrum that "relocating the Zoo is not an appropriate alternative" because "significant funds have already been spent to develop the recently completed Savanna area." (DEA ❷ 1-2). This is a classic example of inept planning practices and segmenting a project to ensure the continuance of a development that would otherwise be seriously questioned.

CONCLUSION

Overview

The proposed Zoological Park development, as described, would provide Oahu's visitors and residents with a facility of greater physical dimensions and expanded operations over that which now exists. This ambitious plan has the potential to generate an increased visitor count and associated revenue through admission fees, concessions and other types of concentrated commercial activities. If located in the appropriate area and planned correctly, this development could become an attractive asset for Oahu.

However, the proposed cumulative development is perceived to have several substantial and significant adverse effects on the sensitive environment within and around Kapiolani Park and adjacent to Waikiki. The Draft Environmental Assessment (DEA) pertaining to this development is inadequate in research and incomplete in information. In addition, the DEA is riddled with a complete absence and/or subtle avoidance of key direct impacts on environmental, historical, topographical, jurisdictional, infrastructural, structural, commercial and financial considerations pertaining to the proposed development's immediate area, surrounding area, residential community, Waikiki and tangential areas, and Oahu's population as a whole.

A. The proposed development appears to be a misplaced Agricultural/ Industrial/Commercial complex planned to generate high volume turn-over in the environmentally and historically protected core area of the Diamond Head Special District.

B. The DEA merely bases a recommendation for a Negative Declaration of Significant Impact on "information presented herein," which is incomplete, inadequate, and unacceptable in that the development, surrounding environment, and all possible impacts are not fully described.

C. The DEA fails to acknowledge the significance of the Kapiolani Park Trust and the Trust's jurisdiction over the Zoo, and Court rulings related thereto.

D. The DEA flies in the face of the legal requirement to address the larger project of the cumulative development.

E. The DEA ignores the fact that Kapiolani Park is currently an over-burdened regional recreational park of which the sustainable capacity is increasingly exceeded.

F. The DEA contradicts its own evaluation of the development's projected associated increases in traffic and parking requirements.

G. The DEA falls flat in presuming a Negative Declaration of Significant Impact through its failure to address Kapiolani Park's historic landscape, historic property, public charitable trust provisions, view planes, and carrying capacity.

H. The DEA is devoid of anticipated revenue projections and expected operations expenses.

I. The DEA is absent verified engineering data on sustainable yields, discharges, quantities, qualities, and capacities of groundwater and wastewater systems.

This action is a cumulative development proposed to be embedded within a preservation parkland governed by Trust provisions, and is proposed to be serviced and accessed from a contiguous high-density urban area. Therefore, it is especially important that environmental concerns, and economic and technical considerations are given full and appropriate consideration in the proposal, review, and any decision making process.

The Draft Environmental Assessment is deficient in these considerations. Further, the Applicant has not provided detailed studies of major impacts as required under Hawaii Administrative Rules, Title 11, Chapter 200. Moreover, the Applicant has not consulted with other agencies, elected officials, citizens groups and individuals having jurisdiction or expertise in specific areas of the proposed development's impact; and there is inadequate discussion and disclosure of environmental impacts, a statement of objectives, description of the affected environment, and disclosure of technical, economic, social, and environmental characteristics.

Significance Criteria as Defined by Hawaii Administrative Rules, Title 11, Chapter 200

The Applicant is required to consider every phase of the proposed action, the expected consequences - both primary and secondary - and the cumulative as well as the short-term and the long-term effects of the action. The proposed cumulative development clearly has a significant effect on the environment under the following criteria for the following reasons:

(1) The development proposal does not commit to preserving historic landscape and cultural resources and to protect them from destruction or loss as assets of the Trust.

(2) The development curtails the range of beneficial uses of the environment.

(3) The development conflicts with the state's long-term environmental policies, court decisions, and executive orders.

(4) The development would substantially affect the economic and social welfare of the community.

(5) The development could substantially affect public health.

(6) The development involves substantial secondary impacts, such as population changes and effects on public facilities.

(7) The development involves a substantial degradation of environmental quality.

(8) The development is individually limited but cumulatively has considerable effect upon the environment and involves a commitment for larger actions.

(9) The development detrimentally affects air and water quality, and ambient noise levels.

(10) The development effects an environmentally sensitive area such as ground water and coastal waters.

Therefore, contrary to the presumptive posture of the Draft Environmental Assessment, there is sufficient reason to expect significant adverse impacts from the proposed Zoo development. A full Environmental Impact Statement should be required if the Applicant seriously intends to pursue an attempt to expand and upgrade the existing Zoo facility at this location. The requirement for an Environmental Impact Statement will help to ensure review of this proposal at both City and State levels, as the Kapiolani Park Trust is the fee landholder, the State Attorney General is the parens patriae for all matters pertaining to Kapiolani Park Trust provisions, and all nine members of the City Council of Honolulu are designated by the Court as individual Trustees for the Kapiolani Park Trust in matters pertaining to use of Trust lands.

We look forward to your response to the above questions, comments and concerns, and to future discussions pertaining to the proposed Zoo Master Plan development.

BELT COLLINS

May 12, 2000
141.0105/00P-097

Mr. Kenneth C.C. Chang
Chairperson
Diamond Head/Kapahulu/St. Louis Heights
Neighborhood Board No. 5
c/o Neighborhood Commission
City Hall, Room 400
Honolulu, Hawaii 96813

Dear Mr. Chang:

Draft Environmental Assessment for
Honolulu Zoo Master Plan, Waikiki, Oahu, Hawaii

Thank you for your letter dated October 23, 1996 regarding the Draft EA for the proposed Honolulu Zoo improvements. Our response to your questions is as follows:

1. Our apologies for the unintentional misrouting of the Draft EA during the notification process. We did extend the comment period deadline with OEQC to insure all comments would be received.

2. Discussion of the Trust has been included in the Final EA. The distribution list is not prioritized; all agencies receive equal priority.

3. Relocating the Zoo to another location is out of the scope of this EA for the following reasons: 1) the objective of the master plan is to enhance the *existing* environment and recreational experience of the Zoo in its current location by creating a more realistic/humane environment for the animals, making improvements for visitors, and initiating education programs; and 2) expansion of the Zoo beyond its existing boundary is not proposed. According to the Department of Planning and Permitting (DPP), the Zoo is considered to be a "public use" and is, therefore, a permitted use in any zoning district.

4. We will correct the text to read that Kapiolani Regional Park is listed on the Hawaii State Register of Historic Places and is eligible to be placed on the National Register. The failure to mention this in the Draft EA may result from the personal communication with the State Historic Preservation Division, which informed us that the Zoo is not a historic site. It is true that none of the buildings at the Zoo are historic, yet the Zoo itself is part of Kapiolani Regional Park, which is a historic area, hence the confusion.

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The National Historic Preservation Act of 1966 applies to federal agencies and federal actions. Therefore, it is not applicable to the proposed project. Regarding your request that a full Environmental Impact Statement (EIS) be completed, if the accepting agency determines no significant impacts are found, or if significant impacts can be adequately mitigated, it must conclude a full EIS will not be required.

5. We disagree that the Draft EA is segmented. When the environmental assessment for the savanna was completed, other Zoo improvements for the future were not yet envisioned. The current Draft EA covers all phases of the proposed project in the master plan (including the savanna), and therefore is not segmented. The estimates included in the Draft EA are cumulative numbers for full build-out.

6. Since the development is planned within the Core Area of the Diamond Head Special Design District and is within the boundaries of Kapiolani Regional Park with a designated zero-foot height limit, the Zoo will apply for a height variance from the City's Department of Planning and Permitting (DPP).
Exact dimensions of all buildings and earthforms within the proposed development are not mentioned in the Draft EA because the master plan is at a conceptual stage; exact dimensions will be determined at a later date. We will, however, revise the text to indicate maximum heights (e.g., one-story or two-story) if this information becomes available. At this point in the planning process, it is anticipated that the proposed South American Aviary will be the tallest structure among the master planned improvements. Its height will be 30 feet.

7. A new section (Section 1.6) has been added to the EA text to identify required permits. At this time, no major permits are anticipated.

8. Only the utility and infrastructure improvements (driveway and utility connections) will extend past the existing fence line.

9. The publication of an EA provides the community with an opportunity to review and comment on the Zoo Master Plan.

10. A. See our response to question #3 above.

    B. Some research facilities may be built into the current Animal Health Facility, but the percentage of space on the Zoo grounds for research will be negligible. Comprehensive research will not be possible at the Zoo for quite some time, but social behavior research is ongoing. Over the years, all of the plant and animal exhibits may potentially be researched, through field surveys and analysis within the animal health facility. The provision of

research facilities will help the City better care for the Zoo animals, which will in turn, enhance the recreational value of the Zoo for its visitors.

C. Two compounds will be devoted to off-exhibit breeding. These compounds will occupy approximately 0.6 acres, which represents about 1.4% of the 42-acre Zoo. Some exhibits may also be used for breeding, and these are accessible to the public. The City recognizes that baby animals greatly contribute to the recreational value of the Zoo for its visitors.

11. No specific studies have been performed. The statement in the Draft EA is based on consideration that an increase in pedestrian traffic and number of visitors means increased exposure, and may potentially lead to more business and sales. We will edit the text from "nearby attractions and businesses surrounding the Zoo are *expected* to also benefit" to "*may* also benefit" (p. 4-8).

12. The information requested, including verification of attendance sustainability, multi-year revenue projections, and related assumptions presented in a business plan format is beyond the scope of the information required in an environmental assessment. The City feels obligated to subsidize Zoo operations in order to keep it affordable for residents and visitors. Without that subsidy, Zoo admission charges would have to be raised to cover all operation costs, as well as debt service for capital improvements, and such an action would likely erode attendance to levels that could not support operations. Recognizing this fact, as well as the fact that Zoo attendance was close to one million visitors a year when no admission was charged, the City's goal is to continue to support a public/private partnership with the Zoological Society to operate the Zoo and keep admission prices affordable. For the purposes of this EA, no further analysis is warranted.

13. As set forth in Sec. 11-200-9, Hawaii Administrative Rules, a project is reviewed at the initial stages of scoping by the accepting agency to determine whether it will or will not warrant a full EIS. While the agency is free to revise its determination based upon a preponderance of new information, such determinations can be made early on given the scope of a given project. In this instance, it was the City's original judgement that nothing in the proposed scope appeared to warrant a full EIS. To date, that determination remains valid.

    None of the other operations and infrastructure impacts that you noted are significant under the criteria set forth in Sec. 11-200-12, Hawaii Administrative Rules. The percent increases in telephone service usage, non-potable water usage, wastewater disposal, and solid waste disposal are not the issue; these increases can be accommodated and the responsible agencies have concurred with these proposed increases. The text will be revised to clarify that these projected increased uses are sustainable.

14. to 17.

    It is acknowledged that the impacts on traffic and parking require further analysis. A parking analysis study was also recommended by the City's Department of Transportation Services. Such studies have been conducted and incorporated in the Final EA.

18. & 19.

    The Draft EA recommends that major City infrastructure improvements be undertaken to enable the Zoo "to develop its proposed master planned facilities and allow unrestricted discharge of its flows." Such infrastructure improvements include construction of sewer relief lines along Kalakaua Avenue and between Kaneloa Street and Kuhio Avenue, and installation of on-site pumps. (p. 2-15).

    Additionally, it is proposed that the Zoo's wastewater contribution to the Public Baths wastewater pump station (WWPS) collection system will be limited to a peak flow of 0.43 mgd, relieving the need to upgrade the sewer line through Kapiolani Park. Upgrade of the Public Baths WWPS force main is currently underway, and upgrade of the Public Baths WWPS is scheduled in the future.

    The remaining Zoo wastewater contributions (1.80 mgd peak flow) will be directed to the Beachwalk WWPS collection system via the sewer line in Leahi Avenue. Besides the improvements to sewer lines mentioned above, there has been some planning effort expended by the DPP for the relocation of the Beachwalk WWPS closer to the Zoo. This relocation will create a more direct path to this WWPS such that the wastewater from the Zoo does not have to flow through the aforementioned problem sewer lines. However, there is no definite schedule or plan in place for the relocation of Beachwalk WWPS at this time.

    Until sewer and pump station infrastructure improvements are constructed, the Zoo will restrict the discharge of peak flows, caused by pond draining, to nighttime hours when the wastewater flows are lower.

    The Ala Wai Trunk Sewer Relief project is budgeted for construction in FY2000. The relocation of the Beachwalk WWPS was budgeted for construction in FY2000. However, construction has been delayed depending on the potential relocation of the Beachwalk WWPS.

    Figure 2-5 has been added to the EA indicating the Zoo's existing wastewater system and points of connection to the City's system.

Further, the improvements required to support the Master Planned Zoo development are those identified in the *East Mamala Bay Final Wastewater Facilities Plan*. While supporting the Zoo, the area wastewater system improvements are actually directed at achieving the goals of the Waikiki Special District ordinance, as stated in the Planning Department's *Waikiki Infrastructure Study Final Report*, dated January 1996. The information requested relative to the wastewater system requirements is presented in the *Facilities Plan* and *Final Report*. The Department of Design and Construction has coordinated with the DPP to program the required area wastewater system improvements in support of the planned Zoo and Waikiki area development.

20. No, the applicant does not intend for the Honolulu Zoo improvements to expand the Zoo to the point of consuming Kapiolani Regional Park's historic landscape flora. Very few trees will be affected. Mature trees and landscaping will be preferred for the Zoo improvements, so retaining existing trees will be a priority, even if they are not listed in the Exceptional Tree Ordinance list.

21. Yes, the box culvert is already completely sealed.

22. No guarantee can be offered that runoff coming in contact with animals will not eventually reach the ocean through groundwater flow. However, the concept with the drywells is the same as using a septic tank and leach field; underground disposal is better than direct sheet flow runoff. Further, waste from covered exhibits and holding areas will be directed to the sanitary sewer.

23. The NPDES system is locally administered by the State Department of Health (DOH). A DOH Notice of Intent to discharge is required if release of a process water, or storm runoff from a specific industrial activity, is to a receiving water of the State. Zoos are not included in the list of regulated industrial activities and are therefore not subject to NPDES permitting requirements. As such, the DEA does not address NPDES permit requirements. The only permit required relative to storm water runoff is a Storm Drain Connection Agreement from the DPP. Based on conditions imposed by DPP, runoff discharged to the storm drain system from the Honolulu Zoo is restricted to building downspout connections. Roof runoff is not a regulated discharge and no permits are required.

24. Wastes generated by the Zoo are not regulated as hazardous waste by RCRA. Non-hazardous waste generated by the Zoo includes empty paint cans and small amounts of neutralized formaldehyde. Biological waste products at the Zoo consist of animal manure and animal parts.

25. Solid waste disposal from the Zoo development will terminate at H Power or to a landfill. Animal wastes will not be analyzed for parasites, bacteria, viruses, etc. prior to disposal; rather, these animal wastes are composted for treatment and reuse.

26. The Zoo currently does not have an incinerator. There are tentative plans to install an incinerator at the Zoo to dispose of medical wastes. However, if, during the detailed design process, this is determined to be impractical, too costly, or unsound, no incinerator will be added.

27. See the response to your question #3 above. In addition, the thrust of the Zoo is public education and recreation, making the recreation/tourist-intensive Waikiki area a suitable location.

28. Odor elimination systems as outlined in your letter are not required by the DOH and some odor is to be expected at a Zoo. However, mitigation, including regular clean-up of animal wastes, will be used to prevent odor problems before they become excessive.

    Fruit bats may or may not be included in the Asian Forest Exhibit. This request is still in the proposal stage. If fruit bats are included, they will likely be captive bats from mainland zoos. These animals receive health check ups before being shipped and are put into quarantine once they arrive at the Honolulu Zoo. Animals are not put on display until the quarantine period is over.

29. The Zoo has been in operation for 50 years and has consistently quarantined imported animals. Airborne viruses carried by introduced exotic animals have not been a problem at the Zoo in the past and no future problems are anticipated.

30. & 31.

    A non-potable water study was completed by the Board of Water Supply in 1992, which was the basis for well pumps installed by the City that currently serve the Zoo. In regards to potable water use, the Board of Water Supply has indicated they can serve the planned Zoo development. Addressing source and supply issues is beyond the scope of the master plan EA. The City's agency responsible for water development and supply has recommended use of the non-potable wells and acknowledged that the potable demands can be met.

    The text will be edited to read that the entrance water features will have a "less negative effect" as opposed to a "positive effect."

32. You inquired which areas under Alternative A were considered areas requiring "critical attention." The endangered species exhibits are considered to be the most critical. In general, many exhibits don't meet current requirements (i.e., amount of space available for animals, modern facilities to care for the animals, number of species per exhibit, etc) expected for modern zoos.

33. The Zoo does not gain profits. See our response to your question #12: Other locations for the Zoo improvements besides the current location were not considered for the reasons outlined in question #3 above. Our response to your concern that the EA was segmented is addressed above in question #5.

We trust our response has adequately addressed your concerns.

Sincerely yours,

BELT COLLINS HAWAII LTD.

Cheryl Palesh

Cheryl Palesh

CP:LS:lf

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

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

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LAWRENCE MIKE
DIRECTOR OF HEALTH

In reply, please refer to

November 29, 1996 96-167/epo

Ms. Cheryl Vann
Belt Collins Hawaii
680 Ala Moana Boulevard, 1st Floor
Honolulu, Hawaii 96813-5406

Dear Ms. Vann:

Subject: Draft Environmental Assessment
for Honolulu Zoo Master Plan
Waikiki, Oahu, Hawaii
TMK: 3-1-43: 01

Thank you for allowing us to review and comment on the proposed project. We have the following comments to offer at this time:

Hazardous Waste

1. On June 18, 1994, the State of Hawaii promulgated its own hazardous waste rules. The state's rules can be found in Hawaii Administrative Rules (HAR), Chapter 11-260 to 280. Prior to this adoption, the state implemented the federal hazardous waste regulations found in 40 CFR, Parts 260 through 280. The hazardous waste regulations incorporate the management of hazardous waste from the point of generation to its final disposal, storage or treatment.

2. If a facility generates solid waste as defined in HAR, Chapter 11-261-2, the owner or operator must determine if that waste is a hazardous waste as defined in HAR, Chapter 11-261-3.

3. A facility that generates and/or transports hazardous waste must notify the Environmental Protection Agency, Region IX of their hazardous waste activities and are subject to HAR, Chapters 11-262, 11-263, 11-265 and 11-268. The Draft Environmental Assessment states that the Honolulu Zoo is a small quantity generator. However, they are not listed in our most current database dated 4/18/96.

4. Needles (or any sharp materials) and animal parts are not considered hazardous waste under these rules.

If you have any questions on this matter, please contact Ms. Lois Hashimoto of the Hazardous Waste Section at 586-4226.

Vector Concerns

The applicant should consider the water holding capacity of plants and landscaping in relation to potential breeding of mosquitoes. Visitors to the Zoo will be bothered by mosquitoes if plants, rocks or landscaping that retains water are used.

If you have any questions on this matter, please contact the Vector Control Branch at 831-6767.

Sincerely,

BRUCE S. ANDERSON, Ph.D.
Deputy Director of Environmental Health

c: Solid & Hazardous Waste Branch
Vector Control Branch

BELT COLLINS

May 12, 2000
141.0105/00P-098

Mr. Gary L. Gill, Deputy Director
Environmental Health Administration
Department of Health
State of Hawaii
P.O. Box 3378
Honolulu, Hawaii 96801

Dear Mr. Gill:

Draft Environmental Assessment for
Honolulu Zoo Master Plan, Waikiki, Oahu, Hawaii

We are responding to Dr. Bruce S. Anderson's letter of November 29, 1996 regarding the Draft EA for the proposed Honolulu Zoo improvements. Our response to his comments is as follows:

Comments 1-3: We appreciate the update on the State of Hawaii's hazardous waste rules. Thank you for bringing to our attention our misidentification of the Honolulu Zoo as a small quantity generator. We have reevaluated the types and amounts of waste generated by the Zoo and found that these are not regulated as hazardous waste by RCRA.

Comment 4: The text will be corrected to include needles and animal parts as solid waste rather than hazardous waste.

Comment 5: We appreciate your attention to detail on the issue of potential breeding sites for mosquitos in plants and landscaping. According to the Zoo's Chief Veterinarian, vector breeding in the Savannah (which has similar landscape soils) has not been a problem to date. If a problem emerges in the future, non-chemical controls are the preferred alternative for vector control.

We trust our response has adequately addressed his concerns.

Sincerely yours,

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Cheryl Palesh

CP:LS:lf

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STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
STATE HISTORIC PRESERVATION DIVISION
33 SOUTH KING STREET, 6TH FLOOR
HONOLULU, HAWAII 96813

November 4, 1996

Dona L. Hanaike, Director
Department of Parks and Recreation
City and County of Honolulu
650 S. King Street
Honolulu, Hawaii 96813

LOG NO: 18457
DOC NO: 9610EJ18

Dear Ms. Hanaike:

SUBJECT: Chapter 6E-8, Historic Preservation Review -- Draft Environmental Assessment (DEA) for the Honolulu Zoo Master Plan
Waikiki, Kona, O'ahu
TMK: 3-1-43:1

Thank you for the opportunity to review the DEA for the Honolulu Zoo Master Plan. The Honolulu Zoo is located on fill land at the site where ponds and a former island known as Makee Island existed. It should be clarified that the Zoo itself is not a historic feature, but it is within the Kapi'olani Park historic boundary. Kapiolani Park is on the Hawaii Register of Historic Places.

A review of our records shows that there are no known archaeological sites at the Honolulu Zoo. No archaeological inventory survey has been done for this area. Although ponds and an island were present, it is unclear whether these were fishponds and whether housing or other activities occurred on the island. Given the extensive land changes that have occurred here, the probability of finding buried historic sites may be fairly low.

Without information on the types of historic sites that might once have been present (if any), without information on the depth of fill soils in this area and without detailed plans for the depth of ground disturbance planned for the Zoo, we cannot evaluate the impacts of the master plan at this time. However, conducting an archaeological inventory survey (as stated in the DEA) would be quite expensive and would not be necessary if only fill soils are to be impacted. Thus, rather than conduct such a survey, we suggest that initially you have a short study conducted which (1) gathers better historical information on the former land use at the site and suggests the types of

archaeological sites that might be present (a background land use study) and (2) gathers detailed information on the nature and depth of fill soils. With this information, you can evaluate whether the proposed ground disturbance for the renovations will penetrate that fill. If they do not, then there would be "no effect" to significant historic sites. If the renovations will penetrate the fill in certain areas and the prior land use information indicates that no historic sites are likely to be present there, then again there would be "no effect" to significant sites. If the land use information indicates that sites might be present, you can then develop a more cost efficient archaeological approach to verify if significant historic sites are present and where.

Let us know if you plan to do an inventory survey or will follow the above approach. We will await the findings either way.

If you have any questions please call Elaine Jourdane at 587-0015.

Aloha,

Don Hibbard, Administrator
State Historic Preservation Division

EJ:jen

cc: Cheryl Vann, Belt Collins Hawaii 680 Ala Moana Blvd., 1st Flr.

BELT COLLINS

May 12, 2000
141.0105/00P-099

Don Hibbard, Ph.D., Administrator
State Historic Preservation Division
Dept. of Land and Natural Resources
601 Kamokila Blvd., Suite 555
Kapolei, Hawaii 96707

Dear Dr. Hibbard:

Draft Environmental Assessment for
Honolulu Zoo Master Plan, Waikiki, Oahu, Hawaii

Thank you for your letter dated November 4, 1996 regarding the Draft EA for the proposed Honolulu Zoo improvements.

We will edit the text to clarify that the Zoo itself is not a historic feature, but is within the historic boundary of Kapiolani Regional Park, which is on the Hawaii Register of Historic Places. We will also include that, given the extensive land changes that have occurred in the area, the probability of finding buried historic sites may be fairly low.

The revised text will also reflect your suggestion that a short initial study, rather than an archaeological inventory survey, be conducted for the project site. The study has been conducted and its findings are presented in the EA.

We trust our response has adequately addressed your concerns.

Sincerely yours,

BELT COLLINS HAWAII LTD.

Cheryl Palesh

CP:LS:lf

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NOV-13-96 WED 7:51 FAX NO. 808 523 4767 141.0104

CW
SS

DEPARTMENT OF PARKS AND RECREATION

FACSIMILE TRANSMITTAL

FAX NUMBER (808) 523-4767

DATE: 11-13-96

TO: BELT COLLING & ASSOCIATES

ATTENTION: CHERYL PALESH cc FAX NUMBER: 536-7819

FROM: STAN KURODA CONTACT NUMBER: 523-4755

SUBJECT: HONOLULU ZOO - MASTER PLAN

CONTENTS/
REMARKS: EA RESPONSE FROM US DEPT. OF THE INTERIOR FISH & WILDLIFE SERVICE DATED 10/28/96.

NUMBER OF PAGES (INCLUDES COVER): 3

FACILITIES DEVELOPMENT DIVISION
650 SOUTH KING STREET
HONOLULU, HAWAII 96813
PHONE NUMBER: 523-4941

NOV.13. 7:48PM PRINT TIME NOV.13. 7:50PM

NOV-13-96 WED 7:52 FAX NO. 808 523 4767 P.02

United States Department of the Interior

FISH AND WILDLIFE SERVICE
PACIFIC ISLANDS ECOREGION
300 ALA MOANA BOULEVARD, ROOM 3103
BOX 50088
HONOLULU, HAWAII 96850
PHONE: (808) 541-3441 FAX: (808) 541-3470

In Reply Refer To: CAW

OCT 28 1996

Ms. Dona L. Hanaike
Director
Department of Parks and Recreation
City and County of Honolulu
650 South King Street
Honolulu, Hawaii 96813

DEPT. OF PARKS & RECREATION & C OF HONOLULU
96 OCT 29 AM 8:35

Re: Review of the Draft Environmental Assessment for Honolulu Zoo Master Plan, Waikiki, Oahu, Honolulu, Hawaii

Dear Ms. Hanaike:

The U.S. Fish and Wildlife Service (Service) has reviewed the Draft Environmental Assessment for Honolulu Zoo Master Plan, Waikiki, Oahu, Hawaii. The applicant is the City and County of Honolulu, Department of Parks & Recrention. The proposed plan involves reorganizing the basic layout of the Honolulu Zoo in order to broaden the recreational and educational experience encountered by visitors to the zoo. The proposed plan outlines the creation of an additional three ecological environments: Hawaii Biome, Rain Forest Biome, and Tropical Islands Biome. Currently, the Zoo has an African Savanna Biome. The plan includes the construction of 41 new buildings, 4 open-sided structures, 11 aviaries, 7 restroom facilities, a restaurant, operational/support facilities, and a greenhouse. The Service offers the following comments for your consideration.

The Service fully supports the goals of the Honolulu Zoo Master Plan. The Service believes that the proposed project will provide an opportunity for education and a greater appreciation of the unique environment found in Hawaii. Based on our review of the document, we do not anticipate that fish and wildlife will be adversely affected by the proposed project. However, the Service should be consulted if the project will involve any rare species.

96-32558
10/29/96 8:50.

RECEIVED TIME NOV.13. 7:48PM PRINT TIME NOV.13. 7:50PM

We noticed that the Hawaii biome will not include information on mollusks, such as the Oahu tree snails (genus Achatinella). These colorful and unique tree snails were once abundant in native forests and were important in Hawaiian culture. We suggest that the zoo consider educating the public about the plight of these critically endangered species and their vital role in the forests of Hawaii in the Hawaii Biome. We encourage the Zoo to work with Dr. Mike Hadfield at the University of Hawaii, Manoa Campus (808/ 539-7319) on pertinent educational materials dealing with the Oahu tree snails.

The Service appreciates the opportunity to provide comments on the Honolulu Zoo Master Plan. If you have questions regarding these comments or would like technical assistance, please contact Fish and Wildlife Biologist Christine Willis at 808/541-3441.

Sincerely,

for Brooks Harper
Field Supervisor
Ecological Services

cc: DLNR, Honolulu

BELT COLLINS

May 12, 2000
141.0105/00P-100

Mr. Paul Henson
Field Supervisor, Ecological Services
Pacific Islands Ecoregion
Fish and Wildlife Service
U.S. Department of the Interior
300 Ala Moana Blvd., Room 3-122
Box 50088
Honolulu, Hawaii 96850

Dear Mr. Henson:

Draft Environmental Assessment for
Honolulu Zoo Master Plan, Waikiki, Oahu, Hawaii

We are responding to Mr. Brooks Harper's letter of October 28, 1996 regarding the Draft EA for the proposed Honolulu Zoo improvements. We are pleased that the Service fully supports the goals of the Honolulu Zoo Master Plan and that he did not anticipate any adverse effects on fish and wildlife from the proposed project. If the proposed project involves any rare species, the Service will be consulted.

The Honolulu Zoo has already recognized the importance of the endangered Oahu tree snails, and are planning to include them in the Hawaii Biome, along with other invertebrates, such as the happy face spider. The Zoo will try to work with endangered species in conjunction with the U.S. Fish and Wildlife Service and State Forestry and Wildlife.

We trust our response has adequately addressed his concerns.

Sincerely yours,

BELT COLLINS HAWAII LTD.

Cheryl Palesh

Cheryl Palesh

CP:LS:lf

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ah
Jim—
Design

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

REPLY TO ATTENTION OF

DEPT. OF PARKS & RECREATION C & C OF HONOLULU

96 OCT 30 AM 8:59

October 25 1996

Operations Branch

Department of Parks and Recreation
City and County of Honolulu
650 South King Street
Honolulu, HI 96813

Aloha:

This letter responds to request for comments on the Draft Environmental Assessment for Honolulu Zoo Master Plan, Oahu, Hawaii.

Based on the information provided, no jurisdictional waters of the United States occur within the project area; therefore, a Department of the Army (DA) permit is not required for the proposed work.

File Number 960000396 has been assigned to this project. Please refer to this number in any future correspondence. If you have further questions regarding this matter, please call me at 438-9258, extension 15.

Sincerely,

Kathleen A. Dadey
Environmental Engineer

Copy Furnished:
U.S. Fish and Wildlife Service, Honolulu, HI
U.S. Environmental Protection Branch, Region IX, San Francisco, CA
Clean Water Branch, Department of Health, Honolulu, HI
Office of Planning, Coastal Zone Management Program Office, Honolulu, HI

96-32469
10/30/96 HO

RECEIVED TIME NOV. 1. 4:59PM PRINT TIME NOV. 1. 5:00PM

BELT COLLINS

May 12, 2000
141.0105/00P-101

Regulatory Branch
Department of the Army
U.S. Army Engineer District, Honolulu
Building 230
Ft. Shafter, Hawaii 96858-5440

Aloha:

Draft Environmental Assessment for
Honolulu Zoo Master Plan, Waikiki, Oahu, Hawaii

We are responding to Ms. Kathleen Dadey's letter dated October 25, 1996 regarding the Draft EA for the proposed Honolulu Zoo improvements. The file number assigned to this project is 960000396. We have noted that a DA permit is not required for the proposed work and that Ms. Dadey had no further comments.

Sincerely yours,

BELT COLLINS HAWAII LTD.

Cheryl Palesh

Cheryl Palesh

CP:LS:lf

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DEPARTMENT OF TRANSPORTATION SERVICES
CITY AND COUNTY OF HONOLULU

[illegible]

96 OCT 25 · A 10 35

BELT COLLINS HAWAII

October 24, 1996

9/96-04431R

Ms. Cheryl Vann
Belt Collins Hawaii
680 Ala Moana Boulevard, 1st Floor
Honolulu, Hawaii 96813-5406

Dear Ms. Vann:

Subject: Honolulu Zoo Master Plan

In response to the September 23, 1996 letter from the Department of Parks and Recreation, we reviewed the draft environmental assessment (EA) for the subject project and have the following comments:

1. New facilities have been designed to accommodate the projected increase in the number of zoo visitors (652,314 in Fiscal 1991-1992 to 1,650,000 in Fiscal 2000-2001). However, additional parking for the projected increase in zoo visitors is not planned. A parking assessment should be provided to this department.

2. The draft EA states that based on the projected increase in the number of zoo visitors, the long-term impacts on traffic flow are expected to be significant. It is proposed that these impacts on traffic flow will be mitigated by programs conducted by the zoo to encourage the public's use of mass transportation. The project phasing plan should include descriptions and expected effectiveness of those programs the zoo will implement to encourage the use of mass transit to accommodate the additional visitors. The EA should also discuss what other measures are proposed in the event that the zoo programs do not completely mitigate the long-term impacts on traffic flow.

Should you have any questions regarding these comments, please call Faith Miyamoto of the Transportation System Planning Division at 527-6976.

Respectfully,

for CHARLES O. SWANSON
Director

cc: Department of Parks
And Recreation

BELT COLLINS

May 12, 2000
141.0105/00P-102

Ms. Cheryl Soon, Director
Department of Transportation Services
City and County of Honolulu
711 Kapiolani Boulevard, 12th Floor
Honolulu, Hawaii 96813

Dear Ms. Soon:

Draft Environmental Assessment for
Honolulu Zoo Master Plan, Waikiki, Oahu, Hawaii

We are responding to Mr. Charles Swanson's letter of October 24, 1996 regarding the Draft EA for the proposed Honolulu Zoo improvements. We have noted his concerns that additional parking for the projected increase in zoo visitors has not been planned and that he recommends a parking assessment be conducted and provided to your department. We have also noted his comment that effectiveness of planned mass transit programs should be evaluated and discussed, as should alternative measures in the event that the zoo programs do not completely mitigate the long-term impacts on traffic flow.

In response to these comments, a parking assessment and traffic study have been conducted to address the above concerns. A copy of both reports will be provided in the Final EA.

We trust our response has adequately addressed his concerns.

Sincerely yours,

BELT COLLINS HAWAII LTD.

Cheryl Palesh

CP:LS:lf

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BOARD OF WATER SUPPLY

CITY AND COUNTY OF HONOLULU
630 SOUTH BERETANIA STREET
HONOLULU, HAWAII 96843
PHONE (808) 527-6180
FAX (808) 533-2714

October 23, 1996

Ms. Cheryl Vann
Belt, Collins Hawaii
680 Ala Moana Boulevard, First Floor
Honolulu, Hawaii 96813-5406

Dear Ms. Vann:

Subject: Draft Environmental Assessment for the Honolulu Zoo Master Plan, Waikiki, Oahu, TMK: 3-1-43: Portion 01

Thank you for the opportunity to review and comment on the proposed master plan for the Honolulu Zoo.

We have the following comments to offer:

1. According to the document, only a fourth of the 504,000 gpd capacity of the nonpotable caprock wells is being presently utilized. The expansion of the zoo should maximize the existing nonpotable supply to reduce the need for potable water. Our records indicate the potable consumption is in excess of 550,000 gpd.

2. There are three existing water meters serving the project site. The existing off-site water system is presently adequate to accommodate the proposed development.

3. The availability of water will be determined when the Building Permit Application is submitted for our review and approval. When water is made available, the applicant will be required to pay our Water System Facilities Charges for resource development, transmission and daily storage.

4. The on-site fire protection requirements should be coordinated with the Fire Prevention Bureau of the Honolulu Fire Department.

5. Board of Water Supply (BWS) approved reduced pressure principle backflow prevention assemblies (RP) are required to be installed immediately after the two existing meters located on Paki and Kapahulu Avenues. There is an existing BWS approved RP installed immediately after the 8-inch compound meter located on Monsarrat Avenue.

If you have any questions, please contact Barry Usagawa at 527-5235.

Very truly yours,

RAYMOND H. SATO
Manager and Chief Engineer

cc: Dona L. Hanaike, Department of Parks and Recreation
Office of Environmental Quality Control

Pure Water . . . our greatest need – use it wisely

BELT COLLINS

May 12, 2000
141.0105/00P-103

Mr. Clifford S. Jamile
Manager and Chief Engineer
Board of Water Supply
City and County of Honolulu
630 South Beretania Street
Honolulu, Hawaii 96843

Dear Mr. Jamile:

Draft Environmental Assessment for
Honolulu Zoo Master Plan, Waikiki, Oahu, Hawaii

We are responding to Mr. Raymond Sato's letter of October 23, 1996 regarding the Draft EA for the proposed Honolulu Zoo improvements. Our response to his comments is as follows:

Comment #1: The proposed Honolulu Zoo improvements will maximize use of the existing nonpotable water supply wells in order to reduce the need for potable water. The two remaining, undeveloped wells can be used for park irrigation in accordance with the Board of Water Supply (BWS) study of July 1992.

Comment #2: We have noted that the existing off-site water system is presently adequate to accommodate the proposed development, and we will make this explicit in the text.

Comment #3: We have noted your comment that the availability of water will be determined when the Building Permit Application is submitted for BWS review and approval, and that the applicant will be required to pay your Water System Facilities Charges for resource development, transmission, and daily storage.

Comment #4: On-site fire protection requirements have been coordinated with the Honolulu Fire Department.

Comment #5: The two existing meters located on Paki and Kapahulu Avenues will be removed.

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We trust our response has adequately addressed his concerns.

Sincerely yours,

BELT COLLINS HAWAII LTD.

Cheryl Palesh

CP:LS:lf

BENJAMIN J. CAYETANO
GOVERNOR

STATE OF HAWAII
OFFICE OF ENVIRONMENTAL QUALITY CONTROL
220 SOUTH KING STREET
FOURTH FLOOR
HONOLULU, HAWAII 96813
TELEPHONE (808) 586-4185
FACSIMILE (808) 586-4186

RECEIVED
1996 OCT 24 P 4:30
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GARY GILL
DIRECTOR

October 23, 1996

The Honorable Dona L. Hanaike, Director
City and County of Honolulu
Department of Parks & Recreation
650 South King Street, 9th Floor
Honolulu, Hawai'i 96813

Dear Ms. Hanaike:

We submit for your response (required by Section 343-5(b), Hawai'i Revised Statutes) the following comments on a September 1996, draft environmental assessment prepared by Belt Collins Hawaii, for the "Honolulu Zoo Master Plan, Waikiki, O'ahu, Hawai'i, TMK: 3-1-43:1, Portion of Kapi'olani Park. The document was submitted by your September 4, 1996, letter (DLH:go) to our office. Notice of availability of this draft environmental assessment was published in the September 23, 1996, edition of the *Environmental Notice*.

1. Please discuss the direct, indirect and cumulative effects (e.g., odor concerns, etc.) of collocating the elephant exhibits next to the restaurant.

2. Please discuss the Department's policy on the use of native Hawaiian plants as landscaping within the confines of the zoo.

3. Please discuss the alternative of relocating the Honolulu Zoo to a site outside of Waikiki.

Please include this letter and your response in the final environmental assessment for this project. If there are any questions, please call Mr. Leslie Segundo, Environmental Health Specialist toll-free at 586-4185. Thank you.

Sincerely,

GARY GILL
Director

c: Mr. Daniel Takamatsu, Dept. of Parks and Recreation
Ms. Cheryl Palesh, Belt Collins Hawaii

BELT COLLINS

May 12, 2000
141.0105/00P-104

Ms. Genevieve Salmonson, Director
Office of Environmental Quality Control
State of Hawaii
235 So. Beretania Street, Suite 702
Honolulu, Hawaii 96813

Dear Ms. Salmonson:

Draft Environmental Assessment for
Honolulu Zoo Master Plan, Waikiki, Oahu, Hawaii

We are responding to Mr. Gary Gill's letter of October 23, 1996 regarding the Draft EA for the proposed Honolulu Zoo improvements. Our response to his comments is as follows:

Comment #1: He expressed concern about the direct, indirect, and cumulative impacts of collocating the elephant exhibits next to the restaurant. Elephant droppings will be removed regularly so they do not accumulate and cause excessive odor. One must expect a certain amount of odor at the Zoo, and elephants are actually less odorous than other animals.

Comment #2: He asked us to discuss the City's policy on the use of native Hawaiian plants as landscaping within the confines of the Zoo. The plant landscaping will be commiserate with the type of exhibit being displayed. When appropriate, such as in the Hawaii Biome exhibit, native Hawaiian plants will be used. Local plants will also be used as substitutes in some biomes in the interest of costs and in consideration that introduction of exotic plant species from other countries may be prohibited by the Department of Agriculture.

Comment #3: Relocating the Honolulu Zoo to a site outside of Waikiki would only constitute a valid alternative if the objective of the EA were to expand Zoo facilities. The master plan does not propose to extend the Zoo beyond its existing boundaries, and therefore this is an out of scope issue. Rather, the objective of the master plan is to enhance the existing environment by creating a more realistic and stimulating environment for the animals, making facilities improvements for visitors, improving the recreational experience at the Zoo, and initiating education programs.

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We trust our response has adequately addressed his concerns.

Sincerely yours,

BELT COLLINS HAWAII LTD.

Cheryl Palesh

Cheryl Palesh

CP:LS:lf

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

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

MICHAEL D. WILSON
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES

DEPUTY
ALBERT S. COLOMA-AGARAN

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October 22, 1996

LD-NAV
REF.: EACCHZMP.RCM

Ms. Cheryl Vann
Belt Collins Hawaii
680 Ala Moana Boulevard, 1st Floor
Honolulu, Hawaii 96813-5406

Dear Ms. Vann:

SUBJECT: Draft Environmental Assessment for Honolulu Zoo Master Plan, Waikiki, Oahu, Hawaii TMK: 3-1-43: 2

Thank you for the opportunity to review and comment on the City and County of Honolulu's Draft Environment Assessment for Honolulu Zoo Master Plan.

We are pleased to inform you that the Department of Land and Natural Resources have no comments to offer on the subject matter, as submitted.

Should you have any questions, please feel free to contact Nick Vaccaro at 587-0438.

Aloha,

for MICHAEL D. WILSON

c: Michael H. Nekoba
Colbert M. Matsumoto

BELT COLLINS

May 12, 2000
141.0105/00P-105

Mr. Timothy E. Johns, Chair
Department of Land and Natural Resources
State of Hawaii
P.O. Box 621
Honolulu, Hawaii 96809

Dear Mr. Johns:

Draft Environmental Assessment for
Honolulu Zoo Master Plan, Waikiki, Oahu, Hawaii

We are responding to Mr. Michael Wilson's letter of October 22, 1996 regarding the Draft EA for the proposed Honolulu Zoo improvements. We have noted that he had no comments to offer on the subject matter.

Sincerely yours,

BELT COLLINS HAWAII LTD.

Cheryl Palesh

Cheryl Palesh

CP:LS:lf

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Hawaiian Electric Company, Inc. • PO Box 2750 • Honolulu, HI 96840 0001

Patricia Uyehara Wong, Esq.
Manager
Environmental Department

October 15, 1996

Ms. Cheryl Vann
Belt Collins Hawaii
680 Ala Moana Boulevard, 1st Floor
Honolulu, HI 96813-5406

Dear Ms. Vann:

Subject: Honolulu Zoo Master Plan

Thank you for the opportunity to comment on your September 1996 draft environmental assessment for the Honolulu Zoo Master Plan, as proposed by the Department of Parks and Recreation, City and County of Honolulu. We have reviewed the subject document would like to point out that in Section 2.7.1, the electrical service to the new African Savanna is from Monsarrat Ave., not Paki Ave.

HECO shall reserve further comments pertaining to the protection of existing powerlines bordering the project area until construction plans are finalized. Again, thank you for the opportunity to comment on this draft environmental assessment.

Sincerely,

BELT COLLINS

May 12, 2000
141.0105/00P-106

Patricia Uyehara Wong, Esq.
Manager, Environmental Department
Hawaiian Electric Company, Inc.
P.O. Box 2750
Honolulu, Hawaii 96840-0001

Dear Ms. Wong:

Draft Environmental Assessment for
Honolulu Zoo Master Plan, Waikiki, Oahu, Hawaii

Thank you for your letter dated October 15, 1996 regarding the Draft EA for the proposed Honolulu Zoo improvements. We have noted the change in the text, in Section 2.7.1, that electrical service to the new African Savanna is from Monsarrat Avenue rather than from Paki Avenue.

We trust our response has adequately addressed your concerns.

Sincerely yours,

BELT COLLINS HAWAII LTD.

Cheryl Palesh

CP:LS:lf

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PLANNING DEPARTMENT
CITY AND COUNTY OF HONOLULU
650 SOUTH KING STREET
HONOLULU, HAWAII 96813

JEREMY HARRIS
MAYOR

CHERYL D. SOON
PLANNING OFFICER

CAROLL TAKAHASHI
DEPUTY CHIEF PLANNING OFFICER

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October 11, 1996

Ms. Cheryl Vann
Belt Collins Hawaii
680 Ala Moana Boulevard, 1st Floor
Honolulu, Hawaii 96813-5406

Dear Ms. Vann:

Draft Environmental Assessment (EA) for the
Honolulu Zoo Master Plan, Waikiki, Oahu, Hawaii
Tax Map Key: 3-1-43: 1

In response to the Department of Parks and Recreation's memorandum of September 23, 1996, we have reviewed the subject EA and offer the following comments.

1. The proposed improvements to the Honolulu Zoo are consistent with the objectives and policies contained in the General Plan and Primary Urban Center Development Plan (DP).

2. The Primary Urban Center DP Public Facilities Map currently shows a publicly funded, Park/Modification symbol, site determined, within six years, on the entire zoo property. This symbol, approved under Ordinance 85-46, permits the improvements proposed by the Department of Parks and Recreation.

Thank you for the opportunity to comment on this matter. Should you have any questions, please contact Tim Hata of our staff at 527-6070.

Sincerely,

Cheryl D. Soon
CHERYL D. SOON
Chief Planning Officer

CDS:ft

BELT COLLINS

May 12, 2000
141.0105/00P-107

Mr. Randall K. Fujiki, Director
Dept. of Planning and Permitting
City and County of Honolulu
650 South King Street
Honolulu, Hawaii 96813

Dear Mr. Fujiki:

Draft Environmental Assessment for
Honolulu Zoo Master Plan, Waikiki, Oahu, Hawaii

We are responding to Ms. Cheryl Soon's letter of October 11, 1996 regarding the Draft EA for the proposed Honolulu Zoo improvements. We are pleased that she has found the proposed Zoo improvements to be consistent with the objectives and policies contained in the General Plan and Primary Urban Center Development Plan, and approved under Ordinance 85-46.

Sincerely yours,

BELT COLLINS HAWAII LTD.

Cheryl Palesh
Cheryl Palesh

CP:LS:lf

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FIRE DEPARTMENT
CITY AND COUNTY OF HONOLULU
3375 KOAPAKA STREET, SUITE H425
HONOLULU, HAWAII 96819-1869

JEREMY HARRIS
MAYOR

ATTILIO K. LEONARDI
FIRE DEPUTY CHIEF

RECEIVED
1996 OCT -8 P 3:49
BELT COLLINS HAWAII

October 4, 1996

Ms. Cheryl Vann
Belt Collins Hawaii
680 Ala Moana Boulevard, 1st Floor
Honolulu, Hawaii 96813-5406

Dear Ms. Vann:

SUBJECT: Draft Environmental Assessment (EA)
For Honolulu Zoo Master Plan,
Waikiki, Oahu, Hawaii
Tax Map Key: 3-1-43: 1

We have reviewed the subject material provided and foresee no adverse impact in Fire Department facilities or services. Fire protection services provided from Waikiki and McCully engine companies with ladder service from Waikiki are adequate.

Access for fire apparatus, water supply and building construction shall be in conformance to existing codes and standards.

Should you have any questions, please call Assistant Chief Arthur Ugalde of our Administrative Services Bureau at 831-7774.

Sincerely,

ANTHONY J. LOPEZ, JR.
Fire Chief

AJL/MPN:ay

BELT COLLINS

May 12, 2000
141.0105/00P-108

Mr. Attilio Leonardi, Chief
Fire Department
City and County of Honolulu
3375 Koapaka Street, Suite H-425
Honolulu, Hawaii 96819-1869

Dear Chief Leonardi:

Draft Environmental Assessment for
Honolulu Zoo Master Plan, Waikiki, Oahu, Hawaii

We are responding to Mr. Anthony Lopez's letter of October 4, 1996 regarding the Draft EA for the proposed Honolulu Zoo improvements. We are pleased that he foresaw no adverse impact in Fire Department facilities or services as a result of the proposed action.

We have revised the text to include the information he provided about fire protection services in the area, and we have noted in the text that access for fire apparatus, water supply, and building construction will be in conformance to existing codes and standards.

We trust our response has adequately addressed his comments.

Sincerely yours,

BELT COLLINS HAWAII LTD.

Cheryl Palesh

CP:LS:lf

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BENJAMIN J. CAYETANO
GOVERNOR

KAZU HAYASHIDA
DIRECTOR

DEPUTY DIRECTORS
JERRY M. MATSUDA
GLENN M. OKIMOTO

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
869 PUNCHBOWL STREET
HONOLULU, HAWAII 96813-5097

RECEIVED
1996 OCT -4 A 10:24
BELT COLLINS HAWAII

IN REPLY REFER TO:
STP 8.7568

October 2, 1996

Ms. Cheryl Vann
Belt Collins Hawaii
680 Ala Moana Boulevard, 1st Floor
Honolulu, Hawaii 96813-5406

Dear Ms. Vann:

Subject: Honolulu Zoo Master Plan
Draft Environmental Assessment (EA)

Thank you for your transmittal of September 23, 1996, requesting our review of the subject draft EA.

The subject project is not anticipated to have an adverse impact on our State transportation facilities.

We appreciate the opportunity to provide comments.

Very truly yours,

KAZU HAYASHIDA
Director of Transportation

BELT COLLINS

May 12, 2000
141.0105/00P-109

Mr. Kazu Hayashida, Director
Department of Transportation
State of Hawaii
869 Punchbowl Street
Honolulu, Hawaii 96813-5097

Dear Mr. Hayashida:

Draft Environmental Assessment for
Honolulu Zoo Master Plan, Waikiki, Oahu, Hawaii

Thank you for your letter dated October 2, 1996 regarding the Draft EA for the proposed Honolulu Zoo improvements. We have noted your comment that the subject project is not anticipated to have an adverse impact on State transportation facilities.

Sincerely yours,

BELT COLLINS HAWAII LTD.

Cheryl Palesh

CP:LS:lf

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DEPARTMENT OF PARKS AND RECREATION

FACSIMILE TRANSMITTAL

FAX NUMBER (808) 523-4767

DATE: 10/7/96

TO: BCA HAWAII

ATTENTION: CHERYL VAN FAX NUMBER: 538-7819

FROM: STAN KUROSU CONTACT NUMBER: 523-4755

SUBJECT: HONOLULU ZOO MASTER PLAN EIA

REMARKS: ATTACH IS DPW COMMENTS TO DRAFT EIA. PLEASE ADDRESS THESE IN THE FINAL EIA.

NUMBER OF PAGES (INCLUDES COVER): 3

FACILITIES DEVELOPMENT DIVISION
650 SOUTH KING STREET
HONOLULU, HAWAII 96813
PHONE NUMBER: 523-4941

RECEIVED TIME OCT. 7. 1:19PM PRINT TIME OCT. 7. 1:21PM

DEPARTMENT OF PUBLIC WORKS
CITY AND COUNTY OF HONOLULU
650 SOUTH KING STREET
HONOLULU, HAWAII 96813

JEREMY HARRIS
MAYOR

KENNETH E. SPRAGUE
DIRECTOR AND CHIEF ENGINEER

DARWIN J. HANAMOTO
DEPUTY DIRECTOR

ENV 96-232

September 30, 1996

DEPT. OF PARKS & RECREATION C & C OF HONOLULU
96 OCT -1 A8:01

MEMORANDUM:

TO: DONA L. HANAIKE, DIRECTOR
DEPARTMENT OF PARKS AND RECREATION

FROM: KENNETH E. SPRAGUE
DIRECTOR AND CHIEF ENGINEER

SUBJECT: DRAFT ENVIRONMENTAL ASSESSMENT (DEA)
HONOLULU ZOO MASTER PLAN
TMK: 3-1-43: 1

We have reviewed the subject DEA and have the following comments:

1. The DEA should address where backwash water, draining of water features, will be handled.
2. Discuss pretreatment of vehicle wash water if disposal is to sanitary sewer system. Also, discuss containment of fuel storage area.
3. Where will 170,000 gallons per minute (gpm) nonpotable water from wells will be disposed (sanitary sewer, evaporation or percolation)?
4. Since effluent from the box culvert that traverses the zoo goes to the Kapahulu Groin, please verify all inlets to ensure that box culvert have been sealed.
5. Since the roof runoff may contain high focal discharge from birds, please consider redirect roof runoff to drywells instead of City's drain system.
6. If anticipated visitor population increases to nearly triple, additional parking stalls should be considered.

96-2959
10/1/96 SKR

RECEIVED TIME OCT. 7. 1:19PM PRINT TIME OCT. 7. 1:21PM

Memo to: Dona L. Hanaike, Director
Page 2
September 30, 1996

7. Discuss implementation of best management practices (BMPs) to reduce pollutants including directing runoff to planted areas, drain inlet alterations with trash traps, more frequent sweeping, collection of oil spoils from parking cars and oil-water separators.

Should you have any questions, please contact Alex Ho at Local 4150.

RECEIVED TIME OCT. 7. 1:19PM PRINT TIME OCT. 7. 1:21PM

BELT COLLINS

May 12, 2000
141.0105/00P-110

Mr. Ross Sasamura
Director and Chief Engineer
Department of Facility Maintenance
City and County of Honolulu
650 South King Street, 11th Floor
Honolulu, Hawaii 96813

Dear Mr. Sasamura:

Draft Environmental Assessment for
Honolulu Zoo Master Plan, Waikiki, Oahu, Hawaii

We are responding to Mr. Kenneth Sprague's letter of September 30, 1996 regarding the Draft EA for the proposed Honolulu Zoo improvements. Our response to his comments is as follows:

Comment #1: Backwash water and draining of water features will be to the sanitary sewer.

Comment #2: Detailed plans have not yet been made for pretreatment of vehicle wash water and containment of a fuel storage area. However, these activities will only occur at the Zoo if they conform with current regulations. There will not be a dedicated space for washing vehicles if this activity cannot comply with environmental concerns.

Comment #3: The 170,000 gallons per minute non-potable water from wells will primarily be disposed through the sanitary sewer. Since water features are lined, loss through percolation will be minimal.

Comment #4: In regards to his concern that the box culvert be sealed (since effluent from the box culvert goes to the Kapahulu Groin), we can verify that the box culvert has been sealed at all inlets.

Comment #5: He suggested we consider redirecting roof runoff to drywells instead of to the City's drain system. However, we feel that drywell construction should be minimized to the extent possible. Gravity drainage to the piped system is preferred due to maintenance concerns.

Comment #6: A parking assessment has been conducted to examine whether or not additional parking stalls will be required to accomodate the visitor population increase.

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Comment #7: We have noted his suggestion that implementation of BMPs be discussed. We will address this issue in the Final EA. There are no operations at the Zoo that would require obtaining a National Pollution Discharge Elimination System (NPDES) Permit. In view of this, no specific Best Management Practice (BMP) Plan has been developed. However, this does not preclude Zoo operational personnel from following Best Management Practices as standard procedures to minimize on-site pollution.

We trust our response has adequately addressed his concerns.

Sincerely yours,

BELT COLLINS HAWAII LTD.

Cheryl Palesh

CP:LS:lf

POLICE DEPARTMENT
CITY AND COUNTY OF HONOLULU
801 SOUTH BERETANIA STREET
HONOLULU, HAWAII 96813 - AREA CODE (808) 529-3111

RECEIVED
1996 SEP 30 A 8:08
BELT COLLINS HAWAII

JEREMY HARRIS
MAYOR

MICHAEL S. NAKAMURA
CHIEF

HAROLD M. KAWASAKI
LEE DONOHUE
DEPUTY CHIEFS

OUR REFERENCE BS-DL

September 26, 1996

Ms. Cheryl Vann
Belt Collins Hawaii
680 Ala Moana Boulevard, 1st Floor
Honolulu, Hawaii 96813-5406

Dear Ms. Vann:

This is in response to Ms. Dona L. Hanaike's, Department of Parks and Recreation, memorandum of September 23, 1996, requesting comments on the Draft Environmental Assessment for the Honolulu Zoo Master Plan, Tax Map Key: 3-1-43: 1.

This project should have no significant impact on the operations of the Honolulu Police Department.

Thank you for the opportunity to comment.

MICHAEL S. NAKAMURA
Chief of Police

By
EUGENE UEMURA, Assistant Chief
Administrative Bureau

BELT COLLINS

May 12, 2000
141.0105/00P-111

Mr. Lee Donohue, Chief
Police Department
City and County of Honolulu
801 South Beretania Street
Honolulu, Hawaii 96813

Dear Chief Donohue:

Draft Environmental Assessment for
Honolulu Zoo Master Plan, Waikiki, Oahu, Hawaii

We are responding to Mr. Michael Nakamura's letter of September 26, 1996 regarding the Draft EA for the proposed Honolulu Zoo improvements. We appreciated receiving his comments and have noted that he did not anticipate any significant impact on the operations of the Honolulu Police Department as a result of the proposed action.

Sincerely yours,

BELT COLLINS HAWAII LTD.

Cheryl Palesh

CP:LS:lf

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CITY COUNCIL
CITY AND COUNTY OF HONOLULU
HONOLULU, HAWAII 96813 - 3065
1999 JUL 29 P 1:24
BELT COLLINS HAWAII

JOHN HENRY FELIX
(808) 547-7020

July 28, 1999

Ms. Cheryl Palesh
Vice President
Belt Collins Hawaii
680 Ala Moana Boulevard, First Floor
Honolulu, Hawaii 96813

Re: Draft Environmental Assessment for the Honolulu Zoo Master Plan

Dear Ms. Palesh:

I am writing to you on behalf of the Trustees of Kapiolani Park ("Trustees") to convey to you the Trustees' comment on the draft environmental assessment ("DEA") for the Honolulu Zoo Master Plan.

The Trustees met on July 27, 1999, at which time the DEA was discussed. Copies of the DEA were initially circulated to all Trustees in October 1996 and another copy was provided them on July 20, 1999. The Trustees agreed that they would have no comment on the DEA.

If you have any questions, please feel free to contact me.

Sincerely,

JOHN HENRY FELIX, Chair
Kapiolani Park Trustees

JHF/RB:au

BELT COLLINS

May 12, 2000
141.0105/00P-124

Honorable John Henry Felix, Chair
Kapiolani Park Trustees
Council District III
Honolulu Hale
530 South King Street
Honolulu, Hawaii 96813

Dear Councilmember Felix:

Response to Comment
Draft Environmental Assessment
for the Honolulu Zoo Master Plan

Thank you for your letter of July 28, 1999 concerning the Draft Environmental Assessment (EA) for the Honolulu Zoo Master Plan. We appreciate your review of the document.

Sincerely yours,

BELT COLLINS HAWAII LTD.

Cheryl Palesh

CP:LS:lf

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DONNA MERCADO KIM
COUNCILMEMBER
(808) 547-7007
(808) 523-4220 (fax)
e-mail: dmk@co.honolulu.hi.us
Internet: http://pr.hula.net/dmk/

CITY COUNCIL
CITY AND COUNTY OF HONOLULU
HONOLULU, HAWAII 96813-3065 / TELEPHONE 547-7000

January 21, 1998

Ms. Cheryl Vann
Belt Collins Hawaii
680 Ala Moana Boulevard, First Floor
Honolulu, HI 96813-5406

Dear Ms. Vann:

Re: Draft Environmental Assessment
for the Honolulu Zoo Master Plan

I am writing to respond to the Draft Environmental Assessment (EA) for the Honolulu Zoo Master Plan. As a Kapiolani Park Trustee, I am writing to express my concerns regarding a lack of parking and traffic mitigation measures.

It is my belief that a thorough study and analysis of the impacts of the proposed improvements to the Honolulu Zoo could be achieved via a comprehensive master plan which includes the Honolulu Zoo and Kapiolani Park collectively. Such a comprehensive master plan would address concerns regarding visitor traffic and parking. The Honolulu Zoo EA indicates that there are no long-term measures to mitigate increased parking and traffic demands created by the Zoo improvements. Traffic congestion and an insufficient number of parking spaces have significant adverse impacts which affect Kapiolani Park and its users. Thus, I believe that these impacts should be addressed before any proposed improvements to the Zoo are implemented.

Thank you for this opportunity to submit my comments.

Sincerely,

DONNA MERCADO KIM
Councilmember
Council District VII

cc: William Balfour, Department of Parks and Recreation
Councilmember Rene Mansho, Chair of Kapiolani Park Trustees

BELT COLLINS

May 12, 2000
141.0104/00P-125

Honorable Donna Mercado Kim
Council District VII
Honolulu Hale
530 South King Street
Honolulu, Hawaii 96813

Dear Councilmember Kim:

Response to Comment
Draft Environmental Assessment
for the Honolulu Zoo Master Plan

Thank you for your letter of January 21, 1998 concerning the Draft Environmental Assessment (EA) for the Honolulu Zoo Master Plan. Following is our response to your comments regarding traffic and parking impacts.

The Department of Design and Construction is presently working on a master plan for Kapiolani Park which will include provisions of the Zoo Master Plan.

A traffic impact study and a parking study have been conducted for the proposed project and their findings are summarized in the Final EA. Copies of the reports are presented as appendices to the document. The results of the traffic impact analysis indicate that increased traffic resulting from the proposed zoo improvements will have, at most, a small effect on average delays at the intersections during the peak hours and existing levels of service will not change. According to the study, the intersections would continue to operate at acceptable levels of service for urban conditions.

The results of the parking study indicate that 45 parking stalls should be added to the existing parking lot at the zoo. This additional parking can be accomplished through several measures that will not result in an expansion of the parking lot area beyond existing zoo property. In addition, the parking study recommends that approximately 130 parking stalls be added to Kapiolani Regional Park. This parking could be accomplished by reducing the width of portions of the 30-foot median on Kalakaua Avenue between Poni Moi Road and Monsarrat Avenue and repaving to provide space for diagonal parking stalls.

Sincerely yours,

BELT COLLINS HAWAII LTD.

Cheryl Palesh

CP:LS:lf

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MUFI HANNEMANN
COUNCILMEMBER
CHAIR, ECONOMIC DEVELOPMENT, PLANNING & TOURISM
(808) 547-7009
E-Mail: mufi@pixi.com

CITY COUNCIL

CITY AND COUNTY OF HONOLULU
HONOLULU, HAWAII 96813-3065 / TELEPHONE 547-7000

'97 JUL 31 A7:00
DEPT. OF PARKS & RECREATION C & C OF HONOLULU

July 30, 1997

Mr. W. D. Balfour
Acting Director
Department of Parks and Recreation
650 South King Street, 10th Floor
Honolulu, Hawaii 96813

Dear Mr. Balfour:

Thank you for granting me the opportunity to review the Draft Environmental Assessment for the Honolulu Zoo Master Plan. I have no comments to offer at this time. Mahalo.

Sincerely,

Mufi Hannemann

MFH:kb

cc: Managing Director

97-2120
7/31/97 MH

RECEIVED TIME AUG. 1. 7:41AM PRINT TIME AUG. 1. 7:43AM

BELT COLLINS

May 12, 2000
141.0105/00P-126

Honorable Mufi Hannemann
Council District VIII
Honolulu Hale
530 South King Street
Honolulu, Hawaii 96813

Dear Councilmember Hannemann:

Response to Comment
Draft Environmental Assessment
for the Honolulu Zoo Master Plan

Thank you for your letter of July 30, 1997 concerning the Draft Environmental Assessment (EA) for the Honolulu Zoo Master Plan. We appreciate your review of the document.

Sincerely yours,

BELT COLLINS HAWAII LTD.

Cheryl Palesh

CP:LS:lf

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SEP- 8-97 TUE 13:58 FAX NO. 808 523 4787 P. 01

To: Fax Note 7671	Date 9/9/97	pages 1
Cheryl Vana	From Dan Griffin	
Co./Dept. Belt Collins	Co. DPR	
Phone #	Phone # 527-6324	
Fax # 538-7819	Fax # 523-4767	

RENE MANSHO
COUNCILMEMBER, DISTRICT 1
[illegible]

CITY COUNCIL

CITY AND COUNTY OF HONOLULU
HONOLULU, HAWAII 96813-3065 / TELEPHONE 547-7000

August 29, 1997

via Managing Director

Mr. William Balfour, Director
Department of Parks and Recreation
City & County of Hawaii
650 S. King Street, 10th Floor
Honolulu, Hawaii 96813

Dear Mr. Balfour: Bill -

SUBJECT: Honolulu Zoo Draft Environmental Assessment

Thank you for the opportunity to review the Honolulu Zoo Draft Environmental Assessment for the Honolulu Zoo Master Plan.

I have no comments at this time.

Sincerely,

RENE MANSHO
Chair, Parks and Recreation Committee

RM:mt
zoodea.dpr

RECEIVED TIME SEP. 9. 1:49PM PRINT TIME SEP. 9. 1:50PM

BELT COLLINS

May 12, 2000
141.0105/00P-127

Honorable Rene Mansho
Council District 1
Honolulu Hale
530 South King Street
Honolulu, Hawaii 96813

Dear Councilmember Mansho:

Response to Comment
Draft Environmental Assessment
for the Honolulu Zoo Master Plan

Thank you for your letter of August 29, 1997 concerning the Draft Environmental Assessment (EA) for the Honolulu Zoo Master Plan. We appreciate your review of the document.

Sincerely yours,

BELT COLLINS HAWAII LTD.

Cheryl Palesh

CP:LS:lf

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INTEROFFICE
MEMORANDUM
(FOR INTERNAL DISTRIBUTION ONLY)

BELT COLLINS
HAWAII

To : Honolulu Zoo EA File #141-0104

From : Cheryl Vann

Subject : Comment letters for EA

Date : November 13, 1996

Christine Meller from the Office of State Planning called on October 11, 1996 to say that both the Office of State Planning and the Dept. of Business, Economic Development, and Tourism have NO COMMENT on the Honolulu Zoo EA.

October 15, 1996 BOULEVARD, FIRST FLOOR, HONOLULU, HAWAII 96813-5406. TEL: (808) 521-5361, FAX: (808) 538-7819
LANDSCAPE ARCHITECTURE • PLANNING • ENGINEERING • ENVIRONMENTAL CONSULTING

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CHAPTER 9
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– Environmental Assessment for Honolulu Zoo Master Plan –

PARKING STUDY

HONOLULU ZOO / KAPIOLANI REGIONAL PARK

PARKING STUDY

Prepared For:
CITY AND COUNTY OF HONOLULU
DEPARTMENT OF DESIGN AND CONSTRUCTION
650 South King Street, 2nd Floor
Honolulu, Hawaii 96813

Prepared By:
BELT COLLINS HAWAII, LTD.
680 Ala Moana Boulevard, First Floor
Honolulu, Hawaii 96813

and

JULIAN NG, INC.
P.O. Box 816
Kaneohe, Hawaii 96744-0816

FEBRUARY 2000

TABLE OF CONTENTS

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LIST OF EXHIBITS

LIST OF APPENDICES

CHAPTER 1
INTRODUCTION

1.0 PURPOSE OF STUDY

An updated master plan for the Honolulu Zoo was completed in 1993. The updated plan was based on accommodating a projected 1.65 million annual visitors by fiscal year (FY) 2020-2021, an increase of 161 percent over the existing (FY1997-1998) visitation of 632,000.

Questions have arisen as to how parking for the projected increase in Honolulu Zoo visitors will be provided. The purpose of this parking study is to address the issue of parking for the Honolulu Zoo and includes other parts of Kapiolani Regional Park and the Waikiki War Memorial (Natatorium).

The parking study reviews activities at the Honolulu Zoo and the other parts of Kapiolani Regional Park, and the expected use of the restored Natatorium. These activities are then related to parking demand. This study report includes an inventory of existing parking, parking utilization surveys, and an assessment of future parking needs of Kapiolani Regional Park, including the Honolulu Zoo, and the Natatorium.

CHAPTER 2
EXISTING CONDITIONS

2.0 SETTING OF KAPIOLANI REGIONAL PARK

Kapiolani Regional Park is located at the south end of Waikiki, at the western base of Diamond Head crater (Exhibit 1: Project Location and Vicinity Map). The 42-acre Honolulu Zoo site is bounded by Kapahulu Avenue, Paki Avenue, Monsarrat Avenue, and Kalakaua Avenue. The Honolulu Zoo's neighbors to the north across Kapahulu Avenue are hotels, shops, residential apartments, and Thomas Jefferson Elementary School. To the east across Paki Avenue are the Waikiki Fire Station, the Paki Community Center, and the Queen Kapiolani Rose Garden. The Waikiki Shell and the remainder of Kapiolani Regional Park are located south of Monsarrat Avenue.

The largest portion of Kapiolani Regional Park (87± acres) is bounded by Monsarrat Avenue, Paki Avenue, Poni Moi Road, and Kalakaua Avenue. Other park activities are located west of Kalakaua Avenue and east of Paki Avenue. The Waikiki Playground and Paki Hale (Winstedt House) are located between Paki Avenue and Leahi Avenue. Waikiki Elementary School and residential uses are located across Leahi Avenue to the east. The City and County of Honolulu's (City's) plant nursery, the Diamond Head Tennis Center, and archery ranges are located east of Paki Avenue at the southern end of the park; the Hawaii School for Girls (La Pietra) is the neighbor to the east. Residential apartments are located to the south across Poni Moi Road. The Natatorium and other park-type uses, such as the Kapiolani Park Beach area, the Waikiki Aquarium, and Sans Souci Beach, are located west of Kalakaua Avenue. Residential apartments, resort hotels, shops, the Outrigger Canoe Club facility, and the Elks Lodge are also located west of Kalakaua Avenue.

The 87-acre portion of Kapiolani Regional Park includes the Waikiki Shell, the Kapiolani Bandstand, tennis courts, picnic areas, and fields for team sports (soccer, softball, and rugby). Two soccer fields are located in the area between the Waikiki Shell and Paki Avenue, which was formerly a golf driving range. Activities within Kapiolani Regional Park include scheduled games and practices for organized team sports, events at the Waikiki Shell and at Kapiolani Bandstand, picnics, cultural festivals, tennis matches, race events, and other activities.

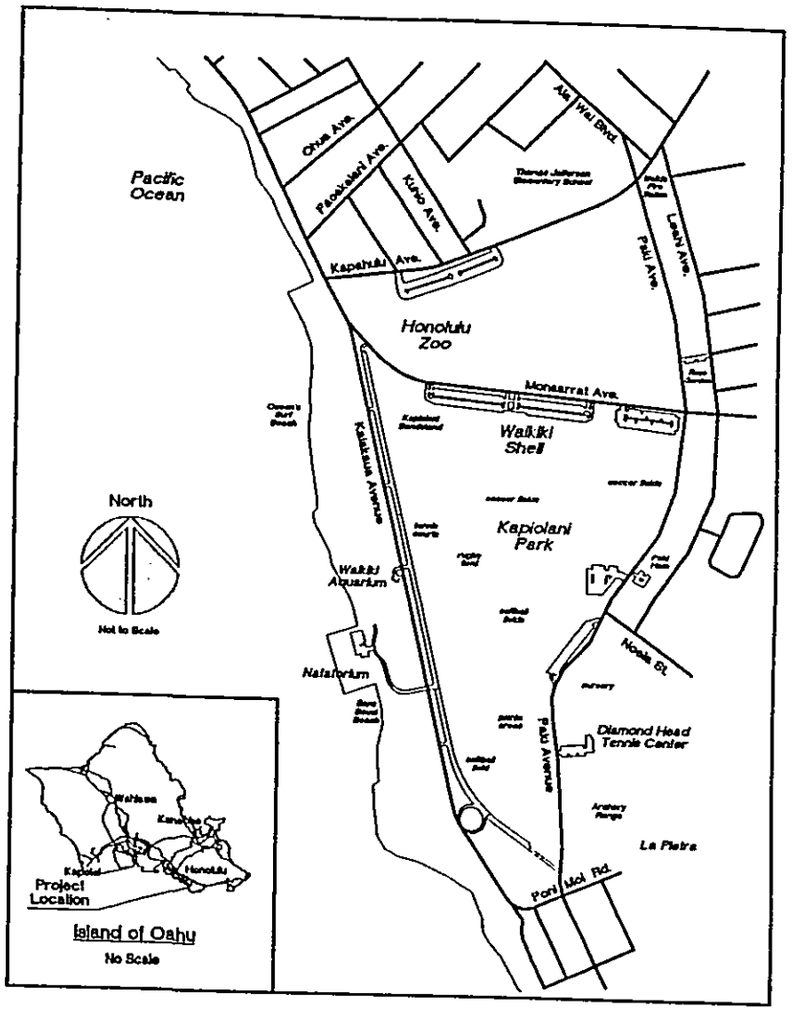

Exhibit 1 - Project Location and Vicinity Map

2.1 DESCRIPTION OF EXISTING STREET SYSTEM IN THE AREA

The streets serving the park are under the jurisdiction of the City and County of Honolulu Department of Transportation Services. The street system operates as an extension of the one-way couplet in Waikiki, where southbound traffic is served primarily on Kalakaua Avenue and northbound traffic on Ala Wai Boulevard. Paki Avenue, while it serves two-way traffic from Poni Moi Road to Kapahulu Avenue, feeds northbound traffic into Ala Wai Boulevard. The makai (toward the ocean) half of Kalakaua Avenue between Monsarrat Avenue and Poni Moi Road serves southbound traffic, while the northbound mauka (toward the mountains) half is functionally a parking lot for Kapiolani Regional Park. Monsarrat Avenue and Poni Moi Road serve as one-way links between the major couplet roads.

Kapahulu Avenue serves two-way traffic, and between Kalakaua Avenue and Paki Avenue, generally has one lane for traffic and one lane for parking or loading in each direction. A second eastbound (maukabound) lane between Kuhio Avenue and Paki Avenue is available when parking is prohibited during the peak period (3:30 P.M. TO 5:30 P.M.) on weekday afternoons.

Monsarrat Avenue serves one-way traffic eastbound from Kalakaua Avenue to Paki Avenue. The street is striped for two lanes of traffic and parallel parking is allowed, without any time restrictions, on both sides of the street. A major bus stop and terminus for the City bus system is located on Monsarrat Avenue near the Queen Kapiolani Bandstand. Other buses (school buses, tour buses and limousines) also use Monsarrat Avenue near Paki Avenue as a staging and parking area.

Paki Avenue varies in width and section, from two paved lanes in an uncurbed cross-section between Poni Moi Road and Noela Street to three lanes (curbed) between Monsarrat Avenue and Kapahulu Avenue. Parking is not permitted on the paved portions of Paki Avenue. Poni Moi Road between Kalakaua Avenue and Paki Avenue is a one-way eastbound (maukabound) road that links Kalakaua Avenue to Diamond Head Road.

Kalakaua Avenue between Monsarrat Avenue and Poni Moi Street makai of the grassed median is a one-lane southbound roadway with marked, unmetered parking parallel to the right (makai) curb. Mauka of the median, a parking lot for Kapiolani Regional Park has angled parking (metered or reserved) along the mauka curb and serves northbound traffic. A bike lane is provided makai of the single traffic lane on each side of the median. Six openings in the median provide access between the makai street and the mauka parking lot.

2.2 CURRENT ACTIVITIES AT KAPIOLANI REGIONAL PARK, INCLUDING THE HONOLULU ZOO

The Honolulu Zoo is open 363 days per year (every day except Christmas Day and New Year's Day), between 9:00 A.M. AND 4:30 P.M. Admission is charged for visits to the Honolulu Zoo. Discounted admission and a one-year family pass are also available to kamaaina (local residents).

Attendance at the Honolulu Zoo varies through the year, with the highest visitation occurring during the summer months. The scheduling of special events, such as evening concerts, as well as school vacation, better weather and more leisure time for residents during summer months are the primary reasons for the higher attendance. Table 2-1 shows zoo attendance statistics for three recent fiscal years.

Table 2-1
Honolulu Zoo Attendance

	Total Attendance				Kamaaina Rate and 1-Year Pass Entries			
Fiscal Year	95-96	96-97	97-98	%*	95-96	96-97	97-98	%*
July	75,441	74,178	76,485	141.5%	16,548	13,408	14,439	117.7%
August	75,650	66,532	66,360	130.5%	16,984	15,185	14,933	124.9%
September	39,496	41,489	37,892	74.4%	10,551	10,425	9,768	81.5%
October	45,353	40,373	45,169	81.9%	12,402	10,313	8,845	83.7%
November	41,037	34,784	40,705	72.9%	10,762	8,708	10,578	79.7%
December	45,098	42,769	44,288	82.7%	9,311	7,126	7,752	64.1%
January	52,078	50,787	48,672	94.9%	13,948	12,695	13,036	105.2%
February	53,135	51,337	48,086	95.5%	13,724	14,105	12,675	107.4%
March	70,262	61,974	58,944	119.7%	19,100	14,404	16,116	131.5%
April	56,651	48,780	43,600	93.3%	12,379	11,478	10,438	90.9%
May	50,657	50,207	53,574	96.7%	12,735	13,399	13,132	104.1%
June	56,846	60,121	68,213	115.9%	13,047	15,201	13,010	109.4%
Annual total	661,704	623,331	631,988		161,491	146,447	144,722	

*100% = average month
Source: Honolulu Zoo

Visitors to the Honolulu Zoo arrive on foot, bicycles, mopeds, and motorcycles, as well as in private automobiles, taxis, limousines, tour buses, and City buses. A metered parking lot is located between Kapahulu Avenue and the Honolulu Zoo; parking is also available at no charge on Monsarrat Avenue or in the nearby lot fronting Waikiki Shell and Kapiolani Bandstand.

Special events include zoo-sponsored activities that are open to the general public, either during regular hours or after hours, and private, after-hours events on the Honolulu Zoo grounds. Table 2-2 lists the special events scheduled for 1998. Daytime special events usually coincide with the regular open hours at the Honolulu Zoo, beginning at 9:00 A.M. or 10:00 A.M. and ending at 3:00 P.M. Evening activities occur after regular hours, and end no later than 10:00 P.M.

Table 2-2
Honolulu Zoo Special Events – 1998

Date of Event	Time of Event	Event
February 14, 1998	evening	Zoorotica
March 22, 1998	morning	Fun run
April 4, 1998	day	MS Society
April 8, 1998	evening	MC&A Party
April 11, 1998	day	Easter Event
April 17, 1998	evening	Current Affairs
April 25, 1998	evening	school event
May 10, 1998	day	Mothers' Day
June 3, 1998	evening	Wildest Show
June 10, 1998	evening	Wildest Show
June 17, 1998	evening	Wildest Show
June 24, 1998	evening	Wildest Show
July 1 1998	evening	Wildest Show
July 8, 1998	evening	Wildest Show
July 15, 1998	evening	Wildest Show
July 22, 1998	evening	Wildest Show
July 29, 1998	evening	Wildest Show
August 1, 1998	day	Children's Fest
August 5, 1998	evening	Wildest Show
August 12, 1998	evening	Wildest Show
August 19, 1998	evening	Wildest Show
August 22, 1998	evening	private picnic
August 26, 1998	evening	Wildest Show
September 12, 1998	evening	Zoofari
September 13, 1998	day	Aloha Festivals
October 21, 1998	evening	Boo in the Zoo
December 18, 1998	evening	Zoo Lites
December 19, 1998	evening	Zoo Lites
December 20, 1998	evening	Zoo Lites
December 26, 1998	evening	Zoo Lites

Source: Honolulu Zoo

Use of other parts of Kapiolani Regional Park varies. Adult rugby and soccer games, youth soccer games, softball games, tennis tournaments, running events, and other sport activities are scheduled throughout the year. The Kodak Hula Show is held three days a week at the Waikiki Shell. Major festivals are scheduled on holiday weekends and at other times. The Honolulu Marathon and other running events also use the park.

A review of the 300± permits issued for use of Kapiolani Regional Park indicate that there were about 140 events for which the anticipated participation was 100 or more persons. Table 2-3 lists the major events (500 or more persons) held at Kapiolani Regional Park in 1998.

Table 2-3
Kapiolani Regional Park Special Events – 1998

Date of Event	Event	Park Area Used	Participants
March 17, 1998	St. Patrick's Day Parade	Shell Parking Lot	500
March 22, 1998	Zoological Society Fundraiser	Shell Parking Lot	2,000
March 26-29, 1998	Youth Soccer Tournament	Soccer Fields	2,500
April 7 & 14, 1998	Band Concert	Bandstand	500
May 16, 1998	Charity Walk (end)	Bandstand	9,000
June 7, 1998	Hawaiian Humane Society Petwalk	Bandstand	2,000
June 13, 1998	Overnight Fundraiser	Soccer Field	1,000
June 20, 1998	Parade & Festival	Bandstand	500
July 10, 1998	Picnic	Luau	600
July 28-August 2, 1998	Youth Soccer Tournament	Soccer Fields	2,000
August 15, 1998	Cultural Festival	Bandstand, Rugby Field	500
September 5-6, 1998	Cultural Festival	Bandstand, Rugby Field	10,000
September 6, 1998	Open Ocean Swim	Sans Souci Beach	1,000
September 25, 1998	School Picnic	Picnic Areas	1,150
October 6, 1998	School Picnic	Picnic Areas	600
October 10, 1998	Picnic	Bandstand	1,000
October 25, 1998	Races	Bandstand	1,000
November 8, 1998	Half Marathon	Bandstand	1,000
November 26, 1998	Turkey Trot	Bandstand	700
December 6, 1998	5K Running Event	Bandstand	500
December 13, 1998	Marathon	Bandstand	30,000
December 20-24, 1998	Cheerleading Practice	Rugby & Soccer Fields	500

Source: City and County of Honolulu, Department of Parks & Recreation

Table 2-3 above does not list events at the Waikiki Shell, which included concerts and other performances, graduation ceremonies, and the Kodak Hula Show, which is staged every Tuesday, Wednesday, and Thursday at 10:00 A.M.

Other activities also occur and, during a typical week, use of the park varies. The Royal Hawaiian Band performs on Sundays from 12:45 P.M. to 3:30 P.M. at the Kapiolani Bandstand. A farmers' market is held at the parking lot near the intersection of Monsarrat and Paki Avenues on Wednesday mornings. Youth soccer teams hold practices on weekday afternoons and compete in games on Saturdays during the fall and spring seasons. Softball leagues and soccer practices use their respective fields during weekends and in the late afternoons on weekdays throughout the year. Unorganized activity on weekdays, such as jogging and picnics, generally occur in the late afternoons. Activity is usually heavier on Saturdays and Sundays, even when there are no special events.

The Natatorium has been closed since 1979. The Honolulu City Council approved permits for the restoration of the Natatorium on December 2, 1998. A partial restoration of the spectator stands is currently underway, with restoration of the saltwater pool to start after issuance of permits from the State Department of Health (DOH).

CHAPTER 3
PARKING STUDY

3.0 PARKING STUDY

A study was conducted of parking in the vicinity of Kapiolani Regional Park, including the Honolulu Zoo. The parking study included an inventory of the parking spaces available and surveys of parking utilization on several days of the week.

The inventory included a compilation of the number of spaces in the various parking areas within the area defined by Kapahulu Avenue, Kalakaua Avenue, Poni Moi Road, and Paki Avenue. Public parking lots that are accessed from these streets were also included. Parking lots that are private or reserved for non-park use, such as those for the New Otani Kaimana Beach Hotel, Elks Lodge, Outrigger Canoe Club, and Thomas Jefferson Elementary School, were not included in the inventory.

The parking survey was conducted in February 1998, during which time activity at the zoo and in the park was somewhat below average. This time was selected so that parking demand could be better gauged, since parking surveys done during periods of high demand may not reflect the demand as more drivers are searching for parking or may be parking away from the Kapiolani Regional Park area.

3.1 PARKING INVENTORY

An inventory of the parking spaces within Kapiolani Regional Park and in adjacent public areas was taken to determine the number of existing parking spaces available for Kapiolani Regional Park, including the Honolulu Zoo. Record plans were obtained from the Department of Parks and Recreation and the Department of Transportation Services. The numbers of marked spaces in metered and unmetered areas were verified in the field, accounting for changes that may have occurred and for spaces that may be temporarily unavailable. The discussion herein is based on the inventory taken in February 1998.

The marked spaces include reserved spaces for permitted accessible vehicles and for lifeguards and other City staff. Parking meters are used in the Honolulu Zoo parking lot, in the ewabound Kalakaua Avenue (mauka side) lot, and on Kapahulu Avenue to help in the enforcement of time limits established for those parking areas. Exhibit 2 and Table 3-1 summarize the marked parking spaces that are available in several areas around Kapiolani Regional Park.

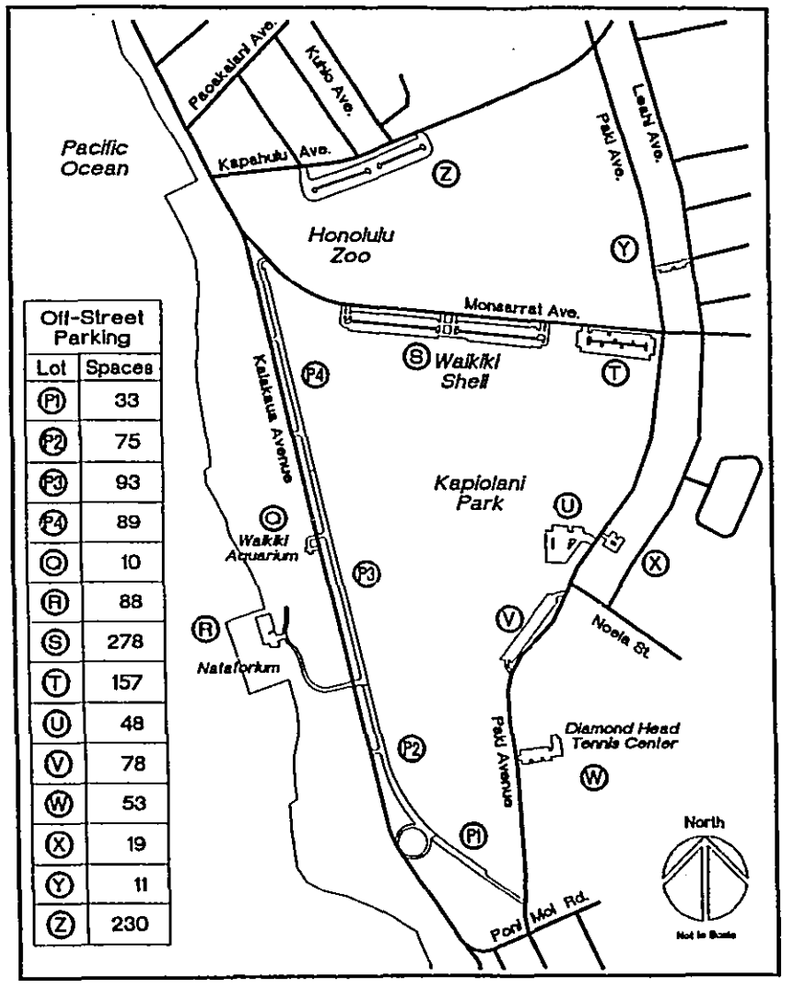

Exhibit 2 – Off-Street Parking Lots

Table 3-1
Marked Parking Spaces

location Code*	Description	A**	B**	C**
-	Kalakaua Avenue, makai side, Monsarrat Avenue to Waikiki Aquarium	0	3	38
-	Kalakaua Avenue, makai side, Waikiki Aquarium to Natatorium	0	0	19
-	Kalakaua Avenue, makai side, Natatorium to fountain	0	0	11
-	Kalakaua Avenue, makai side, fountain to Poni Moi Road	0	0	7
P1	Kalakaua Avenue, mauka side, Poni Moi Road to fountain	2	0	31
P2	Kalakaua Avenue, mauka side, fountain to Natatorium	2	0	73
P3	Kalakaua Avenue, mauka side, Natatorium to crosswalk	1	0	92
P4	Kalakaua Avenue, mauka side, crosswalk to Monsarrat Avenue	2	11	76
Q	Parking lot at Waikiki Aquarium	1	0	9
R	Natatorium roadway and lots	3	2	83
S	Waikiki Shell and Kapiolani Bandstand	9	5	264
T	Lot near Monsarrat Avenue and Paki Avenue	6	0	151
U	Lot at former golf driving range	2	0	46
V	Lot parallel to Paki Avenue	5	0	73
W	Lot at Diamond Head Tennis Center	2	0	51
X	Parking lot at Paki Hale	2	0	17
Y	Parking lot at Queen Kapiolani Rose Garden	0	0	11
Z	Honolulu Zoo parking lot	9	4	217
-	Kapahulu Avenue, fronting Honolulu Zoo lot	0	0	10
-	Kapahulu Avenue, mauka of Honolulu Zoo lot	0	0	35
	Total – 1,385 Marked Parking Spaces	46	25	1,314

* location indicated in Exhibit 2
** A = Americans with Disabilities Act (ADA) accessible spaces (for use with permit only)
** B = other reserved spaces (for lifeguards or other City staff)
** C = available for general public
Source: City and County of Honolulu, Department of Parks and Recreation

In addition, parking is permitted curbside along Monsarrat Avenue and along the shoulders of uncurbed portions of Paki Avenue. On Monsarrat Avenue, there is approximately 1,560 lineal feet of curbspace available for parallel parking. Using an average of 22 feet per vehicle, there would be a capacity for parking 71 cars along Monsarrat Avenue.

On Paki Avenue, parking occurs along the makai side between parking lots "U" and "V," between parking lot "V" and Poni Moi Road, and on the mauka side between Poni Moi Road and Monsarrat Avenue. Parking along Paki Avenue, where permitted, is generally parallel to the street. However, in the area mauka of Paki Avenue between Monsarrat Avenue and Noela Street, the shoulder is about 20 feet wide and parking is usually perpendicular to the street. Illegal parking (parallel and

angled) was observed along the makai shoulder of Paki Avenue fronting parking lots "U" and "V". Table 3-2 shows the estimated parking capacities in each area.

Table 3-2
Unmarked Parking Spaces

Description	Number of Cars
Monsarrat Avenue, between Kalakaua Avenue and Honolulu Zoo exit	28
Monsarrat Avenue, between Honolulu Zoo exit and Waikiki Shell lot mauka driveway	35
Monsarrat Avenue, between Waikiki Shell lot mauka driveway and Paki Avenue	8
Paki Avenue, makai side, lot "V" to Poni Moi Road	49
Paki Avenue, mauka side, Poni Moi Road to Tennis Courts	22
Paki Avenue, mauka side, tennis courts to Paki Hale	42
Paki Avenue, mauka side, Paki Hale to Monsarrat Avenue	45
Total legal spaces	229
Paki Avenue, makai side, fronting lots "U" and "V" (illegal spaces)	41
Total	270

Unmarked parking spaces can accommodate another 229 vehicles legally; the total legal spaces available for the general public in the Kapiolani Regional Park/Honolulu Zoo vicinity is 1,543 spaces (1,314 marked spaces plus 229 unmarked spaces). Cars parked illegally along Paki Avenue during the survey totaled 41.

3.2 PARKING SURVEY

Field surveys were taken in February 1998 to determine parking demand. Two teams, each consisting of a driver and a recorder, circulated through the parking areas within Kapiolani Regional Park area, noting the parking utilization at 20-minute intervals between 8:00 A.M. and 6:00 P.M. Surveys were conducted on Friday, February 20; Saturday, February 21; Sunday, February 22; and Wednesday, February 25, 1998. Data from the surveys are appended to this report (Appendix A). The parking surveys were conducted by making observations of parking lot/area use from the circulating vehicles. No user interviews were conducted as part of the parking survey.

3.2.1 ADA Accessible and Reserved Spaces

As part of the survey, the use of the Americans with Disabilities Act (ADA) accessible spaces and the reserved spaces was identified. During the survey, there was always at least one ADA accessible space available in each of six large subareas of the park, as shown in Table 3-3. Reserved spaces for lifeguards or other City staff were also not completely used.

Table 3-3
Parking Occupancy in ADA Accessible Spaces
(46 spaces available)

	8 A.M. – 10 A.M.	10 A.M. – noon	noon – 2 P.M.	2 P.M. – 4 P.M.	4 P.M. – 6 P.M.	Average for Day	Maximum Counted
Kalakaua Avenue (7 spaces available)							
Wednesday	1	1	3	4	2	2	6
Friday	1	1	3	2	1	2	5
Saturday	1	3	3	2	3	2	4
Sunday	2	2	3	5	3	3	5
Waikiki Aquarium and Natatorium (4 spaces available)							
Wednesday	1	0	1	1	0	1	2
Friday	1	0	1	1	0	1	2
Saturday	0	1	1	0	0	0	2
Sunday	0	1	2	2	1	1	3
Waikiki Shell and Kapiolani Bandstand (9 spaces available)							
Wednesday	1	2	0	0	0	1	4
Friday	0	0	0	0	0	0	0
Saturday	0	0	0	0	0	0	1
Sunday	0	1	2	3	2	1	3
Tennis Center (2 spaces available)							
Wednesday	0	0	1	1	1	1	2
Friday	0	0	1	1	1	1	2
Saturday	0	0	0	0	0	0	1
Sunday	0	0	0	0	0	0	0
Other Paki Avenue Lots (15 spaces available)							
Wednesday	1	1	0	0	1	0	2
Friday	2	0	0	0	0	0	3
Saturday	1	4	2	1	0	2	6
Sunday	1	2	1	1	3	2	4
Honolulu Zoo Lot (9 spaces available)							
Wednesday	2	3	3	3	3	3	3
Friday	0	5	5	1	1	2	8
Saturday	0	6	3	4	2	3	8
Sunday	1	1	6	8	6	4	9

3.2.2 Parking Survey – General Results

The majority of parking spaces is available for use on a first-come basis. The total utilization of parking in the areas included in the study is shown in Table 3-4. Exhibits 3, 4, 5, and 6 show the occupancy of various parking lots.

Table 3-4
Parking Occupancy in Kapiolani Regional Park Area
(1,543 spaces available)

Survey Day	8 A.M. – 10 A.M.	10 A.M. – noon	noon – 2 P.M.	2 P.M. – 4 P.M.	4 P.M. – 6 P.M.	Average for Day	Maximum Counted
Wednesday	623	786	772	749	846	755	952
Friday	586	837	789	736	820	754	845
Saturday	752	1,077	1,180	1,060	856	985	1,209
Sunday	772	1,052	1,172	1,237	963	1,039	1,272

The highest numbers of cars parked in all areas on Wednesday and Friday during the survey period were recorded at 5:30 P.M. The highest numbers of parked cars during the weekend were recorded at 12:45 P.M. on Saturday and at 2:15 P.M. on Sunday. In terms of overall parking at Kapiolani Regional Park, the highest number of cars parked (1,272 on Sunday afternoon) occupied 82.4 percent of the total available spaces (1,543 marked and legal unmarked spaces) in the area.

Parking demand varied by area due to the locations of activities at various parts of the park. Parking demand was well distributed, with the exception of the parking areas near the intersection of Monsarrat and Paki Avenues, which were usually underutilized. Tables 3-5 through 3-19 show the utilization of the available spaces (other than ADA accessible spaces and those reserved for lifeguards and other City staff).

3.2.3 Parking Survey – Kalakaua Avenue, Makai Side

Parking is permitted along most of the makai curb on the makai side of Kalakaua Avenue, with parallel parking provided in marked spaces (see Table 3-5). A passenger loading zone and two reserved spaces are designated between Monsarrat Avenue and the Waikiki Aquarium. Several areas were unavailable during the parking surveys because of construction activities. Utilization of the unrestricted curbside parking was high throughout each day (>90 percent occupied) with little turnover. Unoccupied spaces, when available, were more likely in the area between Monsarrat Avenue and the Waikiki Aquarium.

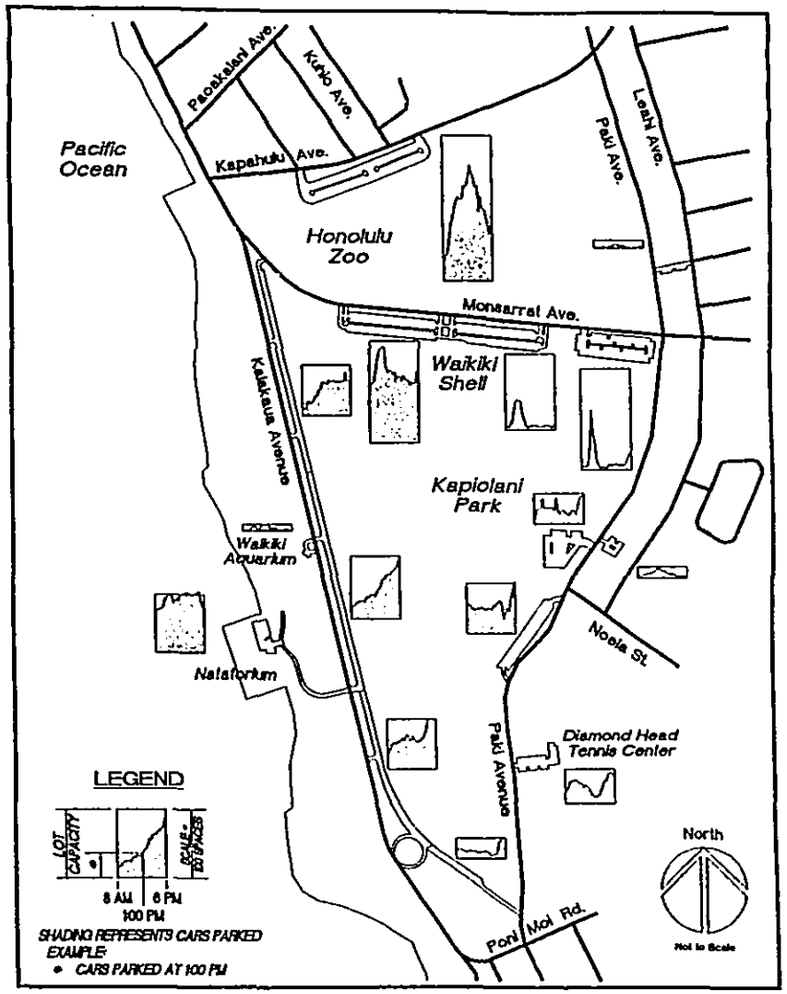

Exhibit 3 – Parking in Lots During Survey (Wednesday)

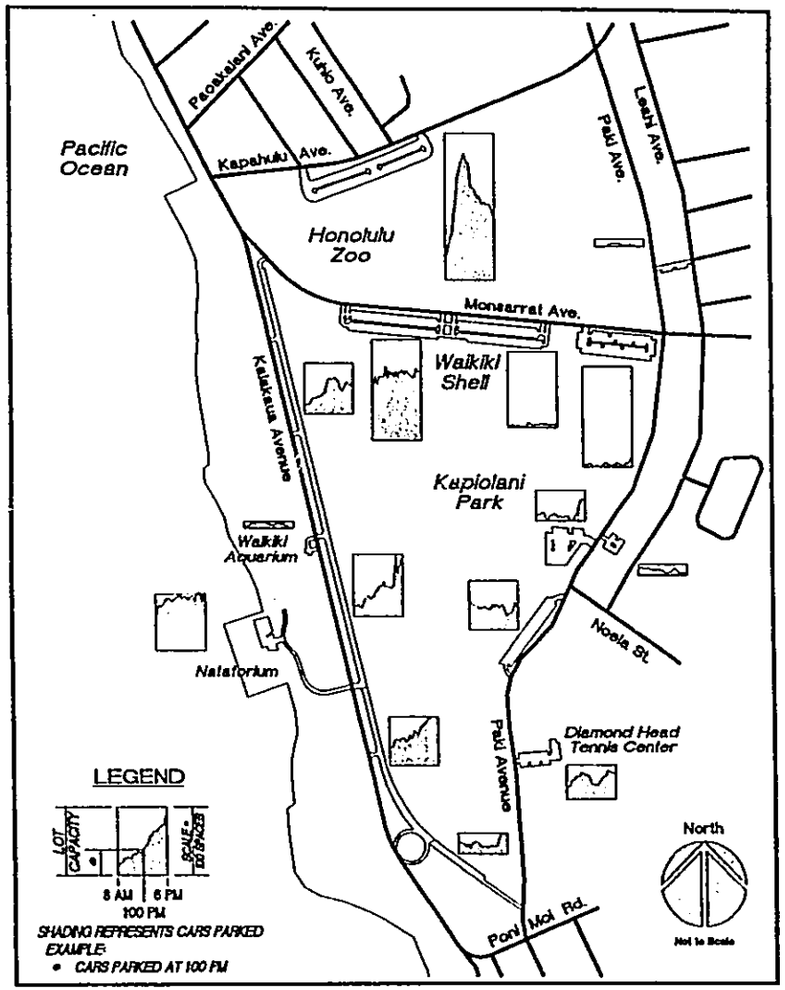

Exhibit 4 - Parking in Lots During Survey (Friday)

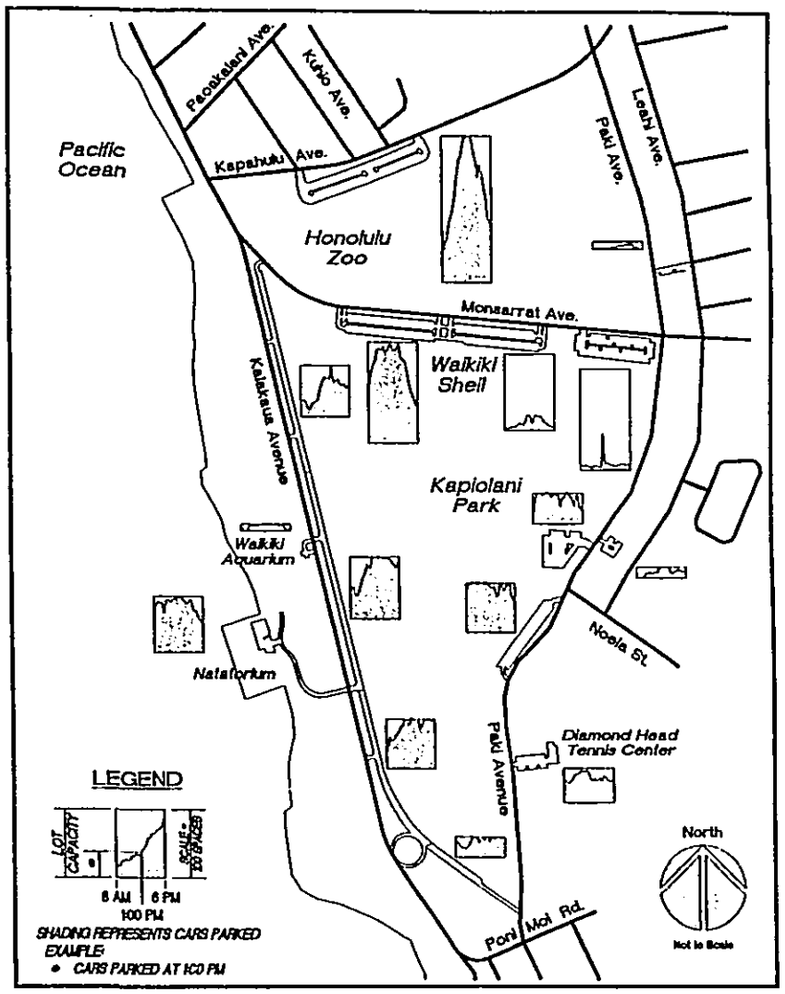

Exhibit 5 - Parking in Lots During Survey (Saturday)

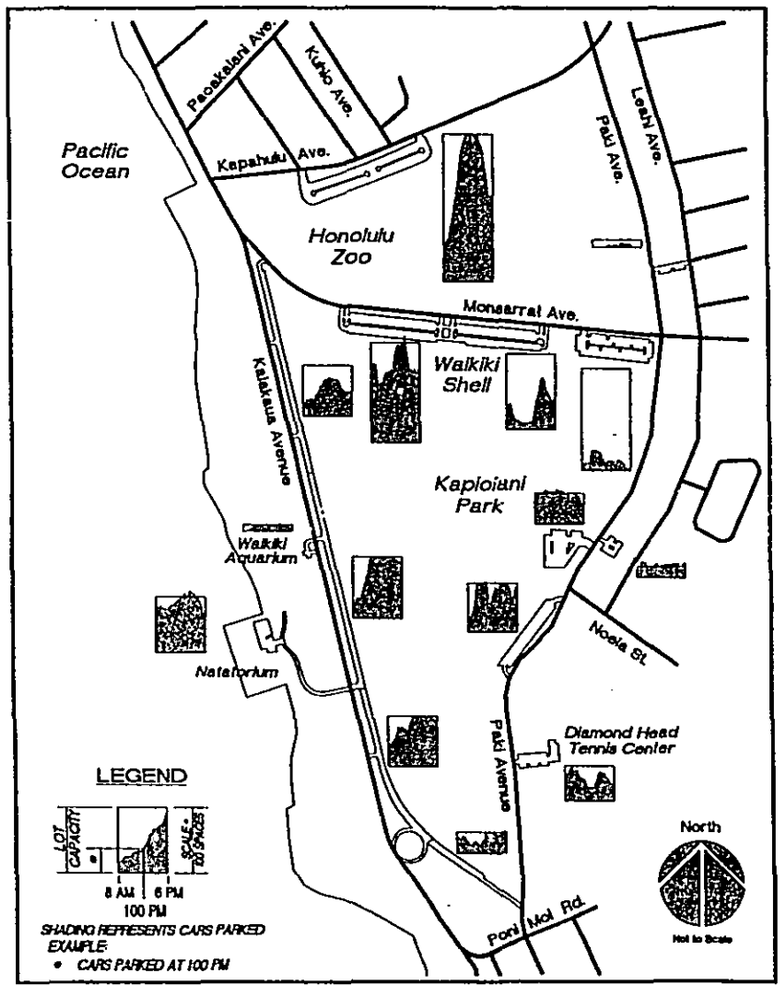

Exhibit 6 – Parking in Lots During Survey (Sunday)

Illegally parked vehicles (in no-parking areas or outside of parking stalls) were counted during the survey, resulting in more cars parked along the curb than the number of available spaces in several of the runs; illegal parking occurred during much of the midday on Sunday. Illegal parking along Kalakaua Avenue generally occurred between the Natatorium roadway and Poni Moi Road.

Table 3-5
Parking Occupancy on Kalakaua Avenue, Makai Side
(75 spaces available)

Survey Day	8 A.M. – 10 A.M.	10 A.M. – noon	noon – 2 P.M.	2 P.M. – 4 P.M.	4 P.M. – 6 P.M.	Average for Day	Maximum Counted
Wednesday	69	71	74	74	74	72	78
Friday	71	72	75	72	72	72	75
Saturday	67	72	75	74	73	68	78
Sunday	72	76	77	85	82	78	88

3.2.4 Parking Survey – Kalakaua Avenue, Mauka Side

The mauka side of Kalakaua Avenue between Paki Avenue and Monsarrat Avenue is a parking lot for Kapiolani Regional Park users (see Table 3-6). Of the nearly 300 angled spaces located along the mauka curb, seven are designated ADA accessible spaces and 11 are reserved for lifeguards; the remaining 272 spaces are metered with a four-hour time limit at $0.25 per hour, effective between 10:00 A.M. and 6:00 P.M. for every day of the week. Field observations indicate that these spaces are used by beachgoers, other park users, and employees and visitors to hotels and other buildings makai of Kalakaua Avenue. The highest use on weekdays occurred after 4:00 P.M. The maximum number of cars counted in the unrestricted spaces on Kalakaua Avenue was 269 (98.9 percent occupied) at 2:15 P.M. on Saturday.

Table 3-6
Parking Occupancy on Kalakaua Avenue, Mauka Side
(272 spaces available)

Survey Day	8 A.M. – 10 A.M.	10 A.M. – noon	noon – 2 P.M.	2 P.M. – 4 P.M.	4 P.M. – 6 P.M.	Average for Day	Maximum Counted
Wednesday	84	114	143	159	229	146	242
Friday	78	108	146	164	216	142	240
Saturday	120	183	244	245	231	193	269
Sunday	105	173	232	236	221	194	253

3.2.5 Parking Survey – Waikiki Aquarium and Natatorium

The Waikiki Aquarium lot consists of 10 unmetered spaces located around a "U" shaped driveway; one space is a reserved ADA accessible space (see Table 3-7). All of the spaces are designated for Aquarium users only with a two-hour time limit (the Waikiki Aquarium is open for public visitation

every day except Christmas Day, typically between 9:00 A.M. and 5:00 P.M.). In general, the Aquarium lot was full during the hours that the Aquarium was open (double-parked vehicles without a driver were counted as parked, resulting in a maximum count greater than the number of available spaces).

Table 3-7
Parking Occupancy in Waikiki Aquarium Lot
(9 spaces available)

Survey Day	8 A.M. – 10 A.M.	10 A.M. – noon	noon – 2 P.M.	2 P.M. – 4 P.M.	4 P.M. – 6 P.M.	Average for Day	Maximum Counted
Wednesday	2	5	7	2	2	3	9
Friday	4	9	6	7	2	5	10
Saturday	3	8	9	9	4	6	9
Sunday	1	8	9	9	7	7	10

The access roadway to the Natatorium is a narrow, curbed roadway with marked, parallel parking spaces on both sides (see Table 3-8). In addition, perpendicular parking is provided in two paved lots adjacent to the Natatorium structure. The parking along the roadway was well used throughout the day with little turnover observed during the survey and at other times. The parking lots near the Natatorium appear to be used primarily by non-park users (residents or employees of nearby hotels and businesses) and beachgoers (cars parked illegally or out of the marked space were individually counted, resulting in counts where there were more cars parked than the available spaces).

Table 3-8
Parking Occupancy at Natatorium, on Access Road and in Lots
(83 available)

Survey Day	8 A.M. – 10 A.M.	10 A.M. – noon	noon – 2 P.M.	2 P.M. – 4 P.M.	4 P.M. – 6 P.M.	Average for Day	Maximum Counted
Wednesday	62	79	80	84	79	77	88
Friday	62	75	79	77	82	75	86
Saturday	72	73	81	74	54	68	83
Sunday	67	69	81	87	66	74	82

3.2.6 Parking Survey – Waikiki Shell

The large parking lot fronting the Waikiki Shell and the Kapiolani Bandstand is used for activities at those sites, as well as by beachgoers, users of the adjacent park area, and visitors to the Honolulu Zoo (see Table 3-9). The high use recorded on Wednesday is attributed to the Kodak Hula Show, which is held at 10:00 A.M. (shows typically last an hour and fifteen minutes, and occur every Tuesday, Wednesday, and Thursday, except Fourth of July, Thanksgiving Day, Christmas Day, and New Year's Day).

The parking in the Waikiki Shell/Kapiolani Bandstand lot that is related to park activities was heavier in the makai half of the lot, which is closer to the bandstand, picnic areas, the shoreline, and the Honolulu Zoo. The mauka half of the lot was generally underutilized by non-Shell event parking, except as an overflow of the makai half. Limousines and tour vans observed parked in the mauka half of the lot apparently use the lot as a waiting or staging area.

The highest occupancy of the Waikiki Shell/Kapiolani Bandstand lot was recorded on Sunday at 2:45 PM, when 235 of the 264 available spaces were used (89.0 percent occupancy). Use of the spaces in this lot after 4:00 P.M. on Sunday may have been affected by a special event held that night, both in increased demand due to the event and decreased use due to the reserved parking signs posted in front of a substantial number of spaces.

Table 3-9
Parking Occupancy at Waikiki Shell/Kapiolani Bandstand Lot
(264 spaces available)

Survey Day	8 A.M. – 10 A.M.	10 A.M. – noon	noon – 2 P.M.	2 P.M. – 4 P.M.	4 P.M. – 6 P.M.	Average for Day	Maximum Counted
Wednesday	111	164	109	100	99	117	186
Friday	93	103	106	107	88	99	114
Saturday	116	145	161	145	78	124	173
Sunday	133	109	145	203	157	149	235

3.2.7 Parking Survey – Paki Avenue Lots

The parking lot near the intersection of Monsarrat Avenue and Paki Avenue (lot "T" in Exhibit 2) is adjacent to several soccer fields (see Table 3-10). This lot generally has few users. The weekly farmers' market is held on Wednesdays between 10:00 A.M. and 11:00 A.M. During the Wednesday survey, 43 vehicles were counted at 9:45 A.M., 90 vehicles at 10:05 A.M., and 52 vehicles at 10:25 A.M. The only other significant use of this lot occurred on Sunday, between 10:00 A.M. and noon, when a maximum of 30 vehicles was parked.

Table 3-10
Parking Occupancy at Parking Lot near Monsarrat and Paki Avenues
(151 spaces available)

Survey Day	8 A.M. – 10 A.M.	10 A.M. – noon	noon – 2 P.M.	2 P.M. – 4 P.M.	4 P.M. – 6 P.M.	Average for Day	Maximum Counted
Wednesday	12	34	5	8	16	15	90
Friday	4	2	5	4	6	4	14
Saturday	6	5	11	7	8	9	13
Sunday	8	28	14	13	6	14	30

A small parking lot (lot "U") located makai of Paki Avenue between Monsarrat Avenue and Noela Street formerly served a golf driving range (see Table 3-11). A single driveway from Paki Avenue provides access to the lot, which is in the shape of a lowercase "b." This parking lot is convenient to several soccer fields on the mauka side of Kapiolani Regional Park. Double parking and parking out of marked spaces occurred during the weekend, resulting in counts higher than the number of available spaces. This parking lot was also used by local people as a gathering place, where socializing occurs in the parking lot itself.

Table 3-11
Parking Occupancy in Lot at Former Golf Driving Range
(46 spaces available)

Survey Day	8 A.M. – 10 A.M.	10 A.M. – noon	noon – 2 P.M.	2 P.M. – 4 P.M.	4 P.M. – 6 P.M.	Average for Day	Maximum Counted
Wednesday	23	25	23	17	33	24	43
Friday	11	7	7	5	21	10	33
Saturday	39	45	41	43	31	38	48
Sunday	44	49	49	40	34	43	52

Another parking lot is located farther south along Paki Avenue (lot "V"). (See Table 3-12: Parking Occupancy in Lot Parallel to Paki Avenue.) This lot is makai of and parallel to the street, with two rows of angled parking accessed from a single lane, one-way aisle. Entry into the lot is from a driveway near the Noela Street intersection; the access drive exits back onto Paki Avenue. The pavement markings in this lot were generally in poor condition, and parking out of stall often allowed more vehicles to park within this lot, as reflected in counts that are higher than the number of "available" spaces. Like the parking lot at the former golf driving range, this lot is convenient to several soccer fields on the mauka side of Kapiolani Regional Park.

Table 3-12
Parking Occupancy in Lot Parallel to Paki Avenue
(73 spaces available)

Survey Day	8 A.M. – 10 A.M.	10 A.M. – noon	noon – 2 P.M.	2 P.M. – 4 P.M.	4 P.M. – 6 P.M.	Average for Day	Maximum Counted
Wednesday	39	35	36	37	52	40	75
Friday	39	33	35	30	26	32	45
Saturday	70	74	70	64	62	65	75
Sunday	35	73	54	71	58	58	75

The Diamond Head Tennis Center is located mauka of Paki Avenue and includes six tennis courts. Regional and statewide tournaments are held periodically at the tennis center (lot "W"); however, tournaments were not held during the parking survey (see Table 3-13). There are two parking areas adjacent to the tennis center; a main parking lot in the front includes spaces perpendicular to the

access aisleway and a smaller lot in the back consists of spaces that are perpendicular or parallel to the accessway. Most of the vehicles parked in these lots appear to belong to users of the tennis center.

Table 3-13
Parking Occupancy at Diamond Head Tennis Center
(51 spaces available)

Survey Day	8 A.M. – 10 A.M.	10 A.M. – noon	noon – 2 P.M.	2 P.M. – 4 P.M.	4 P.M. – 6 P.M.	Average for Day	Maximum Counted
Wednesday	27	30	20	18	41	27	46
Friday	24	36	29	29	34	30	43
Saturday	32	44	41	35	35	36	48
Sunday	42	37	20	37	29	33	51

Paki Hale is located on the mauka side of Paki Avenue, ewa of the Noela Street intersection (see Table 3-14). This structure is used for community meetings and other gatherings; the property is walled and a gated parking lot (lot "X") for users of Paki Hale is located adjacent to the structure. A grassed area behind the parking lot is used for parking City trucks and other vehicles (these were not included in the parking survey counts). Double parking occurred within this lot, resulting in counts that are higher than the number of available spaces.

Table 3-14
Parking Occupancy at Paki Hale
(17 spaces available)

Survey Day	8 A.M. – 10 A.M.	10 A.M. – noon	noon – 2 P.M.	2 P.M. – 4 P.M.	4 P.M. – 6 P.M.	Average for Day	Maximum Counted
Wednesday	5	9	12	5	3	7	15
Friday	10	9	6	7	3	7	12
Saturday	2	7	15	12	11	9	17
Sunday	17	16	19	20	19	18	24

Queen Kapiolani Gardens is located mauka of Paki Avenue and ewa of Monsarrat Avenue (see Table 3-15). A small parking lot (lot "Y") with a single row of angled parking is located adjacent to the garden; the one-way parking aisle is entered from Leahi Avenue and exits onto Paki Avenue.

Table 3-15
Parking Occupancy at Queen Kapiolani Gardens
(11 spaces available)

Survey Day	8 A.M. – 10 A.M.	10 A.M. – noon	noon – 2 P.M.	2 P.M. – 4 P.M.	4 P.M. – 6 P.M.	Average for Day	Maximum Counted
Wednesday	1	2	4	1	1	2	5
Friday	0	3	4	2	0	2	5
Saturday	1	1	4	7	2	3	8
Sunday	0	1	3	4	0	2	6

3.2.8 Parking Survey – Honolulu Zoo Parking Lot

The parking lot for the Honolulu Zoo is located along Kapahulu Avenue (see Table 3-16). Two one-way aisles provide counterclockwise circulation and access to 230 parking spaces, which are angled to the aisles. Entries and exits to Kapahulu Avenue are made at driveways located at the ends of these aisles. Except for four spaces reserved for City staff and nine ADA accessible spaces, the spaces available for use by the general public are metered, with a maximum of four hours (at $0.50 per hour).

Illegal parking was observed during the weekends in no-parking areas at the ends of the aisles. On weekdays, when use of the parking lot is not extensive, stretched limousines were observed parked parallel to the travel aisle across several angled spaces on a number of occasions. While the lot is generally intended for Honolulu Zoo visitors, it is also used by beachgoers and other visitors to Waikiki who are willing to pay the metered rates and walk to their destinations.

Table 3-16
Parking Occupancy in Honolulu Zoo Parking Lot
(217 spaces available)

Survey Day	8 A.M. – 10 A.M.	10 A.M. – noon	noon – 2 P.M.	2 P.M. – 4 P.M.	4 P.M. – 6 P.M.	Average for Day	Maximum Counted
Wednesday	54	117	153	130	90	109	172
Friday	61	161	154	119	106	120	187
Saturday	75	152	214	177	112	141	217
Sunday	67	155	216	207	140	157	219

3.2.9 Parking Survey – Kapahulu Avenue

On-street parallel parking on Kapahulu Avenue is metered (two-hour time limit, 7:00 A.M. to 6:00 P.M. except tow-away hours, $1.00/hour, except Sundays) and includes 10 spaces fronting the Honolulu Zoo parking lot, with an additional 35 spaces on both sides of Kapahulu Avenue between Kuhio Avenue and Paki Avenue (see Table 3-17). The spaces fronting the Honolulu Zoo

parking lot are generally more heavily used, while those farther mauka are less popular. Parking on the Honolulu Zoo side between Kuhio Avenue and Paki Avenue is prohibited between 3:30 P.M. and 5:30 P.M. on weekdays.

Table 3-17
Parking Occupancy on Kapahulu Avenue, Kalakaua to Paki Avenues
(45 spaces available)

Survey Day	8 A.M. – 10 A.M.	10 A.M. – noon	noon – 2 P.M.	2 P.M. – 4 P.M.	4 P.M. – 6 P.M.	Average for Day	Maximum Counted
Wednesday	0	0	0	1	9	2	12
Friday	0	0	4	4	9	3	11
Saturday	0	0	6	9	9	5	11
Sunday	21	28	40	39	32	32	45

3.2.10 Parking Survey – Monsarrat Avenue

On-street parallel parking is also available on both sides of Monsarrat Avenue, between Kalakaua Avenue and Paki Avenue (see Table 3-18). This parking occurs parallel to the curb but is unmarked. The area adjacent to the Honolulu Zoo entrance, near Kalakaua Avenue is the most heavily used; users include zoo visitors, beachgoers, and persons with business in Waikiki. During special events at Waikiki Shell or at Kapiolani Regional Park, curbside parking on Monsarrat Avenue accommodates the overflow from the adjacent Waikiki Shell/Bandstand parking lot.

On weekdays, tour buses, mini-buses, and limousines were observed using the curb area mauka of the makai driveway to the Waikiki Shell parking lot as a staging area, either parked or at times with their engines and air conditioners running.

Table 3-18
Parking Occupancy on Monsarrat Avenue, Kalakaua to Paki Avenues

Survey Day	8 A.M. – 10 A.M.	10 A.M. – noon	noon – 2 P.M.	2 P.M. – 4 P.M.	4 P.M. – 6 P.M.	Average for Day	Maximum Counted
Wednesday	43	53	46	46	39	45	54
Friday	42	52	52	43	34	45	59
Saturday	43	37	46	43	31	40	49
Sunday	21	28	40	39	32	32	45

3.2.11 Parking Survey – Paki Avenue

Vehicles also park along the shoulders of Paki Avenue between Monsarrat Avenue and Poni Moi Road. On the makai side, parking is not permitted along the curbed segment between Monsarrat Avenue and Noela Street, where an improved sidewalk/jogging path/bike path is located. Between the parking lot at the former golf driving range (lot "U") and the exit driveway from the long

parking lot makai of and parallel to Paki Avenue (lot "V"), parking is not permitted on the shoulder. As many as 40 cars have been observed illegally parked at this location.

Between the exit to the lot parallel to the street and Kalakaua Avenue, there is enough space for almost 50 cars to park parallel to the roadway along the makai shoulder. Along the mauka shoulder between Poni Moi Road and the tennis court parking lot, there is space for 22 parked cars. Another 42 cars could park on the mauka shoulder between the tennis court lot and Paki Hale, while up to 45 cars have been counted parked along the mauka shoulder between Paki Hale and Monsarrat Avenue. Table 3-19 shows the counts of the number of cars parked along Paki Avenue.

Table 3-19
Parking Occupancy on Paki Avenue, Monsarrat Avenue to Poni Moi Road

Survey Day	8 A.M. – 10 A.M.	10 A.M. – noon	noon – 2 P.M.	2 P.M. – 4 P.M.	4 P.M. – 6 P.M.	Average for Day	Maximum Counted
Legal Parking							
Wednesday	54	61	49	43	74	56	101
Friday	46	54	48	47	49	49	54
Saturday	79	99	97	90	86	91	123
Sunday	76	119	113	107	73	94	129
Illegal Parking							
Wednesday	0	0	0	0	5	1	9
Friday	0	0	0	0	0	0	1
Saturday	16	35	26	21	19	23	40
Sunday	7	25	21	20	8	18	31

CHAPTER 4
ZOO VISITOR-INTERCEPT SURVEY

4.0 DESCRIPTION OF SURVEY

A survey of Honolulu Zoo visitors was conducted concurrent with the parking survey. The visitor-intercept survey was developed and conducted by the University of Hawaii College of Education's Department of Kinesiology and Leisure Science. Zoo visitors were approached by the University researchers and asked to complete a written questionnaire.

University researchers were on site from 9:00 A.M., when the zoo opens, to just before 4:30 P.M., closing time, on the same days that the parking survey was conducted. At least two researchers were on site during near-opening and near-closing times, with three or four researchers on-site during the peak visitor arrival times. While the questionnaire was printed only in English, the University researchers included individuals fluent in English, Japanese, and Mandarin Chinese to assist visitors in completing the information.

The questionnaire requested information about visitor origin, and parking, as well as inquiring into the reason for the visit, anticipated duration of stay, and frequency of visitation for local residents. The findings discussed in this Chapter are related only to the parking portion of the visitor-intercept survey. A copy of the questionnaire and summary of all the findings, as compiled by the University researchers, are presented in Appendix B.

As noted in Section 3.0, the mid-February 1998 survey period was a time of lower than average visitor activity for Kapiolani Regional Park and the Honolulu Zoo. During the first days of the survey (Friday, February 20, and Saturday, February 21), the trade winds were stronger than usual, with occasionally blustery conditions. Additionally, on the Saturday there were intermittent showers, somewhat heavy at times, during the morning hours. The weather on Sunday, February 22, was less severe, with the winds still stronger than usual. Wednesday, February 25, was a pleasant day with more typical weather patterns. The Zoo Director was of the opinion that the weekend weather patterns kept visitors away since outdoor activity was not attractive to families and other parties with small children, who typically frequent the Honolulu Zoo during the morning hours.

4.1 SURVEY FINDINGS

A total of 554 questionnaires were completed during the four-day period when the parking survey was conducted. Zoo attendance for these days, based on gated entries, was 7,804 visitors, including 1,465 visitors who were part of a school group activity. The surveyed visitors represented about 25 percent of the total attendance over the period.

Attendance during the survey period was greatest on the Friday, February 20, with 2,490 visitors. This total included 1,262 school children, who accounted for 50.6 percent of the day's total number of visitors, while the number of visitors surveyed accounted for 21 percent. The busiest day of the survey period without any school activity was Sunday, February 22, when zoo attendance totaled 2,094 visitors, more than one third (35.5 percent) of whom were surveyed. The Saturday gate count was 1,908 (0.6 percent school groups), with 18 percent of the day's total visitors surveyed. The Wednesday count was 1,312 (including 14.6 percent school groups), with 25.5 percent of all visitors surveyed.

The 554 questionnaires completed represented 1,924 zoo visitors. Groups of three or less persons accounted for about 65 percent of the visitor parties completing questionnaires. Groups consisting of four to 10 persons comprised about 30 percent of the questionnaires. Approximately 3 percent of the questionnaires indicated groups of 10 or more persons. The remaining 2 percent of questionnaires were incomplete or illegible.

The University of Hawaii's visitor-intercept survey found that about half (48.4 percent) of the visitors surveyed during the four days were Hawaii residents. Of these, about 90 percent were from Oahu. The peak arrival time was around the noon hour, with nearly 60 percent of the groups surveyed arriving between 11:00 A.M. and 1:00 P.M.

The visitor-intercept survey found that, overall, the majority (58 percent) of visitors to the Honolulu Zoo arrived by car. Walking was the next most popular means of transportation, accounting for 25 percent, with bus riders following at about 16 percent. A slightly greater percentage of visitors arrived by walking or bus than by personal vehicle on weekdays than on the weekend. These differences correspond to the slightly higher percentages of non-residents visiting the Honolulu Zoo on the weekdays. Less than 1 percent of zoo visitors were dropped off or arrived by taxi or moped. Table 4-1 presents a summary of daily group and visitor arrivals during the survey period.

Table 4-1
Summary of Daily Group and Visitor Arrivals
(based on visitor-intercept survey)

Means of Transportation	Persons /Group	Day of Week Surveyed				Number of Groups	Number of Persons
		Friday	Saturday	Sunday	Wednesday		
Walk							
	1	6	1	7	13	27	27
	2	11	20	30	36	97	194
	3	6	1	5	7	19	57
	4	8	2	7	9	26	104
	5	1	1	4	-	6	30
	6	-	1	-	4	5	30
	7	-	-	-	4	4	28
	10	1	-	-	-	1	10
	16	-	-	-	1	1	16
Bus							
	1	1	-	-	7	8	8
	2	2	1	7	10	20	40
	3	1	-	1	10	12	36
	4	2	-	1	1	4	16
	5	-	2	-	-	2	10
	8	-	-	-	1	1	8
	12	-	1	-	-	1	12
	21	-	-	-	1	1	21
	24	-	-	-	1	1	24
	25	1	-	-	-	1	25
	32	1	-	-	-	1	32
	36	1	-	-	-	1	36
	50	1	-	-	-	1	50
Car							
	1	-	3	1	9	13	13
	2	25	11	25	15	76	152
	3	13	20	30	22	85	255
	4	9	19	24	9	61	244
	5	2	7	9	3	21	105
	6	3	2	9	-	14	84
	7	-	2	9	1	12	84
	8	-	1	2	1	4	32

Table 4-1
Summary of Daily Group and Visitor Arrivals *(continued)*
(based on visitor-intercept survey)

Means of Transportation	Persons/ Group	Day of Week Surveyed				Number of Groups	Number of Persons
		Friday	Saturday	Sunday	Wednesday		
Car (continued)							
	9	-	-	1	1	2	18
	10	-	1	3	-	4	40
	12	-	2	-	-	2	24
	15	-	-	4	-	4	60
	16	-	-	1	-	1	16
	17	-	-	1	-	1	17
Drop Off							
	1	-	-	-	1	1	1
	2	1	-	-	-	1	2
	3	1	-	1	-	2	6
	4	-	1	-	-	1	4
Moped							
	2	1	-	-	-	1	2
Taxi							
	2	1	-	-	-	1	2
Totals							
	Walk					186	496
	Bus					54	318
	Car					300	1,144
	Other					7	17
					Total Number of Groups	547	
					Total Number of Visitors Included		1,975

Considering that school groups and excursion parties represented survey respondents reporting to travel by bus in groups of 12 or more, approximately 9 percent of the visitors were in this category. The remaining visitors (about 6 percent) reporting travel by bus were considered to travel by a City bus or a small tour bus. Since the visitor-intercept survey did not explicitly distinguish between types of buses (i.e., City bus or tour bus), there are no "hard" data to support more specific information. Thus, inferences were made from the few respondents that provided specific information.

Wednesday's visitor-intercept survey results offered the most insight into what type of bus was used. This day's data indicate that some groups arrived by City bus and that some arrived by tour

bus. Of 29 bus-riding groups (excluding two groups with more than a dozen visitors), seven respondents indicated that they arrived at the zoo via a City bus, noting a route number or writing in "City bus" when describing their route to the zoo. Five of the seven respondents were from out-of-state. Three respondents out of the 29 groups wrote down "tour" or "tour bus" when describing their route to the zoo. These 10 responses represent less than 2 percent of the total amount of surveys collected over the four-day survey period. The remaining 19 surveys were either left blank or did not contain a response that related to what type of bus was used. It is also interesting to note that of the remaining 19 surveys, five respondents indicated that they were from Oahu, while the rest indicated otherwise. From this very small sample of data, it could be inferred that roughly two-thirds of bus-riding groups arrived by City bus, while approximately one-third arrived by tour bus.

Since use of a car was the method of transportation for more than half (58 percent) of zoo visitors, a closer look at the survey responses is warranted. Although the number of visitors in a group who arrived by car ranged from one to 17, generally, only groups with eight people or less were considered in the analysis. This distinction is made because it is thought that eight people can fit comfortably in a minivan, which is on the larger side of what is considered a "car." This discussion does not include those being "dropped off" or those arriving by taxi.

The percentage of visitors using a car with eight passengers or less varied from 34 to 65 percent. This percentage takes into account all visitors, regardless of mode of transportation (see summary below).

Day of Survey	Percent of Visitors Arriving by Car
Wednesday	34.0
Friday	37.0
Saturday	64.8
Sunday	59.2

The above percentages correspond to parking occupancy numbers at the Honolulu Zoo Lot shown in Table 3-16. The table shows that parking occupancy is considerably higher on the weekends. The average day parking counts for Wednesday and Friday are 109 and 120, respectively. The average day parking counts for Saturday and Sunday are 141 and 157, respectively.

Table 4-2 presents another aspect of visitors arriving by car. These percentages reflect the day's number of car-riding visitors surveyed out of the total number of car-riding visitors surveyed over the four-day period. For example, almost one-fourth of the visitors traveling by car came on Saturday.

Table 4-2
Visitor Arrivals by Car

Day Surveyed	All Surveyed Cars		Surveyed Cars With Eight Passengers or Less	
	Number Of Surveyed Visitors Arriving by Car	Percentage of Surveyed Visitors*	Number of Surveyed Visitors Arriving by Car	Percentage of Surveyed Visitors*
Wednesday	180	15.7	171	17.6
Friday	153	13.4	153	15.8
Saturday	264	23.1	230	23.7
Sunday	547	47.8	415	42.8
Totals	1144		969	

*Percentage of surveyed visitors arriving by car for the day based on the total number of surveyed visitors arriving by car for the four-day survey period.

The majority of groups using a car to travel to the Honolulu Zoo was from Oahu. Over the four survey days the average percentage of Oahu groups arriving by car, out of the total number of groups traveling by car, was calculated to be 68.2 percent. The day with the lowest percentage of Oahu groups arriving by car was Friday, at 67.3 percent. The day with the highest percentage of Oahu groups arriving by car was Saturday, at 69.2 percent. Wednesday's percentage, 62.3, was slightly higher than Sunday's percentage, 67.9 (see Table 4-3).

Table 4-3
Arrivals by Car – Groups from Oahu

Day Surveyed	Number of Surveyed Groups Arriving by Car	Number of Surveyed Groups Arriving by Car from Oahu	Percentage of Surveyed Groups Arriving by Car from Oahu
Wednesday	60	41	68.3
Friday	52	35	67.3
Saturday	65	45	69.2
Sunday	109	74	67.9
Total	286	195	68.2

Note: These numbers are for vehicles with eight or less passengers.

During the weekend days of the survey there was more variation in the number of Honolulu Zoo visitors per group. On weekdays the number of people per group ranged from one to nine, while on weekends the number of people per party ranged from one to 17.

During the survey period, 286 groups that arrived by car were surveyed. Most of the groups arriving by car traveled in groups of three.

Number in Group	Number of Groups
1	13
2	76
3	85
4	61
5 to 8	51

The average number of passengers per car was calculated to be 3.39 for the four-day survey period. Both weekday averages were lower than the weekend averages. Friday's average was computed at 2.94, with 2.85 average for Wednesday. The average for Saturday was calculated as 3.54, while Sunday's average was 3.81.

In terms of location of parking, the overall survey found that about 50 percent of the groups used the Honolulu Zoo parking lot. This percentage included surveys noting "zoo parking lot" and those stating "metered parking." Another 33 percent noted that they left their vehicle in a "parking lot," with an additional 15 percent noting "Kapiolani Park." Combining these two latter percentages, a total of 48 percent of the groups surveyed indicated that they chose to park in an unmetered location and walk farther to the zoo. Use of the Honolulu Zoo parking lot was greatest on Sunday and Wednesday of the survey period, but parking in areas outside the Honolulu Zoo parking lot was greater on all four days of the survey.

The amount of time visitors spent locating a parking space during the survey period was greatest on Sunday, with 65 percent reporting "10 minutes or longer." Of the Saturday survey respondents, 54 percent indicated spending between 1 and 10 minutes locating a parking space. For the weekdays of the survey period, the majority of respondents indicated that they found parking spaces in "less than a minute."

4.2 FINDINGS RELATED TO KAPIOLANI REGIONAL PARK

The Honolulu Zoo visitor-intercept survey found that the days of peak attendance at the zoo for visitors arriving by car and needing parking coincide with the peak use of the rest of Kapiolani Regional Park. Sundays and Saturdays are both the peak days of park activity and also the primary days for local residents and others traveling by personal vehicle to visit the zoo. Only on the Sunday and Saturday of the parking survey period was the zoo lot at 100 percent utilization, which correlates with the "longer than 10 minutes" length of time zoo visitors needed to find parking spaces.

The peak occupancy period in the Honolulu Zoo parking lot on all days of the survey occurred between noon and 2:00 P.M. The parking lot occupancy peak period thus corresponds to the peak

visitor arrival times noted in the visitor-intercept survey, indicating that zoo visitors tend to use the parking lot adjacent to the main entrance to the zoo in spite of the parking meters.

The unmetered parking lot closest to the Honolulu Zoo entrance is the one serving the Kapiolani Bandstand and the Waikiki Shell. There are 264 stalls in this lot, which is located directly across Monsarrat Avenue from the Honolulu Zoo entrance. At no time during the survey was this lot fully occupied. Maximum use of this lot during the survey period occurred on Sunday between the hours of 2:00 P.M. and 4:00 P.M., which was within the time of the Royal Hawaiian Band performance at the Kapiolani Bandstand.

Zoo visitors tend to use the Honolulu Zoo parking lot, based on the visitor-intercept survey and the monitored parking lot occupancy. For the days that were surveyed, the weather, more than the availability of parking, may have been a deterrent to visiting the zoo. Given the isolated nature of the Honolulu Zoo parking lot from the other areas of Kapiolani Regional Park, such as the sport fields, jogging paths, Waikiki Shell, and Kapiolani Bandstand, this lot does not provide ready access to areas of activity outside of the zoo. Zoo visitors do not seem to be competing with other Kapiolani Regional Park users for vehicular parking.

CHAPTER 5
EXISTING PARKING DEMAND OF HONOLULU ZOO

5.0 ANALYSIS

The parking demand created by the Honolulu Zoo is related to the visitation, particularly the number of visits by Hawaii residents. Data collected from the visitor-intercept survey and the parking survey were used to estimate the parking demand created by the existing zoo operation and the use of the Honolulu Zoo parking lot. The analyses were done for the visitation during February, which is lower than the peak visitation that occurs during March and the summer months. Monthly attendance data from the Honolulu Zoo were used to factor these estimates to peak conditions.

5.1 USE OF THE HONOLULU ZOO PARKING LOT

Honolulu Zoo attendance averaged 1,950 persons per day during the four survey days. The visitor-intercept survey indicated that 58 percent of zoo visitors arrived by automobile. It should be noted that approximately 85 percent of visitors who arrived by automobile arrived in groups of eight persons or less. The average group size of these visitors was 3.39 persons per group, and the average duration of the visit was 2.5 hours. These statistics indicate that 283 vehicle arrivals and 283 vehicle departures could be attributed to zoo visitors, creating a parking demand of 708 space-hours per day. (One "space-hour" is equal to one parking space used for one hour; four space-hours could be the result of one space used for four hours, two spaces used for two hours, or any such combination.)

The visitor-intercept survey tabulated 50 percent of the visitors arriving by automobile used the "zoo parking lot" or "metered parking" and 15 percent parked in Kapiolani Park. Another 33 percent stated that a "parking lot" was used without specifying where the lot was located. The specific responses were used to estimate that 77 percent of the parked vehicles used the Honolulu Zoo parking lot. The traffic generated by zoo visitors, therefore, was 218 vehicles entering the parking lot and 218 vehicles leaving the parking lot. The parking used by zoo visitors totaled 730 space-hours per day.

The parking survey recorded usage of the parking lot at 20-minute intervals during the day, from 50 minutes before the zoo opened to one hour and 20 minutes after the zoo closed. Total use of the lot during the survey period averaged 1,330 space-hours per day; the total use recorded between 8:50 A.M. and 4:50 P.M. (zoo hours are 9:00 A.M. to 4:30 P.M.) averaged 1,200 hours, meaning that an average of 79 spaces were used beyond the Honolulu Zoo hours. These statistics indicate that only 61 percent of the vehicles in the Honolulu Zoo parking lot is due to zoo visitors. The remainder of the parking spaces, or an average of nearly 60 spaces, may be associated with other

area activities. Field observations indicate that persons with destinations in Waikiki, beachgoers, and other park users often use the parking lot.

The parking survey showed an average of 144 spaces, or 66 percent of the 217 spaces available, occupied during the hours the zoo was open. On Saturday and Sunday, the lot reached full occupancy, but the peak occupancy on weekdays was less than 86 percent of the total spaces. The peak parking used based on the parking survey is about 150 percent of the average number of spaces used.

5.2 USE OF OTHER PARKING BY ZOO VISITORS

Zoo visitors also generated an average volume of 90 vehicles per day entering and leaving another parking area, using 220 space-hours per day. In reviewing the parking available near the entrance to Honolulu Zoo, the most likely areas would be along Monsarrat Avenue and in the Waikiki Shell/Kapiolani Bandstand parking lot. Given the convenience off-street nose-in parking in the parking lot, as compared with parallel parking along a street with significant bus traffic, all of this demand was assumed to be met by the parking lot. Using the parking pattern in the Honolulu Zoo parking lot as observed in the survey, the peak parking use by Honolulu Zoo visitors in the Waikiki Shell/Kapiolani Bandstand parking lot is about 50 spaces on Saturday or Sunday, and 40 spaces on weekdays. These estimates imply that Honolulu Zoo visitors account for between 25 percent and 40 percent of the cars parked in the Waikiki Shell/Kapiolani Bandstand parking lot.

5.3 ESTIMATE OF EXISTING PARKING DEMAND AT HONOLULU ZOO

The peak parking demands during the days the surveys were taken are estimated to be 150 spaces on weekdays and 210 spaces on weekends. About 75 percent of these demands is presently served by the metered Honolulu Zoo parking lot, with the remainder parking free elsewhere.

The peak parking demand could correlate with the number of resident visitors. Based on the monthly gate counts, visitors using kamaaina rates and annual passes in February were 107 percent of the average month, and peak visitation by kamaaina and annual pass holders occurs in March, which has been 131.5 percent of the average month. Peak parking demand during the peak month, therefore, would be 22 percent higher than in February. The peak parking demands during the peak month for the existing visitation are estimated to be 180 parking spaces on weekdays and 260 parking spaces on weekends.

5.4 ESTIMATE OF EXISTING "CAPTURE" OF OAHU RESIDENTS

An estimate of the percentage of Oahu residents that currently visit the Honolulu Zoo was made to assist in the projection of future visitation by Oahu residents. The Honolulu Zoo reports 145,000 visits per year by adults with annual passes or at the kamaaina rate. From the visitor-intercept survey, 89 percent of the state residents visiting the Honolulu Zoo are Oahu residents and the

average visitor makes two visits per year. Therefore, approximately 129,000 adult visits are made per year by Oahu residents, with 65,000 adult residents visiting the Honolulu Zoo in any one year. Population estimates made by the State of Hawaii Planning Office indicate a resident population of 870,000 on Oahu (1997), with approximately 74 percent aged 18 or older. The Honolulu Zoo, therefore, is visited by 10 percent of Oahu's adult residents.

CHAPTER 6
EXISTING PARKING DEMAND, OTHER USES AT KAPIOLANI REGIONAL PARK

6.0 ANALYSIS

The parking demand created by Honolulu Zoo visitors is approximately one-sixth of the total parking in the areas discussed in this parking survey. The analysis of existing parking for all of Kapiolani Regional Park, therefore, also considers the parking demand due to users other than zoo visitors. The analysis will then consider the total demand, inasmuch that there are non-zoo users parking in the Honolulu Zoo parking lot as well as zoo visitors parking elsewhere in the park.

6.1 PARKING (NOT RELATED TO THE ZOO) AT KAPIOLANI REGIONAL PARK DURING SURVEY

The parking survey was conducted during a non-peak period so that demand could be better measured without being affected by the lack of parking. On weekdays, the average number of cars in public parking areas within Kapiolani Regional Park (excluding those of Honolulu Zoo visitors) was 650; on Saturday, the average was 850 cars, and on Sunday the average was 900 cars. The highest number of cars parked is estimated to be 800 on Wednesday, 700 on Friday, 1,000 on Saturday, and 1,060 on Sunday. These totals compare with a capacity to park approximately 1,340 cars in areas other than the metered lot adjacent to the Honolulu Zoo.

6.2 PARKING DEMAND, PEAK ACTIVITY PERIOD

Typical weekday activity at the park other than the zoo is not expected to vary significantly from the weekday activity that was present during the survey days in February 1998. Some increase in families using the park during the summer months, when more children are out of school, can be expected, but when compared to the activities that typically occur at the park throughout the year (e.g., adult softball games, tennis matches, jogging and other running sports), the increase in the number of vehicles is not expected to be significant. Nevertheless, typical weekday parking is estimated to be 25 percent higher than the totals in the survey.

The maximum typical weekday parking count would increase from 800 to 1,000, which means that the typical summer weekday parking situation would be similar to the Saturday situation during the survey. Under these conditions, some park users were not able to find parking spaces in close proximity to their activities; however, overall, less than 75 percent of the parking available in the area was used at any one time.

Except for several very large major events, a typical weekend in the summer would be characterized by several large picnics, many smaller family gatherings, and more beachgoers.

However, some of the organized sports activities that occur in the spring and fall (e.g., youth soccer practices and games, adult softball leagues) would not occur simultaneously. The number of people visiting the park is estimated to be 15 percent higher than average, while the use of the park during the survey dates is estimated to be 90 percent of the average. The typical number of people using the park, then, would be about 28 percent higher than during the survey. The average number of persons per vehicle for the summer activities is estimated to be 25 percent higher than that of other times, somewhat mitigating the parking demand created by the higher number of people visiting the park. However, because longer stays are typical of summer visits to the park, people tend to arrive earlier and parking requirements per visitor are estimated to be 20 percent higher than average. Based on these factors, the parking demand on a typical summer weekend is therefore estimated to be 125 percent of the survey.

Park users other than Honolulu Zoo visitors are estimated to require 1,325 parking spaces in the mid-afternoon on a typical summer Sunday. When added to the 260 spaces needed for zoo visitors, the total demand of 1,585 spaces exceeds the inventoried total of 1,543 spaces. For a typical Sunday during the summer, all of the parking available at Kapiolani Regional Park is used.

6.3 PARKING DEMAND, MAJOR EVENTS

Several times a year, major events attracting over 3,000 people to Kapiolani Regional Park are held. Examples of these are the visitor industry charity walk in May, the Okinawan Festival in September, and the Honolulu Marathon in December. Each of these events alone could fill all the spaces in the vicinity of the park; however, other activities and events occur at the same time and the total parking demand clearly exceeds the supply. The organizers of these major events are aware of the situation and have taken steps to ease the parking situation by arranging for additional parking at remote sites and providing shuttle services between these sites and the park.

CHAPTER 7
MASTER PLANS FOR HONOLULU ZOO AND KAPIOLANI REGIONAL PARK

7.0 BACKGROUND

The City undertakes reviews and updates of facility master plans approximately every 10 years. Master plan updates are based on needs and general changes or trends within the community. The length of the review and update process varies, but it normally takes about two years from award of the master planning contract to completion of the document.

7.1 HONOLULU ZOO MASTER PLAN

The current Honolulu Zoo Master Plan was completed in 1993. This plan, once implemented, will broaden the recreational and educational experience offered to visitors, and expand on-site breeding and research facilities. Under the plan, visitors will be provided with an educational story line that presents four ecological habitats: African Savanna, Rain Forest, Hawaii, and Tropical Islands. The African Savanna exhibits were completed in 1992, prior to the updated master plan, and are open to visitors. The first phase of the Rain Forest exhibits is under design. The latter phase(s) of the Rain Forest and remaining habitats have not gone beyond conceptual design and their construction is unscheduled.

Improved breeding and research facilities will be provided as part of the new animal holding facilities within each habitat, or housed in separate on-site buildings, as appropriate. All of the proposed buildings and improvements, other than off-site utilities, will be constructed within the existing Honolulu Zoo fence line.

The master plan envisioned an increase of nearly 1,000,000 million visitors annually. The FY1991-1992 attendance, on which the master plan was based, had a gated attendance of 652,314. The projected FY2000-2001 attendance is 1,650,000. Zoo staff over this same period was projected to increase from 132 to 207.

The current master plan shows no changes to the existing Honolulu Zoo parking lot. Additional visitor parking in support of the master plan development was not proposed. Use of alternative transportation by Honolulu Zoo visitors, such as mass transit, however, was expected to increase.

Additional staff parking is proposed under the master plan. There are currently about 40 unmarked stalls along the internal unpaved access road on the Kapahulu Avenue side of the Honolulu Zoo. As proposed in the master plan, two parking lots in the maintenance/support area will provide an additional 48 staff parking stalls. This lot will continue to be accessed from Kapahulu Avenue, but will be paved and striped for user convenience and optimum vehicle parking.

7.2 KAPIOLANI REGIONAL PARK MASTER PLAN

Updating of the Kapiolani Regional Park master plan is on going. While the plan will review locations of playing fields and other facilities, no significant changes in the number of such facilities and their primary uses have been identified. Kapiolani Regional Park is expected to continue to serve as a regional recreational resource and the location for special events, such as the Okinawan Festival, Honolulu Marathon finish line, and similar activities.

The update of the Kapiolani Regional Park master plan may include changes in vehicular circulation and parking locations; however, the total number of parking spaces will likely remain unchanged. Improvements for pedestrian circulation, such as sidewalks with curbs, may be included in the master plan and could restrict access to some of the illegal parking areas. Since these areas were not considered within the current parking inventory, the improvements will not decrease the available parking for the purpose of this survey.

7.3 OTHER DEVELOPMENTS AT KAPIOLANI REGIONAL PARK

The Waikiki Shell, like the Honolulu Zoo, is considered a special use within Kapiolani Regional Park. It is subject to separate management under the City government, being part of the Department of Enterprise Services. The Waikiki Shell has not been the subject of a separate master plan and was considered as a continuing use in the previous Kapiolani Regional Park master plans.

At the present time there are no plans to change the use of or the level of activities at the Waikiki Shell. The use of the Shell facilities varies by 4 to 5 percent annually based on market trends for the outdoor venue. No expansion of facilities, increase in use, or expansion of parking is proposed for the Waikiki Shell. Its primary use is in the evenings and thus performances held there do not typically compete for parking with Honolulu Zoo or other Kapiolani Regional Park activities.

The only other special use in the Kapiolani Regional Park area is the Natatorium. In January 1999, the City Council has approved the Special Use Permit for renovation of the structure and construction activities are on going. As part of the proposed renovation the Natatorium pool will be restored, with the concrete deck, bleachers and entry arch structurally repaired. The locker facilities will be renovated and offices will be provided for under the bleachers for the facility staff and lifeguards. The pool restoration requirements will be finalized in accordance with the DOH requirements for this type of swimming pool facility.

The plans for the Natatorium restoration do not show any increase in parking. The volleyball court in front of the facility on the southern (diamondhead) side will be retained. Accessible parking will be provided between this play court and the entry courtyard. Reserved parking for office and water safety staff will be on the northern (ewa) side of the courtyard. Parking in the courtyard in front of the facility, which once served as the main Natatorium parking lot, will be removed.

Creating the reserved parking, an entry courtyard, and a buffer area in front of the Natatorium's exterior wall will result in a decrease the number parking stalls available to the public. Based on the plan presented in the *Final Environmental Impact Statement (EIS) for the Natatorium* (1995), only 13 stalls are to be provided in the parking lot that now accommodates 32 vehicles.

Improvements to the Natatorium driveway will also result in decreasing the number of public parking stalls in the area. Along with restoration of the driveway, reconfiguration of the hammerhead-type turnaround at its terminus is proposed, which will eliminate two parking stalls. This reconfiguration will result in having only 22 parking stalls, which will be along the mauka side of the driveway.

The proposed Natatorium renovation as presented in the Natatorium EIS will result in a loss of as many as 34 public parking stalls in the immediate area. The number of ADA accessible stalls will remain at two, which are in addition to the remaining 49 stalls along the entry driveway. (See Table 3-1.)

CHAPTER 8
RECOMMENDATIONS TO ACCOMMODATE FUTURE PARKING DEMANDS

8.0 BASES FOR RECOMMENDATIONS

The parking survey data were reviewed and estimates of future parking demand to FY2020-2021 were made. From these projections, recommendations for parking at Kapiolani Regional Park were developed. Overall parking within the Kapiolani Regional Park will be investigated with the park master plan study.

8.1 FUTURE PARKING DEMAND AT HONOLULU ZOO

The Honolulu Zoo Master Plan envisions an annual attendance of 1.65 million visitors by FY2020-2021, compared to the FY1998-1999 attendance of 632,000 visitors. This 1.18-million-visitor increase in annual attendance is 161 percent of the existing attendance.

The future parking demand can be estimated by assuming that the distribution of Zoo visitors over time and modal characteristics will remain the same. It is assumed that (1) the number of visits that occur in a peak month, the time of day that visits are made, the average duration of visits, and group sizes will not change, and (2) the mode of travel to the Honolulu Zoo remains constant. High range estimates of future parking demand could be made by simply increasing the existing peak demand of 260 parking spaces by the same 161 percent. These estimates would be 470 parking spaces for weekdays and 680 parking spaces for weekends. A major increase in the capacity of the Honolulu Zoo parking lot, however, does not appear to be feasible or desirable.

Estimates related to other planning for the City, therefore, were made. These estimates would be more consistent with other transportation planning and would provide more reasonable recommendations for future parking requirements. While some non-residents arrive at the Honolulu Zoo by automobile, the majority of the Honolulu Zoo visitors that require parking spaces are Oahu residents. Estimates from the State Department of Business, Economic Development and Tourism (DBEDT) project an increase in population on Oahu from 870,000 in 1997 to 1,130,600 in year 2020. If all existing characteristics related to zoo visitors remained unchanged, this 30 percent increase in local population would translate to a 30 percent increase in parking demand.

Honolulu Zoo officials, however, expect that the new exhibits will attract more residents, and that the frequent visitors will visit more often. With a larger base of visitors, the average visitation (currently estimated at two visits per year) is not expected to increase. A larger base of visitors also means that the distribution over time of the visits would be wider; i.e. the number of visits in the peak month compared to the average month would be less. If the existing "capture" of 10 percent of Oahu residents were increased to 12.5 percent, and if the number of visits in the peak month

became 120 percent of the average month, the peak parking demand would be 48 percent higher than existing demand.

A 48 percent increase in parking demand for Honolulu Zoo visitors would have weekday peak demands of 270 parking spaces and weekend peak demands of 390 parking spaces during the peak month. The visitor-intercept survey data indicate that approximately 75 percent of zoo visitors arriving by automobile park in the metered Honolulu Zoo parking lot. If this pattern were to continue, the peak demand in the peak month would require 290 non-reserved spaces in the Honolulu Zoo parking lot and 100 parking spaces elsewhere in the Kapiolani Regional Park area.

8.1.1 Discussion of Alternatives for Increasing Parking for Honolulu Zoo

The analyses show a need to increase parking for Honolulu Zoo visitors by approximately 175 spaces. This increase is needed based on providing all of the zoo visitor parking in the lot adjacent to the zoo, and assuming that use of the lot can be limited to zoo visitors during the hours that the zoo is open. A change from the existing metered parking to gate controls with a manned exit gate, along with a parking rate comparable to private parking facilities in Waikiki (with validation or partial reimbursement for zoo visitors) would support this concept.

The construction of a parking structure over the existing surface parking lot could provide additional parking. A second level of parking could increase the number of parking spaces from an existing total of 230 spaces to approximately 410 spaces, for a net gain of 180 spaces.

A second alternative would be to expand and better utilize the existing surface parking lot to increase the capacity, and to provide additional parking elsewhere in Kapiolani Regional Park. This alternative recognizes that some visitors will prefer to park elsewhere, for reasons ranging from saving on the parking fee to linking their zoo visit with another activity at the park such as a picnic. Reconstruction of the zoo parking area, which may include widening the parking aisle closest to the Kapahulu Avenue, narrowing the entrances, removing or relocating the existing parking meters, and restriping the parking stalls, could increase the parking inventory by 15 to 20 spaces. Along with the conversion of five parking spaces currently reserved for employee parking, the capacity of the lot could be increased to 240 non-reserved spaces. Increasing the size of the lot by extending it approximately 50 feet in the mauka direction with a relocation of the entry along Kapahulu Avenue could provide another 20 parking spaces. The resulting 260 spaces would provide 90 percent of the projected peak parking needed for the zoo. An additional 130 spaces would be needed elsewhere in the Kapiolani Regional Park vicinity.

The expansion of the parking lot would affect the space available in the support/maintenance area of the Honolulu Zoo. Relocation of the proposed classroom building to accommodate the parking lot expansion would eliminate nearly 20 of the new staff parking spaces located along the access road. To offset that loss, a small parking deck could be constructed over the larger staff parking lot

to provide sufficient number of spaces to replace those that would be lost (the deck could also improve access to the upper level of the adjoining building).

8.1.2 Recommendation for Additional Parking for Honolulu Zoo Visitors

Construction of a parking structure over the existing parking lot would be costly and would have visual impact along Kapahulu Avenue. The additional parking would provide a total that is more than the amount needed by Honolulu Zoo visitors.

The combination of a minor expansion of the parking lot next to the zoo with additional parking elsewhere in the Kapiolani Regional Park area (the second alternative described above) is recommended to provide the needed parking for the zoo. The expansion of the public lot into the support/maintenance area would require that a small parking deck be built within the fenced support/maintenance area.

8.2 ESTIMATE OF FUTURE PARKING DEMAND AT KAPIOLANI REGIONAL PARK

The master plan for Kapiolani Regional Park does not foresee changes in the number of playing fields or other facilities. The anticipated future use of park facilities is not expected to increase over existing levels. No changes to the use of Waikiki Shell or other facilities, except the Natatorium, have been identified. Major events will continue to use the park.

While the populations of Oahu and of the Primary Urban Center are expected to increase, the provision of other large parks will provide alternative locations for many activities, such as adult and youth team sport practices and tournaments, picnics, and running events, which currently use Kapiolani Regional Park. The net effect is that the future parking demand created by activities at Kapiolani Regional Park other than the zoo is expected to be similar to the existing demand.

The additional parking needed to accommodate the peak demand by Honolulu Zoo visitors if the recommended alternative (minor expansion of the lot on Kapahulu Avenue) is implemented would be 130 spaces. The relocation of the curb and additional paving of approximately 15 feet wide along the median of Kalakaua Avenue between Poni Moi Road and Monsarrat Avenue could provide the space for as many as 200 additional diagonal parking spaces. This paving would "double-load" the existing ewabound aisleway. Only a selected portion of the median would need to be paved to provide the needed 130 additional spaces. The areas used could be selected to minimize any impacts to the existing ironwood trees located along the makai third of the 30-foot wide median. (If any additional parking is provided along the median the existing northbound bike lane should be replaced by a bike path within the park grounds so that the potential conflicts between bicycles and motorists backing out of parking spaces are eliminated.)

8.2.1 Recommendations for Additional Parking, Kapiolani Regional Park

The number of parking spaces in the Kapiolani Regional Park area for non-zoo use should remain constant. Minimal improvements in the parking lot adjacent to the Honolulu Zoo would require an addition of 130 spaces in Kapiolani Regional Park.

While the number of parking spaces for non-zoo use should remain constant, the master plan for Kapiolani Park may affect parking along Paki Avenue. Some improvements to park facilities could affect parking that is currently available to park users, such as parallel parking that is permitted in the area across from the Diamond Head Tennis Center. If the existing jogging path along Paki Avenue near Monsarrat Avenue is extended to Poni Moi Road, the curb and a no parking restriction along the makai side of Paki Avenue would likely be extended and about 50 parallel parking spaces would be lost. A new parking lot parallel to Paki Avenue similar to the existing lot near Noela Street is one alternative that could provide sufficient off-street parking to offset this loss.

The existing median of Kalakaua Avenue provides an opportunity to provide additional parking spaces to replace any losses. The parking lot on the mauka side of the median currently has nearly 300 diagonal parking spaces on one side of the travelway. Removal of portions of the grassed median, relocation of the curbs, and paving could create as much as 250 diagonal parking spaces opposite the existing parking (the existing median openings, which should be maintained, will affect the number of new spaces that could be provided). Only a small portion of this median would be necessary to replace any parking that may be lost along the makai side of Paki Avenue.

The existing median of Kalakaua Avenue can also be used to increase parking that would be convenient to visitors to the Honolulu Zoo and to other users of Kapiolani Regional Park. The 130 spaces that are needed to supplement the zoo parking could be placed on the median from the vicinity of the Natatorium to Monsarrat Avenue. The relocation of the existing northbound bike lane should be part of any change to add parking in the median area.

8.2.2 Evaluation of and A Recommendation for Parking near the Natatorium

The total of 34 parking spaces in the vicinity of the Natatorium that would be lost with the implementation of the changes described in the Natatorium EIS is one-third of the existing spaces available between the Waikiki Aquarium and Sans Souci Beach. This loss is less than 3 percent of the total parking in the Kapiolani Regional Park area. A review of the parking data indicates that much of the use of the existing parking is not related to the public park or beach uses (high occupancy of the spaces in this area was evident at 8:00 A.M. every day, with no or little activity observed in the park or on the beaches). The implementation and enforcement of restrictions to parking for non-park purposes (as discussed above) could mitigate the impact of the loss of parking to park and beach users.

Alternatively, improved access into the Natatorium area should be considered. The additional traffic that the renovated Natatorium could generate would strain the existing narrow, curved roadway. The existing 32-foot width, with parallel parking on both sides, effectively leaves less than 18 feet of travelway for opposing traffic along a curved roadway. The ability of the existing roadway to adequately serve traffic in the area is also constrained by the need to turn around and by the existing ironwood trees in the median of Kalakaua Avenue near the existing median opening serving the access road. A new roadway to the Natatorium perpendicular to Kalakaua Avenue configured as a counterclockwise loop around the existing Stone Monument could present a more symmetrical view of the memorial from the roadway. Angled parking off of this roadway could be included to replace some of the existing parking in the area that would be lost with the renovation of the Natatorium.

8.2.3 Recommendations for Parking, Kapiolani Regional Park (General)

Several other observations that were made in the course of the parking inventory and surveys have led to the following general recommendations for improving the parking for zoo visitors and park users.

The pavement markings in the parking lots were in poor condition during the survey. With better maintenance of these markings, users would be able to correctly use the parking lots and illegal parking can be enforced. Time limits on the duration of parking along the makai side of Kalakaua Avenue and near the Natatorium should be implemented and enforced; parking meters with conditions similar to those used on the mauka side of Kalakaua Avenue should be installed to assist in the enforcement of the parking restrictions.

Increasing the parking supply at Kapiolani Park to meet the higher parking demands created by the major events is not recommended. During these events, parking spills over into the nearby neighborhoods and many vehicles are parked illegally (too close to crosswalks, fire hydrants, or driveways, or otherwise hazardously). However, the relatively rare occurrence (less than twenty days per year) of these events do not justify the loss of park space and other expense related to providing the additional parking.

8.3 SUMMARY AND RECOMMENDATION

The Kapiolani Regional Park master plan will be considering changes to parking and vehicular circulation within the park area. Based on the findings of the parking study, an additional 175 parking spaces will be needed. Expansion of the existing Honolulu Zoo parking lot is estimated to provide 45 additional spaces. The other 130 spaces should be provided within the Kapiolani Regional Park.

The existing number of spaces for other parts of Kapiolani Regional Park is at an appropriate level of parking for existing and future use of the park other than zoo parking demand. Park

improvements along Paki Avenue and the Natatorium restoration may result in the loss of approximately 100 spaces. With the additional parking for the increase in zoo visitors, 230 new spaces will be needed. The paving of the area that is now part of an existing grassed median on Kalakaua Avenue to expand the existing parking lot could provide these replacement parking spaces.

– Environmental Assessment for Honolulu Zoo Master Plan –

PARKING SURVEY DATA

Honolulu Zoo / Kapiolani Park Parking Survey — **Friday, February 20, 1998**

Parking Zone / Activities across entire site	8:30-9:45 AM	10:00-11:15 AM	11:30-12:45 PM	1:00-2:15 PM	2:30-3:45 PM	4:00-5:15 PM	5:30-6:45 PM	7:00-8:15 PM	8:30-9:45 PM	10:00-11:15 PM	11:30-12:45 AM	Capacity Maximum occupied	Marked stalls
Monsarrat Avenue, crosswalk to Shell mauka driveway	17 17 18	21 17 27	25 27 30	31 32 35	34 30 29	28 28 25	31 23 25	18 18 21	19 15 17	15 14		35	0
Waikiki Shell lot, street side, mauka half	0 0 1	4 0 0	0 0 0	0 0 1	4 4 0	0 0 0	0 0 0	1 1 1	1 0 0	0 0		4	60
Waikiki Shell lot, street side, makai half	43 42 59	46 51 50	52 49 64	47 58 52	56 54 57	53 59 54	54 51 57	54 55 51	50 51 52	45 42		64	64
Waikiki Shell lot, park side, makai half	37 43 38	37 45 47	43 48 48	48 48 47	47 42 47	44 45 48	52 49 49	46 45 48	45 45 57	57 63		63	67
Waikiki Shell lot, park side, mauka half	2 2 2	1 2 2	3 2 2	1 1 2	4 2 3	3 4 4	4 5 6	4 4 4	2 3 4	5 5		6	53
Monsarrat Avenue, Shell mauka driveway to Paki Ave	0 0 2	0 6 0	1 0 0	0 0 0	0 0 0	0 1 0	0 0 0	0 0 0	0 0 0	0 0		6	0
Monsarrat/Paki lot, makai end	0 0 0	0 0 3	0 0 0	2 0 2	1 1 0	4 0 3	1 3 0	5 0 3	0 6 0	7 0		7	10
Monsarrat/Paki lot, soccer field side	2 2 1	0 3 0	1 0 3	0 2 0	3 3 3	0 0 0	1 0 4	0 1 0	2 0 2	0 12		12	63
Monsarrat/Paki lot, mauka (Paki Ave.) end	0 0 1	0 1 0	0 1 0	0 0 0	0 1 0	0 0 0	0 0 0	0 0 0	0 0 2	0 0		2	10
Monsarrat/Paki lot, Monsarrat Ave. side	0 2 1	4 2 0	1 0 0	0 0 0	1 2 3	0 3 0	2 0 3	0 3 0	1 0 2	0 2		4	68
Paki Avenue, Monsarrat Ave. to old driving range lot	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0		0	0
Old driving range lot	9 8 10	11 13 11	4 0 8	8 10 11	9 7 7	6 5 7	7 7 1	1 3 8	9 19 30	33 32		33	46
Paki Avenue, old driving range lot to Hoole St.	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 1 0	0 0 0	0 0 0	0 0 0	0 1		1	0
Lot diamondhead of Hoole St	45 42 37	36 37 36	32 33 33	35 34 31	30 32 36	34 36 35	33 37 36	30 21 23	25 25 27	40 37		45	73
Paki Avenue, Hoole St. lot to Kalakaua Ave	21 24 25	24 26 12	27 26 25	27 28 26	25 23 24	22 24 21	23 24 22	23 22 24	24 26 31	32 34		34	0
Kalakaua Avenue, eastbound, Paki Ave. to Circle	16 17 17	15 14 10	15 8 16	16 19 17	15 13 9	11 11 10	9 12 11	12 12 12	22 28 31	31 29		31	31
Kalakaua Avenue, ahead bound, Circle to Poni Moi St	10 8 8	10 8 8	12 7 8	7 8 6	8 7 7	8 7 7	7 7 7	8 8 7	8 7 8	7 8		12	7
Paki Avenue, Kalakaua Ave. to tennis center	17 16 15	16 17 16	17 16 16	16 19 16	15 16 16	16 14 15	14 15 15	16 16 16	17 16 17	14 15		18	0
Tennis center lot	15 19 20	28 28 31	34 33 36	40 39 36	37 36 29	24 23 22	21 24 27	31 33 35	42 43 40	40 38		43	61
Paki Avenue, tennis center to Paki Hale	1 1 0	0 0 0	0 0 0	0 1 3	3 3 3	2 1 1	2 2 2	1 1 1	2 1 4	3 9		9	0
Paki Hale lot	7 12 12	10 11 10	12 9 9	8 8 8	8 8 7	8 3 3	5 5 7	10 10 7	4 3 4	3 4		12	17
Paki Avenue, Paki Hale to Monsarrat Ave	7 4 5	4 8 11	9 10 10	8 8 7	9 5 8	7 8 8	8 8 7	9 7 7	8 8 9	9 13		13	0
Kapiolani Rose Garden	0 0 0	0 0 0	0 1 2	4 4 4	5 4 4	4 2 2	2 3 2	3 2 2	0 0 0	0 0		5	11
Kapahulu Avenue, Paki Ave. to Zoo mauka entrance	0 0 0	0 0 0	0 0 0	0 0 0	0 0 1	1 1 1	1 1 1	0 0 0	0 0 0	0 0		1	35
Honolulu Zoo lot, street side, mauka half	1 1 2	1 3 2	9 12 13	18 20 21	17 18 19	17 11 9	8 8 4	5 4 2	2 1 1	1 0		21	29
Honolulu Zoo lot, street side, makai half	17 24 29	33 48 46	64 81 65	83 85 84	66 66 59	54 54 56	53 54 52	50 54 50	51 50 43	43 44		66	74
Honolulu Zoo lot, makai end	11 3 3	1 4 4	4 4 4	4 4 4	3 3 4	4 4 4	4 4 4	4 4 4	4 4 4	4 4		11	4
Honolulu Zoo lot, zoo side, mauka half	5 8 12	15 17 20	24 23 24	24 23 24	25 25 23	21 24 22	23 21 23	22 25 24	23 24 24	21 22		25	24
Honolulu Zoo lot, zoo side, makai half	0 5 9	10 17 27	37 52 80	68 80 75	63 51 32	40 37 37	32 37 32	31 30 31	32 33 35	27 26		75	78
Honolulu Zoo lot, mauka end	2 0 0	0 1 0	0 0 0	0 0 0	0 4 0	0 3 0	0 0 0	0 0 0	0 0 0	0 0		4	10
Kapahulu Avenue, between Zoo lot driveways	0 0 0	0 0 0	1 0 1	0 0 0	0 3 4	6 5 5	2 3 3	2 5 6	6 9 11	10 10		11	10
Kalakaua Avenue, Kapahulu Ave. to Aquarium	36 34 34	33 34 34	34 36 35	35 36 35	37 38 39	37 37 36	33 34 32	35 37 34	34 34 36	34 35		39	38
Honolulu Aquarium lot	2 2 4	3 6 7	7 9 9	9 8 9	8 8 5	8 5 4	4 10 7	8 5 8	4 3 3	0 0		10	9
Kalakaua Avenue, Aquarium to Natatorium	7 18 19	19 18 19	11 19 12	19 19 19	20 20 19	19 18 19	19 19 18	18 18 18	18 19 19	20 19		20	19
Waikiki Natatorium roadway, mauka/bound	24 23 31	26 29 25	34 27 35	27 34 27	35 27 30	24 33 27	35 28 36	27 37 27	29 37 25	36 28		37	27
Waikiki Natatorium lots	8 14 22	19 23 23	25 27 25	24 25 26	27 28 30	30 29 29	26 21 28	30 28 23	31 31 31	28 31		27	31
Waikiki Natatorium roadway, mauka/bound	12 20 15	19 18 22	18 23 16	22 15 23	16 24 24	23 18 24	15 25 18	23 15 23	16 25 18	22 19		24	25
Kalakaua Avenue, Natatorium to Diamond Head Circle	9 13 12	13 12 11	12 13 10	14 12 10	6 13 15	12 10 11	12 13 12	11 12 12	12 11 12	13 14		13	15
Kalakaua Avenue, eastbound, Circle to Natatorium	29 8 27	37 39 39	37 40 41	42 36 39	46 41 45	53 49 46	53 56 60	64 67 71	70 73 73	72 73		73	73
Kalakaua Avenue, eastbound, Natatorium to crosswalk	18 16 16	18 14 14	23 26 28	31 28 29	29 38 37	44 45 46	52 44 44	45 42 44	54 80 64	73 83		86	92
Kalakaua Avenue, eastbound, crosswalk (CW) to CW	0 4 5	8 one? 9	8 8 13	14 18 17	14 24 33	33 30 35	37 34 37	29 25 29	34 35 29	24 26		23	37
Kalakaua Avenue, eastbound, CW to Monsarrat Ave	13 11 8	10 18 16	16 17 13	13 11 14	18 20 19	21 22 18	18 17 14	11 10 10	10 14 18	19 21		20	22
Monsarrat Avenue, Kalakaua Ave. to crosswalk	17 22 22	21 21 22	22 22 20	22 20 23	25 23 21	23 22 22	22 21 22	17 19 22	20 21 23	23 19		20	25
Kalakaua Avenue, eastbound, Paki Ave. to Circle	0 18 17	17 15 14	10 15 8	16 16 19	17 15 13	9 11 11	10 9 12	11 12 12	12 22 28	31 31 29	0	31	31
Kalakaua Avenue, eastbound, Circle to Natatorium	29 8 27	37 39 39	37 40 41	42 36 39	46 41 45	53 49 46	53 58 60	64 67 71	70 73 73	72 73 72	0	73	73
Kalakaua Avenue, eastbound, Natatorium to crosswalk	18 16 16	18 14 14	23 26 28	31 28 29	29 38 37	44 45 46	52 44 44	45 42 44	54 80 64	73 83 86	0	90	92
Kalakaua Avenue, eastbound, crosswalk to Monsarrat Ave	13 15 14	18 19 25	24 25 28	27 27 31	32 44 52	54 52 53	55 51 51	40 35 39	44 49 47	43 47 43	0	55	78
Total, Aquarium lot (excluding special stalls)	2 2 4	3 6 7	7 9 9	9 8 9	6 6 5	6 5 4	4 10 7	8 5 8	4 3 3	0 0 0	0	10	9
Total, Natatorium roadway & lot (excluding special stalls)	44 57 68	64 68 70	75 77 78	73 74 76	78 79 84	77 78 80	78 74 78	80 80 73	84 85 86	73 86 79	0	86	83
Total, Waikiki Shell lot (excluding special stalls)	0 82 87	101 90 98	99 98 99	114 96 107	102 111 102	107 100 108	106 110 105	112 107 105	102 98 99	113 107 110	0	114	264
Total, lot at Monsarrat / Paki Ave. (excluding special stalls)	0 2 4	3 4 6	3 2 1	3 2 2	2 5 7	6 4 3	3 4 3	7 5 4	3 3 6	6 7 14	0	14	151
Total, Old Golf Driving Range lot (excluding special stalls)	0 9 9	10 11 13	11 4 0	8 8 10	11 9 7	7 6 5	7 7 7	1 1 3	8 9 19	30 33 32	0	33	46
Total, lot near Hoole St. (excluding special stalls)	0 45 42	37 36 37	35 32 33	33 35 34	31 30 32	38 34 38	35 33 37	36 30 21	23 25 25	27 40 37	0	45	73
Total, Tennis Center (excluding special stalls)	0 15 19	20 28 28	31 34 33	36 40 39	36 37 38	29 24 23	22 21 24	27 31 33	35 42 43	40 40 38	0	43	51
Total, Paki Hale lot (excluding special stalls)	0 7 12	12 10 11	10 12 9	9 8 8	8 8 8	7 6 3	3 5 5	7 10 10	7 4 3	4 3 4	0	12	17
Total, Kapiolani Rose Garden	0 0 0	0 0 0	0 0 1	2 4 4	4 5 4	4 4 2	2 2 3	2 3 2	0 0 0	0 0 0	0	5	11
Total, Honolulu Zoo lot (excluding special stalls)	36 41 55	63 70 100	113 152 161	172 178 187	176 174 167	136 136 133	127 120 124	115 112 115	111 112 112	107 96 96	0	187	217
Total, Kalakaua Ave. (mauka side, excluding special stalls)	51 75 73	73 74 72	65 80 64	76 74 73	69 79 80	75 73 73	71 73 69	72 75 74	71 72 72	78 75 75	0	80	75
Total, Paki Avenue	0 46 45	45 44 52	41 53 56	53 53 55	54 52 47	53 47 46	43 46 49	46 49 46	48 51 53	61 58 72	0	72	0
Total, Monsarrat Avenue	17 39 39	42 42 45	49 48 47	52 51 55	60 57 51	52 50 50	48 52 46	42 37 40	41 40 38	40 34 34	0	60	0
Total, Kapahulu Avenue (metered)	0 0 0	0 0 0	0 1 0	1 0 0	0 0 3	5 7 6	6 3 4	4 3 5	8 8 9	11 10 10	0	11	45
Total parked (excluding special stalls):	208 477 531	561 570 631	633 708 692	757 736 777	763 792 780	782 731 730	725 722 728	719 704 705	727 786 780	807 823 831	0	1,098	reduction capacity
Occupancy:	18.94% 43.44%	48.36% 51.09%	51.91% 57.47%	57.65% 64.48%	63.02% 68.94%	67.03% 70.77%	69.49% 72.13%	71.04% 69.40%	66.58% 66.48%	66.03% 65.48%	64.12%	64.21% 66.21%	73.58% 71.04% 73.50%	74.95% 75.68% 0.00%	
Total of accessible (a) stalls	0 1 3	5 6 4	6 3 7	8 7 8	9 10 11	8 10 12	7 8 7	5 1 3	2 2 4	3 3 6	0	20	46
Kalakaua Avenue, mauka side	0 0 1	0 1 1	3 0 1	1 1 1	1 3 2	2 4 5	4 3 4	3 0 1	1 1 1	1 1 2	0	5	7
Aquarium and Natatorium	0 0 1	2 2 1	2 0 0	1 1 0	0 0 0	1 1 0	1 1 1	0 0 0	0 0 0	0 0 0	0	2	4
Waikiki Shell	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0	0	9
Tennis Center	0 0 0	1 0 0	0 0 0	0 1 1	1 1 1	1 1 1	1 1 1	0 1 1	2 2 2	2 2	0	2	2
Other Paki Avenue Lots	0 1 1	1 3 1	2 0 1	0 0 0	0 0 0	0 1 0	0 0 0	0 0 0	0 0 0	1 0	0	3	15
Honolulu Zoo	0 0 0	1 0 1	1 3 5	6 7 6	8 4 4	5 1 3	1 0 1	0 1 2	1 0 1	0 1	0	8	9
Total of staff and lifeguard (b) stalls	8 10 13	18 19 15	15 13 14	15 14 17	13 10 14	10 9 13	12 15 15	14 12 12	14 11 13	11 11 7	0	20	25
Lifeguard stalls	5 6 7	8 9 8	8 6 7	8 8 9	9 7 10	8 7 9	9 10 9	8 6 7	9 7 8	7 7 5	0	10	18
Waikiki Shell	0 2 2	4 4 3	3 3 3	3 2 4	2 1 2	1 1 2	2 2 2	2 2 1	1 0 1	0 0 0	0	4	5
Honolulu Zoo	3 2 4	4 6 4	4 4 4	4 4 4	2 2 2	1 1 2	1 3 4	4 4 4	4 4 4	4 2 0		6	4
Passenger loading zone (c) on Kalakaua Avenue	0 0 0	0 0 0	0 0 0	0 1 1	0 0 0	0 0 0	0 0 0	0 0 0	1 0 1	0 1 0	0	1	2
Total parked, special stalls:	8 11 16	21 25 19	23 16 21	23 22 26	22 20 25	18 19 25	19 23 22	19 13 15	16 14 17	15 14 14	0	41	73
No parking areas													
Paki Avenue, no parking area, Monsarrat Ave. to Paki Hale	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0	0	0
Paki Avenue, no parking area diamondhead of Hoole St.	0 0 0	0 0 0	0 0 1	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	1 0 0	0 0 0	0	1	0
Total parked in surveyed areas:	216 488 547	582 595 650	656 724 713	780 758 803	786 812 805	780 750 755	744 745 750	738 717 720	743 801 797	822 837 845	0	1,140	
Occupancy:	18.95% 42.81%	47.98% 51.05%	52.19% 57.02%	57.54% 63.51%	62.54% 68.42%	68.49% 70.44%	68.95% 71.23%	70.61% 68.42%	65.79% 66.23%	65.26% 65.35%	65.79%	64.74%	62.89% 63.16%	65.18% 70.26%	69.91% 72.11%	73.42% 74.12% 0.00%	

Honolulu Zoo / Kapiolani Park Parking Survey — **Saturday, February 21, 1998**

Parked Cars — including special stalls	07:30 AM	08:00 AM	08:30 AM	09:00 AM	09:30 AM	10:00 AM	10:30 AM	11:00 AM	11:30 AM	12:00 PM	12:30 PM	01:00 PM	01:30 PM	02:00 PM	02:30 PM	03:00 PM	03:30 PM	04:00 PM	04:30 PM	05:00 PM	05:30 PM	06:00 PM	Capacity (if observed)	Marked stalls
Monsarrat Avenue, crosswalk to Shell mauka driveway	20	11	18	20	23	20	26	26	23	24	25	23	23	24	20	20	20	23	21	22	18	18	15	15	12	13	7	8	7	26	0
Waikiki Shell lot, street side, mauka half	2	1	0	1	2	2	1	3	3	3	4	6	11	12	10	8	9	9	7	6	6	5	5	4	3	4	12	90		
Waikiki Shell lot, street side, makai half	42	47	50	51	65	72	74	78	67	72	72	79	83	78	73	72	74	78	68	82	63	62	54	46	41	39	39	35	1	83	84
Waikiki Shell lot, park side, mauka half	36	51	63	67	62	67	67	63	58	64	67	66	65	65	65	67	70	71	64	62	63	56	49	42	41	34	28	22	36	71	67
Waikiki Shell lot, park side, mauka half	2	1	3	3	2	4	4	6	7	8	5	7	12	11	11	3	9	14	13	12	13	11	7	3	2	3	1	1	21	21	53
Monsarrat Avenue, Shell mauka driveway to Palu Ave	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2	1	0	0	1	0	0	0	0	0	1	1	0	0	7	0
Monsarrat/Palu lot, mauka end	5	0	5	0	6	0	4	6	0	6	0	6	1	0	0	0	0	0	8	0	8	0	8	4	9	0	8	0	0	9	10
Monsarrat/Palu lot, soccer field side	0	1	0	1	0	2	0	0	1	0	0	0	5	8	7	5	5	4	0	3	0	4	0	1	0	3	0	6	0	8	83
Monsarrat/Palu lot, mauka (Palu Ave.) end	0	5	0	4	0	3	0	0	2	0	0	0	3	3	2	2	2	2	0	2	0	2	0	1	0	1	0	1	0	5	10
Monsarrat/Palu lot, Monsarrat Ave. side	0	2	0	3	0	1	0	0	3	0	1	0	47	2	3	3	2	1	0	1	0	2	0	4	0	4	0	3	0	47	68
Palu Avenue, Monsarrat Ave. to old driving range lot	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Old driving range lot	15	34	44	47	47	45	44	48	47	44	41	45	45	44	44	26	41	40	45	48	46	41	38	26	42	43	25	22	27	48	46
Palu Avenue, old driving range lot to Noela St.	0	2	11	14	13	14	14	13	12	14	13	18	12	11	13	14	14	11	11	14	14	10	9	9	8	7	6	5	3	16	0
Lot diamondhead of Noela St.	57	69	70	74	75	73	75	75	73	75	73	75	72	69	67	67	68	54	56	72	73	82	65	70	74	73	55	45	49	75	73
Palu Avenue, Noela St. lot to Kalakaua Ave.	29	34	32	32	33	40	46	46	47	47	45	43	0	40	36	38	40	39	39	40	43	43	37	39	40	42	41	45	41	47	0
Kalakaua Avenue, eastbound, Palu Ave. to Circle	27	23	20	18	15	14	13	18	26	30	30	31	30	22	28	31	28	31	31	23	31	30	28	30	31	30	28	31	30	31	31
Kalakaua Avenue, shared bound, Circle to Poni Moi St.	8	8	8	8	9	8	8	7	7	8	7	7	8	8	7	8	7	7	7	7	8	7	7	9	7	7	7	7	7	8	7
Palu Avenue, Kalakaua Ave. to tennis center	16	17	18	17	18	18	17	17	19	19	19	22	20	21	21	19	19	19	19	20	20	19	17	19	17	11	18	18	18	22	0
Tennis center lot	30	35	30	29	32	35	40	43	44	48	47	45	46	47	40	35	33	37	32	33	37	33	39	36	36	32	32	32	37	48	51
Palu Avenue, tennis center to Palu Hale	3	7	11	17	26	36	37	35	41	42	41	37	29	25	24	28	25	22	22	20	21	18	19	19	17	23	15	18	22	42	0
Palu Hale lot	1	1	1	1	2	4	7	8	7	7	10	8	15	17	17	17	17	17	17	8	7	10	10	13	12	12	10	11	7	17	17
Palu Avenue, Palu Hale to Monsarrat Ave.	10	8	9	13	17	16	20	21	17	16	20	21	16	17	17	11	8	7	9	11	10	11	14	15	14	12	10	9	9	21	0
Kapiolani Rose Garden	1	1	1	1	1	1	1	1	1	2	2	2	2	3	5	6	6	6	7	7	8	7	8	2	3	2	0	0	2	8	11
Kapahulu Avenue, Palu Ave. to Zoo mauka entrance	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	0	0	0	1	35
Honolulu Zoo lot, street side, mauka half	1	2	1	2	3	2	2	12	19	21	27	29	29	29	29	29	30	25	27	20	20	16	9	8	7	3	2	2		30	29
Honolulu Zoo lot, street side, makai half	32	30	36	37	39	39	46	53	60	66	66	70	73	73	74	73	73	72	63	60	57	66	60	57	51	51	44	45	46	74	74
Honolulu Zoo lot, mauka end	2	1	4	3	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	2	4	4	4	2		4	4
Honolulu Zoo lot, zoo side, mauka half	25	11	14	20	22	23	24	24	23	24	24	23	23	24	24	24	24	19	21	24	24	24	21	24	20	16	18	19		25	24
Honolulu Zoo lot, zoo side, mauka half	28	1	5	8	22	28	31	36	63	72	71	75	78	76	76	76	75	72	65	42	60	61	56	49	39	27	19	18		76	76
Honolulu Zoo lot, mauka end	0	4	0	0	0	0	0	0	0	0	5	8	9	10	10	10	0	5	0	7	0	0	0	0	0	0	0	0		10	10
Kapahulu Avenue, between Zoo lot driveways	0	0	0	0	0	0	0	0	0	0	1	0	8	11	10	10	9	10	9	7	7	8	7	7	7	6	10	11		11	10
Kalakaua Avenue, Kapahulu Ave. to Aquarium	30	33	34	32	3	36	0	35	35	36	35	35	37	39	37	36	36	37	37	33	36	35	36	36	35	33	38	40		40	38
Honolulu Aquarium lot	4	4	0	0	2	7	7	7	8	8	9	9	8	9	9	9	9	9	9	9	8	9	8	7	3	3	1	0		9	9
Kalakaua Avenue, Aquarium to Natatorium	19	18	19	19	19	18	19	19	19	18	18	19	19	19	19	19	19	18	18	20	17	19	19	19	18	13	13	13		20	18
Waikiki Natatorium roadway, makaibound	24	33	24	34	26	34	26	33	34	24	34	27	34	26	26	25	26	26	25	32	26	27	20	22	21					34	27
Waikiki Natatorium lots	17	21	28	26	24	26	25	29	28	29	27	28	30	31	31	30	27	24	25	25	26	28	24	18	16	15	10	11	11	31	32
Waikiki Natatorium roadway, maukabound	24	15	22	15	23	15	8	15	16	22	17	25	18	24	26	27	27	27	24	15	24	17	17	12	19	12	19	13	18	27	24
Kalakaua Avenue, Natatorium to Dillingham Circle	13	13	11	12	12	12		12	12	13	11	12	12	12	12	12	13	12	12	12	13	13	12	14	12	12	12	12		14	11
Kalakaua Avenue, eastbound, Circle to Natatorium	32	29	48	41	42	47		53	53	63	73	73	65	67	78	73	72	72	72	60	64	72	73	73	74	73	70	73	73		78	73
Kalakaua Avenue, eastbound, Natatorium to crosswalk	41	45	49	36	35	41		58	71	82	78	77	92	92	92	82	80	91	89	92	90	89	86	83	81	75	84	79		92	92
Kalakaua Avenue, eastbound, crosswalk (CW) to CW	14	15	17	17	13	8		11	16	17	27	34	37	40	39	40	37	51	36	35	37	37	33	31	30	24	26	30		51	53
Kalakaua Avenue, eastbound, CW to Monsarrat Ave.	9	9	6	5	3	3		9	7	6	12	14	17	19	18	18	19	23	19	17	18	19	17	16	18	18	19	19	18		23	23
Monsarrat Avenue, Kalakaua Ave. to crosswalk	24	24	25	24	25	24		28	22	23	23	24	23	22	24	24	24	22	23	26	26	24	23	21	21	20	18	20	20		28	0
Kalakaua Avenue, eastbound, Palu Ave. to Circle	0	27	23	20	18	15	14	13	0	18	26	30	30	31	30	22	28	31	26	31	31	23	31	30	28	30	31	30	28	31	31
Kalakaua Avenue, eastbound, Circle to Natatorium	32	29	48	41	42	47	0	53	0	63	63	73	73	65	67	78	73	72	72	72	60	64	72	73	73	74	73	70	73	73	0	78	73
Kalakaua Avenue, eastbound, Natatorium to crosswalk	41	45	49	36	35	41	0	58	0	71	82	78	77	92	92	92	92	90	92	91	89	92	90	89	88	83	81	75	84	79	0	92	92
Kalakaua Avenue, eastbound, crosswalk to Monsarrat Ave	23	24	25	22	16	11	0	20	0	23	25	39	48	54	59	57	58	56	74	55	52	55	58	50	47	49	48	43	45	48	0	74	78
Total, Aquarium lot (excluding special stalls)	4	4	0	0	2	7	7	7	0	8	8	9	9	8	9	9	9	9	9	9	9	9	8	9	8	7	3	3	1	0	0	9	9
Total, Natatorium roadway & lot (excluding special stalls)	65	69	74	75	73	75	59	77	0	78	75	78	80	80	81	83	83	79	77	74	73	78	79	66	62	61	54	49	48	50	0	83	83
Total, Waikiki Shell lot (excluding special stalls)	0	84	100	116	122	131	145	148	0	149	135	145	148	158	171	164	159	150	163	173	151	145	148	136	116	99	89	81	72	61	64	173	264
Total, lot at Monsarrat / Palu Ave. (excluding special stalls)	0	5	8	5	8	6	6	4	0	6	6	6	4	6	56	13	12	10	9	7	8	6	6	8	8	10	9	8	8	10	0	56	151
Total, Old Golf Driving Range lot (excluding special stalls)	0	15	34	44	47	47	45	44	0	48	47	44	41	45	45	44	44	26	41	40	45	48	46	41	39	26	42	43	25	22	27	48	46
Total, lot near Noela St. (excluding special stalls)	0	57	69	70	74	75	73	75	0	75	73	75	73	75	72	69	67	67	69	54	56	72	73	62	65	70	74	73	55	48	49	75	73
Total, Tennis Center (excluding special stalls)	0	30	35	30	29	32	35	40	0	43	44	48	47	45	48	47	40	35	33	37	32	33	37	33	39	38	36	32	32	32	37	48	51
Total, Palu Hale lot (excluding special stalls)	0	1	1	1	1	2	4	7	0	8	7	7	10	8	15	17	17	17	17	17	17	8	7	10	10	13	12	12	10	11	7	17	17
Total, Kapiolani Rose Garden	0	1	1	1	1	1	1	1	0	1	1	2	2	2	2	3	5	6	6	6	7	7	8	7	8	2	3	2	0	0	2	8	11
Total, Honolulu Zoo lot (excluding special stalls)	88	48	61	69	89	97	107	121	0	163	181	186	205	214	214	217	216	216	205	188	177	154	174	165	149	134	121	94	88	87	0	217	217
Total, Kalakaua Avenue (makai side, excl. special stalls)	62	72	72	71	42	76	27	74	0	73	75	73	72	75	77	76	74	77	76	75	70	75	73	75	76	77	70	70	70	72	7	77	75
Total, Palu Avenue	0	58	68	81	93	109	124	134	0	132	138	138	138	139	79	114	111	110	106	98	100	105	106	101	98	101	96	95	90	95	93	139	0
Total, Monsarrat Avenue	24	44	36	42	45	47	20	54	0	48	46	47	49	48	45	48	46	46	43	48	47	49	42	39	36	36	32	32	28	28	7	54	0
Total, Kapahulu Avenue (metered)	0	0	1	0	0	0	0	0	0	0	0	0	1	0	6	11	10	10	9	10	9	7	7	9	8	8	8	7	10	11	0	11	45
Total parked (excluding special stalls):	339	613	705	724	735	819	667	928	0	1,007	1,030	1,076	1,107	1,143	1,168	1,162	1,144	1,107	1,127	1,083	1,033	1,028	1,065	1,003	956	918	882	819	765	758	323	1,344	vehicles capacity
Occupancy:	25.22%	45.61%	52.46%	53.87%	54.69%	60.94%	49.63%	69.05%	0.00%	74.93%	76.64%	80.06%	82.37%	85.04%	86.90%	86.46%	85.12%	82.37%	83.85%	80.58%	76.86%	76.49%	79.24%	74.63%	71.13%	68.30%	65.63%	60.94%	56.92%	56.40%	24.03%		
Total of accessible (a) stalls	1	1	0	0	0	4	7	12	0	13	15	16	15	11	10	8	9	10	12	10	9	8	7	6	6	6	5	5	6	6	1	22	46
Kalakaua Avenue, mauka side	1	1	0	0	0	1	1	4	0	3	2	3	4	4	3	3	3	3	3	3	3	2	2	2	3	3	3	3	3	3	1	4	7
Aquarium and Natatorium	0	0	0	0	0	0	1	1	0	1	1	1	1	1	1	2	1	1	1	0	1	0	0	0	0	0	0	0	0	0	0	2	4
Waikiki Shell	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	1	9
Tennis Center	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	2
Other Palu Avenue Lots	0	0	0	0	0	2	4	4	0	4	6	4	4	4	4	0	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	6	15
Honolulu Zoo	0	0	0	0	0	1	1	3	0	5	6	8	6	2	2	3	4	4	5	5	4	5	4	3	3	3	2	2	3	3	0	8	9
Total of staff and lifeguard (b) stalls	5	10	8	7	0	13	5	12	0	14	15	17	13	16	12	14	15	14	13	14	13	12	12	12	12	12	12	11	12	8	0	18	25
Lifeguard stalls	5	7	6	4	0	10	2	9	0	11	10	11	9	10	9	9	11	9	9	9	11	10	10	11	10	10	11	10	11	7	0	11	16
Waikiki Shell	0	1	1	1	0	2	1	1	0	1	2	2	1	2	2	3	2	3	2	3	0	0	0	0	0	1	0	0	0	0	0	3	5
Honolulu Zoo	0	2	1	2	0	1	2	2	0	2	3	4	3	4	1	2	2	2	2	2	2	2	2	1	2	1	1	1	1	1	0	4	4
Passenger loading zone (c) on Kalakaua Avenue	1	0	0	0	0	0	0	0	0	0	1	0	1	0	1	1	2	1	1	1	1	1	1	1	1	1	1	1	0	2	0	2	2
Total parked, special stalls:	7	11	8	7	0	17	12	24	0	27	31	33	29	27	23	23	26	25	26	25	23	22	20	19	19	19	18	17	18	16	1	42	73
No parking area																																	
Palu Avenue, no parking area, Monsarrat Ave. to Palu Hale	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Palu Avenue, no parking area diamondhead of Noela St.	0	0	1	2	8	11	16	21	0	24	23	23	22	17	18	14	10	9	9	6	7	11	12	14	13	11	10	12	10	8	10	24	0
Total parked in surveyed areas:	348	624	714	733	743	847	695	973	0	1,058	1,084	1,132	1,158	1,187	1,209	1,199	1,180	1,141	1,162	1,114	1,063	1,061	1,097	1,036	988	948	910	848	793	782	334	1,410	
Occupancy:	24.54%	44.26%	50.64%	51.99%	52.70%	60.07%	49.29%	69.01%	0.00%	75.04%	76.88%	80.29%	82.13%	84.18%	85.74%	85.04%	83.69%	80.92%	82.41%	79.01%	75.39%	75.25%	77.80%	73.48%	70.07%	67.23%	64.54%	60.14%	56.24%	55.46%	23.69%		

Honolulu Zoo / Kapiolani Park Parking Survey — **Sunday, February 22, 1998**

Parking Count — excluding leased stalls — Actual start	07:30 AM	08:30 AM	09:30 AM	10:30 AM	11:30 AM	12:30 PM	01:30 PM	02:30 PM	03:30 PM	04:30 PM	05:30 PM	06:30 PM	Capacity (all temporary changes presented)	Maximum Visits
Monsarrat Avenue, crosswalk to Shell mauka driveway		5	7	7	8	10	10	11	10	12	18	12	15	13	17	16	25	24	31	29	21	16	17	4	5	4	4	5	6	8	8	31	0
Waikiki Shell lot, street side, mauka half		23	10	18	17	11	9	7	6	6	6	5	5	5	5	5	5	6	14	21	24	36	39	39	29	24	17	13	9	10	12	39	60
Waikiki Shell lot, street side, makai half		60	65	66	70	55	54	54	52	57	58	58	59	59	57	58	78	83	80	83	81	82	77	68	58	61	60	60	52	56	60	83	84
Waikiki Shell lot, park side, mauka half		25	53	48	46	36	31	37	34	42	46	50	45	50	49	60	64	65	64	66	61	79	64	53	48	49	45	51	51	53	53	79	67
Waikiki Shell lot, park side, makai half		0	23	20	16	11	7	5	5	4	4	4	4	4	4	8	6	13	19	27	31	38	39	37	35	33	35	33	32	36	34	39	53
Monsarrat Avenue, Shell mauka driveway to Paki Ave		8	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	1	3	8	0
Monsarrat/Paki lot, makai end		0	0	10	0	10	0	0	0	0	0	0	0	0	0	0	3	2	2	13	1	7	0	15	0	11	0	5	0	3	0	15	10
Monsarrat/Paki lot, soccer field side		0	2	0	4	0	3	24	22	23	22	22	22	17	14	8	7	7	8	0	8	0	9	0	6	0	4	0	0	0	1	24	63
Monsarrat/Paki lot, mauka (Paki Ave.) end		0	4	0	3	0	0	3	3	6	5	4	3	3	1	1	0	0	0	0	1	0	1	0	1	0	1	0	0	0	0	6	10
Monsarrat/Paki lot, Monsarrat Ave. side		0	3	0	3	0	7	3	3	1	1	1	1	0	0	1	3	4	4	0	3	0	3	0	7	0	6	0	3	0	1	7	68
Paki Avenue, Monsarrat Ave. to old driving range lot		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Old driving range lot		42	42	44	45	46	47	50	50	49	48	49	48	47	52	49	50	49	48	45	45	45	26	43	35	44	42	42	35	29	12	52	46
Paki Avenue, old driving range lot to Noela St		0	1	2	5	11	13	15	14	17	13	13	15	14	17	15	15	14	14	13	13	12	11	10	10	7	5	5	5	6	4	17	0
Lot diamondhead of Noela St		18	22	26	32	44	60	74	73	73	72	75	73	44	42	53	56	66	63	63	73	71	71	74	72	66	60	43	61	67	53	75	73
Paki Avenue, Noela St. lot to Kalakaua Ave.		23	25	29	37	40	37	42	40	43	39	40	36	31	31	32	39	41	42	49	47	48	46	49	45	39	39	0	36	41	41	43	0
Kalakaua Avenue, westbound, Paki Ave. to Circle		24	24	19	24	25	23	18	18	12	13	16	17	16	12	13	17	19	31	31	0	31	31	31	0	25	28	28	30	30	29	31	31
Kalakaua Avenue, ahead bound, Circle to Poni Moi St		6	7	7	7	9	7	8	9	7	8	7	9	7	7	9	7	8	8	8	9	7	7	8	7	7	7	7	7	7	8	9	7
Paki Avenue, Kalakaua Ave. to tennis center		15	15	18	19	20	20	20	17	19	18	19	17	13	8	18	18	18	19	21	22	21	20	18	18	17	17	15	15	15	16	22	0
Tennis center lot		31	37	42	46	51	42	43	45	37	34	31	32	26	21	17	20	17	20	24	31	40	43	40	41	36	33	29	25	24	27	51	51
Paki Avenue, tennis center to Paki Hale		0	1	3	12	17	17	27	26	27	26	29	35	27	27	27	25	22	24	22	17	18	20	22	15	10	10	11	7	11	10	35	0
Paki Hale lot		4	7	21	24	22	23	16	11	15	17	17	20	21	18	18	19	19	20	20	20	20	20	21	21	20	22	9	20	22	21	24	17
Paki Avenue, Paki Hale to Monsarrat Ave.		13	11	18	23	26	25	36	42	40	24	24	30	24	25	25	25	29	29	21	21	19	23	26	17	13	15	16	11	14	13	42	0
Kapiolani Rose Garden		0	0	1	0	0	0	0	1	0	3	2	2	2	3	3	1	3	6	5	4	5	5	5	1	0	0	0	0	0	0	6	11
Kapahulu Avenue, Paki Ave. to Zoo mauka entrance	8	11	10	10	10	10	13	14	17	17	21	19	20	21	22	33	34	34	35	34	29	29	28	28	25	22	22	21	21	23	26	35	35
Honolulu Zoo lot, street side, mauka half	0	0	1	1	2	3	3	8	12	16	24	26	28	29	29	29	29	29	29	29	29	29	29	27	23	18	15	9	8	9		29	29
Honolulu Zoo lot, street side, makai half	34	33	39	35	40	44	54	55	56	58	65	70	72	76	74	73	74	76	74	78	74	75	72	67	68	63	56	61	65	63		78	74
Honolulu Zoo lot, mauka end	4	4	2	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4		4	4
Honolulu Zoo lot, zoo side, mauka half	13	14	16	13	17	22	23	24	24	25	24	22	24	24	24	24	24	24	24	20	22	15	22	22	22	23	24		23	24		25	24
Honolulu Zoo lot, zoo side, makai half	1	1	4	10	17	19	25	37	47	63	71	76	78	78	78	77	78	75	78	78	78	74	75	73	63	51	31	30	27	25		77	76
Honolulu Zoo lot, mauka end	0	0	0	0	0	0	0	0	0	0	0	3	3	7	10	12	10	10	10	0	10	0	0	0	0	0	0	0	0	0		12	10
Kapahulu Avenue, between Zoo lot driveways	9	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	9	10	10	9	10	11	9	8		11	10
Kalakaua Avenue, Kapahulu Ave. to Aquarium	35	34	34	33	34	33	37	38	39	36	38	38	38	37	36	32	40	43	41	42	46	47	42	42	46	42	46	41	41	35		47	38
Honolulu Aquarium lot	0	0	0	1	2	3	8	8	9	9	9	8	8	9	10	9	9	9	9	8	9	10	10	8	8	7	9	5	2	10		10	9
Kalakaua Avenue, Aquarium to Natatorium	19	19	18	19	18	18	19	19	19	19	19	19	19	19	19	20	19	19	20	19	19	19	18	19	19	20	20	19	17	14		20	19
Waikiki Natatorium roadway, makaibound	27	34	23	30	22	30	23	31	26	33	25	32	26	34	26	28	29	36	26	33	30	35	29	35	27	34	24	30	20	22		36	27
Waikiki Natatorium lots	15	19	21	25	22	22	21	18	19	21	23	25	25	25	29	29	32	33	33	34	36	35	36	32	34	28	27	25	11	9		36	32
Waikiki Natatorium roadway, maukabound	22	15	22	15	21	14	21	15	23	16	23	16	24	19	24	25	24	19	25	18	26	18	25	18	20	18	24	12	17	11		25	24
Kalakaua Avenue, Natatorium to Dillingham Circle	12	11	12	12	12	13	13	12	12	12	12	12	10	12	12	13	12	13	13	18	16	15	15	16	14	16	15	15	14	14		16	11
Kalakaua Avenue, eastbound, Circle to Natatorium	30	33	33	38	40	48	58	52	58	54	55	51	55	62	67	73	73	73	73	73	73	73	72	73	72	72	70	69	65	62		73	73
Kalakaua Avenue, eastbound, crosswalk (CW) to CW	14	20	29	30	28	33	42	52	63	69	87	92	92	89	92	92	91	92	92	92	91	91	91	92	92	87	87	84	84	82		92	92
Kalakaua Avenue, eastbound, CW to Monsarrat Ave		17	17	19	18	18	17	18	25	23	31	31	36	37	37	39	38	38	37	36	36	36	36	36	36	36	36	36	35	36		39	53
Monsarrat Avenue, Kalakaua Ave. to crosswalk		0	6	6	6	9	8	10	11	12	14	15	18	19	18	15	19	19	19	18	18	17	9	5	4	1	3	0	2	3		19	23
Total of rows	36	24	27	26	26	25	24	26	26	27	25	27	26	26	27	25	25	26	24	27	21	21	9	9	7	6	5	2	1			38	0
Total parked	04:10 AM	05:25 AM	06:40 AM	08:00 AM	09:25 AM	09:55 AM	10:35 AM	10:25 AM	10:55 AM	11:10 AM	11:32 AM	11:51 AM	12:07 PM	12:30 PM	12:54 PM	01:13 PM	01:25 PM	01:51 PM	02:08 PM	02:31 PM	02:47 PM	03:11 PM	03:25 PM	03:42 PM	04:07 PM	04:25 PM	04:46 PM	05:25 PM	05:53 PM	06:45 PM	06:58 PM	1,967	1,318
Kalakaua Avenue, eastbound, Paki Ave. to Circle	0	24	24	19	24	25	23	18	18	12	13	16	17	16	12	13	17	19	31	31	0	31	31	31	0	25	28	28	30	30	29	31	31
Kalakaua Avenue, westbound, Circle to Natatorium	30	33	33	38	40	48	58	52	58	54	55	51	55	62	67	73	73	73	73	73	73	73	72	73	72	72	70	69	65	62	0	73	73
Kalakaua Avenue, eastbound, Natatorium to crosswalk	14	20	29	30	28	33	42	52	63	69	87	92	92	89	92	92	91	92	92	92	91	91	91	92	92	87	87	84	84	82	0	92	92
Kalakaua Avenue, eastbound, crosswalk to Monsarrat Ave	0	17	25	25	24	27	25	26	36	35	45	46	52	58	55	58	57	57	56	56	55	54	45	41	40	37	39	38	38	39	0	58	76
Total, Aquarium lot (excluding special stalls)	0	0	0	1	2	3	8	8	9	9	9	8	9	9	10	9	9	9	9	8	9	10	10	8	8	7	9	5	2	10	0	10	9
Total, Natatorium roadway & lot (excluding special stalls)	64	68	66	70	65	66	65	64	68	70	71	73	75	78	79	81	85	88	84	85	92	88	89	85	81	80	75	67	48	42	0	92	83
Total, Waikiki Shell lot (excluding special stalls)	0	128	151	156	149	115	101	103	99	109	114	114	113	118	115	139	153	167	177	197	197	235	219	197	172	167	157	157	144	157	159	235	264
Total, lot at Monsarrat / Paki Ave. (excluding special stalls)	0	0	9	10	10	10	10	30	28	30	28	27	26	20	15	10	13	13	14	13	13	7	13	15	14	11	11	5	3	3	2	30	151
Total, Old Golf Driving Range lot (excluding special stalls)	0	42	42	44	45	46	47	50	50	49	48	49	48	47	52	49	50	49	48	45	45	45	25	43	35	44	42	42	35	29	12	52	46
Total, lot near Noela St. (excluding special stalls)	0	19	22	26	32	44	60	74	73	73	72	75	73	44	42	53	56	66	63	63	73	71	71	74	72	66	60	43	61	67	53	75	73
Total, Tennis Center (excluding special stalls)	0	31	37	42	46	51	42	43	45	37	34	31	32	26	21	17	20	17	20	24	31	40	43	40	41	36	33	29	25	24	27	51	51
Total, Paki Hale lot (excluding special stalls)	0	4	7	21	24	22	23	16	11	15	17	17	20	21	18	18	19	19	20	20	20	20	20	21	21	20	22	9	20	22	21	24	17
Total, Kapiolani Rose Garden	0	0	0	1	0	0	0	0	1	0	3	2	2	2	3	3	1	3	6	5	4	5	5	5	1	0	0	0	0	0	0	6	11
Total, Honolulu Zoo lot (excluding special stalls)	52	52	62	63	80	92	109	126	143	166	186	201	207	216	217	219	217	218	217	211	217	206	200	193	173	158	128	126	127	125	0	219	217
Total, Kalakaua Avenue (mauka side, excl. special stalls)	66	70	71	71	71	74	76	77	79	74	75	74	74	75	74	81	76	83	82	85	90	88	82	85	86	85	88	82	79	70	8	80	75
Total, Paki Avenue	0	51	53	68	98	114	110	140	139	148	120	125	133	109	108	117	122	124	128	126	120	117	120	125	105	86	86	47	76	87	84	146	0
Total, Monsarrat Avenue	0	51	31	34	32	36	35	37	36	38	44	38	42	39	43	43	50	49	57	53	48	37	38	13	14	11	10	10	9	10	9	57	0
Total, Kapahulu Avenue (metered)	18	21	20	20	20	20	23	24	27	27	31	29	29	31	32	43	44	44	45	44	39	39	37	38	35	31	32	32	30	31	26	45	45
Total parked (excluding special stalls):	244	631	682	739	788	824	864	938	981	1,013	1,052	1,068	1,099	1,058	1,055	1,118	1,155	1,190	1,222	1,231	1,217	1,257	1,211	1,179	1,062	1,023	977	871	878	890	430	1,467	reduction capacity
Occupancy:	16.63%	43.01%	46.49%	50.37%	53.72%	56.17%	58.90%	63.94%	66.87%	69.05%	71.71%	72.80%	74.91%	72.12%	71.92%	76.21%	78.73%	81.12%	83.30%	83.91%	82.96%	85.69%	82.55%	80.37%	72.36%	69.73%	66.80%	59.37%	59.71%	60.67%	29.31%		
Total of accessible (A) stalls	0	3	3	4	7	5	6	6	8	7	5	3	6	8	12	15	16	17	16	17	18	20	22	17	17	16	14	17	16	14	6	24	46
Kalakaua Avenue, mauka side	0	2	2	2	3	2	2	2	2	2	2	1	2	2	2	3	3	4	5	4	5	5	5	5	4	3	3	4	3	2	1	5	7
Aquarium and Natatorium	0	0	0	0	0	0	0	0	1	1	2	1	1	1	1	1	2	2	2	2	2	3	3	1	2	2	1	1	1	1	0	3	4
Waikiki Shell	0	0	0	0	1	1	1	1	1	1	0	0	1	0	2	2	3	3	3	3	3	3	3	2	1	1	1	2	2	2	3	3	9
Tennis Center	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
Other Paki Avenue Lots	0	0	0	1	2	1	2	2	3	2	1	1	0	1	0	1	1	2	2	1	1	1	2	1	1	2	2	3	4	3	2	4	15
Honolulu Zoo	0	1	1	1	1	1	1	1	1	1	0	0	2	4	7	8	7	6	4	7	7	8	9	8	9	8	7	7	6	6	0	9	9
Total of staff and lifeguard (b) stalls	2	9	8	12	14	12	11	12	11	11	11	12	12	14	16	17	18	18	20	16	16	17	18	18	16	15	16	18	17	13	3	20	25
Lifeguard stalls	1	6	4	9	11	11	10	10	10	10	10	9	10	10	10	10	12	12	12	11	11	11	11	12	11	11	11	10	10	7	0	12	18
Waikiki Shell	0	3	3	3	2	1	1	2	1	1	1	3	2	3	3	4	4	3	4	2	2	3	4	3	1	2	1	4	4	3	3	4	5
Honolulu Zoo	1	0	1	0	1	0	0	0	0	0	0	0	0	1	3	3	2	3	4	3	3	3	3	3	4	2	4	4	3	3	0	4	4
Passenger loading zone (c) on Kalakaua Avenue	1	1	1	0	1	1	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	1	2
Total parked, special stalls:	3	13	12	16	22	18	17	18	19	18	17	16	19	23	29	33	35	36	37	34	35	38	41	36	34	32	31	35	33	27	9	45	73
No parking areas																																	
Paki Avenue, no parking area, Monsarrat Ave. to Paki Hale	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Paki Avenue, no parking area diamondhead of Noela St	0	0	0	0	1	1	2	6	10	12	7	10	14	7	7	8	5	8	5	7	7	9	14	4	6	6	5	2	2	3	3	14	0
Total parked in surveyed areas:	247	644	694	755	811	843	883	962	1,010	1,043	1,076	1,094	1,132	1,088	1,091	1,157	1,195	1,234	1,264	1,272	1,259	1,304	1,266	1,219	1,102	1,061	1,013	908	911	920	442	1,526	
Occupancy:	16.19%	42.20%	45.48%	49.48%	53.15%	55.24%	57.86%	63.04%	66.19%	68.35%	70.51%	71.69%	74.18%	71.30%	71.49%	75.82%	78.31%	80.87%	82.83%	83.36%	82.50%	85.45%	82.96%	79.88%	72.21%	69.53%	66.38%	59.50%	59.70%	60.29%	28.96%		

Honolulu Zoo / Kapiolani Park Parking Survey — Wednesday, February 25, 1998

Parking Count — existing special stalls — Actual start	07:15 AM	07:30 AM	07:45 AM	08:00 AM	08:15 AM	08:30 AM	08:45 AM	09:00 AM	09:15 AM	09:30 AM	09:45 AM	10:00 AM	10:15 AM	10:30 AM	10:45 AM	11:00 AM	11:15 AM	11:30 AM	11:45 AM	12:00 PM	12:15 PM	12:30 PM	12:45 PM	01:00 PM	01:15 PM	01:30 PM	01:45 PM	02:00 PM	02:15 PM	02:30 PM	02:45 PM	03:00 PM	03:15 PM	03:30 PM	03:45 PM	04:00 PM	04:15 PM	04:30 PM	04:45 PM	05:00 PM	05:15 PM	05:30 PM	05:45 PM	Capacity Maximum occupied	Surveyed stalls
Monsarrat Avenue, crosswalk to Shell mauka driveway		17	18	16	18	19	23	27	27	28	28	30	27	23	21	23	25	27	20	18	23	24	20	23	22	20	18	16	13	11	13	30	0
Waikiki Shell lot, street side, mauka half		0	1	0	2	8	12	19	18	63	18	10	7	1	0	0	0	0	0	1	1	1	2	1	3	0	1	1	1	3	3	63	60
Waikiki Shell lot, street side, makai half		39	43	46	50	56	65	73	78	79	81	85	81	82	61	54	56	49	50	47	46	49	48	45	43	42	48	45	42	49	46	81	84
Waikiki Shell lot, park side, makai half		39	45	42	48	60	65	66	64	18	58	47	43	47	46	47	49	46	48	50	48	51	47	48	49	43	42	42	47	57	54	66	67
Waikiki Shell lot, park side, mauka half		4	4	4	7	10	18	24	26	24	26	13	7	6	3	6	6	7	6	5	5	2	2	4	4	7	6	4	2	4	5	26	53
Monsarrat Avenue, Shell mauka driveway to Paki Ave		2	1	0	0	0	1	3	3	0	1	0	0	0	1	0	0	1	1	1	2	0	0	0	0	0	0	0	0	0	0	3	0
Monsarrat/Paki lot, mauka end		0	5	0	5	0	0	8	3	2	1	1	3	1	4	1	4	2	6	1	7	0	6	0	6	1	7	1	19	0	25	25	10
Monsarrat/Paki lot, soccer field side		1	0	2	0	8	32	62	34	24	11	4	0	2	0	1	0	3	0	4	0	5	0	2	0	4	0	10	0	22	0	62	63
Monsarrat/Paki lot, mauka (Paki Ave.) end		2	0	2	0	0	1	3	2	3	2	1	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	3	10
Monsarrat/Paki lot, Monsarrat Ave. side		1	0	1	0	2	10	17	13	8	0	1	0	1	0	0	0	3	0	3	0	3	0	4	0	1	0	0	0	3	0	17	68
Paki Avenue, Monsarrat Ave. to old driving range lot		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Old driving range lot		15	14	22	23	23	39	24	24	25	26	23	25	20	41	18	16	20	21	18	15	14	15	20	21	15	22	35	42	42	43	43	46
Paki Avenue, old driving range lot to Noela St		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	1	1	1	3	3	3	0
Lot diamondhead of Noela St		45	42	42	35	36	33	36	34	36	37	35	33	34	36	34	34	38	41	41	45	46	39	21	26	35	31	44	55	72	75	75	73
Paki Avenue, Noela St. lot to Kalakaua Ave		20	21	21	25	24	24	23	22	22	21	22	21	21	21	23	24	25	24	28	24	24	21	22	25	29	32	33	36	44	36	44	0
Kalakaua Avenue, eastbound, Paki Ave. to Circle		15	15	15	15	14	12	12	11	14	12	13	13	10	8	12	10	10	13	11	10	6	4	6	8	9	24	28	30	31	31	31	31
Kalakaua Avenue, street bound, Circle to Paki Mo St		7	5	6	8	7	7	8	7	7	7	7	6	7	7	7	7	9	7	8	7	7	7	6	7	7	8	7	7	9	7	9	7
Paki Avenue, Kalakaua Ave. to tennis center		14	15	18	16	15	13	15	15	14	12	11	10	9	10	13	12	12	12	12	12	8	8	8	9	10	18	11	16	17	18	18	0
Tennis center lot		18	19	25	33	32	34	35	33	30	30	29	24	27	26	22	18	13	11	9	11	13	18	25	34	33	42	45	46	41	41	46	51
Paki Avenue, tennis center to Paki Hale		1	2	2	2	3	2	2	4	2	2	2	2	2	3	4	3	0	2	1	1	1	1	1	1	1	1	1	4	15	17	17	0
Paki Hale lot		4	4	4	5	5	6	7	7	8	8	10	13	15	13	12	11	10	8	6	6	6	6	5	3	3	3	3	3	3	3	15	17
Paki Avenue, Paki Hale to Monsarrat Ave		10	8	8	8	16	36	45	33	29	13	12	12	14	14	13	10	9	10	12	10	9	6	8	8	12	13	17	17	25	24	45	0
Kapiolani Rose Garden		2	2	0	0	0	1	2	1	1	1	3	3	5	5	5	2	4	4	3	0	0	0	0	0	2	0	1	2	2	1	5	11
Kapahulu Avenue, Paki Ave. to Zoo mauka entrance		1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	2	2	7	35
Honolulu Zoo lot, street side, mauka half	2	2	2	3	5	6	5	10	11	11	11	11	12	11	11	12	22	22	19	17	18	14	18	7	5	4	3	2	0	1		22	29
Honolulu Zoo lot, street side, makai half	19	22	21	29	35	40	42	42	47	47	44	49	53	53	53	56	64	60	58	54	51	21	49	47	49	46	45	31	49	51		64	74
Honolulu Zoo lot, mauka end	4	4	3	2	3	4	4	4	3	4	4	4	4	4	4	4	4	4	3	4	3	3	3	4	4	4	4	4	4	3		4	4
Honolulu Zoo lot, zoo side, mauka half	1	4	7	8	16	17	20	23	23	24	23	21	24	23	24	24	23	24	24	18	23	24	24	24	22	23	20	19	21	21		24	24
Honolulu Zoo lot, zoo side, mauka half	4	5	7	7	17	22	25	35	38	40	39	34	40	46	54	60	59	51	50	47	50	42	35	25	26	22	20	11	9	12		60	78
Honolulu Zoo lot, mauka end	0	1	0	5	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	2	0	4	0	2	0	0		5	10
Kapahulu Avenue, between Zoo lot driveways	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0	3	5	6	7	10	10	10		10	10
Kalakaua Avenue, Kapahulu Ave. to Aquarium	33	28	30	31	35	33	34	33	33	34	36	34	34	35	33	36	38	37	36	36	36	36	36	34	36	35	36	35	35	34		36	36
Honolulu Aquarium lot	0	0	1	1	2	5	8	7	5	2	3	6	9	8	9	9	4	4	4	4	3	0	1	0	1	2	3	2	0	1		9	9
Kalakaua Avenue, Aquarium to Natatorium	17	18	19	19	18	19	18	19	19	18	19	19	18	19	19	19	19	19	19	18	19	19	19	19	17	19	19	19	17	19		19	19
Waikiki Natatorium roadway, westabound	27	24	32	24	24	21	33	24	33	25	34	25	32	28	36	27	36	27	37	29	37	28	32	27	33	28	36	28	29	26		37	27
Waikiki Natatorium lots	13	14	17	23	25	25	30	33	34	33	33	24	27	27	29	32	32	33	32	33	32	30	32	31	34	33	35	29	24	29		35	32
Waikiki Natatorium roadway, eastabound	15	21	15	15	15	22	15	22	16	23	15	23	16	21	15	23	15	25	16	25	17	24	18	26	17	25	17	21	13	23		26	24
Kalakaua Avenue, Natatorium to Ellingham Circle	12	14	12	13	12	13	10	14	11	11	12	10	11	12	12	13	12	12	12	13	11	12	12	12	13	15	12	13	13	15		15	11
Kalakaua Avenue, eastbound, Circle to Natatorium	22	25	32	37	39	36	40	39	42	46	42	48	50	45	42	48	44	42	30	41	43	5	53	57	72	73	73	73	72	73		73	73
Kalakaua Avenue, eastbound, Natatorium to crosswalk	16	17	18	22	25	24	26	26	24	30	32	31	35	33	32	37	42	44	50	59	58	65	65	66	69	71	74	75	86	92		92	92
Kalakaua Avenue, eastbound, crosswalk (CW) to CW	7	3	4	10	8	5	5	7	10	10	19	22	31	30	29	29	32	32	32	31	33	31	33	32	32	31	37	32	31	27		37	53
Kalakaua Avenue, eastbound, CW to Monsarrat Ave	15	8	7	9	14	16	18	18	18	20	19	19	19	20	18	18	21	19	20	20	19	19	19	18	20	20	29	20	21	19		29	23
Monsarrat Avenue, Kalakaua Ave. to crosswalk	25	23	25	23	24	24	24	24	24	24	23	24	23	18	25	25	23	24	25	24	24	20	23	24	24	27	23	24	25	22		27	0
End of run	06:51 AM	06:51 AM	06:51 AM	06:37 AM	08:30 AM	08:53 AM	08:53 AM	08:37 AM	09:30 AM	09:58 AM	09:58 AM	09:37 AM	10:30 AM	10:58 AM	10:58 AM	11:30 AM	11:58 AM	11:58 AM	12:37 PM	12:30 PM	12:45 PM	01:05 PM	01:30 PM	01:45 PM	01:45 PM	02:05 PM	02:30 PM	02:45 PM	03:05 PM	03:30 PM	03:45 PM	04:05 PM	04:30 PM	04:45 PM	05:05 PM	05:30 PM	05:45 PM	06:05 PM	1,355	1,316
Kalakaua Avenue, eastbound, Paki Ave. to Circle	0	15	15	15	15	14	12	12	11	14	12	13	13	10	8	12	10	10	13	11	10	6	4	6	6	9	24	28	30	31	31	31	31
Kalakaua Avenue, eastbound, Circle to Natatorium	22	25	32	37	39	36	40	39	42	46	42	48	50	45	42	48	44	42	30	41	43	5	53	57	72	73	73	73	72	73	0	73	73
Kalakaua Avenue, eastbound, Natatorium to crosswalk	16	17	18	22	25	24	26	26	24	30	32	31	35	33	32	37	42	44	50	59	58	65	65	66	69	71	74	75	86	92	0	92	92
Kalakaua Avenue, eastbound, crosswalk to Monsarrat Ave	22	11	11	19	22	19	21	23	29	30	38	41	50	50	47	47	53	51	52	51	52	50	52	50	52	51	66	52	52	46	0	66	78
Total, Aquarium lot (excluding special stalls)	0	0	1	1	2	5	6	7	5	2	3	6	9	8	9	9	4	4	4	4	3	0	1	0	1	2	3	2	0	1	0	9	9
Total, Natatorium roadway & lot (excluding special stalls)	55	59	64	62	64	68	78	79	83	81	82	72	75	74	79	82	83	85	85	86	86	82	82	84	84	86	88	75	65	75	0	88	83
Total, Waikiki Shell lot (excluding special stalls)	0	82	93	92	107	132	160	182	186	184	181	135	118	116	110	107	111	102	105	103	100	103	99	98	99	92	97	92	92	113	108	186	264
Total, lot at Monsarrat / Paki Ave. (excluding special stalls)	0	4	5	5	5	10	43	90	52	37	14	7	3	4	4	3	4	9	6	8	7	8	6	6	8	6	7	11	19	26	25	90	151
Total, Old Golf Driving Range lot (excluding special stalls)	0	15	14	22	23	23	39	24	24	25	26	23	25	20	41	18	16	20	21	18	15	14	15	20	21	15	22	35	42	42	43	43	46
Total, lot near Noela St. (excluding special stalls)	0	45	42	42	35	36	33	36	34	36	37	35	33	34	36	34	34	38	41	41	45	46	39	21	26	35	31	44	55	72	75	75	73
Total, Tennis Center (excluding special stalls)	0	18	19	25	33	32	34	35	33	30	30	29	24	27	26	22	18	13	11	9	11	13	18	25	34	33	42	45	46	41	41	46	51
Total, Paki Hale lot (excluding special stalls)	0	4	4	4	5	5	6	7	7	6	6	10	13	15	13	12	11	10	8	6	6	6	6	5	3	3	3	3	3	3	3	15	17
Total, Kapiolani Rose Garden	0	2	2	0	0	0	1	2	1	1	1	3	3	5	5	5	2	4	4	3	0	0	0	0	0	2	0	1	2	2	1	5	11
Total, Honolulu Zoo lot (excluding special stalls)	30	38	39	54	76	89	98	114	122	126	121	122	142	139	146	156	172	161	154	140	143	104	127	109	106	103	92	69	83	88	0	172	217
Total, Kalakaua Avenue (mauka side, excl. special stalls)	62	67	66	69	72	72	70	74	70	70	74	70	69	73	71	74	76	77	74	78	75	73	74	71	73	76	73	74	72	77	7	78	75
Total, Paki Avenue	0	45	48	47	51	58	75	85	74	67	48	47	45	48	48	53	49	47	48	51	47	42	36	39	43	53	58	63	74	104	101	104	0
Total, Monsarrat Avenue	25	42	44	39	42	43	48	54	54	52	52	54	50	39	47	48	48	52	48	43	49	44	43	47	48	47	41	40	38	33	13	54	0
Total, Kapahulu Avenue (metered)	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0	3	5	6	7	11	11	12	2	12	45
Total parked (excluding special stalls):	232	488	515	555	616	686	788	889	851	839	802	748	757	738	764	787	777	769	761	752	751	661	722	707	750	763	801	793	842	931	450	1,355	makes this easy easy
Occupancy:	17.12%	36.01%	38.01%	40.95%	45.46%	49.15%	58.15%	65.61%	62.80%	61.92%	59.19%	55.06%	55.87%	54.48%	56.36%	58.61%	57.34%	56.75%	56.16%	55.50%	55.42%	48.78%	53.28%	52.18%	55.35%	56.31%	59.11%	58.52%	62.14%	68.71%	33.21%		
Total of accessible (a) stalls	1	4	4	5	7	6	6	10	8	11	6	9	6	7	7	9	10	8	10	14	10	6	7	6	6	4	5	6	7	6	3	21	46
Kalakaua Avenue, mauka side	0	1	1	1	3	1	1	1	1	1	1	1	1	2	2	2	3	3	6	6	5	4	4	3	3	3	3	2	2	2	1	6	7
Aquarium and Natatorium	0	0	1	1	1	2	1	1	1	0	0	0	0	0	0	1	2	2	1	2	1	1	0	0	0	0	0	1	0	0	0	2	4
Waikiki Shell	0	0	0	1	0	1	1	4	2	4	1	3	0	0	0	1	0	0	0	2	0	0	0	0	0	0	0	0	1	1	0	4	9
Tennis Center	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	2	1	1	1	1	1	1	2	2
Other Paki Avenue Lots	0	1	1	1	1	0	0	1	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	2	1	1	2	15
Honolulu Zoo	1	2	1	1	2	2	3	3	4	5	4	4	5	5	4	4	4	2	2	3	3	2	2	1	1	0	1	1	1	1	0	5	9
Total of staff and lifeguard (b) stalls	6	9	11	12	16	14	17	14	14	13	16	14	15	16	18	18	16	16	16	17	19	17	13	18	16	15	13	9	10	9	1	21	25
Lifeguard stalls	8	6	7	8	10	9	9	9	9	8	9	9	9	9	10	11	9	11	10	12	13	11	10	12	12	12	9	8	7	5	0	13	16
Waikiki Shell	0	2	2	2	3	3	5	3	2	2	4	2	3	4	5	4	4	3	3	2	3	3	0	3	1	0	1	0	0	1	1	5	5
Honolulu Zoo	0	1	2	2	3	2	3	2	3	3	3	3	3	3	3	3	3	2	3	3	3	3	3	3	3	3	3	3	3	3	0	3	4
Passenger loading zone (c) on Kalakaua Avenue	0	0	0	0	0	0	1	0	1	0	0	0	0	1	1	1	1	0	0	0	0	0	0	1	1	1	1	1	1	1	0	1	2
Total parked, special stalls:	7	13	15	17	23	20	24	24	23	24	22	23	21	24	26	28	27	24	26	31	29	25	20	25	23	20	19	16	18	16	4	43	73
No parking areas																																	
Paki Avenue, no parking area, Monsarrat Ave. to Paki Hale	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Paki Avenue, no parking area diamondhead of Noela St.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	3	5	6	6	0
Total parked in surveyed areas:	239	501	530	572	639	686	812	913	874	863	824	769	778	762	790	795	804	793	787	783	780	686	742	732	773	784	820	810	863	952	460	1,404	
Occupancy:	17.02%	35.68%	37.75%	40.74%	45.51%	48.86%	57.83%	65.03%	62.25%	61.47%	58.69%	54.77%	55.41%	54.27%	56.27%	56.62%	57.26%	56.48%	56.05%	55.77%	55.56%	48.86%	52.85%	52.14%	55.06%	55.84%	58.40%	57.69%	61.47%	67.81%	32.78%		

– Environmental Assessment for Honolulu Zoo Master Plan –

VISITOR-INTERCEPT SURVEY
FINDINGS SUMMARY

HONOLULU ZOO ENVIRONMENTAL ASSESSMENT
AND KAPIOLANI PARK MASTER PLAN
PARKING SURVEY AND TRAFFIC STUDY

HONOLULU ZOO INTERCEPT SURVEY
FINDINGS SUMMARY

Prepared by:

University of Hawaii at Manoa
College of Education
Department of Kinesiology and Leisure Science

Prepared for:

City and County of Honolulu
Department of Parks and Recreation

And

Belt Collins Hawaii

University of Hawai'i at Mānoa

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Telephone: (808) 956-7606 • Facsimile: (808) 956-7976

DATE: June 28, 1998

TO: Cheryl Palesh
Belt Collins
680 Ala Moana Blvd.
Honolulu, HI 96813

FROM: Sam Lankford
Program for Recreation Research & Service
Univ. of Hawaii
1337 Lower Campus Rd.
Honolulu, HI 96822

SUBJECT: Honolulu Zoo Intercept Survey

Please find my comments regarding the Honolulu Zoo Intercept Survey. I have ran a number of cross-tabulations on the data set and compiled them in graphic and tabular format for your review. If you have any questions please contact me at 956-3804 or email at samk@hawaii.edu. Please note that as of 1 August I will be on the mainland for a leave until 20 May of 1999. My email on the mainland is Sam.Lankford@uni.edu. I will be available to help Belt Collins on this project or other projects during this time.

My comments on these findings are as follows:

The data collected from respondents reflect that 48.4% are Hawaii State residents and 51.6% are visitors to the islands. The majority (88.9%) of State of Hawaii resident visitors to the zoo are from Oahu, 5.9% from Maui, 4.1% from the Big Isle, and only 1.1% from Kauai. Out of state visitors originated from places such as California (4%), Canada (5.1%), and Minnesota, Japan, and New York (all reporting 2%). These findings are included as an attachment. Confidence intervals for all findings range from 4-5.8% for each questions.

Figure 1 - 3 presents the data by resident and visitor status for reasons of visitation. The majority (77%) of visitors to the zoo consider the visit as a family outing (Figure 1). Of those respondents who indicated it was a family outing, 97% are Hawaii residents. Figure 2 suggests that the majority of visitors to the zoo were not prompted to visit due to any particular media event or coverage for that day. Figure 3 indicates that about 13% (n=71) of the visitors came to the zoo to see a specific animal, of which the majority were residents of Hawaii.

Figure 4. Most visitors arrived to the zoo by car (57%) or walked (32.5%). Given the trip origination data (see Figure 10), the walkers are visitors who reside in Waikiki hotels.

Figure 5. Most (64.5%) visitors to the zoo planned on spending about 1-2 hours at the zoo. Nearly 27% indicated they would stay 3-4 hours.

Figure 6. Respondents indicated they were traveling to the zoo with another person (33.9%), 21.8% indicated they were 3 persons in their group, while 16.7% indicated a group size of four persons.

Figure 7. Respondents indicated that they came to the zoo because their children were interested (24.2%), while 14% indicated an interest in animals. When comparing resident and tourist respondents, nearly 36% of the residents reported the reason of visitation was due to their children's interest. Tourists indicated the main reason was to see the animals.

Figure 8. Visitors to the zoo found out about the zoo through friends, brochures, relatives or past knowledge of the zoo. Residents of the State of Hawaii indicated friends and past knowledge were means of knowing about the zoo. Tourists indicated that friends and brochures were means of gaining knowledge about the zoo.

Figure 9. Zoo users tend to visit once (19%) or twice a year (23.7%). However, nearly 16% of the respondents indicated they visit the zoo once a month, while 10% were first time users.

Figure 10. This table indicates that the visitors came from the Waikiki area, or other parts of Oahu. Although 56% reported other, this percentage includes non-respondents and out of state visitors.

Zoo Summary: University of Hawaii

The following tables and graphs summarize the data collected by University of Hawaii students during the Spring of 1998.

	Overall	Is this visit a family outing?	
		Yes	No
	554	77.1%, 205	22.9%, 81
Are you a resident of the State of Hawai'i?			
Yes	48.4%	97.0%	91.5%
No	51.6%	3.0%	8.5%
Totals	100.0%	100.0%	100.0%

Figure 1:

	Overall	Was there some publicity or media coverage?	
		Yes	No
	554	4.1%, 11	95.9%, 259
Are you a resident of the State of Hawai'i?			
Yes	48.4%	100.0%	94.9%
No	51.6%	0.0%	5.1%
Totals	100.0%	100.0%	100.0%

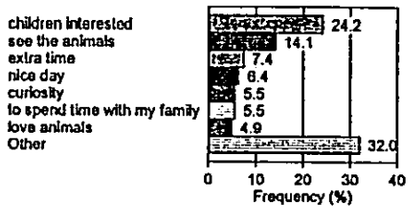
Figure 2:

	Overall	Did you come to see specific animals?	
		Yes	No
	554	71	200
Are you a resident of the State of Hawai'i?			
Yes	48.4%	95.7%	94.9%
No	51.6%	4.3%	5.1%
Totals	100.0%	100.0%	100.0%

Figure 3:

Overall

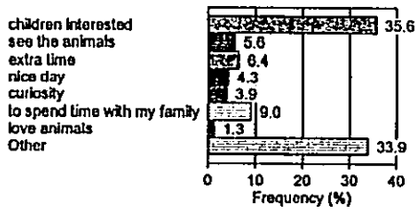
Why did you decide to come to the Zoo today?



Are you a resident of the State of Hawai'i?

Yes

Why did you decide to come to the Zoo today?



Are you a resident of the State of Hawai'i?

No

Why did you decide to come to the Zoo today?

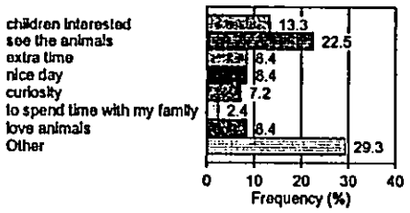
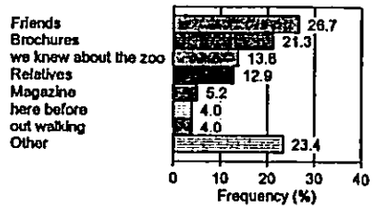


Figure 7:

Overall

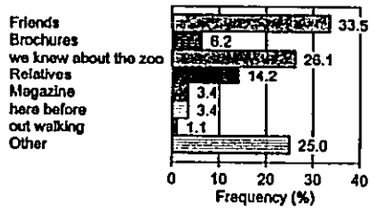
How did you find out about the Zoo?



Are you a resident of the State of Hawai'i?

Yes

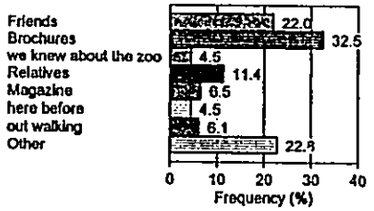
How did you find out about the Zoo?



Are you a resident of the State of Hawai'i?

No

How did you find out about the Zoo?



* Note: Multiple answers can total over 100%.

Figure 8:

How often do you visit the Zoo?

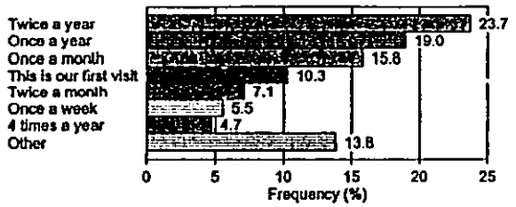


Figure 9:

Where did your trip originate? (what hotel or what		
Waikiki	5.4%	25
Outrigger	4.6%	21
Kailua	4.3%	20
Kaneohe	3.5%	16
Outrigger reef	3.3%	15
Outrigger West	2.8%	13
Hawaii Kai	2.6%	12
Pearl City	2.6%	12
Mililani	2.4%	11
Aiea	2.2%	10
Honolulu	2.2%	10
Waipahu	2.2%	10
Outrigger Waikiki	2.0%	9
Schofield Barracks	2.0%	9
Diamond Head	1.7%	8
Other	56.3%	259
Totals	100.0%	460

Figure 10:

- Thunder Bay, Ontario, Canada

(6) How many people are with you today? (# of people in your group)

33.4%	2	10.3%	1	2.9%	7	0.7%	15	0.4%	9
21.5%	3	5.4%	5	0.9%	10	0.5%	12	1.3%	Other
16.4%	4	3.4%	6	0.9%	8	0.4%	16	1.6%	No Answer

Freq Error* 4.1%

- 32
- 50
- 38
- 25
- 17
- 21
- 23

(7) How did you arrive at the Zoo?

56.0%	By Car (parked here)	0.4%	By Moped	2.2%	No Answer
31.8%	Walked	0.2%	By Taxi		
9.6%	By Bus	0.0%	By Bicycle		

Freq Error* 4.3%

(8) If you arrived by car, where did you park?

23.8%	zoo parking lot	7.8%	Kapiolani park	0.4%	Fort DeRussy
16.6%	Parking Lot	2.3%	metered parking	49.1%	No Answer

Freq Error* 5.9%

(9) How long did it take to find parking?

25.3%	1-5 minutes	6.9%	5-10 minutes	43.5%	No Answer
21.3%	Less than a minute	3.1%	Longer than 10 minutes		

Freq Error* 5.6%

(10) If you were dropped off, where were you dropped off?

2.0%	Bus stop	1.6%	at entrance	0.4%	corner	93.3%	No Answer
1.8%	parking lot	0.5%	At the park	0.4%	Other		

Freq Error* 15.0%

- Waikiki Beach
- Pacific Beach Hotel

(11) Did a driver drop off the others in your group before searching for parking?

39.5%	No	2.2%	Yes	58.3%	No Answer

Freq Error* 2.9%

(12) Where did your trip originate (what hotel or what part of Oahu)?

4.5%	Waikiki	0.9%	Wahiawa	0.4%	Alliolani Elementary School
3.8%	Outrigger	0.9%	Waikiki Banyon	0.4%	Hilton
3.6%	Kailua	0.7%	Ala Moana area	0.4%	HPU
2.9%	Kaneohe	0.7%	Ala Moana Hotel	0.4%	Ilikai
2.7%	Outrigger reef	0.7%	Banyan hotel	0.4%	Ilima
2.3%	Outrigger West	0.7%	Hilton Hawaiian Village	0.4%	Leeward
2.2%	Hawaii Kai	0.7%	Kaneohe Base	0.4%	Maile sky court
2.2%	Pearl City	0.7%	Manoa	0.4%	Marine Surf
2.0%	Mililani	0.7%	Pearl Harbor	0.4%	Miramir
1.8%	Aiea	0.7%	Queen Kapiolani	0.4%	Moanalua
1.8%	Honolulu	0.7%	Royal Hawaiian	0.4%	Ocean Resort
1.8%	Waipahu	0.7%	Waianae	0.4%	Ocean Resort Waikiki
1.6%	Outrigger Waikiki	0.7%	Waikiki Beach Hotel	0.4%	Outrigger East
1.6%	Schoffield Barracks	0.5%	Aston Waikiki Banyon	0.4%	Outrigger Surf Kuhio
1.4%	Diamond Head	0.5%	Downtown	0.4%	Pacific Beach
1.4%	Kalihi	0.5%	Hobron	0.4%	Palolo
1.4%	Makiki	0.5%	Island Colony	0.4%	Parkshores
1.3%	Aston Waikiki	0.5%	Kuhio	0.4%	Parkside
1.3%	Ewa Beach	0.5%	Moiliili	0.4%	Sheraton Waikiki
1.3%	Hickam Air Force base	0.5%	Ocean Beach hotel	0.4%	Waikele
1.3%	Kaimuki	0.5%	Outrigger Malia	0.4%	Waipio
1.3%	Sheraton	0.5%	Prince Kuhio	0.4%	White Sands Resort
1.1%	Hale Koa	0.5%	Princess Kaiulani	9.0%	Other
1.1%	Salt Lake	0.5%	University of Hawaii	17.0%	No Answer
0.9%	Kapahulu	0.5%	Waikiki Circle Hotel		
0.9%	Kapolei	0.4%	Aina Haina		

Freq Error* 2.9%

- Waikiki Hotel
- Ainakoa
- Reef Tower
- Aloha Towers
- Waikiki Grand
- Maui Outrigger Court
- Hauula
- Coral Reef
- West side
- Continental Surf
- Hotel
- Honolulu Park Place
- Queens Hospital
- Windward Campus
- Waikane
- Lanikai
- Palolo Housing
- Waikiki Parkside
- McCully
- Windward side
- Marco Polo
- Wheeler
- Sheraton Manoa
- Imperial
- Gateway
- Turtle Bay
- Laie
- East/West Center
- Waialua
- New Otani
- Inn at the Park
- Beachcombers
- Holiday Hotel
- Aston Park Shores
- Lewers
- Makakilo

- Coconut plaza hotel
- Haleiwa
- Halekulani
- Waikiki Royal ste
- Fort Shafter
- Pagoda
- Pauoa Valley
- Ala Wai Towers
- U
- Outrigger Prince
- Tradewinds Plaza
- Outrigger Maile Skycourt
- Hawaiian Waikiki Beach
- Hyatt Regent

(14) How long do you expect to stay at the zoo?

61.9%	1-2 hours	6.9%	Less than 1 hour	0.5%	More than 6 hours
25.6%	3-4 hours	1.1%	5-6 hours	4.0%	No Answer

Freq Error* 4.1%

(15) How did you find out about the Zoo?

20.6%	Friends	2.9%	Travel Agent	0.5%	Drove by
18.4%	Brochures	2.3%	Newspaper	0.5%	Hotel
10.6%	we knew about the zoo	1.8%	Television	0.5%	Trolley
9.9%	Relatives	0.9%	Friends and relatives	0.4%	Member
4.0%	Magazine	0.9%	Saw zoo while at beach	6.5%	Other
3.1%	here before	0.9%	school	22.9%	No Answer
3.1%	out walking	0.5%	Radio		

Freq Error* 4.3%

- bus driver
- 7
- Recommended by hotel staff
- Tour driver
- volunteer

(16) Why did you decide to come to the Zoo today?

21.3%	children interested	1.3%	Meet with friends
12.5%	see the animals	1.1%	Good place to go
6.5%	extra time	0.9%	Birthday party
5.6%	nice day	0.7%	Study for school
4.9%	curiosity	0.4%	Business
4.9%	to spend time with my family	0.4%	close to hotel
4.3%	love animals	0.4%	Near hotel
3.6%	I like the zoo	0.4%	Take pictures
3.4%	excursion	0.4%	to feel close to nature & see friend worker
3.4%	For fun	0.4%	to visit Waikiki
3.2%	relax	0.4%	volunteer
2.9%	Brought grandchild	2.2%	Other
1.4%	Day off	11.9%	No Answer
1.4%	like to walk		

Freq Error* 3.9%

- I visit the Zoo every time I'm on Oahu for years
- to buy nephew a zoo shirt and to see the zoo
- brought grandchild
- Jellyfish at the beach
- Free dorm trip
- children interested and nice day
- Come every Sunday
- Art Show
- rain
- Adult interested
- Application for zoo fun run
- to work & enjoy
- Renew membership

For residents:

(17) How often do you visit the Zoo?

10.8%	Twice a year	2.2%	4 times a year	0.4%	once every four years
8.7%	Once a year	1.1%	occasionally	0.4%	once every two years
7.2%	Once a month	0.9%	Twice a week	2.5%	Other
4.7%	This is our first visit	0.4%	3 or 4 times per month	54.3%	No Answer
3.2%	Twice a month	0.4%	as oftem as possible		
2.5%	Once a week	0.4%	Never		

Freq Error* 5.3%

- every few days that I pass
- 2
- 8 to ten times a year
- once every ten years
- once every two months
- every other year
- 8 times a year
- everyday
- 3 - 4 times a week
- 6 times a year

(18) Is this visit a family outing?

37.0%	Yes	11.0%	No	52.0%	No Answer

Freq Error* 5.2%

(19) Was there some publicity or media coverage that prompted this visit?

46.6%	No	2.0%	Yes	51.3%	No Answer

Freq Error* 2.4%

(20) Did you come to see specific animals?

36.1%	No	12.8%	Yes	51.1%	No Answer

Freq Error* 5.3%

* Note: Frequency error covers 95% of distribution.

The Zoo Visitor-Intercept Survey

(1) Day: _____

33.0%	22	30.3%	25	18.4%	20	18.2%	21	0.0%	No Answer

Freq Error* 4.0%

(2) Time of Day: _____

12.6%	12:00	7.8%	11:30	6.0%	12:30	4.7%	15:00	0.5%	09:30
9.9%	11:00	7.0%	10:00	5.4%	9:00	3.2%	15:30	0.2%	Other
9.0%	13:00	6.9%	13:30	5.2%	9:30	1.1%	16:00	0.0%	No Answer
8.5%	14:00	6.5%	10:30	4.9%	14:30	0.5%	09:00		

Freq Error* 2.6%

- 8:30

(3) Are you a resident of the State of Hawai'i?

50.9%	No	47.8%	Yes	1.3%	No Answer

Freq Error* 4.3%

(4) If yes, what island are you from?

43.3%	Oahu	0.5%	Kauai	0.0%	Niihau
2.9%	Maui	0.0%	Lanai	51.3%	No Answer
2.0%	Hawai'i (The Big Island)	0.0%	Molokai		

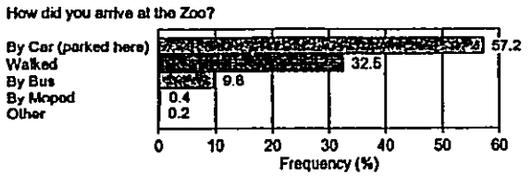
Freq Error* 3.8%

(5) If not, where are you from?

4.0%	California	0.5%	Sweden
2.9%	Canada	0.5%	Virginia
2.2%	Minnesota	0.4%	Australia
2.2%	Vancouver, B.C.	0.4%	B.C. Canada
2.0%	Japan	0.4%	Cleveland, OH
2.0%	New York	0.4%	Dallas, Texas
1.1%	Washington	0.4%	England
0.9%	Connecticut	0.4%	Germany
0.7%	Alberta, Canada	0.4%	Illinois
0.7%	Atlanta, Georgia	0.4%	Indiana
0.7%	Boston, MA	0.4%	Maryland
0.7%	Edmonton, Alberta, Canada	0.4%	Michigan
0.7%	New Jersey	0.4%	Missouri
0.7%	Virgin Islands	0.4%	Newfoundland, Canada
0.5%	Alaska	0.4%	Nova Scotia, Canada
0.5%	Chicago, Illinois	0.4%	Oregon
0.5%	Colorado	0.4%	Pennsylvania
0.5%	Las Vegas, Nevada	0.4%	Saskatchewan, Canada
0.5%	Montana	0.4%	Saskatoon, Canada
0.5%	New Hampshire	0.4%	Seattle
0.5%	Ohio	0.4%	Toronto, Canada
0.5%	San Diego, California	0.4%	Victoria, Vancouver Island, British Columbia
0.5%	San Francisco	11.4%	Other
0.5%	San Francisco, California	53.4%	No Answer

Freq Error* 5.3%

- Los Angeles, California
- Kentucky
- Tomahawk, Wisconsin
- Belleville, Illinois
- North Dakota
- Union City, Ca
- Tahiti
- Trinidad
- London, England
- Calgary, Alta, Canada
- Medicine Hat, Alberta, Canada
- Tennessee
- White Rock B.C. Canada
- South Dakota
- Florida
- Custer, Washington
- San Jose, California
- River Forest, Illinois
- Santa Rosa, California
- Green Bay, Wisconsin
- Rhode Island
- Sioux Lookout, Ontario Canada
- Nebraska
- Sydney, Australia
- Snohomish, Washington
- Maine
- Kelowna, BC, Canada
- Kansas City
- Ontario, Canada
- Laughlin, Nevada
- Kanagawa, Japan
- Tokyo, Japan
- Vermont
- York, Pennsylvania
- Oakdale, Minnesota
- Charleston, South Carolina
- Brantford, Canada
- Luxemburg
- Sandpoint, Idaho
- Denver, Colorado
- Oklahoma
- Sunnyvale, California
- Scottsdale, Arizona
- Federalway, Washington
- Netherlands
- Wisonsin Rapids, Wisconsin
- Boise, Idaho
- Wisconsin
- Richmond, Virginia
- Auburn, New York
- Minden, Nevada
- Houston, Texas
- Herford, Germany
- Ottawa, Canada
- Anchorage, Alaska
- Arizona
- Idaho
- New Zealand
- Albany, New York
- New Mexico
- Nevada
- Melbourne, Australia



* Note: Multiple answers can total over 100%.

Figure 4:

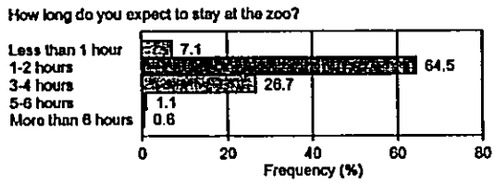


Figure 5:

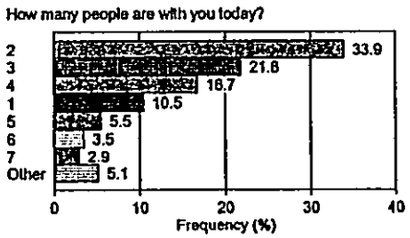
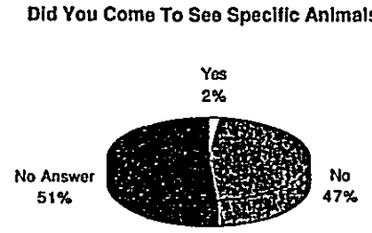
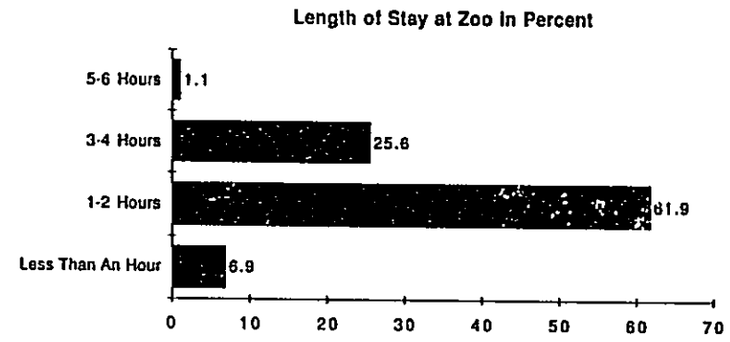


Figure 6:

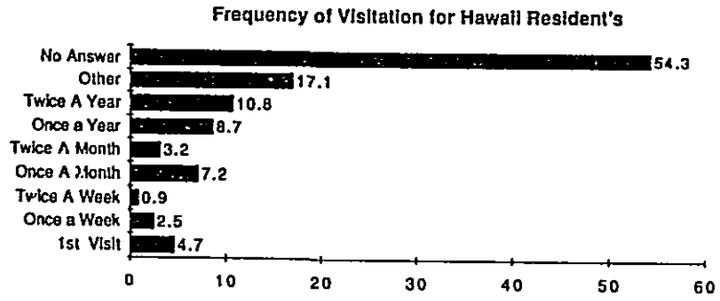
See Animals



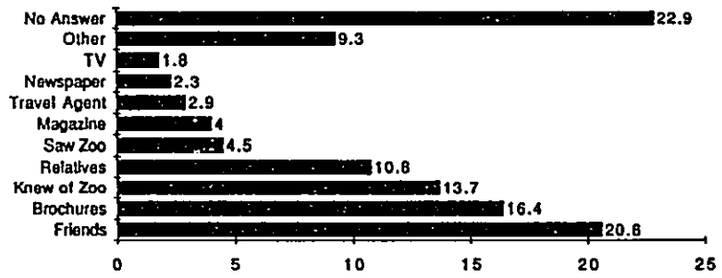
StayZoo



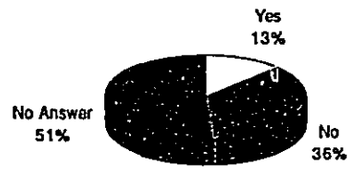
Visitation to Zoo



How Visitors Knew About The Zoo

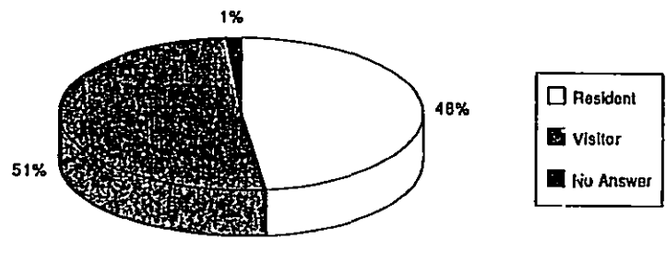


Did Media Coverage Prompt Your Visit to the Zoo?



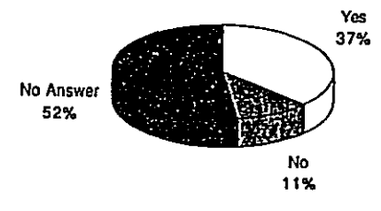
zooresident

Residency Status of Zoo Visitors



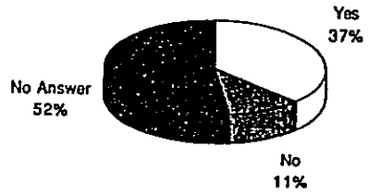
Media Prompt Visit

Did Media Coverage Prompt Your Visit?



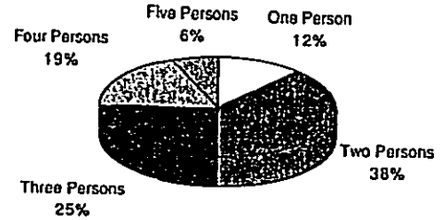
Family Visit

Is This A Family Visit?



Travel Party Size

Zoo Travel Party Size



The Zoo Visitor-Intercept Survey

If you have any questions regarding this study, please call 956-3804.

Date: February _____ 1998 Time of Day: _____

Are you a resident of the State of Hawai'i? ..... ☐ Yes ☐ No

If yes, what island are you from?

☐ Oahu ☐ Maui ☐ Kauai ☐ Lanai ☐ Molokai ☐ Niihau ☐ Hawai'i (The Big Island)

If not, where are you from? _____

How many people are with you today? (# of people in your group) ..... _____

How did you arrive at the Zoo?

☐ By Bus ☐ By Car (parked here) ☐ By Taxi ☐ By Moped ☐ By Bicycle ☐ Walked

If you arrived by car, where did you park? _____

How long did it take to find parking?

☐ Less than a minute ☐ 1-5 minutes ☐ 5-10 minutes ☐ Longer than 10 minutes

If you were dropped off, where were you dropped off? _____

Did a driver drop off the others in your group before searching for parking? ..... ☐ Yes ☐ No

Where did your trip originate (what hotel or what part of Oahu)? _____

Can you describe your route in coming here? _____

_____

How long do you expect to stay at the zoo?

☐ Less than 1 hour ☐ 1-2 hours ☐ 3-4 hours ☐ 5-6 hours ☐ More than 6 hours

How did you find out about the Zoo?

☐ Newspaper ☐ Travel Agent ☐ Radio ☐ Friends
☐ Magazine ☐ Brochures ☐ Television ☐ Relatives
☐ Other: _____

Why did you decide to come to the Zoo today? _____

_____

For residents:

How often do you visit the Zoo?

☐ This is our first visit ☐ Twice a week ☐ Twice a month ☐ Twice a year
☐ Once a week ☐ Once a month ☐ Once a year
☐ Other: _____

Is this visit a family outing? ..... ☐ Yes ☐ No

Was there some publicity or media coverage that prompted this visit? ..... ☐ Yes ☐ No

Did you come to see specific animals? ..... ☐ Yes ☐ No

– Environmental Assessment for Honolulu Zoo Master Plan –

TRAFFIC IMPACT ANALYSIS REPORT

Table of Contents

▸TRAFFIC IMPACT ANALYSIS REPORT

HONOLULU ZOO MASTER PLAN
KAPIOLANI REGIONAL PARK MASTER PLAN

▸HONOLULU, HAWAII

▸prepared for:

Belt Collins Hawaii, Ltd.

City and County of Honolulu
Department of Design and Construction

▸prepared by:

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

February, 2000

Honolulu Zoo / Kapiolani Regional Park
Traffic Impact Analysis Report
February, 2000

Introduction

A master plan for the Honolulu Zoo has been prepared to accommodate 1.65 million annual visitors, an increase of 161 percent over the existing (Fiscal Year 1997-1998) visitation of 632,000. Fears that a similar increase in traffic in the vicinity of the zoo will occur, thereby causing traffic congestion at several critical intersections, have been raised. A traffic study was conducted to evaluate existing traffic conditions, identify the impact of the zoo and park activities on traffic conditions, estimate future traffic due to the zoo and park activities, and evaluate future traffic conditions.

The master plan for Kapiolani Regional Park is currently under revision. Earlier plans indicate that existing activities are expected to continue at approximately the same levels and no significant changes in the number, type, or intensity of activities are expected. The master plan revision may include new locations for the various activities, changes to vehicular circulation patterns, and new parking areas to replace existing parking that may be displaced.

This traffic study included a review of existing activities at the Honolulu Zoo and in Kapiolani Regional Park, and the expected use of the restored Natatorium. The study related the activities to traffic volumes on the streets near the park.

Existing Traffic Conditions

The Honolulu Zoo and Kapiolani Regional Park are located at the south end of Waikiki, at the base of Diamond Head crater (Exhibit 1). The 42-acre Honolulu Zoo site is bounded by Kapahulu Avenue, Paki Avenue, Monsarrat Avenue, and Kalakaua Avenue. The Honolulu Zoo's neighbors to the north across Kapahulu Avenue are hotels, shops, residential apartments, and Thomas Jefferson Elementary School. To the east across Paki Avenue are

the Waikiki Fire Station, the Paki Community Park, and the Queen Kapiolani Rose Garden. The Waikiki Shell and the remainder of Kapiolani Regional Park are located south of Monsarrat Avenue.

The main part of Kapiolani Regional Park (87± acres) is bounded by Monsarrat Avenue, Paki Avenue, Poni Moi Road, and Kalakaua Avenue. Other park activities are located west of Kalakaua Avenue and east of Paki Avenue. The Waikiki Playground and Paki Hale (Winstedt House) are located between Paki Avenue and Leahi Avenue. Waikiki Elementary School and residential uses are located across Leahi Avenue to the east. The City's plant nursery, the Diamond Head Tennis Center, and archery ranges are located east of Paki Avenue at the southern end of the park; the Hawaii School for Girls (La Pietra) is the neighbor to the east. Residential apartments are located to the south across Poni Moi Road. The War Memorial (Natatorium) and other park-type uses, such as the Kapiolani Beach area, the Waikiki Aquarium, and Sans Souci Beach are located west of Kalakaua Avenue. Residential apartments, resort hotels, shops, the Outrigger Canoe Club facility, and the Elks Club lodge are also located west of Kalakaua Avenue.

The main part of Kapiolani Regional Park includes the Waikiki Shell, the Kapiolani Bandstand, tennis courts, picnic areas, and fields for team sports (soccer, softball, and rugby). Two soccer fields are located in the area between the Waikiki Shell and Paki Avenue, which was once a golf driving range. Activities within Kapiolani Regional Park include scheduled games and practices for organized team sports, events at the Waikiki Shell and at Kapiolani Bandstand, picnics and festivals, tennis matches, and other activities.

The streets serving the park are under the jurisdiction of the City and County of Honolulu Department of Transportation Services. The street system operates as an extension of the one-way couplet in Waikiki, where southbound traffic is served primarily on Kalakaua Avenue and northbound traffic on Ala Wai Boulevard. Paki Avenue, while it serves two-way traffic from Poni Moi Road to Kapahulu Avenue, feeds northbound traffic into Ala Wai Boulevard. The makai half of Kalakaua Avenue between Monsarrat Avenue and Poni Moi Road serves southbound traffic, while the mauka half (northbound) is functionally a parking lot for Kapiolani Regional Park. Monsarrat Avenue and Poni Moi Road serve as one-way links between the major couplet roads.

Kapahulu Avenue serves two-way traffic, and between Kalakaua Avenue and Paki Avenue, generally has one lane for traffic and one lane for parking or loading in each

direction. A second eastbound (maukabound) lane between Kuhio Avenue and Paki Avenue is available when parking is prohibited during the peak period (3:30 PM to 5:30 PM) on weekday afternoons.

Monsarrat Avenue serves one-way traffic eastbound from Kalakaua Avenue to Paki Avenue. The street is striped for two lanes of traffic and parallel parking is allowed, without any time restrictions, on both sides of the street. A major bus stop and terminus for the City's *The Bus* system is located on Monsarrat Avenue near the Queen Kapiolani Bandstand. Other buses (tour buses and limousines, school buses) also use Monsarrat Avenue near Paki Avenue as a staging and parking area.

Paki Avenue varies in width and section, from two paved lanes in an uncurbed cross-section between Poni Moi Road and Noela Street to three lanes (curbed) between Monsarrat Avenue and Kapahulu Avenue. Parking is not permitted on the paved portions of Paki Avenue. Poni Moi Road between Kalakaua Avenue and Paki Avenue is one-way eastbound (maukabound) and links Kalakaua Avenue to Diamond Head Road.

Kalakaua Avenue between Monsarrat Avenue and Poni Moi Road west (makai) of the grassed median is a one-lane southbound roadway with marked, unmetered parking parallel to the right (makai) curb. Mauka of the median, a parking lot for Kapiolani Regional Park has angled parking (metered or reserved) along the mauka curb and serves northbound traffic. A bike lane is provided west (makai) of the single traffic lane on each side of the median. Six openings in the median provide access between the makai street and the mauka parking lot.

The City and County of Honolulu, Department of Transportation Services has collected traffic count data at various locations in the area. Daily count totals and peak hour volumes from the City counts were supplemented by manual turning movement counts which were collected as part of a parking study for Honolulu Zoo and Kapiolani Regional Park by Belt Collins Hawaii, Ltd. The count data is appended to this report. The peak hour traffic movements from the manual counts are shown in Exhibit 2. Count data for east-west (mauka-makai) roadways and for north-south (ewa-diamondhead) roadways are shown in Table 1 and Table 2, respectively.

Table 1

Traffic Counts - East-West (mauka-makai) Roadways

	AM Peak Hour	PM Peak Hour	24-Hour Total
Kapahulu Avenue, eastbound approaching Kuhio Avenue			
January 22, 1991 (Tuesday)	585	421	5,741
July 18, 1995 (Tuesday)	267	428	6,409
Kapahulu Avenue, eastbound between Kuhio Avenue and Kapahulu Avenue			
October 18, 1994 (Thursday)	660	1,060	13,760
February 26, 1998 (Thursday)	*630*	*1,074*	--
Kapahulu Avenue, westbound approaching Paki Avenue			
January 14, 1991 (Monday)	536	441	6,829
February 26, 1998 (Thursday)	*567*	*447*	--
Kapahulu Avenue, westbound between Paki Avenue and Kuhio Avenue			
January 15, 1991 (Tuesday)	585	511	7,873
February 26, 1998 (Thursday)	*694*	*577*	--
Kapahulu Avenue, westbound between Kuhio Avenue and Kalakaua Avenue			
July 29, 1991 (Monday)	259	303	4,353
September 6, 1994 (Tuesday)	217	281	3,530
Monsarrat Avenue, westbound between Leahi Avenue and Paki Avenue			
May 17, 1989 (Wednesday)	851	405	5,930
February 25, 1998 (Wednesday)	*734*	*525*	--
Monsarrat Avenue, eastbound between Kalakaua Avenue and Monsarrat Avenue			
May 18, 1989 (Thursday)	331	867	10,125
February 25, 1998 (Wednesday)	*299*	*692*	--
Monsarrat Avenue, eastbound between Monsarrat Avenue and Leahi Avenue			
November 3, 1993 (Wednesday)	263	547	5,209
February 25, 1998 (Wednesday)	*287*	*463*	--
Poni Moi Road, westbound approaching Paki Avenue			
November 7, 1989 (Tuesday)	76	53	586
Kalakaua Avenue, westbound departing from Paki Avenue			
September 12, 1988 (Monday)	129	244	2,634
August 14, 1995 (Thursday)	160	266	2,852
Poni Moi Road, eastbound approaching Paki Avenue			
November 7, 1989 (Tuesday)	338	497	7,768
August 14, 1995 (Thursday)	373	517	7,445

Sources: City and County of Honolulu Department of Transportation Services,
Belt Collins Hawaii Ltd.

Table 2

Traffic Counts - North-South (ewa-diamondhead) Roadways

	AM Peak Hour	PM Peak Hour	24-Hour Total
Kalakaua Avenue, southbound approaching Kapahulu Avenue			
July 29, 1991 (Monday)	678	1,205	15,180
September 6, 1994 (Tuesday)	620	1,193	14,284
July 22, 1998 (Wednesday)	682	1,207	15,291
August 12, 1998 (Wednesday)	722	1,234	15,389
Kalakaua Avenue, southbound south of Monsarrat Avenue			
November 2, 1988 (Wednesday)	324	487	8,143
July 29, 1991 (Monday)	382	686	8,641
Kalakaua Avenue, northbound (parking lot) approaching Monsarrat Avenue			
July 29, 1991 (Monday)	152	267	3,757
September 6, 1994 (Tuesday)	148	279	3,074
Paki Avenue, southbound between Kapahulu Avenue and Monsarrat Avenue			
May 17, 1989 (Wednesday)	74	149	1,749
February 25, 1998 (Wednesday)	*83*	*150*	--
February 26, 1998 (Thursday)	*73*	*118*	--
Paki Avenue, southbound between Monsarrat Avenue and Noela Street			
February 25, 1998 (Wednesday)	*139*	*375*	--
Paki Avenue, southbound approaching Kalakaua Avenue			
July 21, 1989 (Friday)	179	295	3,755
Paki Avenue, southbound approaching Poni Moi Road			
November 8, 1989 (Wednesday)	56	74	1,155
Diamond Head Road, northbound approaching Poni Moi Road			
July 21, 1989 (Friday)	160	328	5,327
November 7, 1989 (Tuesday)	352	353	4,379
Paki Avenue, northbound between Noela Street and Monsarrat Avenue			
May 17, 1989 (Wednesday)	460	488	7,417
February 25, 1998 (Wednesday)	*472*	*427*	--
Paki Avenue, northbound between Monsarrat Avenue and Kapahulu Avenue			
January 14, 1991 (Monday)	1,345	988	15,279
February 25, 1998 (Wednesday)	*1,162*	*956*	--
February 26, 1998 (Thursday)	*1,221*	*1,042*	--
Paki Avenue, northbound departing Kapahulu Avenue			
January 14, 1991 (Monday)	1,116	654	10,140
February 26, 1998 (Thursday)	*1,025*	*700*	--

Sources: City and County of Honolulu Department of Transportation Services, *Belt Collins Hawaii Ltd.*

The parking study and a related visitor-intercept study indicated that approximately one-quarter of the zoo visitors who arrive by car parked their vehicle in Kapiolani Regional Park other than in the metered lot between the zoo and Kapahulu Avenue. The nearest parking locations are the parking lot fronting the Waikiki Shell and along Monsarrat Avenue. These vehicles would affect traffic on Monsarrat Avenue, so conditions at the intersection of Monsarrat Avenue and Paki Avenue were evaluated. The impact of zoo traffic on Kapahulu Avenue would be the greatest at its intersection with Paki Avenue and conditions at that intersection were also considered.

Both of these intersections are signalized and operate in two phases. Capacity analyses of these intersections were done using the Planning Method described in Chapter 9 of the *Highway Capacity Manual — Third Edition* (Updated December 1997). For the volumes shown in Exhibit 2, both intersections operated at desirable "under capacity" condition, with estimated delays rated at an acceptable Level of Service D or better (results are summarized in Table 4 of this report).

The traffic counts were taken in February, 1998. Zoo attendance data indicate that peak visitation occurs in March and in August, with attendance as much as 37 percent higher than in February. A review of the traffic data indicates that 24-hour traffic volumes on the roadways are generally higher during summer months, but peak hour volumes do not vary significantly. Traffic conditions during peak months, therefore, were estimated for volumes that are 15 percent higher than the counted volumes. The capacity analyses show increased saturation and delays, with unchanged levels of service (D or better).

Existing Traffic Generated by the Honolulu Zoo

The parking study and visitor-intercept study provided information related to the time of visit, duration of visit, vehicle occupancy, and other travel characteristics which were used to simulate the traffic movements due to zoo visitors. Traffic generated by zoo employees and service vehicles were estimated and all of these trips were assigned to the roadway system. The highest volumes of zoo-related traffic occur during the midday hours, predominantly between 9:30 AM and 3:30 PM, when traffic on the surrounding streets are lower than during the typical peak hours.

The hour with the highest volumes on a typical weekday morning (AM Peak Hour) occurs between 6:15 AM and 8:30 AM, during which the only traffic generated by the zoo is

due to employees arriving for work. The contribution of the zoo to traffic volumes at the intersections considered is limited to 20 vehicles in the peak hour traveling westbound (makai) on Kapahulu Avenue making the through movement at the Paki Street intersection. The zoo traffic is 3 percent of the total volume making this movement in the AM Peak Hour.

The hour with the highest volumes in the weekday afternoon (PM Peak Hour) occurs between 3:30 PM and 6:00 PM; during this time, the zoo contributes traffic from employees leaving work, visitors who have completed their visit to the zoo, and service vehicles leaving the zoo. Traffic leaving the zoo is estimated to be 35 vehicles traveling eastbound (mauka) on Kapahulu Avenue in the through movement across the Paki Avenue intersection and 5 vehicles turning left from eastbound Monsarrat Avenue to northbound Paki Avenue, then turning right from Paki Avenue to eastbound Kapahulu Avenue. These volumes represent 2 percent to 3 percent of the total volumes of each movement in the PM Peak Hour.

On weekends, the zoo generates more traffic as the number of Oahu residents visiting the zoo is larger than on weekdays. Traffic volumes on roadways near the zoo do not have the pronounced commuting peak patterns that are typical of weekday traffic. Volumes are moderately high throughout the day, as indicated by the manual counts at the intersection of Paki Avenue and Monsarrat Avenue. While the peak hourly volumes were recorded between 1:45 PM and 2:45 PM, traffic flows at the intersection were at least 85 percent of the peak rates for much of the daylight hours.

The effects of zoo traffic, therefore, were evaluated assuming a concurrent peak hour. The traffic attracted by the zoo is estimated to be 95 vehicles per hour westbound on Kapahulu Avenue moving through the Paki Avenue intersection and 5 vehicles per hour on northbound Paki Avenue moving through the Monsarrat Avenue intersection and turning left onto Kapahulu Avenue. Vehicles leaving the zoo include 45 vehicles per hour on Kapahulu Avenue traveling eastbound through the Paki Avenue intersection, 5 vehicles per hour turning right from eastbound Kapahulu Avenue to Paki Avenue and proceeding southbound across Monsarrat Avenue, and 10 vehicles per hour turning left from eastbound Monsarrat Avenue to northbound Paki Avenue and then right onto eastbound Kapahulu Avenue.

Of the existing through traffic during the day on weekends, zoo traffic is as much as 23 percent of the westbound and 6 percent of the eastbound volumes on Kapahulu Avenue at Paki Avenue. Zoo traffic is less than 10 percent of the existing traffic volume at the other locations.

Base Case for Evaluation of Future Traffic

The long-range land transportation plan for Oahu indicates that traffic in the vicinity of the project can be expected to increase from 1990 levels by approximately 16 percent by the year 2020. The traffic count data shown in Tables 1 and 2 indicate that traffic volumes in the area have been stable over the last ten years. The roadways serving the Honolulu Zoo and Kapiolani Regional Park are not expected to have significant increases due to increased population or other new development in the area.

A future condition which assumes no change in the level of activity at Honolulu Zoo or in Kapiolani Regional Park, or a "base case" condition, would have volumes that are equal to existing volumes. The previously discussed peak month condition in which volumes were 15 percent higher than those counted would be the future base case; the turning volumes at the intersections for this condition are shown in Exhibit 3.

The capacity analyses show that the existing roadways would be adequate, with increased average delays at the signalized intersections; worst conditions, however, remain at Level of Service D, which is acceptable for urban intersections.

Future Traffic Generated by the Honolulu Zoo

The Honolulu Zoo Master Plan has been prepared for a significant increase in the number of visitors, from an annual total of 632,000 in FY1997-1998 to 1,650,000 per year. As part of the parking study, an evaluation of the existing parking and the expected increase in parking demand found that the parking demand and traffic generated by the zoo would be related not to the total visitation, but to the visitation by Oahu residents. Even considering increased visits by residents, the 30 percent increase in population that is used for regional planning would limit the growth in traffic and parking demand generated by the improved zoo.

Using the simulation that was developed to identify existing parking and traffic generated by the zoo, estimates of the increases in traffic demand were made to describe the traffic impact of implementing the master plan for the zoo. The recommendations for providing parking from the parking study were also used to assign the new traffic to the roadway system. Table 3 shows the results of the estimate of traffic impacts.

Table 3
Traffic Impact of the Honolulu Zoo Master Plan

	AM Peak Hour	PM Peak Hour	Weekend Peak Hour
Kapahulu Avenue at Paki Avenue			
westbound through movement	15	0	110
eastbound through movement	0	30	20
Paki Avenue at Kapahulu Avenue			
northbound right turns	0	5	10
northbound left turns	0	0	5
Monsarrat Avenue at Paki Avenue			
eastbound left turn	0	15	25
eastbound through movement	0	5	5
Paki Avenue at Monsarrat Avenue			
northbound through movement	0	0	5

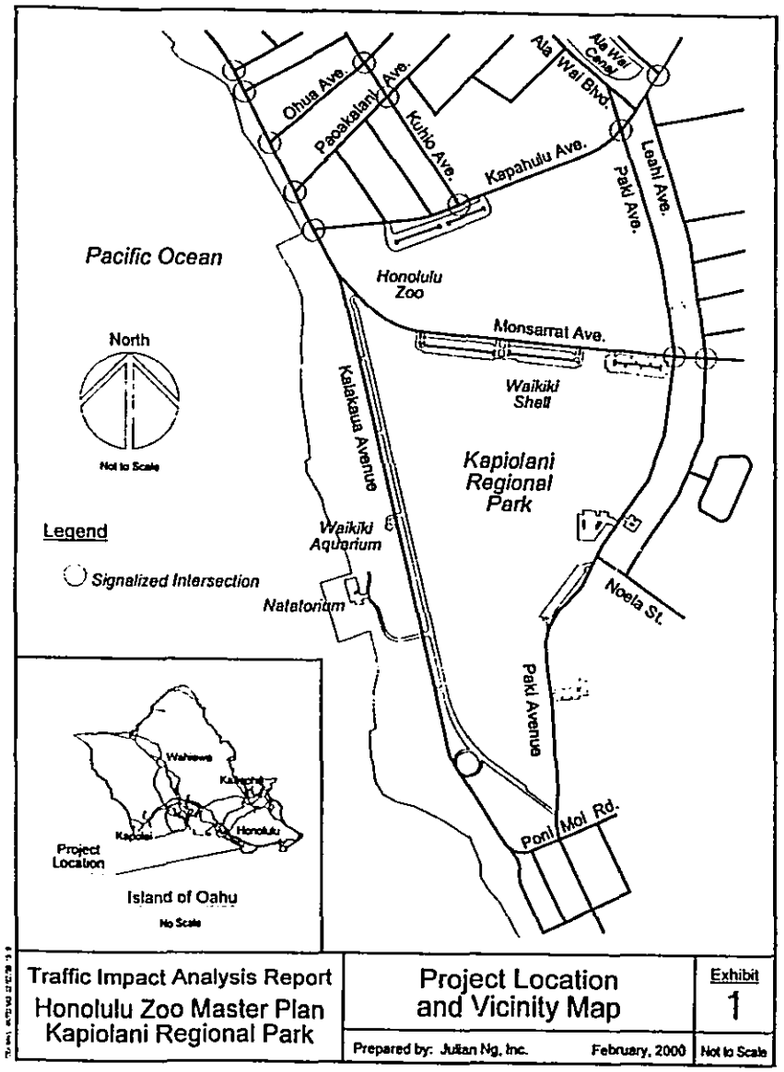
These volumes represent increases of 10 percent or less of base case traffic, except for the Kapahulu Avenue westbound through movement at Paki Avenue, where the increase is 27 percent of the base case volume.

The master planning for Kapiolani Regional Park is ongoing and it will review the locations of playing fields and other facilities. However, no significant changes in the number of such facilities and their use have been identified. The restoration of the Waikiki Natatorium will allow it to be used for events that may attract significant numbers of participants and observers. Any activity at the Natatorium would be coordinated with other activities within the Kapiolani Regional Park so that parking and other infrastructure requirements are not overburdened. Total peak hour traffic due to activities at Kapiolani Regional Park, therefore, are not expected to change.

These volumes were added to the base case and the future traffic assignments with the project are shown in Exhibit 4. The results of the capacity and level of service analyses are shown in Table 4.

Table 4
Results of Capacity Analyses (Planning Method)

	1998 Counts	Future Base Case	Future with Project
Weekday AM Peak Hour			
Kapahulu Avenue at Paki Avenue			
Critical v/c ratio	0.63	0.71	0.71
Estimated average delay (seconds/vehicle)	28.7	31.7	31.8
Level of Service	C	C	C
Monsarrat Avenue at Paki Avenue			
Critical v/c ratio	0.63	0.75	0.75
Estimated average delay (seconds/vehicle)	36.3	47.8	47.8
Level of Service	D	D	D
Weekday PM Peak Hour			
Kapahulu Avenue at Paki Avenue			
Critical v/c ratio	0.61	0.68	0.69
Estimated average delay (seconds/vehicle)	30.9	34.1	35.2
Level of Service	C	C	C
Monsarrat Avenue at Paki Avenue			
Critical v/c ratio	0.64	0.75	0.75
Estimated average delay (seconds/vehicle)	27.1	31.5	31.6
Level of Service	C	C	C
Saturday Peak Hour			
Kapahulu Avenue at Paki Avenue			
Critical v/c ratio	--	0.58	0.59
Estimated average delay (seconds/vehicle)	--	33.4	34.7
Level of Service	--	C	C
Monsarrat Avenue at Paki Avenue			
Critical v/c ratio	0.45	0.52	0.52
Estimated average delay (seconds/vehicle)	27.7	31.5	31.5
Level of Service	C	C	C

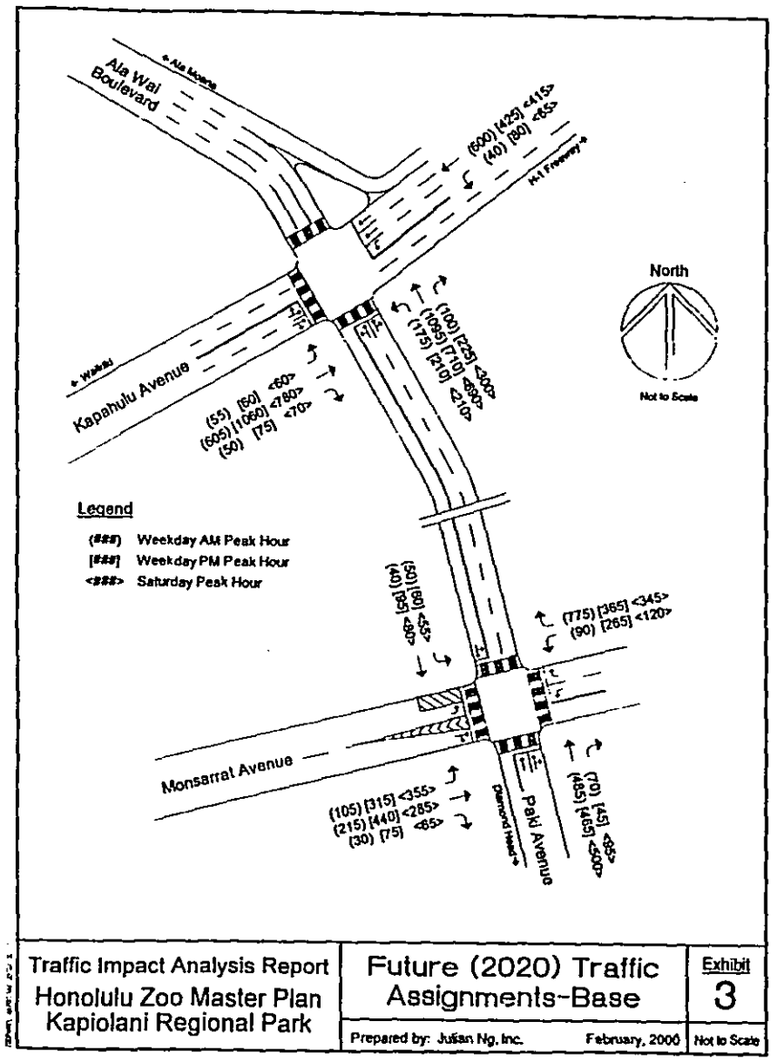


The analyses were done for increases in traffic at the intersections where the project will have the greatest impact. The results of the analyses show that the increased traffic will have at most a small effect on average delays at the intersections during the peak hours and existing levels of service will not change. The intersections would continue to operate at acceptable levels of service.

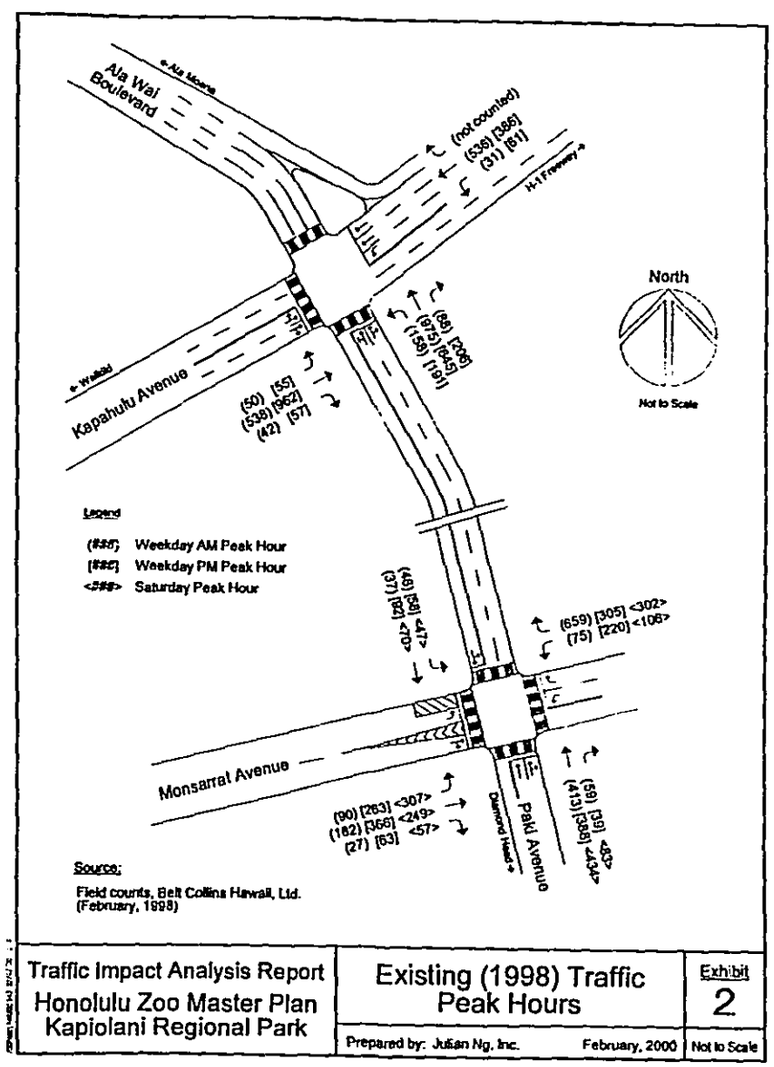
Summary

The implementation of the Honolulu Zoo Master Plan will accommodate greater numbers of visitors. The increases in traffic volumes are expected to have the greatest impacts at the existing signalized intersections of Paki Avenue with Kapahulu Avenue and Paki Avenue with Monsarrat Avenue. Existing peak hour conditions at these intersections are acceptable, with conditions described by Level of Service C or Level of Service D.

The increased traffic in the vicinity of the Kapiolani Regional Park that would result from implementation of the Honolulu Zoo Master Plan ranges from less than 10 percent of existing traffic to nearly 30 percent of existing traffic. These increases do not have major impacts to average delays at the intersections and peak hour conditions are expected to continue to be acceptable.



Traffic Impact Analysis Report Honolulu Zoo Master Plan Kapiolani Regional Park	Future (2020) Traffic Assignments-Base	Exhibit 3
	Prepared by: Julian Ng, Inc. February, 2000	Not to Scale



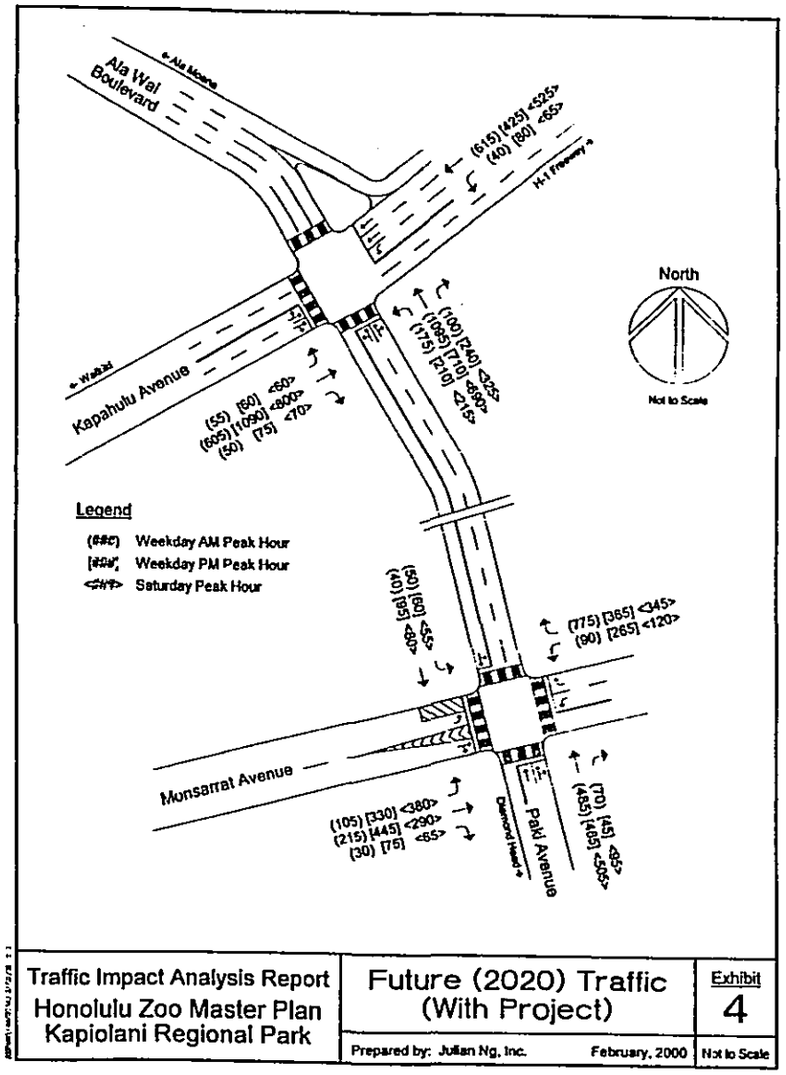
Traffic Impact Analysis Report Honolulu Zoo Master Plan Kapiolani Regional Park	Existing (1998) Traffic Peak Hours	Exhibit 2
	Prepared by: Julian Ng, Inc. February, 2000	Not to Scale

APPENDIX

FIELD TRAFFIC COUNT DATA

(Counts taken February, 1998)

(3 pages)



Traffic Impact Analysis Report Honolulu Zoo Master Plan Kapiolani Regional Park	Future (2020) Traffic (With Project)	Exhibit 4
	Prepared by: Julian Ng, Inc. February, 2000	Not to Scale

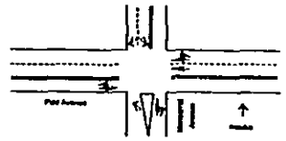
Summary of Manual Traffic Count

Monsarrat Avenue and Paki Avenue

Control: two-phase signal

Counted for: City & County of Honolulu, Department of Parks & Recreation

Counted by: Belt Collins Hawaii, Ltd.



street of approach:	Paki Avenue		Monsarrat Avenue					Paki Avenue		Total
direction of travel:	diamondhead		makaibound		maukabound			ewabound		Approach
February 25, 1998 (Wednesday)	LT	TH	RT	LT	LT	TH	RT	TH	RT	Volume
Time Period	↗	→	↱	↰	↰	↑	↱	←	↖	
06:00 AM – 06:15 AM	5	3	29	11	15	10	5	11	0	89
06:15 AM – 06:30 AM	5	5	43	10	7	15	5	20	3	113
06:30 AM – 06:45 AM	2	12	58	14	9	16	5	40	3	159
06:45 AM – 07:00 AM	4	6	85	15	21	21	5	81	3	241
07:00 AM – 07:15 AM	7	6	102	6	21	33	3	83	8	269
07:15 AM – 07:30 AM	10	4	171	22	25	42	3	114	12 *	403
07:30 AM – 07:45 AM	8	12	187	20	19	42	7	116	16 *	427
07:45 AM – 08:00 AM	14	12	158	22	21	55	10	96	17 *	405
08:00 AM – 08:15 AM	14	9	143	11	25	43	7	87	14 *	353
08:15 AM – 08:30 AM	6	6	136	11	29	43	4	71	11	317
08:30 AM – 08:45 AM	5	8	92	15	46	41	17	69	17	310
08:45 AM – 09:00 AM	10	8	106	11	36	48	7	59	8	293
06:00 AM – 09:00 AM	90	91	1,310	168	274	409	78	847	112	3,379
AM Peak Hour:										
07:15 AM – 08:15 AM	46	37	659	75	90	182	27	413	59	1,568
03:00 PM – 03:15 PM	14	17	63	27	52	38	9	89	16	325
03:15 PM – 03:30 PM	15	10	81	20	68	63	10	88	20	375
03:30 PM – 03:45 PM	19	8	66	33	69	63	10	93	5	366
03:45 PM – 04:00 PM	11	18	79	39	52	60	17	69	7	352
04:00 PM – 04:15 PM	8	15	75	24	59	74	12	72	16	355
04:15 PM – 04:30 PM	21	20	72	45	64	99	10	66	15	412
04:30 PM – 04:45 PM	11	21	87	63	74	84	13	111	13	477
04:45 PM – 05:00 PM	9	23	62	62	75	82	14	80	20	427
05:00 PM – 05:15 PM	11	27	69	62	71	77	20	83	6 *	426
05:15 PM – 05:30 PM	16	21	60	34	61	82	11	103	21 *	409
05:30 PM – 05:45 PM	23	25	82	55	77	98	21	113	8 *	502
05:45 PM – 06:00 PM	8	19	94	69	54	109	11	89	4 *	457
03:00 PM – 06:00 PM	166	224	890	533	776	929	158	1,056	151	4,883
PM Peak Hour:										
05:00 PM – 06:00 PM	58	92	305	220	263	366	63	388	39	1,794

Summary of Manual Traffic Count

Monsarrat Avenue and Paki Avenue

Control: two-phase signal

Counted for: City & County of Honolulu, Department of Parks & Recreation

Counted by: Belt Collins Hawaii, Ltd.

street of approach:	Paki Avenue		Monsarrat Avenue					Paki Avenue		Total
direction of travel:	diamondhead		makaibound		maukabound			ewabound		Approach
February 21, 1998 (Saturday)	LT	TH	RT	LT	LT	TH	RT	TH	RT	Volume
Time Period	↗	→	↱	↰	↰	↑	↱	←	↖	
08:00 AM – 08:15 AM	15	27	66	25	42	39	13	52	13	292
08:15 AM – 08:30 AM	9	12	63	26	29	50	6	54	11	260
08:30 AM – 08:45 AM	5	28	74	31	49	58	7	72	13	335
08:45 AM – 09:00 AM	5	15	63	18	40	49	12	62	20	284
09:00 AM – 09:15 AM	11	28	65	32	70	50	10	98	16	378
09:15 AM – 09:30 AM	8	26	59	23	48	38	16	83	13	312
09:30 AM – 09:45 AM	14	18	64	42	44	40	8	72	16	318
09:45 AM – 10:00 AM	6	18	63	24	50	50	16	86	12	325
10:00 AM – 10:15 AM	7	13	60	33	48	51	15	67	11	305
10:15 AM – 10:30 AM	14	18	72	24	56	47	21	95	16	363
10:30 AM – 10:45 AM	14	21	68	28	62	41	11	70	19	334
10:45 AM – 11:00 AM	7	26	44	27	65	51	18	89	22	349
11:00 AM – 11:15 AM	11	25	65	33	66	45	22	104	19	390
11:15 AM – 11:30 AM	6	19	68	36	79	54	12	94	17	385
11:30 AM – 11:45 AM	12	24	71	15	69	60	16	78	16	361
11:45 AM – 12:00 PM	6	20	81	40	47	44	8	116	18	382
12:00 PM – 12:15 PM	8	20	50	29	52	52	14	100	13	338
12:15 PM – 12:30 PM	11	17	64	29	60	69	11	119	20	400
12:30 PM – 12:45 PM	15	28	62	24	68	67	16	96	39	405
12:45 PM – 01:00 PM	11	30	73	31	73	65	18	107	19	427
01:00 PM – 01:15 PM	8	21	67	31	71	59	17	102	26	402
01:15 PM – 01:30 PM	9	32	70	29	72	43	13	88	17	373
01:30 PM – 01:45 PM	8	17	72	27	75	42	13	99	22	375
01:45 PM – 02:00 PM	6	18	74	28	68	55	11	147	22 *	429
02:00 PM – 02:15 PM	6	21	77	14	81	71	15	94	25 *	404
02:15 PM – 02:30 PM	16	11	58	26	65	63	10	80	15 *	344
02:30 PM – 02:45 PM	19	20	93	38	93	60	21	113	21 *	478
02:45 PM – 03:00 PM	16	26	70	25	84	66	17	94	19	417
03:00 PM – 03:15 PM	9	12	60	16	32	38	8	104	13	292
03:15 PM – 03:30 PM	9	14	74	24	79	68	11	109	20	408
03:30 PM – 03:45 PM	13	14	70	23	66	53	11	98	18	366
03:45 PM – 04:00 PM	3	23	89	24	84	69	11	100	16	419
04:00 PM – 04:15 PM	6	12	82	31	65	56	13	103	14	382
04:15 PM – 04:30 PM	8	17	83	19	79	70	13	104	15	408
04:30 PM – 04:45 PM	26	10	90	21	74	72	17	107	15	432
04:45 PM – 05:00 PM	9	9	77	15	60	50	10	114	15	359
05:00 PM – 05:15 PM	18	25	99	20	69	59	15	107	30	442
05:15 PM – 05:30 PM	10	8	73	12	68	49	15	90	13	338
05:30 PM – 05:45 PM	12	13	74	19	64	53	12	94	28	369
05:45 PM – 06:00 PM	8	14	95	29	78	38	5	92	16	375
08:00 AM – 06:00 PM	416	768	2,842	1,041	2,544	2,150	528	3,741	725	14,755

* Highest one hour (total intersection)

01:45 PM – 02:45 PM	47	70	302	108	307	249	57	434	83	1,655

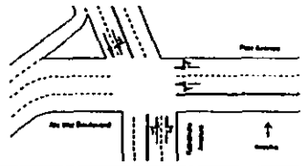
Summary of Manual Traffic Count

Kapahulu Avenue and Paki Avenue

Control: two-phase signal

Counted for: City & County of Honolulu, Department of Parks & Recreation

Counted by: Bell Collins Hawaii, Ltd.



street of approach:	Kapahulu Avenue						Paki Avenue			Total
direction of travel:	makaibound			maukabound			ewabound			Approach
February 26, 1998 (Thursday)	RT *	TH	LT	LT	TH	RT	LT	TH	RT	Volume
Time Period	↱	↓	↰	↰	↑	↱	↙	←	↖	
06:00 AM – 06:15 AM	0	52	4	2	66	1	11	23	9	168
06:15 AM – 06:30 AM	0	57	14	1	69	4	16	38	1	200
06:30 AM – 06:45 AM	0	97	0	1	88	8	19	73	26	312
06:45 AM – 07:00 AM	0	89	5	3	78	6	19	112	14	326
07:00 AM – 07:15 AM	0	91	9	5	96	3	26	193	23	446
07:15 AM – 07:30 AM	0	79	16	3	118	10	33	196	25	480
07:30 AM – 07:45 AM	0	113	7	10	116	13	34	235	18	* 546
07:45 AM – 08:00 AM	0	186	9	17	155	11	38	284	20	* 720
08:00 AM – 08:15 AM	0	111	6	11	120	9	50	226	24	* 557
08:15 AM – 08:30 AM	0	126	9	12	147	9	36	230	26	* 595
08:30 AM – 08:45 AM	0	80	12	5	153	3	27	162	48	490
08:45 AM – 09:00 AM	0	95	14	2	121	9	36	147	52	476
06:00 AM – 09:00 AM	0	1,176	105	72	1,327	86	345	1,919	286	5,316
AM Peak Hour:										
07:30 AM – 08:30 AM	0	536	31	50	536	42	158	975	88	2,418
03:00 PM – 03:15 PM	0	86	5	13	208	12	19	128	55	526
03:15 PM – 03:30 PM	0	107	10	14	218	12	52	174	51	638
03:30 PM – 03:45 PM	0	95	16	12	222	13	51	145	54	608
03:45 PM – 04:00 PM	0	103	18	13	174	11	36	135	44	534
04:00 PM – 04:15 PM	0	97	18	6	277	18	60	170	48	* 696
04:15 PM – 04:30 PM	0	95	16	23	261	12	40	140	54	* 641
04:30 PM – 04:45 PM	0	115	14	12	219	17	49	155	51	* 632
04:45 PM – 05:00 PM	0	79	13	12	205	10	42	180	53	* 594
05:00 PM – 05:15 PM	0	92	14	10	234	16	43	150	61	620
05:15 PM – 05:30 PM	0	97	17	14	299	25	37	178	50	717
05:30 PM – 05:45 PM	0	86	12	8	225	20	27	160	49	587
05:45 PM – 06:00 PM	0	87	18	12	199	16	25	147	50	554
03:00 PM – 06:00 PM	0	1,139	171	151	2,741	182	481	1,862	620	7,347
PM Peak Hour:										
04:00 PM – 05:00 PM	0	388	61	55	962	57	191	645	206	2,563

* not counted

– Environmental Assessment for Honolulu Zoo Master Plan –

ARCHAEOLOGICAL ASSESSMENT

ARCHAEOLOGICAL ASSESSMENT OF THE HONOLULU ZOO PARCEL, WAIKĪKĪ, ISLAND OF O`AHU (TMK 3-1-43: 1)

by

Hallett H. Hammatt, Ph.D.
David Shideler, M.A.
and
Rodney Chiogioji, B.A.

Prepared for

Department of Design and Construction,
City and County of Honolulu

Cultural Surveys Hawai`i
April 2000

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I. INTRODUCTION

A. Project Description

At the request of the Department of Design and Construction of the City and County of Honolulu, Cultural Surveys Hawaii has conducted an archaeological assessment of the Honolulu Zoo property in Waikiki on the island of O'ahu (TMK 3-1-43:1) (Figures 1 & 2). The zoo parcel is a triangular-shaped area comprising 42.5 acres. It is bounded by Kapahulu Avenue to the north, Paki Avenue to the east, Monsarrat Avenue to the south, and Kalākaua Avenue to the west.

B. Scope of Work

The scope of the work for this archaeological assessment comprised:

1. Historic Background study to determine prehistoric and historic land use to establish the likelihood of encountering archaeological materials in the 42.5-acre zoo project area. Sources will include archival documents, historic maps, Land Commission Award documents, early written accounts and other sources of the land use in this area of Waikīkī. Source material in libraries, archives, and government agencies are to be consulted.

2. Review and evaluation of existing soil core information to determine the location and extent of undisturbed natural deposits that may contain archaeological materials. It should be noted that soil core information presently available is quite limited (i.e., areas west of Kapahulu Avenue and along Kalākaua Avenue).

3. Preparation of a report giving the results of the historic background study and an evaluation of the cores. This report will consider all available information to determine the potential for and location of archaeological materials within the project area and the potential impact that construction activities would have on these materials. The report will also consider the implications of Kapi'olani Park being on the State Register of Historic Places.

C. Work Accomplished

The Honolulu Zoo property was inspected in October 1999 and March 2000. Photographs were taken and general notes on present conditions in the area were recorded. Zoo staff were informally interviewed, with special attention given to dates of construction of structures currently present in the zoo.

Background research included: a review of previous archaeological studies on file at the State Historic Preservation Division of the Department of Land and Natural Resources; review of documents at Hamilton Library of the University of Hawai'i, the Hawai'i State Archives, the Mission Houses Museum Library, the Hawai'i Public Library, and the Archives of the Bishop Museum; study of historic photographs at the Hawai'i State Archives and the Archives of the Bishop Museum; and study of historic maps at the Survey Office of the Department of Land and Natural Resources.

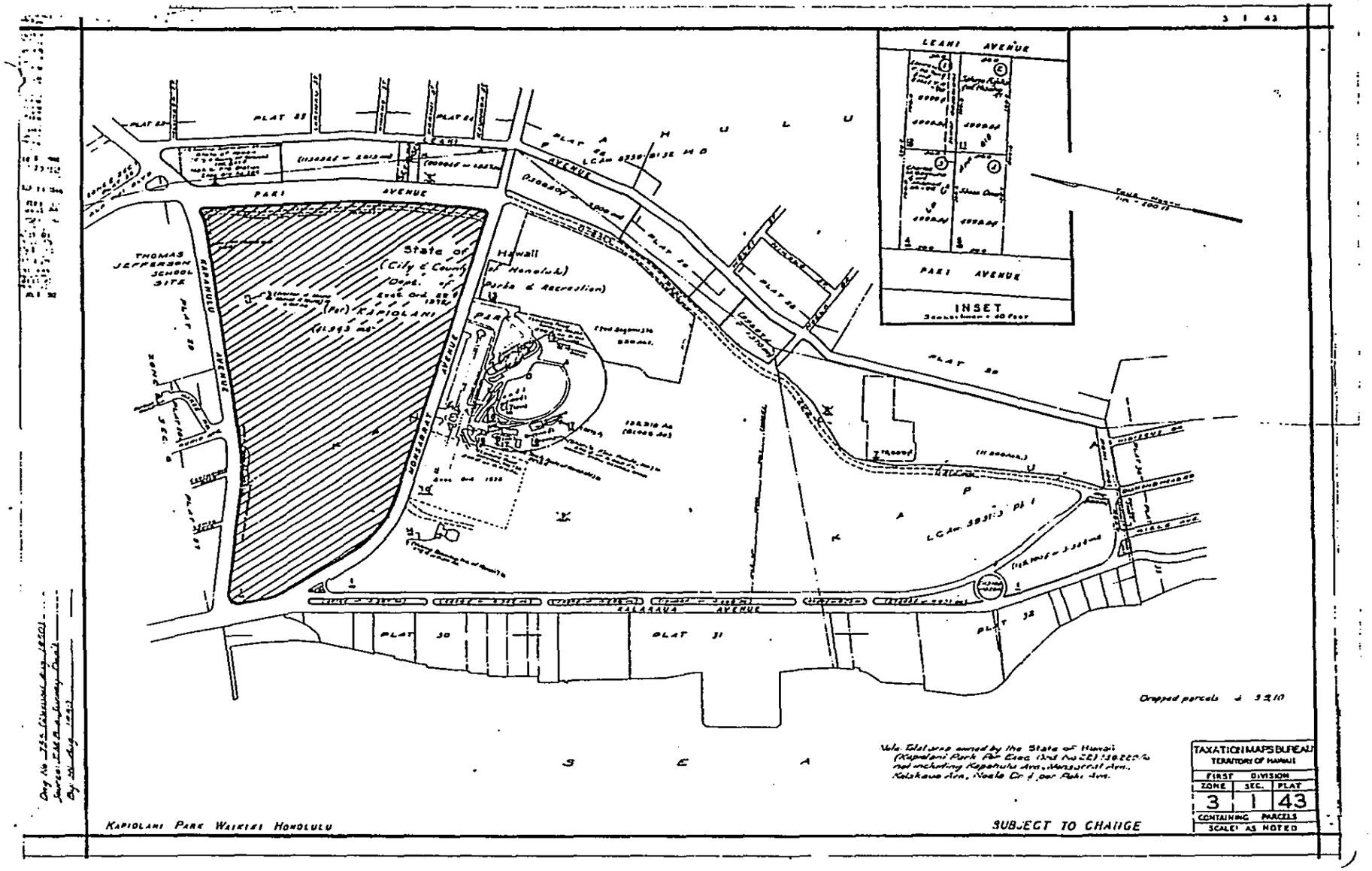


Figure 1 Tax map (3-1-43) showing project area

II. WAIKĪKĪ AND THE HONOLULU ZOO PARCEL: CULTURAL AND HISTORICAL DOCUMENTATION

This section presents a review of the available documentary evidence for the general character of the area presently identified as Waikīkī as it had evolved in the years before western contact in the later 18th century. The development of Waikīkī lands adjacent to and including the present Honolulu Zoo parcel during the 19th century and into the early 20th century was recorded in increasingly detailed documentation - including government records, photographs and maps. Finally, during subsequent decades of the 20th century, abundant documentation of Waikīkī allows a more precise focus on the Honolulu Zoo parcel itself.

A. Pre-contact to 1800s

Waikīkī, by the time of the arrival of Europeans in the Hawaiian Islands during the late eighteenth century, had long been a center of population and political power on O`ahu. According to Martha Beckwith (1940), by the end of the fourteenth century Waikīkī had become "the ruling seat of the chiefs of O`ahu." The preeminence of Waikīkī continued into the eighteenth century. Kamehameha I resided there upon gaining control of O`ahu, following the defeat of the island's chief, Kalanikūpule. The nineteenth century Hawaiian historian John Papa `Ī`ī (1959: 17), himself a member of the *ali`i*, described the king's Waikīkī residence:

> Kamehameha's houses were at Pua`ali`ili`i, *makai* of the old road, and extended as far as the west side of the sands of `Āpuakehau. Within it was Helumoa where Ka`ahumanu *mā* went to while away the time. The king built a stone house there, enclosed by a fence.

`Ī`ī further noted that the "place had long been a residence of chiefs. It is said that it had been Kekuapoi's home, through her husband Kahahana, since the time of Kahekili" (*Ibid.*).

Chiefly residences, however, were only one element of a complex of features - sustaining a large population - that characterized Waikīkī up to pre-contact times. Beginning in the fifteenth century, a vast system of irrigated taro fields was constructed, extending across the littoral plain from Waikīkī to lower Mānoa and Pālolo valleys. This field system - an impressive feat of engineering the design of which is traditionally attributed to the chief Kalamakua - took advantage of streams descending from Makiki, Mānoa and Pālolo valleys. These streams also provided ample fresh water for the Hawaiians living in the *ahupua`a*. Water was also available from springs in nearby Mō`ili`ili and Punahou. Closer to the Waikīkī shoreline, coconut groves and fishponds dotted the landscape. A sizeable population developed amidst this Hawaiian-engineered abundance. Captain George Vancouver, arriving at "Whyteete" in 1792, captured something of this profusion in his journals:

> On shores, the villages appeared numerous, large, and in good repair; and the surrounding country pleasingly interspersed with deep, though not extensive valleys; which, with the plains near the sea-side, presented a high degree of cultivation and fertility.

> [Our] guides led us to the northward through the village, to an exceedingly well-made causeway, about twelve feet broad, with a ditch on each side.
>
> This opened our view to a spacious plain, which, in the immediate vicinity of the village, had the appearance of the open common fields in England; but, on advancing, the major part appeared to be divided into fields of irregular shape and figure, which were separated from each other by low stone walls, and were in a very high state of cultivation. These several portions of land were planted with the eddo or *taro* root, in different stages of inundation; none being perfectly dry, and some from three to six or seven inches under water. The causeway led us near a mile from the beach, at the end of which was the water we were in quest of. It was a rivulet five or six feet wide, and about two or three feet deep, well banked up, and nearly motionless; some small rills only, finding a passage through the dams that checked the sluggish stream, by which a constant supply was afforded to the *taro* plantations.
>
> [We] found the plain in a high state of cultivation, mostly under immediate crops of *taro*; and abounding with a variety of wild fowl, chiefly of the duck kind...The sides of the hills, which were at some distance, seemed rocky and barren; the intermediate vallies, which were all inhabited, produced some large trees, and made a pleasing appearance. The plain, however, if we may judge from the labour bestowed on their cultivation, seemed to afford the principal proportion of the different vegetable productions on which the inhabitants depend for their subsistence. (Vancouver, 1798: I, 161-164)

Further details of the exuberant life that must have characterized the Hawaiians use of the lands that included the *ahupua`a* of Waikīkī are given by Archibald Menzies, a naturalist accompanying Vancouver's expedition:

> The verge of the shore was planted with a large grove of cocoanut palms, affording a delightful shade to the scattered habitations of the natives. Some of those near the beach were raised a few feet from the ground upon a kind of stage, so as to admit the surf to wash underneath them. We pursued a pleasing path back to the plantation, which was nearly level and very extensive, and laid out with great neatness into little fields planted with taro, yams, sweet potatoes and the cloth plant. These, in many cases, were divided by little banks on which grew the sugar cane and a species of *Draecena* without the aid of much cultivation, and the whole was watered in a most ingenious manner by dividing the general stream into little aqueducts leading in various directions so as to be able to supply the most distant fields at pleasure, and the soil seemed to repay the labour and industry of these people by the luxuriancy of its productions. Here and there we met with ponds of considerable size, and besides being well stocked with fish, they swarmed with water fowl of various kinds such as ducks, coots, water hens, bitterns, plovers and curlews. (Menzies 1920:23-24)

However, the traditional Hawaiian focus on Waikīkī as a center of chiefly and agricultural activities on southeastern O`ahu was soon to change - disrupted by the same Euro-American contact

which produced the first documentation (including the records cited above) of that traditional life. The *ahupua'a* of Honolulu - with the only sheltered harbor on O'ahu - became the center for trade with visiting foreign vessels, drawing increasing numbers of Hawaiians away from their traditional environments. Kamehameha himself moved his residence from Waikīkī to Honolulu. By 1828, Levi Chamberlain describing a journey into Waikīkī would note:

> Our path led us along the borders of extensive plats of marshy ground, having raised banks on one or more sides, and which were once filled with water, and replenished abundantly with esculent fish; but now overgrown with tall rushes waving in the wind. The land all around for several miles has the appearance of having once been under cultivation. I entered into conversation with the natives respecting this present neglected state. They ascribed it to the decrease of population. (Chamberlain 1957:26)

Tragically, the depopulation of Waikīkī was not simply a result of the attractions of Honolulu (where, by the 1820s, the population was estimated at 6,000 to 7,000) but also of the European diseases that had devastating effects upon the Hawaiian populace.

The depopulation of Waikīkī , however, was not total and the *ahupua'a* continued to sustain Hawaiians living traditionally into the nineteenth century. Land Commission Award records from the 1850s document awardees continuing to maintain fishponds and irrigated and dry-land agricultural plots though on a greatly reduced scale than had been possible previously with adequate manpower.

B. Waikīkī at the base of Leahi Crater (Diamond Head)

Details specific to the history and development of the southeast end of Waikīkī below Diamond Head, where the Honolulu Zoo parcel is located, are available in the works of pioneering Hawaiian memoirists and historians, on historic maps, and in the works of 20th century scholars.

Historic maps of O'ahu suggest that the southeast end of Waikīkī may have stood apart from the agricultural abundance and dense population that otherwise characterized Waikīkī in pre-contact Hawai'i. Lt. Charles Malden, an English cartographer, mapped the south coast of O'ahu in 1825. Malden's map shows an extensive coconut grove and village above the coastline at "Waiatité", stretching westward from two "Fresh Water Ponds" (Figure 2). Southeast of the ponds, toward "Diamond Hill", the map indicates only the "Ruins of a Morai" near the ponds and a scattering of house sites along the shoreline below Diamond Head.

Fifty-one years later, in 1876, the surveyor Curtis J. Lyons prepared a map of "Kaneloa, Waikiki, Oahu" showing the land between the two ponds and Diamond Head (Figures 3-5). Based on survey points shown on the map, the approximate location of the present Honolulu Zoo parcel has been indicated. It appears that much of the Honolulu Zoo sits on what was formerly two ponds and a sand spit in pre-contact Waikīkī.

Place names and features presented on the Lyons map provide additional clues to the nature of this area in pre-contact times. Traditions and historical events are associated with Kapua, a favorite

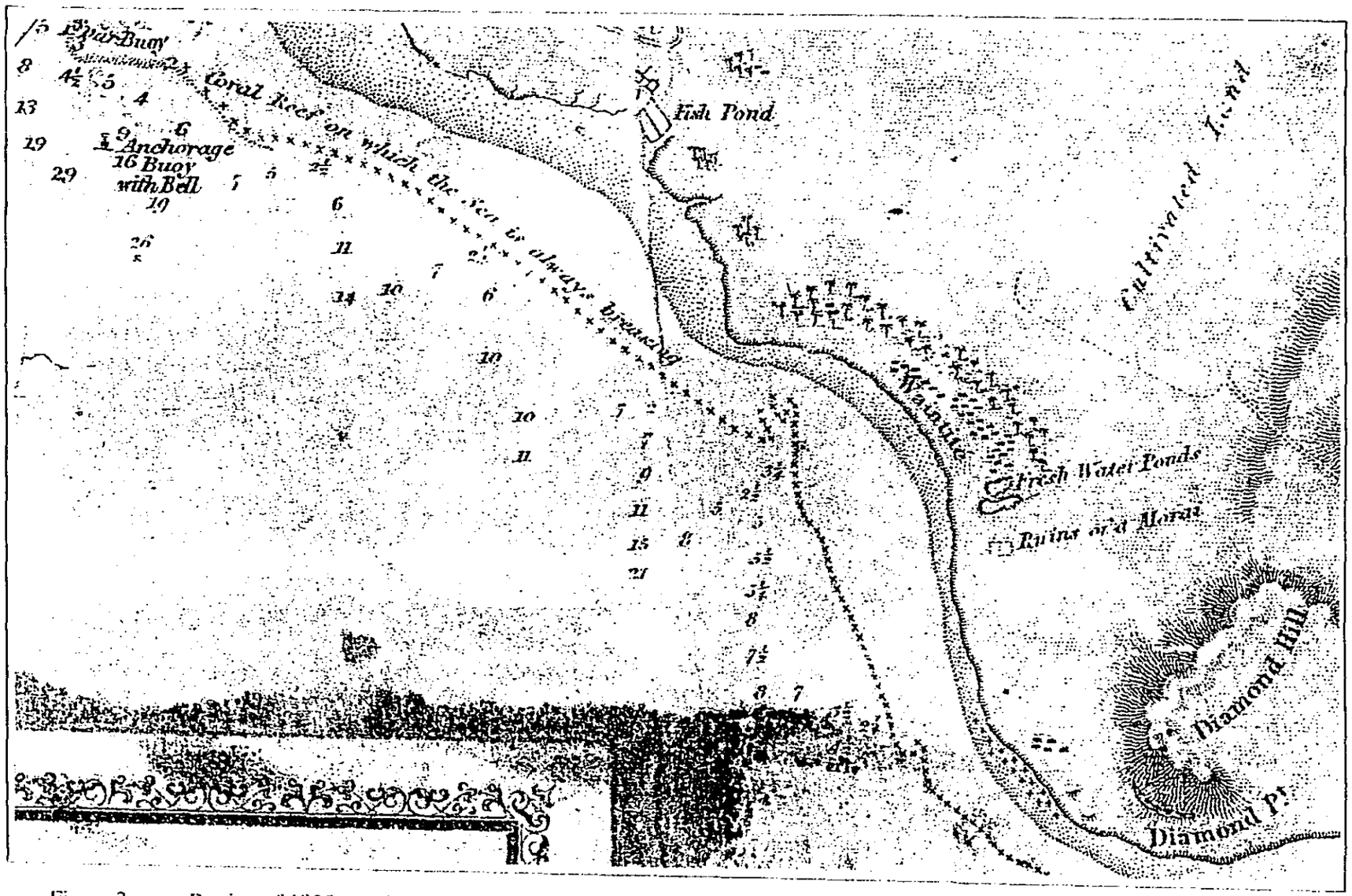


Figure 2 Portion of 1825 map by Lt. Charles Malden showing south coast of O`ahu (State Survey Office)

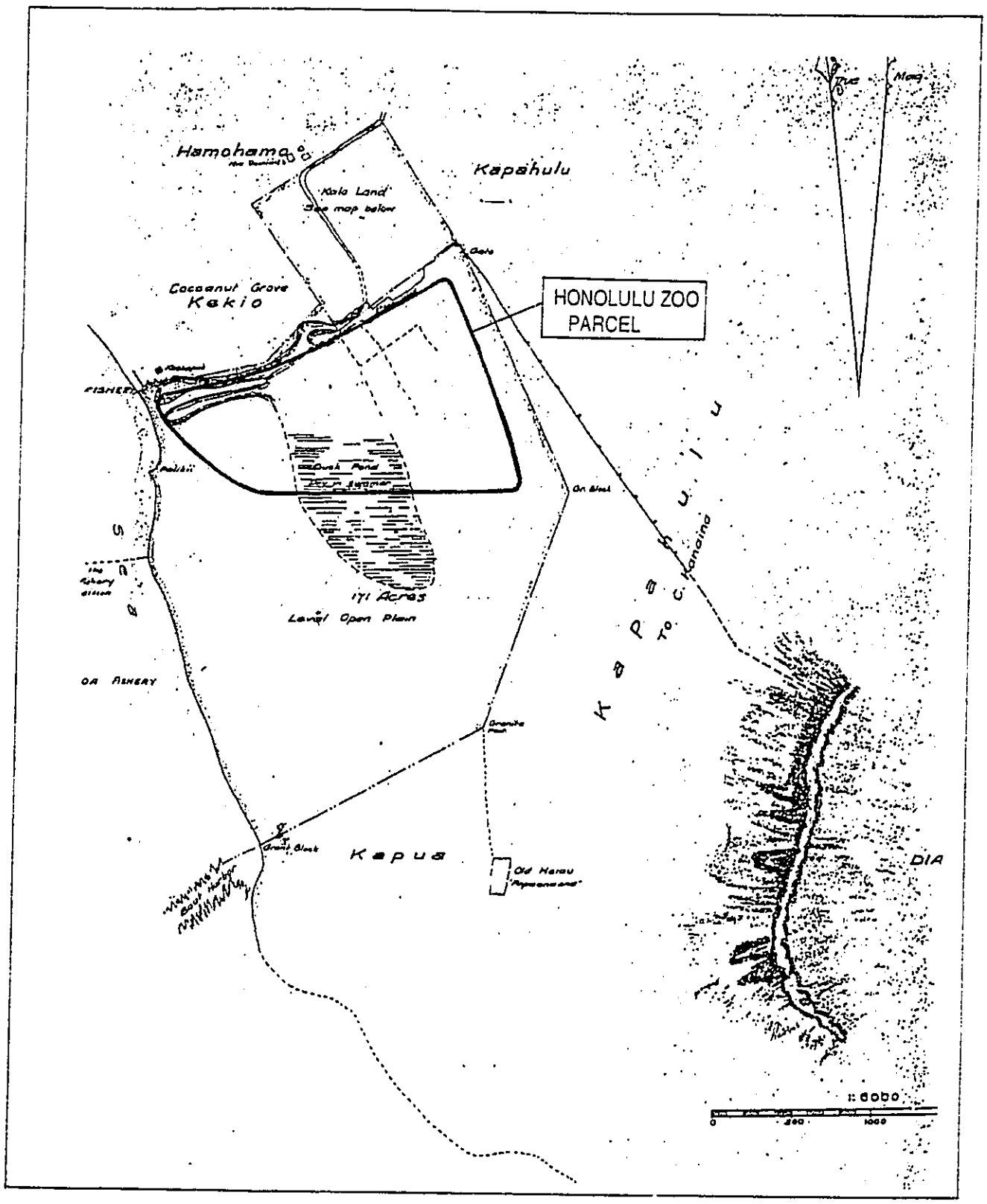


Figure 3 Portion of 1876 map by C.J. Lyons with location of present Honolulu Zoo parcel indicated (State Survey Office)

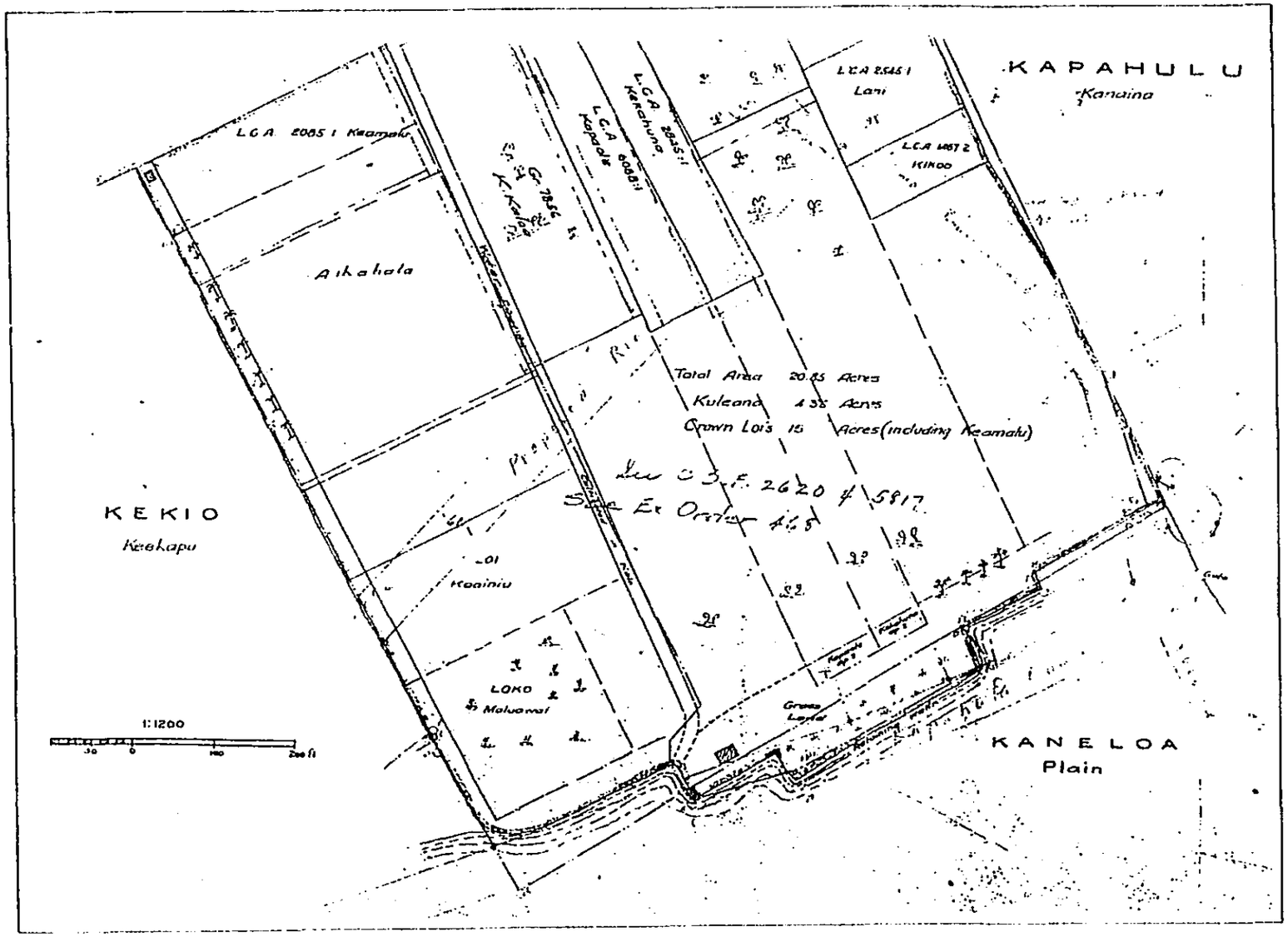


Figure 4 Inset on 1876 map by C.J. Lyons showing taro *lo'i* to north of future zoo parcel and identifying area including zoo parcel as "Kaneloa Plain" (State Survey Office)

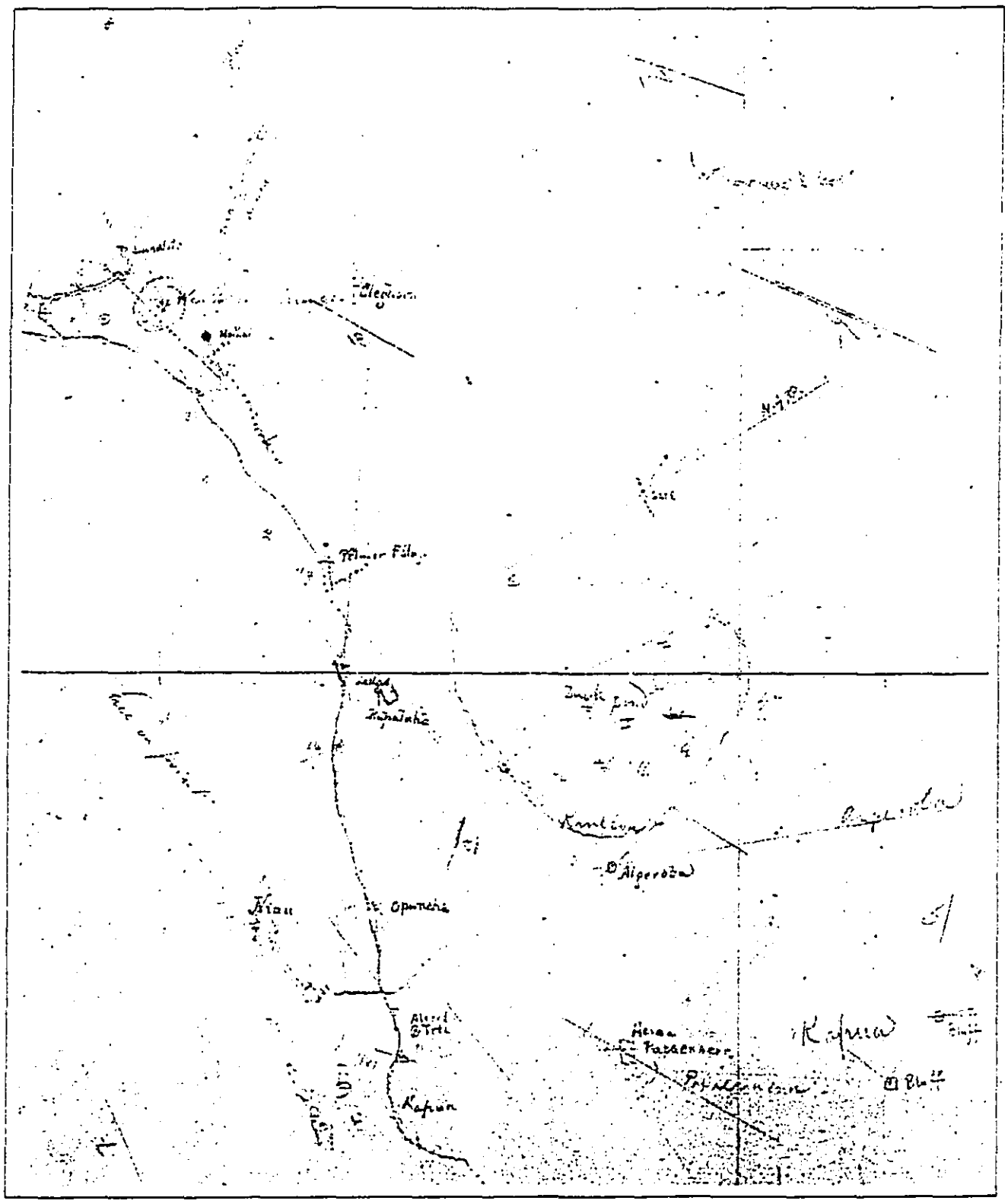


Figure 5 Undated field drawing by C.J. Lyons, apparently for 1876 map, showing locations of Kupalaha *heiau* and Papaenaena *heiau* (State Survey Office)

surfing spot of the *ali`i*. According to Samuel Kamakau:

> We all know that sharks have rows and rows of teeth, but this shark, called `Unihokahi (One-toothed), had but one tooth. He was known to Pelejoholani, Kahekili, and Kamehameha I. When the chiefs went surfing at Kapua in Waikiki, if a man was bitten by this particular shark that left a single toothmark, it was a warning that an enemy of the sea was approaching. (Kamakau 1964: 74)

Kamakau also identifies Kapua as a site where "bone-breaking wrestlers" engaged in their sport (Kamakau 1992: 72) Into the 19th century, Kapua continued to be associated with episodes of the *ali`i*. John Papa I`i recalled:

> When in 1809, Kanihonui, a nephew of Kamehameha, was put to death for committing adultery with Kaahumanu, Kaahumanu's wrath was aroused...and she considered taking the kingdom from the king by force and giving it to the young chief, Liholiho. Before she laid her plans for the war, a holiday for the purpose of surfing at Kapua in Waikiki was proclaimed, because the surf was rolling fine then. It was where one could look up directly to the heiau on Leahi, where the remains of Kanihonui were...The chiefess had heard something about her lover's remains being there, and perhaps that was why the proclamation was made.
>
> On the appointed day, chiefs , chiefesses, prominent people, and the young chief Liholiho went to Kapua...It is said that three things were done at Kapua: surfing, lamenting, and more surfing...(I`i 1959: 50-51)

I`i records that Liholiho refused to participate in the plot against Kamehameha.

The *heiau* on Leahi that I`i mentions is likely Papaenaena, the *heiau* indicated on the Lyons map. Papaenaena is one of five *heiau* identified by Thomas Thrum in the early 1900s as having been located at Diamond Head, in or near the present Kapi`olani Park:

Papaenaena — At the foot of Diamond Head slope, rear of Douglas' premises. Heiau pookanaka, 130x70 feet in size; a walled and paved structure of open terraced front, destroyed by Kanaina about 1856, the stones used to enclose Queen Emma's premises and for road work. This heiau is the supposed place of a number of sacrifices by Kam. I, at the opening of the last century...

Kupalaha — Kapiolani Park, near Cunha's.--Entirely obliterated. Class unknown, but said to have had connection in its working with Papaenaena.

Kapua — Near Kapiolani Park, opposite Camp McKinley. Heiau pookanaka. Fragments of its walls, torn down in 1860, show it to

have been about 240 feet square; said to be the place of sacrifice of Kaolohaka, a chief from Hawaii, on suspicion of being a spy.

Kamauakapu — Kapahulu. Diamond Head, 11x15.8 feet in size; erected by Kalakaua in 1888; of husbandry class for his "Naua Society" workings. Already in partial ruins.

Makahuna — Diamond Head, overlooking "Aqua Marine."--A large heiau enclosure dedicated to Kane and Kanekoa, of Kuula character, so said. (Thrum 1907: 44)

Papaenaena was still standing in the late 1820s when the missionary C.S. Stewart was on O`ahu. His account of a visit to the *heiau* provides one of the first descriptions of the southeastern portion of Waikikī, below the slopes of Diamond Head. He describes Papaenaena as:

> ...a large *heiau*, which often attracted my attention, situated about a mile above the bay and groves of Waititi, immediately under the promontory of Diamond Hill. It seems well situated for the cruel and sanguinary immolations of the heathen, standing far from every habitation, and being surrounded by a wide extent of dark lava, partially decomposed and slightly covered with an impoverished and sunburnt vegetation. It is the largest and most perfect ruin of the idolatry of the Islands I have yet seen; and was the most distinguished temple in Oahu. By a rough measurement, I made its length forty, and its breadth twenty yards. The walls of dark stone are perfectly regular and well built, about six feet high, three feet wide at the foundation, and two feet at the top. It is enclosed only on three sides, the oblong area, formed by the walls being open on the west; from this side there is a descent by three regular terraces or very broad steps, the highest having five small *koa* trees, planted upon it at regular distances from one another.
>
> ...The terraces of the heiau command a beautiful prospect of the bay and plantations of Waititi, of the plain and village of Honoruru, rendered more picturesques by the lofty embankments of Fort Hill on one side, and the tall masts of the shipping on the other, and still farther in the back ground, of the dark eminences in the vicinity of the Salt Lake, and the picturesque chain of mountains that forms the northwestern boundary of the island. The view to the east is of a perfectly different character, presenting nothing but the precipitous projections and shelvings of the indescribably rude promontory of Diamond Hill. This, on the side next the heiau, is entirely inaccessible, and though it is without a single germ of vegetation in its whole extent from top to bottom, a space of many hundred feet, is still one of the most imposing and beautiful features in the scenery of Oahu. (Stewart 1970: 298-301)

Papaenaena, as historic maps discussed below will show, was located above the present Kapi`olani Park, in the vicinity of the present public tennis court complex. If Stewart is accurate, then Kapi`olani Park and the Honolulu Zoo are located in an area that once comprised a "wide extent of dark lava" which was "far from every habitation".

Another *heiau* that Thrum describes is Kupalaha which does not appear on the Lyons map (see Figure 3 above). However, an undated field drawing by Lyons, apparently in preparation for his 1876 map, shows the locations of both Kupalaha and Papaenaena *heiau* (see Figure 5 above). Correlating Lyons field map to subsequent historic maps and to the current USGS topographic map suggests that Kupalaha *heiau* was located in the vicinity of the Honolulu Zoo parcel, on or adjacent to the present Kalākaua Avenue, just southeast of the intersection with Monsarrat Ave. It appears that Kupalaha is the *heiau* identified as "Ruins of a Morai" near the ponds on the 1825 Malden map (see Figure 2 above). The fact that Kupalaha *heiau* does not appear on Lyons formal 1876 map (while Papaenaena continues to be shown) suggests that Kupalaha may have been dismantled sometime between the date of his field map and the drawing of the formal map.

The 1876 map also shows "Kalo Land" immediately adjacent to the north of the future zoo parcel. These taro *lo'i* were claimed in Land Commission Award (LCA) documents of the mid-nineteenth century *Mahele*. An inset on the Lyons map identifies the area of Waikīkī which includes the future zoo parcel as "Kaneloa", which is further identified as a "plain" (see Figure 4 above).

The field map and the 1876 map indicate that, in the mid-1870s, the Waikīkī area below Diamond Head apparently comprised ponds, a seasonal duck pond and stands of algaroba (kiawe) on an open plain. That landscape was altered dramatically when Kapi'olani Park was created by a consortium of prominent businessmen which included Archibald Cleghorn, John O. Dominis, and James Makee. The park was dedicated on June 11, 1877 (Kamehameha Day) . Its original configuration included an open field and horse racing track, surrounded by private estates. As Robert Weyeneth notes, the original park was not intended for the general public:

> Kapi'olani Park was established by a private corporation whose stockholders were chiefly interested in developing an exclusive residential retreat. The intention was not to create a site for public recreation. For its first two decades, the park was operated by the Kapiolani Park Association...The Association was founded at a meeting on 8 November 1876, with a two-fold purpose: (1) building residences for its stockholders along the ocean at Waikiki and on the slopes of Diamond Head and (2) laying out a first-class horse-racing track as the focal point of this new suburb. (Weyeneth 1991: 4)

At the northwest end of the park - *i.e.*, the area of the present Honolulu Zoo parcel - the park association transformed the two nondescript ponds:

> To "reclaim" the marshy wetlands at the park entrance, Makee and Cleghorn proposed to create a picturesque water landscape. Through construction of a system of ditches and canals, they drained sufficient water from this portion of the park to create a collection of small islands and shallow ponds. Although the waterways were routinely criticized as stagnant breeding grounds for "limu moss," the general effect was considered agreeable. Erecting rude wooden bridges enabled visitors to meander among the islands. The largest piece of dry land created from the former swamp was called Makee Island after the first Association president, and it became a favorite spot for picnics. (Weyeneth 1991: 12)

An 1883 map of the park park layout (with the present Honolulu Zoo parcel indicated) and historic photographs show the water features created for Kapi'olani Park (Figures 6-8).

A Kapiolani Park Association report of 1890 emphasizes the formerly bare landscape which the park had replaced:

> The area comprising the present Park, before its conversion into a place of public resort, was made up of a barren waste composed mostly of drift sand and bogs or swamps. To drain and ditch the latter have been one of the most laborious undertakings which the Executive has undertaken on this property. (Executive Committee 1890: 5)

The report also suggests new attractions for the park, including the "building of an Aviary and the importation of birds, etc., for stocking same" (*Ibid.*: 6-7). This suggestion was implemented during the following century and would lead to the development of the present Honolulu Zoo.

C. The Honolulu Zoo in the 20th Century

By second decade of the 20th century, ownership of Kapi'olani Park had passed to the Territory of Hawaii which, in 1913, transferred administrative authority over the park to the City and County of Honolulu (Weyeneth 1991: 26). Although a variety of animals and birds had been imported informally onto the park grounds since the 1880s, it was only after 1913 that a more elaborate scheme was implemented:

> Building a zoo became a priority soon after the city began managing Kapi'olani Park. During 1915 and 1916, acquisition of animals and the construction of cages and bird houses established a "zoological garden." So delighted were officials that they filled the park report for 1916 with photographs of animals and added a detailed list of new park acquisitions that included two lions, twelve monkeys, two bears, one tortoise, four elk, four deer, twelve horses, seven donkeys, forty-six ducks, ten geese, four swans, two cranes two emus, assorted Australian doves, and an African elephant. (Weyeneth 1991: 28)

Apparently the cages for the animals were set among the islands and pathways at the northwest end of the park. A 1920 map - with the outline of the present zoo parcel indicated - shows this portion of the park to contain the network of islands, ponds, and roadways, along with stables, a kiosk, and the park superintendent's house (Figure 9). A photograph of the 1920s shows some of the zoo's animal cages and houses, linked by a roadway (Figure 10). A portion of the roadway is embanked, suggesting that the terrain slopes down to one of the park's ponds, just outside of the photograph.

The park's ponds may have been dry when the photograph was taken. The construction of the Ala Wai Canal, begun in 1921 and completed eight years later - was the key component of the Waikiki Reclamation Project, aimed at draining and filling the wetlands of Waikiki. In Kapi'olani Park, all the ponds were drained and subsequently filled in with dredged material from the canal.

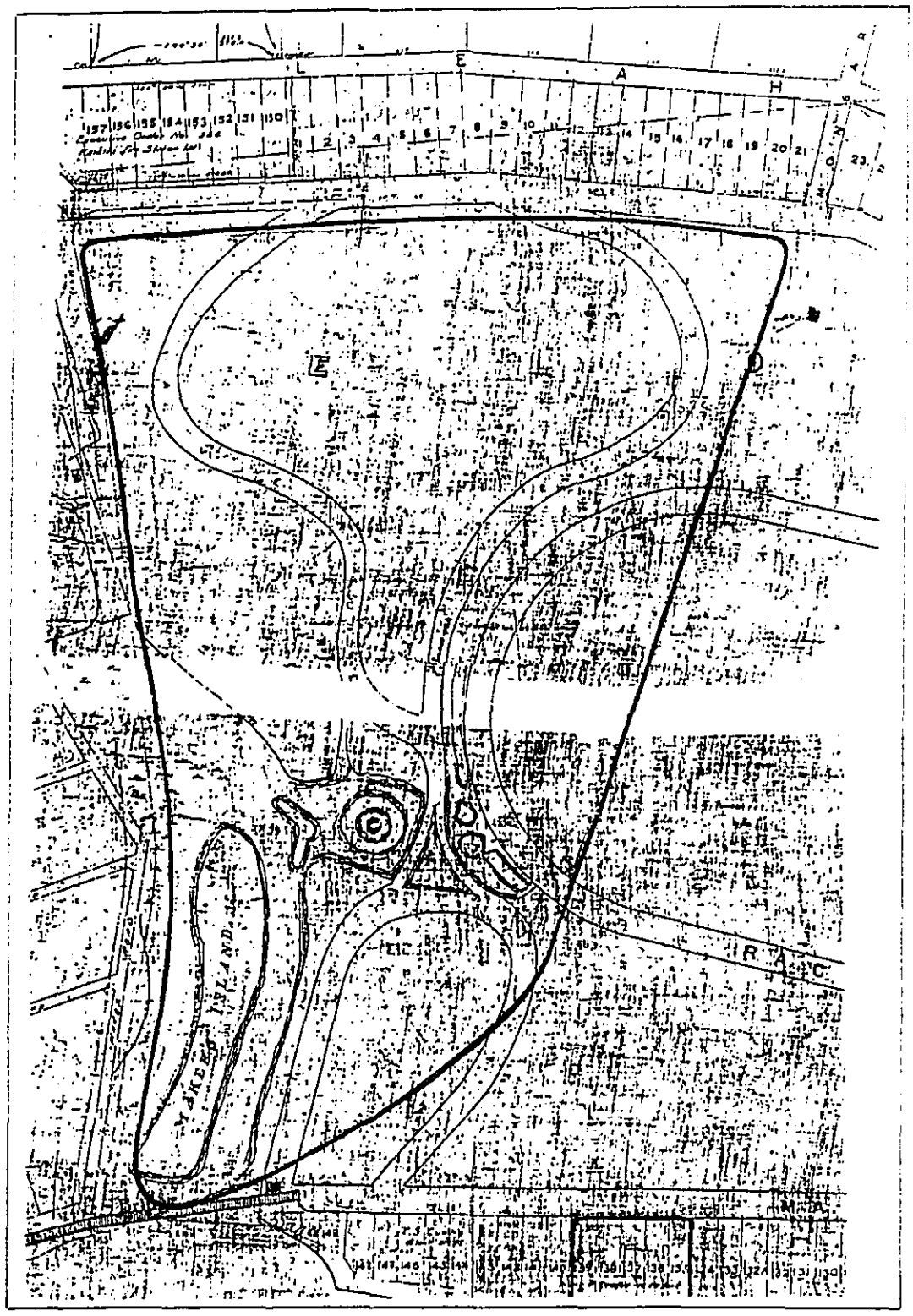


Figure 6 Portion of 1883 map of Kapi`olani Park, surveyed by J.F. Brown and M.D. Monsarrat, with location of present Honolulu Zoo parcel indicated (State Survey Office)

Figure 7 Makee Island and pond, *ca.* 1900, near intersection of future Kapahulu Ave. (left) and Kalākaua Ave. (right) (Bishop Museum Archives)

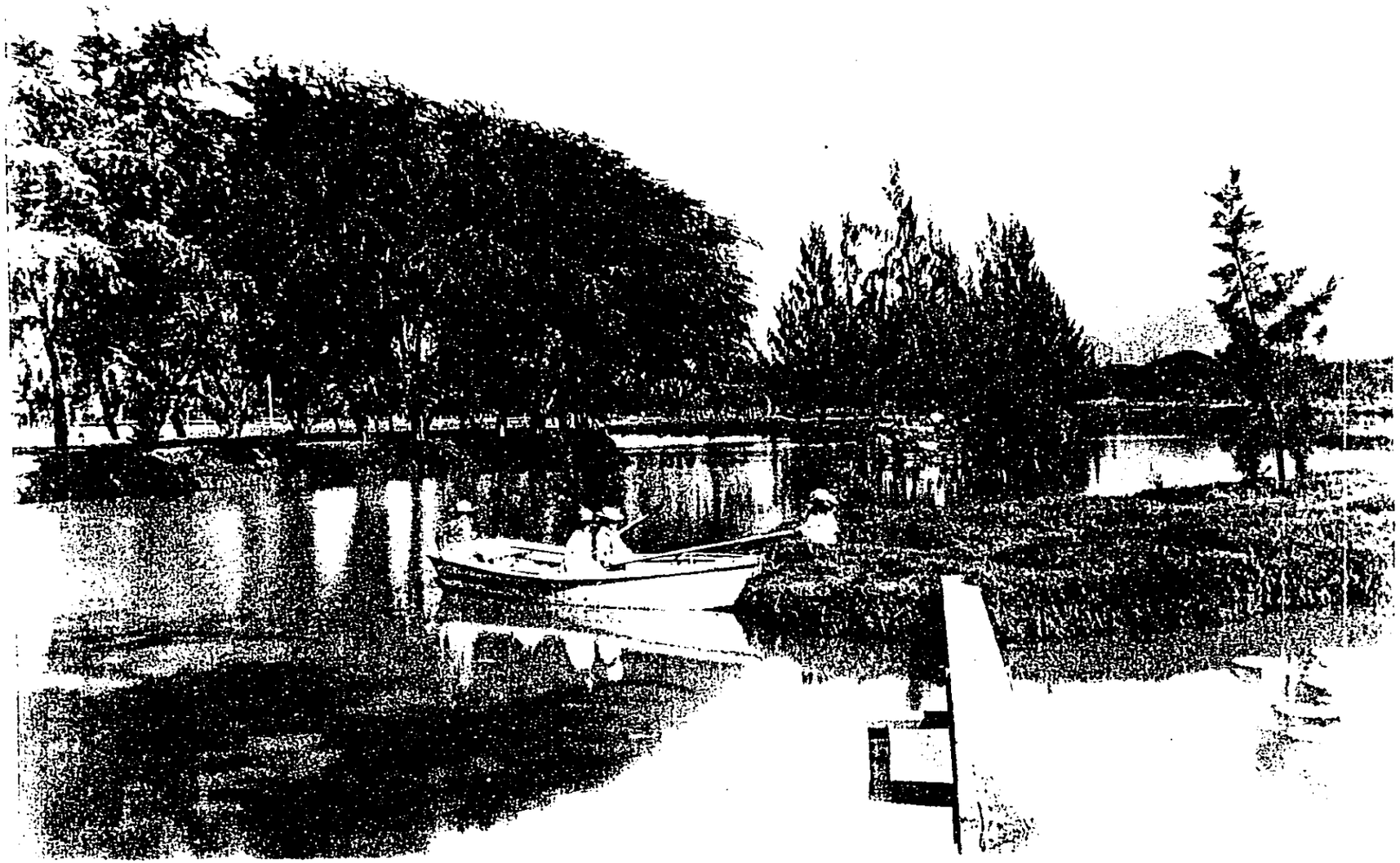


Figure 8 Kapi'olani Park waterscape, *ca.* 1895 (Bishop Museum Archives)

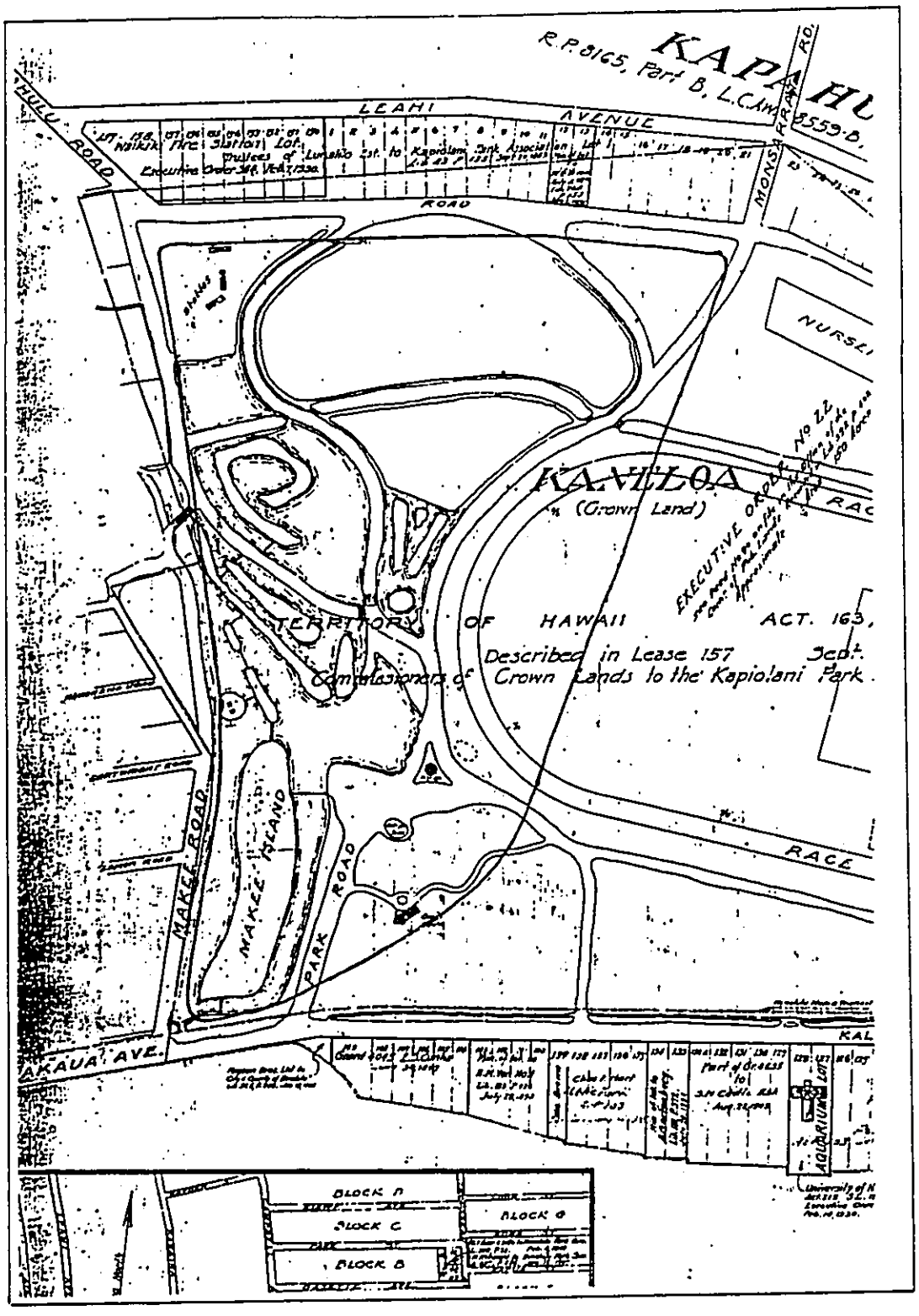


Figure 9 Portion of 1920 map by M.D. Monsarrat of Kapi`olani Park with future zoo parcel indicated (Hawai`i State Survey Office)

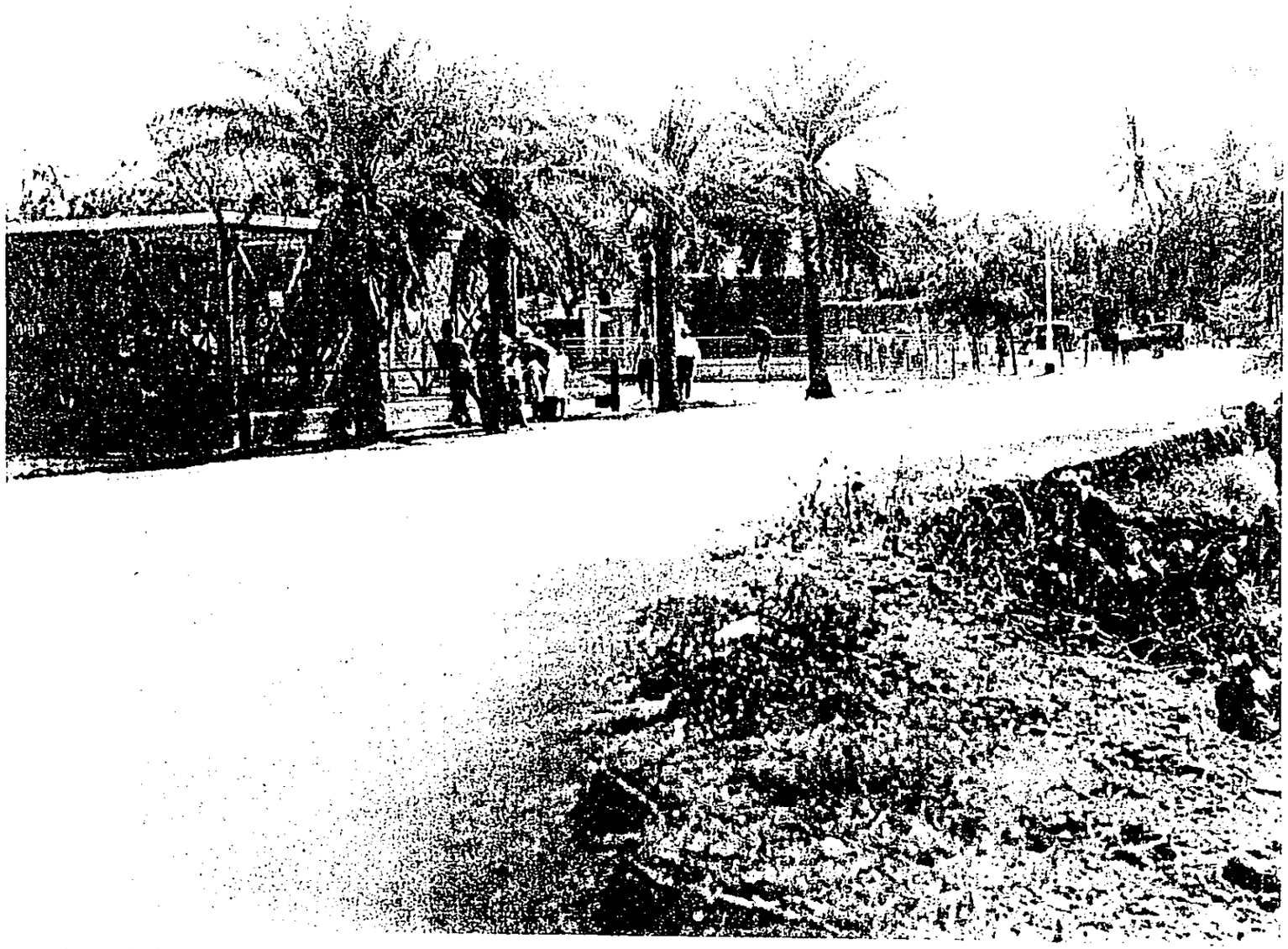


Figure 16 Animal cages and houses along roadway in zoo area of Kapi'olani Park, *ca.* 1920s (U.S. Army Museum-Hawai'i)

CORRECTION

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

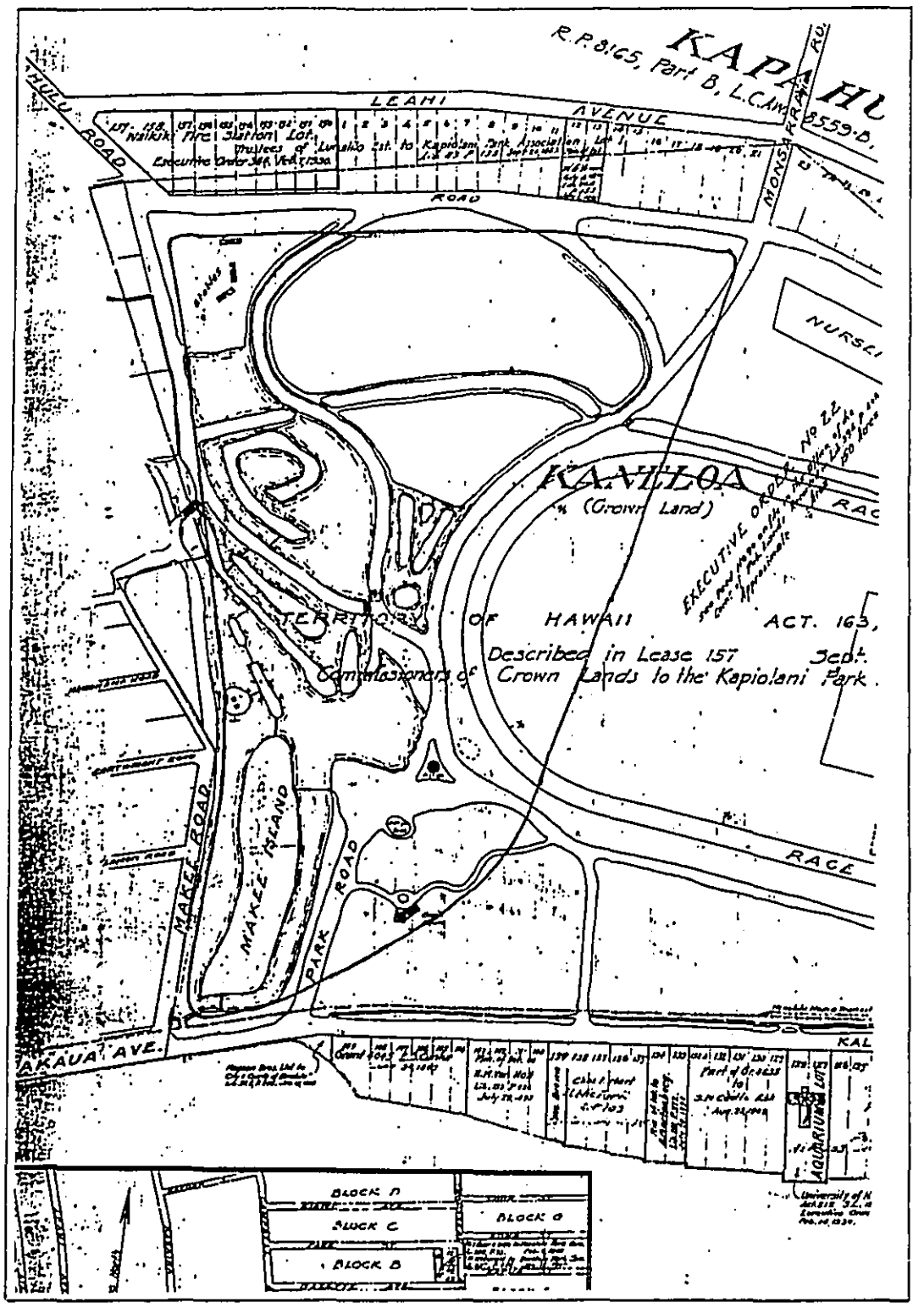


Figure 9 Portion of 1920 map by M.D. Monsarrat of Kapi`olani Park with future zoo parcel indicated (Hawai`i State Survey Office)

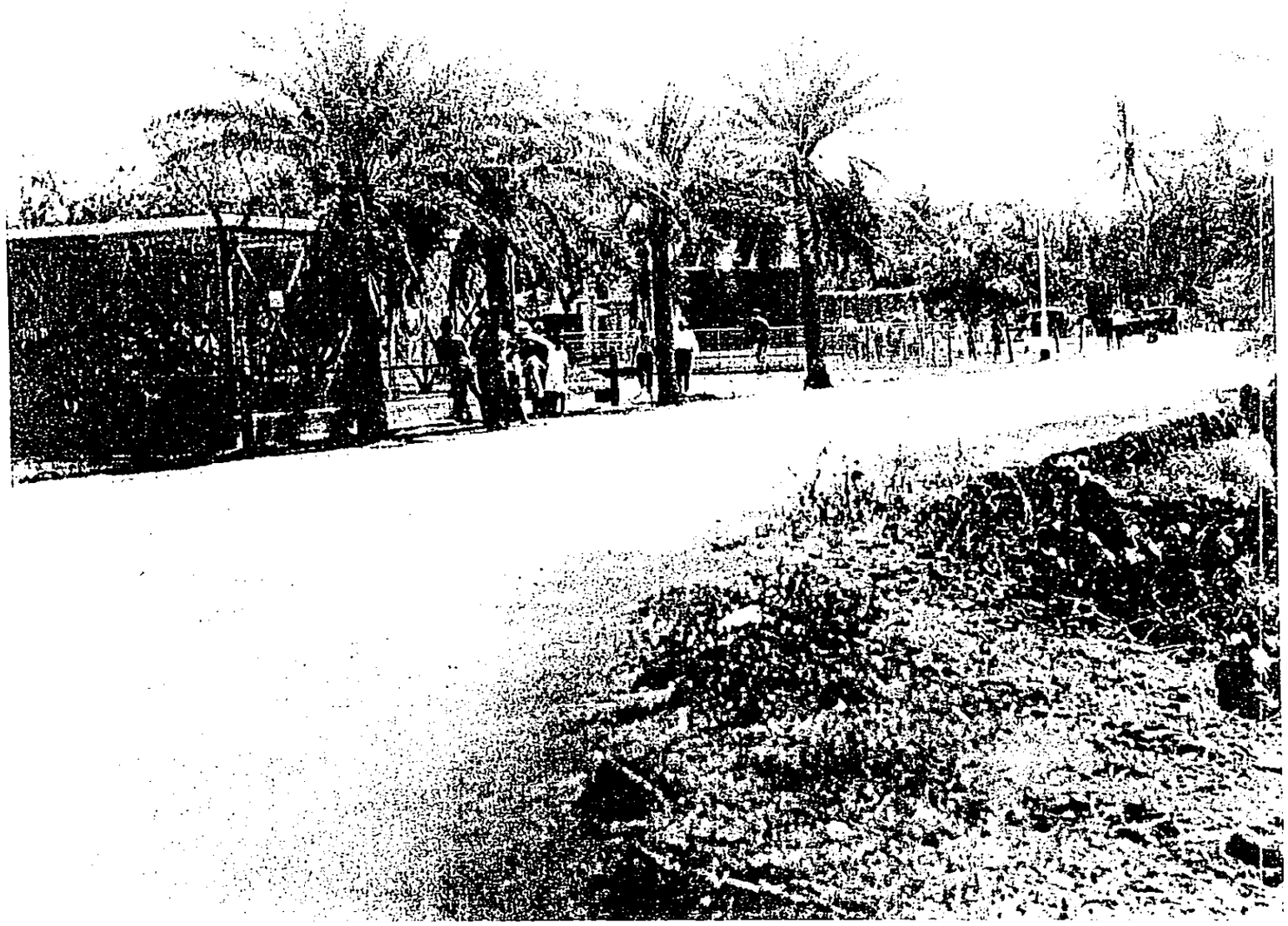


Figure 10 Animal cages and houses along roadway in zoo area of Kapi`olani Park, *ca.* 1920s (U.S. Army Museum-Hawai`i)

It was only after World War II, in 1948, that the City and County of Honolulu began construction of a modern zoo facility on the drained and filled former watercape:

> The present forty-two acre setting between Kapahulu and Monsarrat Avenues was fenced, and construction began on enclosures for an elephant, a camel, and two chimpanzees donated the previous year. The ambitious plans of the 1940s called for a collection of exotic animals living in settings designed to seem more "natural" than the cages of the first zoo. (Weyeneth 1991: 29)

According to information provided by Paul Breese, former zoo director, and current zoo personnel, the only current zoo structures that date to the 1940s or earlier are some bird cages. All of them, however, have been extensively improved and modified over the years.

Kapi'olani Park was placed on the Hawai'i Register of Historic Places on July 17, 1992. The Honolulu Zoo is within the Kapi'olani Park historic boundary.

III. PREVIOUS ARCHAEOLOGICAL RESEARCH IN WAIKĪKĪ

The *ahupua'a* of Waikīkī, in the centuries before the arrival of Europeans, was a well-used locale, with abundant natural and cultivated resources, that supported a large population. In the nineteenth century, after a period of depopulation, Waikīkī was reanimated by Hawaiians and foreigners residing there, and by farmers continuing to work the irrigated field system which had been converted from taro to rice. Farming continued up to the first decades of this century until the Ala Wai Canal drained the remaining ponds and irrigated fields. Remnants of the pre-contact and historical occupation of Waikīkī have been discovered and recorded in archaeological reports, usually in connection with construction activities related to urban development, or infrastructural improvements. These discoveries, which have occurred throughout Waikīkī, have included many human burials, traditional Hawaiian and historic, as well as pre-contact Hawaiian and historic cultural deposits.

N.B. Emerson reported on the uncovering of human burials during the summer of 1901 on the property of James B. Castle - site of the present Elks Club - in Waikiki during excavations for the laying of sewer pipes (Emerson 1902:18-20). Emerson noted:

> The soil was white coral sand mixed with coarse coral debris and sea-shells together with a slight admixture of red earth and perhaps an occasional trace of charcoal. The ground had been trenched to a depth of five or six feet, at about which level a large number of human bones were met with, mostly placed in separate groups apart from each other, as if each group formed the bones of a single skeleton. Many of the skulls and larger bones had been removed by the workmen before my arrival, especially the more perfect ones. (Emerson 1902:18)

Emerson's report on the find describes the remains of at least four individuals, all presumed to be Hawaiian. Associated burial goods were also exposed during excavation; these included "a number of conical beads of whale-teeth such as the Hawaiians formerly made" and "a number of round glass beads of large size". The glass beads "can be assigned with certainty to some date subsequent to the arrival of the white man" (Emerson 1902:19). Also located with the beads was "a small sized niho-palaoa, such as was generally appropriated to the use of the chiefs" which had been "carved from the tooh of the sperm-whale" and which was "evidently of great age" (Emerson 1902:19).

In the 1920s and 30s the first systematic archaeological survey of O'ahu was conducted by J. C. McAllister (1933). He recorded four *heiau*, three of which were located at the mauka reaches of Waikīkī *ahupua'a* in lower Mānoa Valley. The fourth *heiau* - Papa'ena'ena - was located at the foot of Diamond Head crater in the environs of the present Hawai'i School for Girls. Papa'ena'ena *heiau* is traditionally associated with Kamehameha I who was said to have visited the *heiau* before setting off to battle for Ni'ihau and Kaua'i in 1804. Five years later, according to John Papa 'Ī'ī , Kamehameha placed at Papa'ena'ena the remains of an adulterer - "all prepared in the customary manner of that time" (Ī'ī 1959:50-51).

In 1961, a human burial and a nineteenth century trash pit were unearthed during construction on Saratoga Road adjacent to Fort DeRussy.

In 1963, two human skulls and other human remains were discovered in a construction trench at 2431 Prince Edward St. (Bishop Museum site Oa-A4-23, cited in Neller, 1984).

In 1963 a major burials discovery was made at the site of the Outrigger Canoe Club, then under construction. As reported in a newspaper article:

> The Outrigger Canoe Club yesterday dedicated its new site [on land adjacent to and leased from the Elks Club], an ancient Hawaiian burial ground in Waikiki...
>
> Robert Bowen of the Bishop Museum has been working closely with Ernest Souza, Hawaiian Dredging superintendent, on the removal of skeletons unearthed on the site, between the Colony Surf and the Elks Club...
>
> Most of the bodies were buried in the traditional hoolewa position, with the legs bound tightly against the chest.
>
> One of the skeletons, Bowen said, shows evidence of a successful amputation of the lower forearm, indicating that the Hawaiians knew this kind of operation before the arrival of Europeans.
>
> The ages of the skeletons ranged from children to 40-year-old men and women. The average life span of the Hawaiians at the time was about 32 years. (Honolulu Star-Bulletin; 24 January 1963: 1A)

A total of 27 burials was encountered (Yost 1971: 28). Apparently, no formal archaeological report on the burials was produced.

In 1964, sand dune burials, a traditional Hawaiian mortuary practice, were revealed as beach sand eroded fronting the Surfrider Hotel.

In 1976, during construction of the Hale Koa Hotel, adjacent to the Hilton Hawaiian Village Hotel, six burials were unearthed, five of apparent prehistoric or early historic age, and one of more recent date.

In 1980, three burials were exposed at the Hilton Hawaiian Village during construction of the hotel's Tapa Tower. Earl Neller of the (then named) State Historic Preservation Program was called in upon discovery of the burials and conducted fieldwork limited to three brief inspection of the project area. Neller's (1980) report noted:

> The bones from three Hawaiian burials were partially recovered; one belonged to a young adult male, on a young adult female, and one was represented by a single bone. An old map showed that rapid shoreline accretion had occurred in the area during the 1800s, and that the beach in the construction area was not very old. It is possible the burials date back to the smallpox epidemic of 1853. It is likely that burials will continue to be found

> in the area. It is also possible that early Hawaiian sites exist farther inland, beneath Mō`ili`ili, adjacent to where the shoreline would have been 1000 years ago. (Neller 1980:5)

Neller also documented the presence of trash pits, including one from the 1890s which contained "a large percentage of luxury items, including porcelain tablewares imported from China, Japan, the United States, and Europe" (*ibid*:5). He further notes:

> It is suspected that other important historic archaeological sites exist in the highly developed concrete jungle of Waikīkī, with discrete, dateable trash deposits related to the different ethnic and social groups that occupied Waikīkī over the last 200 years. (*ibid*:5)

Between December 1981 and February 1982, archaeologists from the Bishop Museum led by Bertell Davis conducted a program of excavations and monitoring during construction of the new Halekūlani Hotel (Davis 1984). Six human burials were recovered along with "animal burials [and] cultural refuse from prehistoric Hawaiian firepits, and a large collection of bottles, ceramics, and other materials from trash pits and privies dating to the late 19th century" (*ibid.*:i). Age analysis of volcanic glass recovered from the site led Davis to conclude: "For the first time we can now empirically date...settlement in Waikīkī to no later than the mid-1600s" (*ibid.*:i). Just as significant to Davis was the collection of historic era material at the Halekūlani site; he states:

> [The] Halekūlani excavations clearly demonstrate...that there is a definite need to consider historic-period archaeology as a legitimate avenue of inquiry in Hawaiian research. Furthermore, archaeology in the urban context can yield results every bit as significant as in less developed areas. Development in the 19th and early 20th centuries clearly has not destroyed all archaeological resources in Waikīkī, Honolulu, or in any of the other urbanized areas of Hawai`i. (*ibid.*:i)

In 1983, at the Lili`uokalani Gardens condominium construction site, seven traditional Hawaiian burials were recovered (Neller, 1984). This had been the site of a bungalow owned by Queen Lili`uokalani at the end of the 19th century. In addition to the burials, the site contained plentiful historic artifacts, and a pre-historic cultural layer pre-dating the burials.

In 1985, International Archaeological Research Institute, Inc. performed archaeological monitoring and data recovery at the Pacific Beach Hotel Office Annex (Beardsley and Kaschko 1997). Two traditional Hawaiian burials were discovered and removed. Intact buried traditional Hawaiian cultural deposits, including a late pre-contact habitation layer, contained pits, firepits, post molds, artifacts, and food debris. The artifacts included basalt and volcanic glass flakes and cores, a basalt adze and adze fragments, worked pearl shells, a coral file and abraders, and a pearl shell fishhook fragment. Additionally, a late nineteenth century trash pit was discovered, which contained a variety of ceramics, bottles, and other materials.

During 1985 and 1986 archaeologists from Paul H. Rosendahl, Ph. D. Inc. conducted archaeological monitoring at the site of the Mechanical Loop Project at the Hilton Hawaiian Village,

Waikīkī. Much of this project area was disturbed by historic and modern construction and modification. Fifteen subsurface features were uncovered during the monitoring all of which were determined to be historic trash pits or trenches. The dating of these features was based on dating the artifactual material they contained. All 15 features are thought to post-date 1881 based on this artifact analysis. The 3 partial burials reported by Neller (1980) were found within this project area (see above). No further burials were encountered during the PHRI field work (Hurlbert, et. al. 1992).

In 1987, a human burial was discovered and removed at the intersection of Kalākaua Ave. and Ka'iulani St. during excavations for a gas pipe fronting the Moana Hotel (Griffin, 1987).

In1988 the Moana Hotel Historical Rehabilitation Project (Simmons et. al. 1991) encountered human remains that amounted to at least 17 individuals. Based on stratigraphic association these burials were interred over time as the land form at the site changed. The sediment surrounding these burials yielded traditional midden and artifact assemblages. The burials and human remains were found in the Banyan Court and beneath the hotel itself.

In 1989 skeletal remains were unearthed on the grounds of the Ala Wai Golf Course during digging of an electrical line trench for a new sprinkler system. The trench had exposed a pit containing two burials (Bath and Kawachi 1989: 2). The report suggests that one of the burials may have been disturbed earlier during grading for the Territorial Fair Grounds. The osteological analysis included in the report concludes that both sets of remains "appear ancient." (*Ibid.*:2)

Davis' (1989, 1991) excavation and monitoring work at Fort DeRussy documented substantial subsurface archaeological deposits--prehistoric, historic, and modern. These deposits included buried fishpond sediments, *'auwai* sediments, midden and artifact enriched sediments, structural remains such as post holes and fire pits, historic trash pits, and a human burial. Davis' (1991) report documents human activity in the Fort DeRussy beach front area from the 16th century to the present.

The work at Fort DeRussy continued in 1992 when BioSystems researchers built upon Davis' work (Simmons 1995). BioSystems research documents the development and expansion of the fishpond and *'auwai* (ditch) system in this area. (The *'auwai* system was entered on the State Inventory of Historic Places (SHIP) as State Site 50-80-14-4970. As indicated on the 1881 map by S. E. Bishop discussed above (see Figure 4), this *'auwai* enters the Ft. DeRussy grounds through the present project area.) Remains of the fishpond and *'auwai* deposits, as well as habitation deposits were documented below modern fill deposits. This research, along with that of Davis (1991) clearly demonstrates that historical document research can be an effective guide to locating late prehistoric/early historic subsurface deposits, even amidst the development of Waikīkī.

The realignment of Kālia Road at Fort DeRussy in 1993 uncovered approximately 40 human burials. A large majority of these remains were recovered in a large communal burial feature (Carlson *et. al.* 1994). The monitoring and excavations associated with this realignment uncovered a cultural enriched layer which contained post holes.

In 1993, during construction activities at the Waikīkī Aquarium, directly adjacent to the present project area, fragmentary human remains were discovered scattered in a back dirt pile, although no burial pit was identified (Dega and Kennedy, 1993).

On April 28, 1994 an inadvertent burial discovery was made during excavation for a water line at the intersection of Kalākaua Ave. and Kuamo'o St. (just *mauka* of Ft. DeRussy). These remains represented a single individual (McMahon 1994).

In 1995, the remains of one individual were discovered in situ during construction activities on Paoakalani Street, fronting the Waikīkī Sunset Hotel (Jourdane, 1995).

In 1996 Pacific Legacy, Inc. conducted an archaeological inventory survey of the block bounded by Kalākaua Ave., Kūhiō Ave., 'Olohana St., and Kālaimoku St. (Cleghorn 1996). The survey included excavation of seven backhoe trenches. The subsurface testing indicated that

> ...this area was extremely wet and probably marshy. This type of environment was not conducive for traditional economic practices...The current project area appears to have been unused because it was too wet and marshy. Several peat deposits, containing the preserved remains of organic plant materials were discovered and sampled. These deposits have the potential to add to our knowledge of the paleoenvironment of the area. (Cleghorn 1996:15)

The report concluded that no further archaeological investigations of the parcel were warranted since "no potentially significant traditional sites or deposits were found" but cautioned of the "possibility, however remote in this instance, that human burials may be encountered during large scale excavations" (*Ibid.*:15).

In 1996, a traditional Hawaiian burial was discovered and left in place during test excavations on two lots at Liliu'okalani Ave. and Tusitala Street (McDermott *et al.*, 1996). Indigenous Hawaiian artifacts and historic artifacts were also found within the project area.

In 1997, during archaeological monitoring for the ongoing Waikīkī Force Main Replacement project, scattered human bones were encountered on 'Ōhua St.. These included the proximal end and mid-shaft of a human tibia, a patella, and the distal end and mid-shaft of a femur. These remains occurred within a coralline sand matrix which had been heavily disturbed by previous construction, and by the on-going construction project. No precise location for the original burial site was identified.

In April 1999 two human burials were inadvertently encountered near the intersection of Ena Road and Kalākaua Avenue during excavation activities for the first phase of the Waikīkī anti-crime lighting improvements project. A report on these findings by Cultural Surveys Hawai'i is presently in the SHPD review process.

By February of 2000, at least forty human burials with associated cultural deposits have been exposed during excavation for a waterline project on Kalākaua Avenue along Kuhio Beach between the

Moana Hotel and Ohua Avenue. This project is ongoing at the present time (March 2000) and a full report by Cultural Surveys Hawai'i is to be accomplished after the project's completion.

In summary, past archaeological research, from the beginning of the 20th century to the present has produced evidence that traditional Hawaiian cultural deposits, historic trash deposits, and, most notably, human burials, do exist throughout the breadth of the Waikīkī area.

IV. SOIL PROFILE STUDY

A. Introduction

Part of the scope of work for this assessment involved an examination of available soil profiles in the vicinity of the zoo. As originally envisaged this was to focus on data from geological soil borings but more detailed records were available from archaeological studies. Detailed soil profiles were evaluated for four locations around the periphery of the zoo (Figure 11). Three of these soil profiles (discussed under the nomenclature: Jacking Pit #3, Receiving Pit #4 and Jacking Pit #4) were compiled by Cultural Surveys Hawai'i archaeologists working on the "Public Baths Waste Water Pumping Station Force Main Replacement" project along Kalākaua Avenue. The fourth profile (discussed under the heading Bandstand profile #1) was compiled during recent archaeological monitoring by Cultural Surveys Hawaii of the Waikīkī Bandstand improvements in the Kapi'olani Park parking lot on Monsarrat Ave. These four soil profiles are presented and discussed further below.

B. Jacking Pit #3

Jacking Pit #3 was located on the inland (*mauka*) side of Kalākaua Avenue, just south of its intersection with Monsarrat Avenue. The stratigraphy (Figure 12) consisted of asphalt and a gravel road bed overlying an intact old "A" horizon, which overlayed a 70 cm thick layer of sterile beach sand. Underlying the beach sand was a layer of cemented sand. Grey gleyed sand occurred at the water level below the cemented layer. Originating in, and contemporaneous with the old "A" horizon, a pit feature was observed in the west (*makai*) face of the trench. It was circular with a maximum diameter of approximately 40 cm. It intruded into the beach sand layer 20 cm, to a maximum depth of 70 cmbs. The base of the feature contained a black charcoal stained sand concentration, the probable remains of a fire pit, though no amount of charcoal adequate for dating analysis was possible to collect. The pit had been backfilled with old "A" horizon material. No other cultural material was present.

C. Receiving Pit #4

Receiving pit #4 was located in a triangular grassy area bounded by the fork of Kalākaua and Monsarrat Avenues. The stratigraphy (Fig 13) consisted of grass and dark reddish brown topsoil overlying an old asphalt and gravel road surface. Directly underlying the old road surface was a thin layer of beach sand. It is unclear whether this sand was used as fill or was from a natural storm surge. Underlying this sand layer, dark sandy charcoal stained old "A" horizon was present, which contained plentiful coral rubble and sparse, diffuse charcoal flecking. No concentration of charcoal was present adequate for collection. Underlying the old "A" horizon was an 80 cm thick layer of sterile beach sand, which itself overlayed a layer of cemented sand. Grey gleyed sand underlay the cemented layer at the was level.

D. Jacking Pit #4

Jacking Pit #4 was located directly inland (*mauka*) of Kalākaua Avenue at the south side of its intersection with Kapahulu Avenue. It was excavated in a grassy area directly adjacent to the small visitor center kiosk. The stratigraphy (Figure 14) consisted of grass and dark reddish brown topsoil overlying an old asphalt road surface. The old road surface overlayed an 80 cm thick dark reddish brown fill layer, contained plentiful gravel. No sterile beach sand layer was observed, rather the thick fill layer

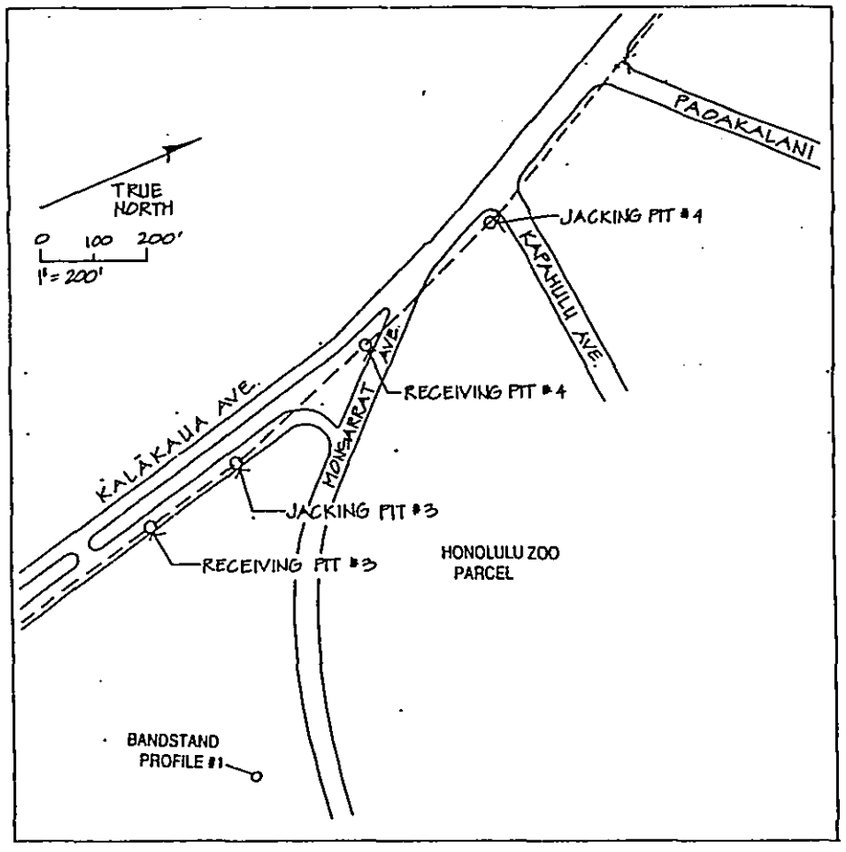
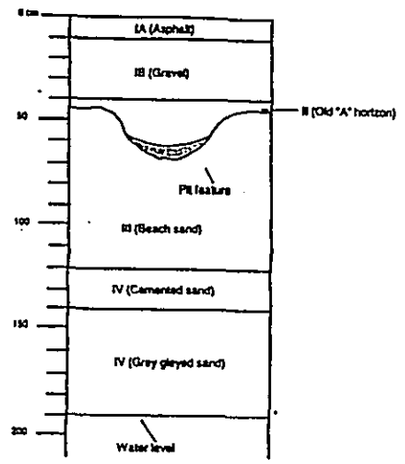
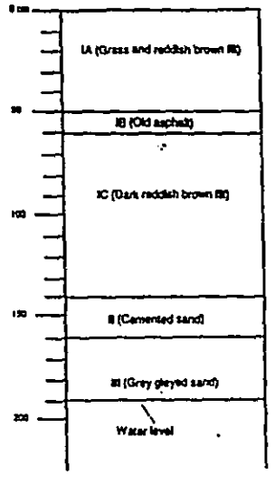


Figure 11 Locations of four profiled excavations in vicinity of the Honolulu Zoo



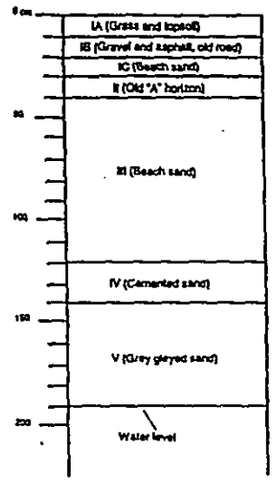
Stratum	Depth (cm.)	Description
IA	0-10	Asphalt
IB	10-40	Gravel fill
II	40-45	10YR 3/2 very dark grayish brown, fine to medium silty sand, non- coherent, with coral debris. Old "A" horizon with diffuse charcoal flecking and pit feature extending to a depth of 70 cmbs intruding into Stratum III. Pit filled with Stratum II material, with black charcoal stained concentration at base.
III	45-120	10YR 6/6 light brownish yellow, fine to medium calcareous beach sand, non-coherent, with coral debris.
IV	120-140	10YR 8/2 white, cemented calcareous beach sand
V	140-BOE	5Y 5/1 grey gleyed sand. Water table at 190 cmbs

Figure 12 Jacking Pit #3, one-meter profile, west (*makai*) face, showing old "A" Horizon and fire pit feature



Stratum	Depth (cm.)	Description
IA	0-50	Grass on top of 5YR 3/4 dark reddish brown fill
IB	50-60	Old asphalt road surface
IC	60-140	5YR 3/4 dark reddish brown fill with gravel
II	140-160	10YR 8/2 white, cemented calcareous beach sand
III	160-BOE	5Y 5/1 grey gleyed sand. Water table at 190 cmbs

Figure 13 Jacking pit #4, one-meter profile, west (*makai*) profile, showing old road surface



Stratum	Depth (cm.)	Description
IA	0-10	Grass on topsoil, 5YR 3/4 dark reddish brown fill
IB	10-20	Gravel fill, asphalt - probable old road
IC	20-30	10YR 6/6 light brownish yellow, fine to medium calcareous beach sand, non-coherent, with coral debris. Unclear whether naturally or artificially deposited.
ID	30-40	10YR 3/2 very dark grayish brown, fine to medium calcareous beach sand, non-coherent, with coral debris. Old "A" horizon.
II	40-120	10YR 6/6 light brownish yellow, fine to medium calcareous beach sand, non-coherent, with coral debris
III	120-140	10YR 8/2 white, cemented calcareous beach sand
IV	140-BOE	5Y 5/1 grey gleyed sand. Water table at 190 cmbs

Figure 14 Receiving pit #4, one-meter profile, south face, showing old road surface and old "A" Horizon

directly overlayed a layer of cemented sand. Grey gleyed sand occurred at the water level. No old "A" horizon or cultural materials were present.

E. Bandstand Profile #1

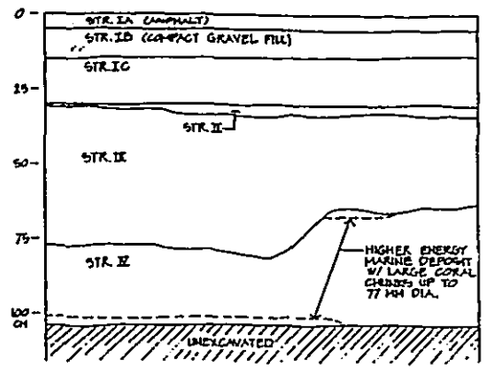
Archaeological monitoring was conducted by Cultural Surveys Hawai'i on two days (March 30 and 31, 2000) in the southeast (*makai*) Diamond Head) portion of the Kapiolani Park public parking lot on Monsarrat Avenue. The stratigraphy (Figure 15) consisted of four designated strata. Stratum IA, IB, and IC designate the asphalt and associated fill layer of the parking lot. Stratum II, encountered at 30 cm below surface, was understood as a well-developed dark grayish brown "A"-horizon with some charcoal flecking indicative of a stable ground surface with probable cultural activity in the vicinity. Charcoal concentrations were observed in the immediate vicinity at a depth of 36 to 50 cm below surface. A large fragment of an unadorned basalt vessel with a carved knob handle was recovered in the immediate vicinity from the top of the sand layer. While this basalt vessel may have been a utilitarian domestic implement, the extent of the carving and the presence of a handle suggests possible ritual importance.

F. Conclusions

The evidence suggests that the vicinity of Jacking Pit # 4 at the corner of Kapahulu and Kalākaua has little potential for encountering significant cultural deposits. Thick reddish brown fill deposits directly overly cemented sand and grey gleyed sand suggesting that if a stable soil surface ever existed in this area that it was destroyed during filling and grading activities decades ago.

On the other hand, the profiles from Receiving Pit #4, Jacking Pit #3 and the Monsarrat Avenue parking lot area indicate the presence of an old "A" horizon at a depth of 30-45 cm. below surface with charcoal staining. This suggests a stable soil surface with signs of human activity. A probable fire pit was identified at Jacking Pit # 3 and the recovery of a very unusual artifact from the parking lot indicate substantial cultural activity in this area.

This data supports our conclusion from historic maps that the intersection of Kapahulu and Kalākaua has little potential for encountering significant cultural deposits but that this potential increases significantly Diamond Head of the Kalākaua/Monsarrat Avenue intersection. How far *mauka* this old "A" horizon with signs of cultural use continues, and whether it extends as far *mauka* as the Honolulu Zoo is uncertain.



North Wall Profile: Length 2.15m (max); Width: 1.9m (max); Depth: 1.05m (max)

Profile Description

Strata	Depth (cmbs)	Description
Stratum IA	0-5	Asphalt
Stratum IB	5-13	Compact gravel fill
Stratum IC	13-30	10YR 3/3 dark brown, cemented sandy clay loam, coarse grained. Contains basalt gravel, coral rubble, and some roots/rootlets. Lower boundary abrupt/smooth.
Stratum II	30-33	10YR 3/2 very dark grayish brown, cemented former A-Horizon, structureless, coarse sand. Few roots or rootlets and some charcoal flecking. Lower boundary gradual/wavy.
Stratum III	33-64	10YR 6/4 light yellowish brown, medium calcareous structureless sand with large (up to 50mm in dia.) gravel. No roots or rootlets. No cultural material. Lower boundary abrupt/ smooth.
Stratum IV	64-BOE	10YR 8/4 very pale brown, slightly compact, coarse calcareous structureless beach sand. No roots or rootlets. No cultural material. Lower boundary is below BOE (Base of Excavation.)

Figure 15 Bandstand profile #1

V. SUMMARY AND RECOMMENDATIONS

A. Summary

Historical research indicates that the present Honolulu Zoo parcel is situated on former marshlands that included two ponds divided by a sand spit. This marshy area may have demarcated the northwest bounds of a generally less-populated and less-cultivated area of Waikīkī between the base of Diamond Head and the ocean. Extending to the northwest beyond the ponds were the expansive agricultural fields and abundant population that otherwise characterized pre-contact Wakīkī.

The southeast end of Waikīkī below Diamond Head appears to have been a focus of *ali'i* activity - e.g., Kapua (the area of the present Outrigger Canoe Club) was an *ali'i* gathering place, sport site, and, offshore, surfing spot. Additionally, at least five *heiau* were located in the vicinity of the present Kapi`olani Park. Cultural Surveys Hawaii's research also suggests that one of these *heiau*, Kupalaha, may have been located near the zoo parcel, in the vicinity of the intersection of Monsarrat Avenue and Kalākaua Avenue.

The area including and surrounding the future zoo parcel appears to have remained undeveloped until the late 1870s when a consortium of businessmen created Kapiolani Park, most of which consisted of a horse racing track. Created at the `ewa (northwest) end of the park was a complex of ponds, islands - including "Makee Island" - and riding paths. The first collection of animals (that would later evolve into the Honolulu Zoo) was housed in this area of the park after 1913.

During the late 1920s, in conjunction with the dredging of the Ala Wai Canal, the ponds were filled in. The formal, enclosed Honolulu Zoo grounds were established in the late 1940s when Paul Breese was hired as the zoo director. According to information provided by Mr. Breese (who has since retired) and other zoo personnel, the only current zoo structures whose construction precedes 1950 are some bird cages. However, all these cages were extensively modified and improved during subsequent decades.

Kapi`olani Park was placed on the Hawai`i Register of Historic Places on July 17, 1992. The Honolulu Zoo is within the Kapi`olani Park historic boundary.

A review of soil profile studies indicates that the vicinity of the corner of Kapahulu Ave. And Kalākaua Ave. has little potential for encountering significant cultural deposits. However, the presence of stable old A-horizons at a depth of 30 to 45 centimeters below surface on the west (*makai*) side of the zoo suggests a stable soil surface with signs of human activity, including features and yielding at least one very unusual artifact. These investigations indicate substantial cultural activity in the vicinity of the southwest portion of the zoo.

B. Recommendations

As noted above, historical documentation indicates that the vast majority of the zoo parcel was underwater or marshy in pre-contact times, and subsequently was heavily impacted by historic developments. Our review suggests that the vast majority of the zoo lands are unlikely to yield significant cultural deposits. However, the historical evidence for the presence of Kupalaha *heiau* in the

area immediately west of the zoo and the results of three archaeological profiles on the west side of the zoo suggest the strong possibility of significant subsurface cultural deposits in the southwestern portion of the zoo parcel. A relatively small area is indicated as having been spared significant land development. The area of concern corresponds roughly to that area between the main zoo entrance, the 70-plus year old banyan tree located just east of (inside from) the zoo entrance to the Monsarrat Ave. exit (Figure 16). This wedge of the zoo parcel is suggested to have the prospect of significant cultural deposits that have not been historically disturbed. Thus we recommend monitoring of any significant subsurface impacts in this immediate area.

Present evidence suggests that monitoring or further archaeological study are not warranted for the rest of the zoo lands owing to the pre-contact character of these lands and subsequent historic disturbance.

As was also noted above, the zoo is within the historic boundary of Kapi`olani Park, which is on the Hawai`i Register of Historic Places. Thus consultation with the State Historic Preservation Division (SHPD) on development plans is indicated. It is also recommended that the findings of this archaeological assessment be made available to the SHPD for its examination.

Finally, once construction activities commence, if inadvertent discoveries of subsurface cultural materials are made, work should be halted in that immediate area and the SHPD should be notified immediately.

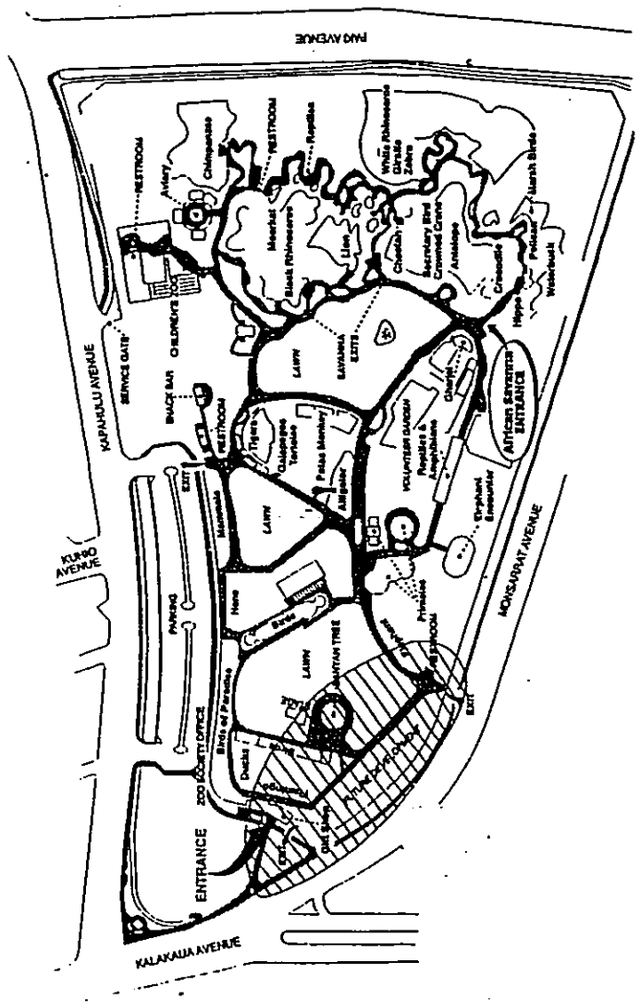


Figure 16 Present layout of Honolulu Zoo showing area of archaeological concern (hatched)

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APPENDIX D

Draft Archaeological Literature Review and Field Inspection Report
Cultural Surveys Hawai‘i (2019)

Draft

Archaeological Literature Review and Field Inspection in Support of Consultation with the SHPD for the Honolulu Zoo Native Birds Exhibit Project, Waikīkī Ahupua‘a, Honolulu District, O‘ahu TMK: [1] 3-1-043:001 por.

Prepared for
Belt Collins Hawaii LLC
on behalf of
City and County of Honolulu Department of Design and Construction and the
City and County of Honolulu Department of Enterprise Services Honolulu Zoo

Prepared by
David W. Shideler, M.A.,
and
Hallett H. Hammatt, Ph.D.

Cultural Surveys Hawai‘i, Inc.
Kailua, Hawai‘i
(Job Code: WAIKIKI 286)

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Management Summary

Reference	Archaeological Literature Review and Field Inspection in Support of Consultation with the SHPD for the Honolulu Zoo Native Birds Exhibit Project, Waikīkī Ahupua‘a, Honolulu District, O‘ahu, TMK: [1] 3-1-043:001 por. (Shideler and Hammatt 2019)
Date	November 2019
Project Number(s)	Cultural Surveys Hawai‘i, Inc. (CSH) Job Code: WAIKIKI 286
Investigation Permit Number	CSH currently operates under archaeological fieldwork permit number 19-07, issued by the Hawai‘i State Historic Preservation Division (SHPD) per Hawai‘i Administrative Rules (HAR) §13-282.
Agencies	SHPD, City and County of Honolulu Department of Design and Construction (DDC) on behalf of the City and County of Honolulu Department of Enterprise Services (Honolulu Zoo)
Land Jurisdiction and Project Funding	City and County of Honolulu Department of Enterprise Services Honolulu Zoo
Project Location	The project area comprises three contiguous areas within the west central portion of the Honolulu Zoo campus at the north end of Kapi‘olani Park in Waikīkī. The Honolulu Zoo is bounded on the north by Kapahulu Avenue, on the east by Pākī Avenue, and on the south/west by Monsarrat Avenue. The Honolulu Zoo property and the project area(s) are depicted on a portion of the 1998 Honolulu U.S. Geological Survey (USGS) 7.5-minute topographic quadrangle.
Project Description	The project displays native flora and fauna, improves visitors' experience by providing an immersive walk-through experience, and associates landscaping with Hawaiian culture. The "Hawaiian Wetland Aviary Exhibit" has three components. In Component One, "Coastal Wetlands Aviary," visitors will be immersed in and walk through an enclosed aviary. The aviary will replicate Hawaiian wetlands providing a safe and spacious environment for native birds. In Component Two, "Mountain Rainforest Aviary," visitors will slowly ascend and enter a lava tube. From a high vantage point or a suspended viewing platform, visitors can view the endangered forest birds. In Component Three, "Dry Forest & Grassland Aviary," visitors will descend onto a plain to view the Hawaiian Goose (*Nēnē*). Both Components Two and Three are in a conceptual design phase, and no additional information is available at present.
Project Acreage	Together the project areas encompass a total area of approximately 1.39 acres (0.56 hectare)

Project-Related Disturbance	The proposed project will entail excavation for ponds of different depths (but typically quite shallow), minor foundation work for aviaries and boardwalks, and subsurface utility lines and appurtenances (electric and water lines for water pumps, lighting, heating lamps and water recirculation).
Historic Preservation Regulatory Context	The DDC is supplying this literature review and field inspection (LRFI) to facilitate SHPD consideration of HAR §13-275-3 “Obtaining a determination letter.”
Historic Properties Potentially Affected	State Inventory of Historic Places (SIHP) # 50-80-14-7208 was designated to include 12 pit features (Walden et al. 2013:68) These 12 features were relatively close together in the west (*makai*; seaward) portion of the zoo and approximately 15 m northwest of the northwest corner of the present project area(s). The lead hypothesis was that these features “are located on Makee’s Island, and that they are associated with activities on the island, dating to the late 1800’s into the early 1900’s” (Walden et al. 2013:68). Clark et al. (2014) used this SIHP # 50-80-14-7208 site designation for an additional pit feature, identified in the west portion of the zoo parking lot along Kapahulu Avenue. Clark et al. (2014) sequentially numbered Feature 13 and identified and associated this designation with the entirety of the former Makee’s Island. The outline of Makee’s Island appears differently on different historic maps and it may have changed shape and size over time (being of the nature of a sandbar) but was approximately 50 m by 200 m. Features reasonably associated with SIHP # -7208 may extend into the present project area(s). SIHP # 50-80-14-9578, Kapi‘olani Park, encompasses the entirety of the Honolulu Zoo campus. Components of this historic property, consisting of a manhole and a concrete culvert (Features 1 and 2) have been previously identified within the Honolulu Zoo grounds. Though neither of these features fall within the boundaries of the proposed project areas, it is possible additional infrastructure features of Kapi‘olani Park could be identified during the archaeological monitoring program.
Recommendations	This study documents that the project is within Kapi‘olani Park designated as SIHP # 50-80-14-9758 for which a National Register of Historic Places (NRHP) form was prepared in 1992 (included here as Appendix A). A rationale for no adverse effect to Kapi‘olani Park and hence a determination (as per HAR §13-275-7[a][1]) of “No historic properties affected” is presented. This study documents that the recommendations in a (SHPD-accepted) prior archaeological monitoring report for excavations in the Honolulu Zoo parking lot concluded, “if future construction activities are

	scheduled to occur in the vicinity of the Honolulu Zoo's entrance area or parking lot, and within the vicinity of Site 7208, archaeological monitoring and sampling is recommended" (Clark et al. 2014:52). The present project area is suggested to be "in the vicinity" and hence an archaeological monitoring program is suggested for the purpose of identification. CSH recommends an on-site archaeological monitoring program be implemented for all ground disturbance activities within all proposed project areas. Any departure from this will occur only following consultation with and written concurrence from the SHPD. This monitoring program will provide an opportunity to collect data on subsurface pre- and post-Contact archaeological deposits that may be present within the project areas. Initial monitoring would serve to better document the present zoo exhibit layout – some components of which may well be more than fifty years old.

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Section 1 Introduction

1.1 Project Background

At the request of Belt Collins Hawaii LLC on behalf of the City and County of Honolulu Department of Enterprise Services Honolulu Zoo, Cultural Surveys Hawai‘i, Inc. (CSH), has prepared this *Archaeological Literature Review and Field Inspection in Support of Consultation with the SHPD for the Honolulu Zoo Native Birds Exhibit Project, Waikīkī Ahupua‘a, Honolulu District, O‘ahu TMK: [1] 3-1-043:001 por.*

The project area comprises three contiguous areas (a total area of approximately 1.39 acres or 0.56 hectare) within the west central portion of the Honolulu Zoo campus at the north end of Kapi‘olani Park in Waikīkī. The Honolulu Zoo is bounded on the north by Kapahulu Avenue, on the east by Pākī Avenue, and on the south/west by Monsarrat Avenue.

The project displays native flora and fauna, improves visitors' experience by providing an immersive walk-through experience, and associates landscaping with Hawaiian culture. The "Hawaiian Wetland Aviary Exhibit" has three components. The underlying theme is "We ARE Hawai‘i" to unite all three phases through the display of native flora and fauna and association of landscaping with Hawaiian culture.

In Component One, "Coastal Wetlands Aviary," visitors will be immersed and walk through an enclosed aviary. The aviary will replicate Hawaiian wetlands providing a safe and spacious environment for native birds.

In Component Two, "Mountain Rainforest Aviary," visitors will slowly ascend and enter a lava tube. From a high vantage point or a suspended viewing platform, visitors can view the endangered forest birds.

In Component Three, "Dry Forest & Grassland Aviary," visitors will descend onto a plain to view the Hawaiian Goose (*Nēnē*). Both Components Two and Three are in a conceptual design phase, and no additional information is available at present.

The Honolulu Zoo property and the project area(s) are depicted on a portion of the 1998 Honolulu U.S. Geological Survey (USGS) 7.5-minute topographic quadrangle (Figure 1), a tax map plat (Figure 2), and a 2013 aerial photograph (Figure 3).

1.2 Project Scope(s) of Work

1.2.1 Detailed description for Component 1

The project has an approximate footprint of 6,000 square feet (sq ft). The proposed length will be about 100 ft, and the proposed width will be about 60 ft. The highest point of the aviary will not exceed 25 ft. Structural steel columns and perforated steel mesh panels are the construction materials. The columns and panels are fire-resistant and will have anti-corrosion finishing to withstand the exposure to salt, seawater, and ultraviolet light. The entire aviary is enclosed with transparent steel mesh panels to ensure cross-ventilation and visual permeability across the exhibit.

The structural steel columns and steel mesh panels can withstand earthquakes and hurricane-force wind. The locations of columns are unconfirmed. The upper part of the structural steel columns will branch off and resemble a forest's canopy.

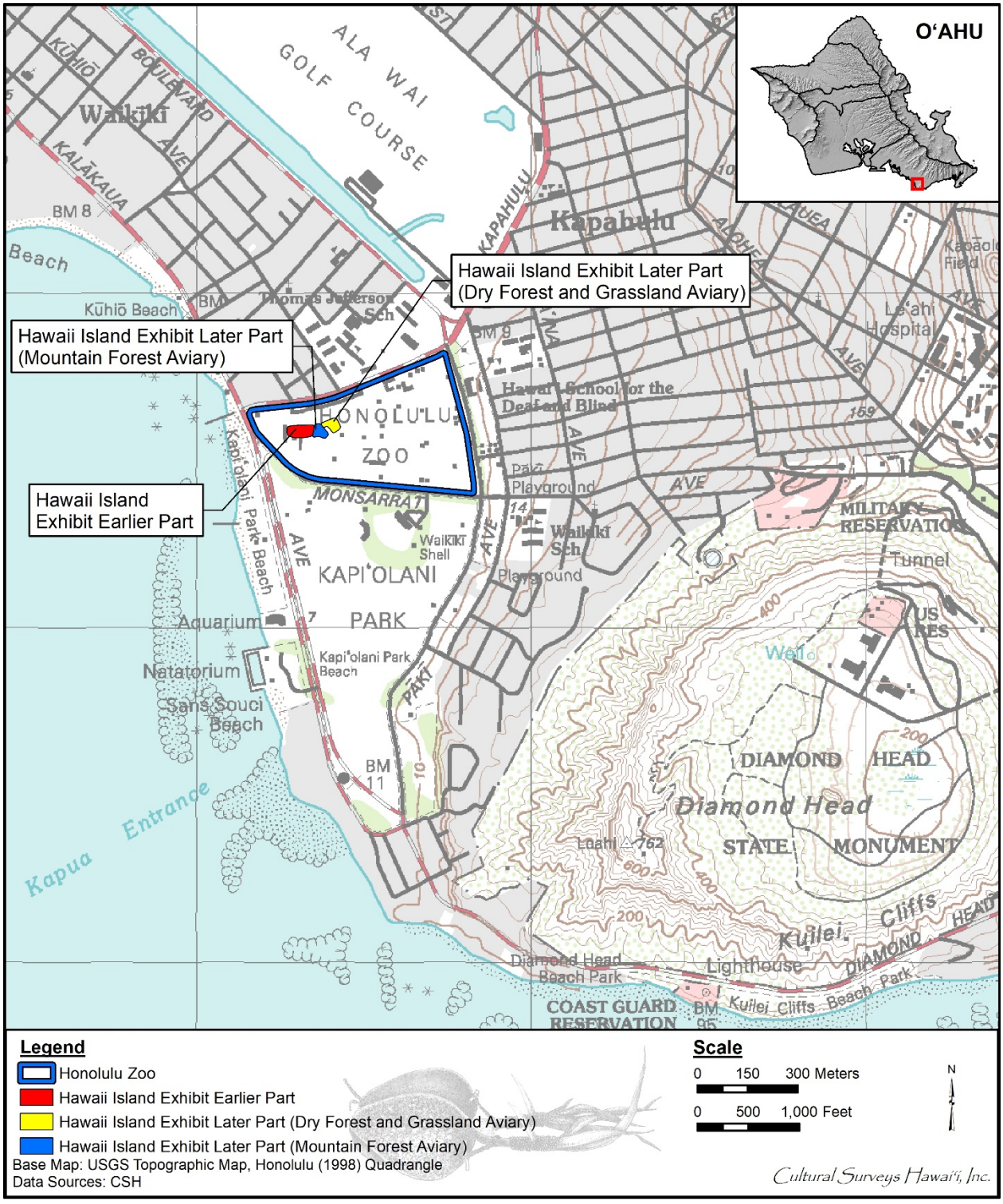

Figure 1. Portion of the 1998 Honolulu USGS 7.5-minute topographic quadrangle showing project area(s)

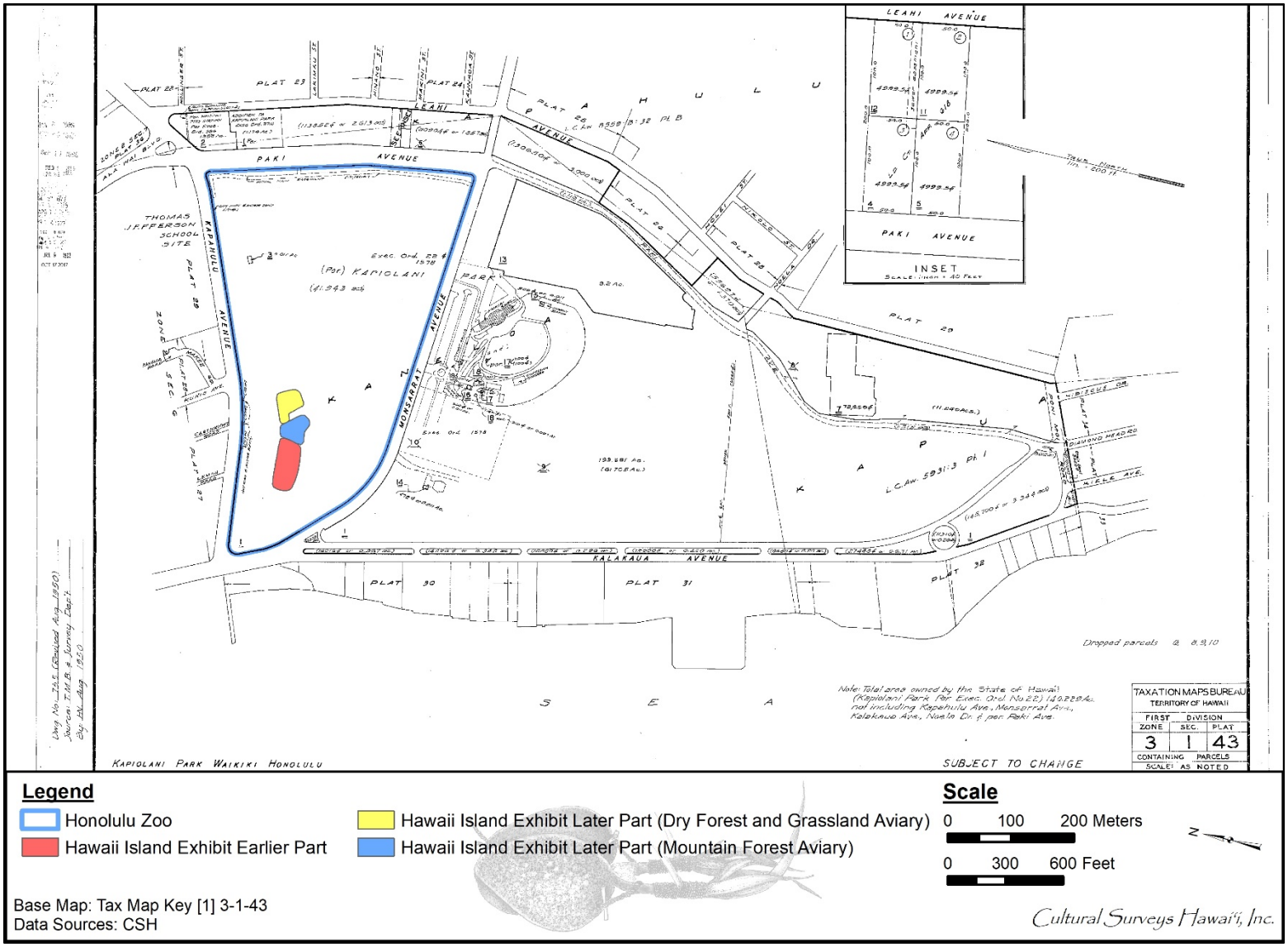

Figure 2. Tax Map Key (TMK) [1] 3-1-043 showing project area(s) (Hawai‘i TMK Service 2014)

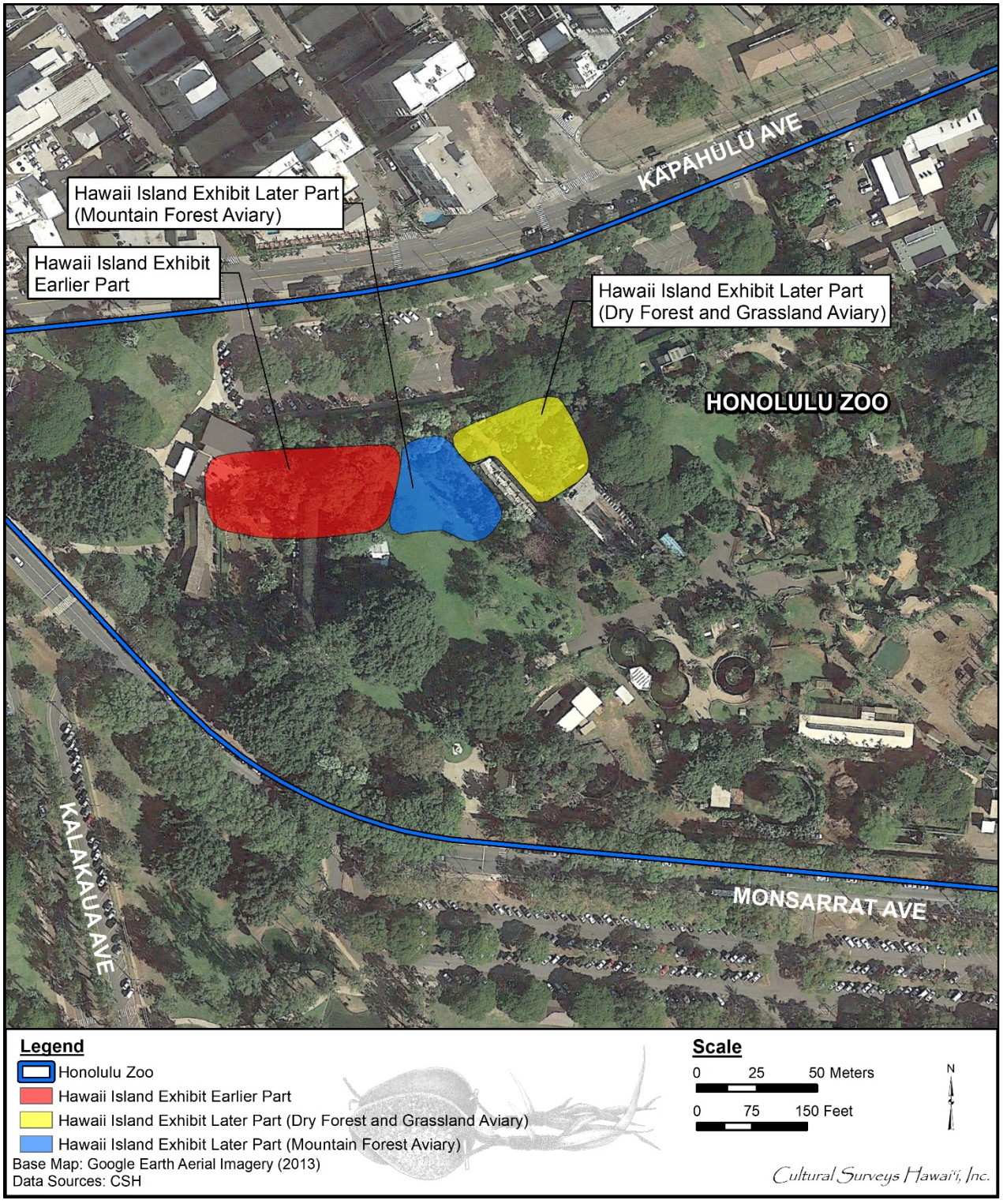

Figure 3. Aerial photograph of the project area(s) (Google Earth Aerial Imagery 2013)

Potential exhibits include Hawaiian Coot (*‘Alae ke‘oke‘o*) Hawaiian Duck (*Kōloa maoli*), Hawaiian Moorhen *(‘Alae ‘ula*), Hawaiian Stilt (*Ae‘o*), and Laysan Duck (*Anas laysanensis*).

1.2.2 Physical arrangement

The project divides into three functional areas: the boardwalk, staged exhibit, and maintenance area.

The Boardwalk

Visitors will begin their journey on the edge of the pond and enter the aviary through a vestibule. The vestibule is an enclosed area between the exterior and the aviary, to prevent the escape of exhibit birds and the entry of feral animals.

Inside the aviary, visitors will continue their journey on the Boardwalk. The Boardwalk is a level path and has a zig-zag arrangement to segment the experience, increase vantage points, and prevent the congregation of visitors at one particular place within the aviary.

At the end of the Boardwalk, visitors will take the stairs to a viewing platform, “Aviary Overlook.” The platform has dual functions. It is a vestibule for exiting the exhibit and for providing viewing opportunity at a high level. The platform is approximately 2.90 m (9.5 ft) high, and visitors will look across the exhibit. The “Aviary Overlook” is ADA compliant. Step-free access is on the *mauka* (inland, toward the mountains) side of the “Aviary Overlook.”

The Staged Exhibit

The exhibit is between the edge of the pond (‘Ewa side) and the maintenance area (Diamond Head side). The exhibit has a series of ponds with different depths. The different depth of water would widen the ability to exhibit birds, preventing them from congregating at particular areas within the exhibit.

Water will descend gently in the direction from Diamond Head to Waikīkī. The flow of water will prevent water stagnation, generate pleasant sound, and replicate the natural environment. Free-flowing water will reduce the need for filtration and replacement of water.

Native plants will be planted on the edge and in the pond to provide refuge for the exhibit birds. Native landscaping will ensure the exhibit area is self-sustained, minimizing cleaning. These design principles will reduce the number of entries in the exhibit and reduce disturbance to exhibit animals.

The Maintenance Area

The maintenance area is to the rear of the exhibit. The staged exhibit will mask the maintenance area from public view. Zoo personnel will access the maintenance area from an existing footpath to the east of the “Flamingo Pond.” The maintenance area is compartmentalized to avoid contamination. All compartments will have two sets of doors to prevent the escape of exhibit birds. In these compartments, zoo personnel can perform routine feeding, cleaning, and recording. The water pump and filtration system will be in one of the compartments.

1.2.3 Utilities

The water pumps, lighting, and heating lamps will consume electricity. The proposed project neither requires active cooling nor nighttime light. Therefore, future electricity consumption will be insignificant.

The exhibit will consume freshwater. A water recirculation system will remove sediments, filter water, and refill the exhibit. Future consumption of freshwater will be significantly lower than the current level at the Duck Pond, which requires complete drainage and replacement of freshwater every two weeks.

1.2.4 Summary of Anticipated Ground Disturbance

The proposed project will entail excavation for ponds of different depths (but typically quite shallow), minor foundation work for aviaries and boardwalks, and subsurface utility lines and appurtenances (electric and water lines for water pumps, lighting, heating lamps, and water recirculation).

1.3 Historic Preservation Regulatory Context and Document Purpose

The City and County of Honolulu Department of Design and Construction (DDC) is supplying this literature review and field inspection (LRFI) to facilitate State Historic Preservation Divsiion (SHPD) consideration of Hawai‘i Administrative Rules (HAR) §13-275-3 “Obtaining a determination letter.”

1.4 Environmental Setting

1.4.1 Natural Environment

The Honolulu Zoo is at the southeast end of the plain of Waikīkī, which is flat and generally less than 4.5 m (15 ft) above mean sea level (AMSL) (Davis 1989:5). Within the Honolulu Zoo parcel, the topography is generally level, with elevations predominantly between 1.2–2 m (4 and 6.5 ft) AMSL. Rainfall averages 636 mm (25 inches) annually, with the majority falling between October and April (Giambelluca et al. 2013). Besides rainfall, the area receives abundant additional water from the Mānoa/Palolo streams, which drain well-watered, inland mountain and valley areas (Cleghorn 1996:3). Northeasterly trade winds prevail throughout the year, although their frequency varies from more than 90% during the summer months to 50% in January; the average annual wind velocity is approximately 10 miles per hour (Wilson Okamoto & Associates 1998:2-1). The average temperature is 23.8° C (74.8° F), with January being the coolest month and August the warmest (Giambelluca et al. 2014).

O‘ahu’s leeward coastal plain in the vicinity of Waikīkī and Honolulu is stratified with late Pleistocene coral reef substrate overlaid with calcareous marine beach sand or terrigenous sediments and stream-fed alluvial deposits (Armstrong 1983:36; Geolabs Hawaii Inc. 1993:7). According to the U.S. Department of Agriculture (USDA) Soil Survey Geographic (SSURGO) database (2001) and soil survey data gathered by Foote et al. (1972), the project area’s soils consist of Kawaihapai clay loam, 0 to 2% slopes (KIA) in the eastern (*mauka*) half and Jaucas Sand 0-15% slopes (JaC) in the western (*makai*) half (Figure 4).

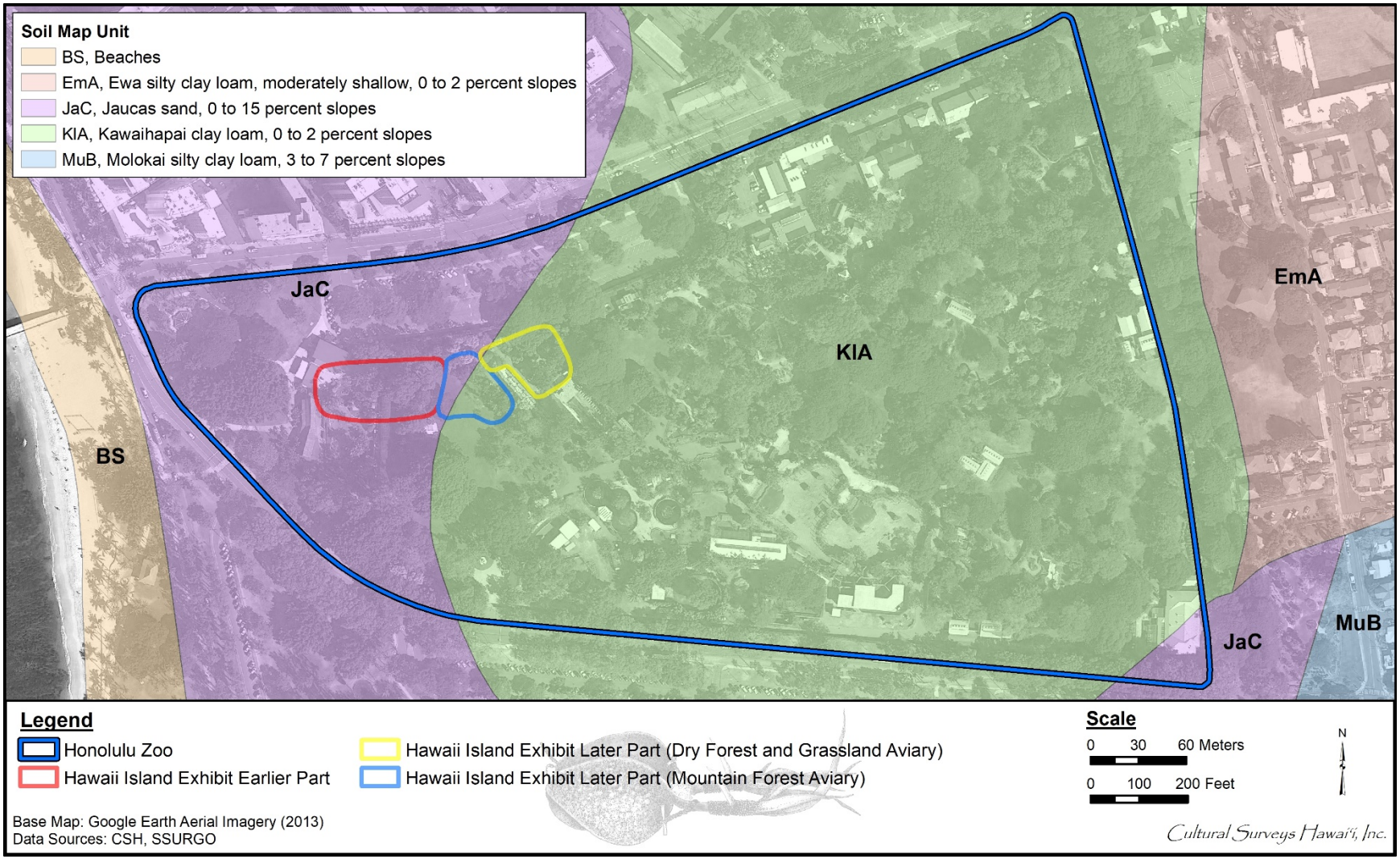

Figure 4. Aerial photograph (Google Earth Aerial Imagery 2013) with overlay of *Soil Survey of the State of Hawaii* (Foote et al. 1972), indicating soil types within and surrounding the project area(s) (USDA SSURGO 2001)

Soils of the Kawaihapai Series are described as follows:

> This series consists of well-drained soils in drainageways and on alluvial fans on the coastal plains on the islands of Oahu and Molokai. These soils formed in alluvium derived from basic igneous rock in humid uplands. They are nearly level to moderately sloping. Elevations range from nearly sea level to 300 feet. The annual rainfall amounts to 30 to 50 inches. [Foote et al. 1972:63–64]

Kawaihapai clay loam, 0 to 2% slopes soils are further described as

> This soil occupies smooth slopes. […] in a representative profile the surface layer is dark-brown clay loam about 22 inches thick. The next layer is dark-brown stratified sandy.loam 32 inches thick. The substratum is stony and gravelly. […]
>
> Permeability is moderate. Runoff is slow, and the erosion hazard is no more than slight. [Foote et al. 1972:64]

Jaucas Series Soils are described as follows:

> This series consists of excessively drained, calcareous soils that occur as narrow strips on coastal plains, adjacent to the ocean. These soils occur on all the islands of this survey area. They developed in wind- and water-deposited sand from coral and seashells. They are nearly level to strongly sloping. Elevations range from sea level to 100 feet ; […] The annual rainfall amounts to 10 to 40 inches. […]
>
> These soils are used for pasture, sugarcane, truck crops, alfalfa, recreational areas, wildlife habitat, and urban development. The natural vegetation consists of kiawe, koa haole, bristly foxtail, bermudagrass, fingergrass, and Australian saltbush. [Foote et al. 1972:48]

Jaucas Sand 0-15% slopes soils are further described a follows:

> In a representative profile the soil is single grain, pale brown to very pale brown, sandy, and more than 60 inches deep. In many places the surface layer is dark brown as a result of accumulation of organic matter and alluvium. […]
>
> Permeability is rapid, and runoff is very slow to slow. The hazard of water erosion is slight, but wind erosion is a severe hazard where vegetation has been removed. [Foote et al. 1972:64]

1.4.1 Built Environment

The Honolulu Zoo parcel containing the current project area(s) is a roughly triangular-shaped area comprising 42.5 acres. The entire Honolulu Zoo property has been landscaped and developed with facilities for the zoo. Concrete sidewalks and asphalt pathways meander through the parcel amid the many animal exhibits. There are several open, well-maintained lawns beneath broad shade trees. Numerous concrete ponds and watercourses have been constructed for the animals. Concrete balustrades, ornamental plant hedges, and/or chain link fences separate the animal habitation/viewing areas from areas open to the public. Vegetation consists largely of exotic ornamentals, with some native Hawaiian and Polynesian-introduced species.

Section 2 Background Research

2.1 Traditional and Historical Background

2.1.1 Traditional Accounts

By the time of Europeans' arrival in the Hawaiian Islands during the late eighteenth century, Waikīkī had long been a center of population and political power on O‘ahu. According to Martha Beckwith (1940), by the end of the fourteenth century Waikīkī had become "the ruling seat of the chiefs of O‘ahu." The preeminence of Waikīkī continued into the eighteenth century, as evidenced by Kamehameha's decision to reside there after gaining control of O‘ahu by defeating the island's chief, Kalanikūpule.

However, chiefly residences were only one element of a complex of features that sustained the large population of Waikīkī during pre-Contact times. Beginning in the fifteenth century, a vast system of irrigated taro fields was constructed, extending across the littoral plain from Waikīkī to lower Mānoa and Pālolo valleys. This field system—an impressive engineering design traditionally attributed to the chief Kalamakua—took advantage of streams descending from Makiki, Mānoa and Pālolo valleys, which also provided ample fresh water for Hawaiians living in the *ahupua‘a* (land division, typically running from the mountains to the sea). Water was also available from springs in nearby Mō‘ili‘ili and Punahou. Closer to the Waikīkī shoreline, coconut groves and fishponds dotted the landscape. A sizeable population developed amidst this Hawaiian-engineered abundance.

The Honolulu Zoo is within the traditional Hawaiian land area known as Kāneloa ("tall Kāne") between Kekio and Hamohamo ("rub gently—as the sea on the beach") to the west and Kapua ("the flower") to the south (Figure 5).

2.1.2 Early Historic Period

Papa‘ena‘ena Heiau (see Figure 5, Figure 8, and Figure 9) just south of the current project area was one of the most important *heiau* (pre-Christian place of worship) on the island of O‘ahu in the late pre- and early post-Contact periods. There may also have been associated residences of the priesthood and aristocracy in the vicinity. Another temple, Kūpalaha Heiau, associated with human sacrifice, is understood to have been just southwest of the Honolulu Zoo (see Figure 5, Figure 7, and Figure 8).

In general terms the present project area is understood to have been on the southern edge of the primary Waikīkī habitation area (see Figure 6 through Figure 8). One of our first detailed maps of the project area of (the 1876 Lyons map, Figure 9) depicts the vicinity as a "level, open, plain" and shows the east portion of the project area within the center of a duck pond, indicated to be "dry in summer."

The traditional Hawaiian focus on Waikīkī as a center of chiefly and agricultural activities in southeastern O‘ahu was disrupted by Western Contact. The *ahupua‘a* of Honolulu, containing the only sheltered harbor on O‘ahu, became the center for trade with visiting foreign vessels and drew increasing numbers of Hawaiians away from their traditional environments. The shift in preeminence is illustrated by the fact that Kamehameha moved his residence from Waikīkī to Honolulu. However, the depopulation of Waikīkī was not simply a result of the attractions of Honolulu, but also of the European diseases that had devastating effects for the Hawaiian populace.

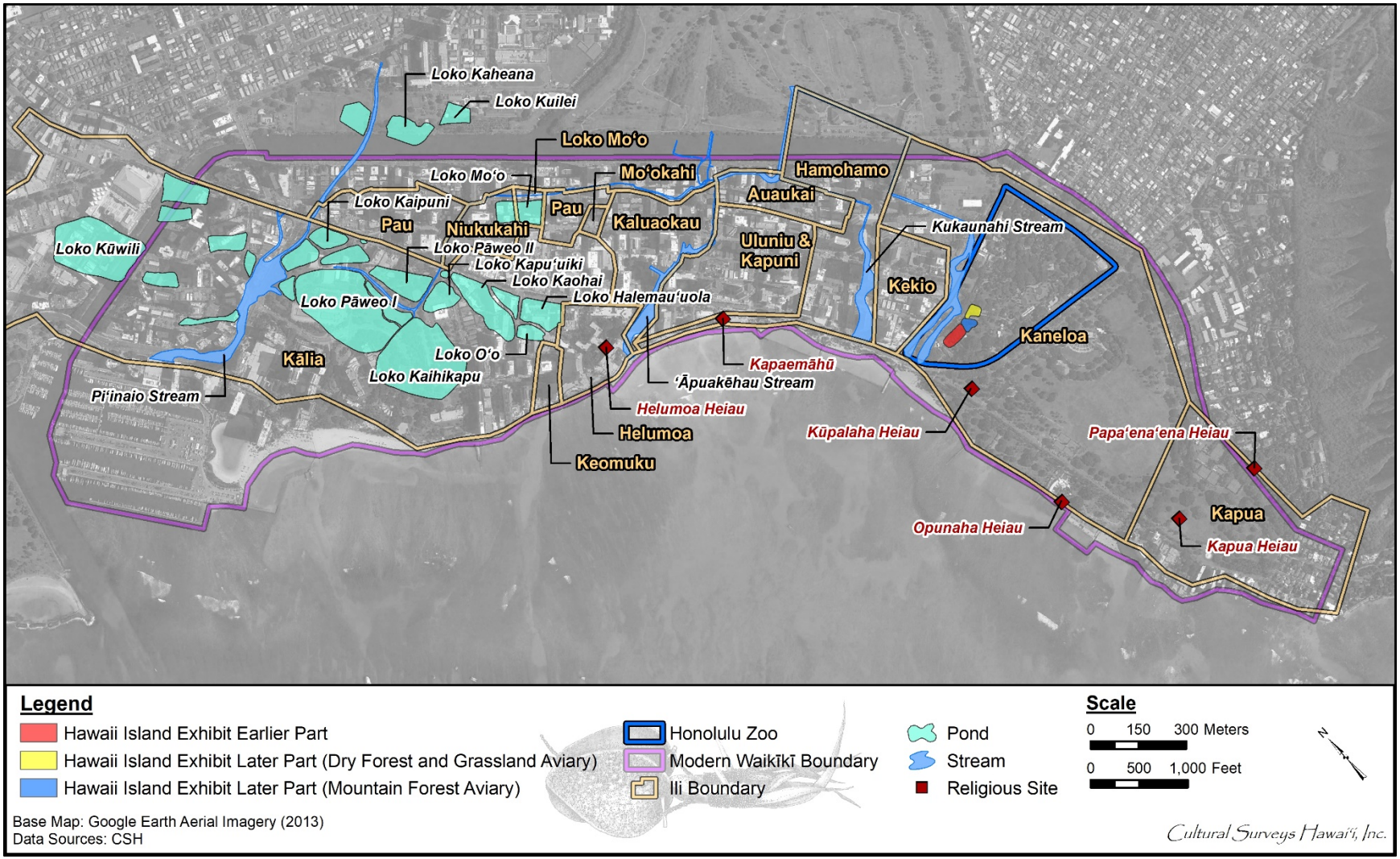

Figure 5. Waikīkī place names in relation to the Honolulu Zoo and project areas (base map: Google Earth Aerial Imagery 2013)

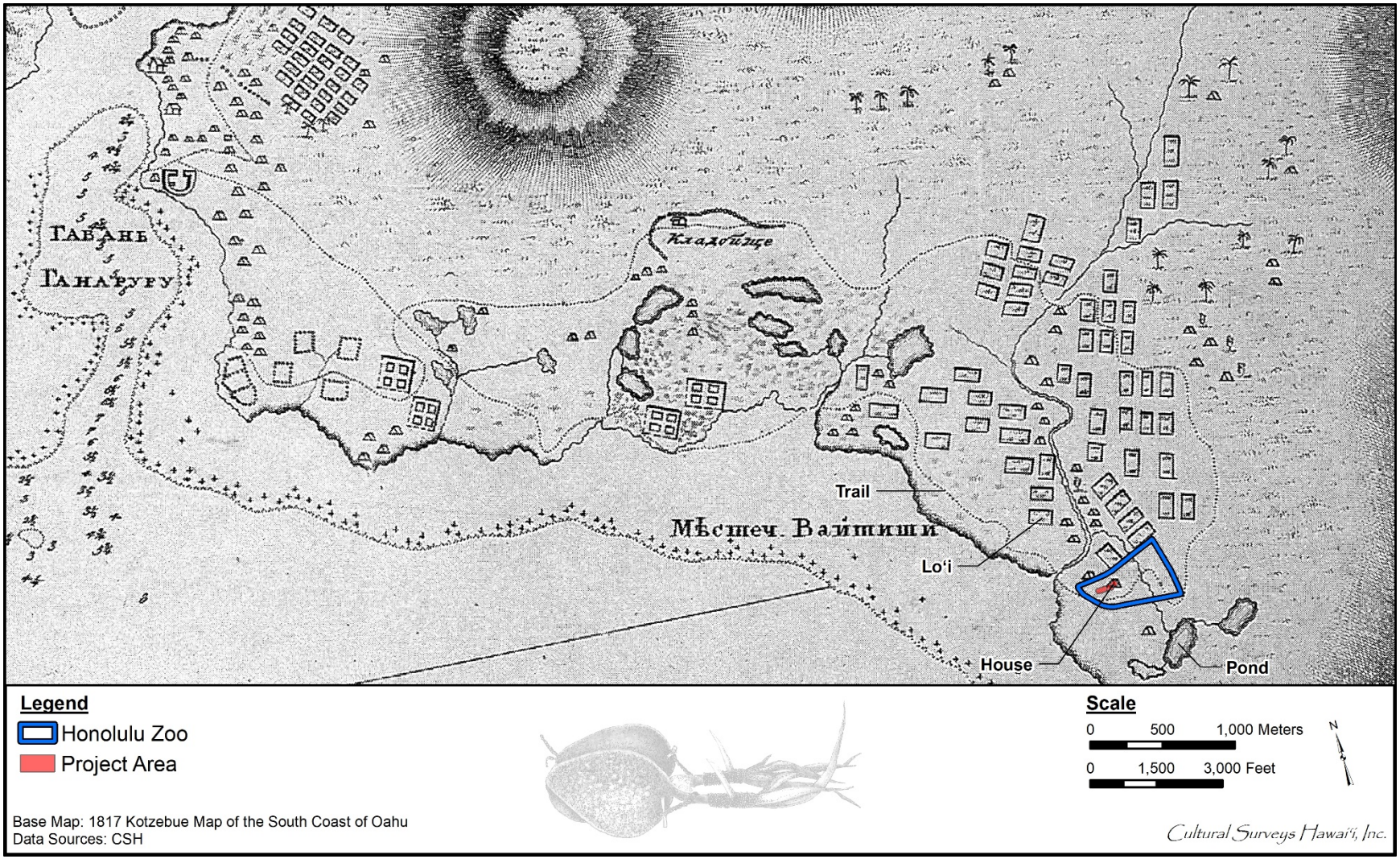

Figure 6. 1817 Kotzebue map of the South Coast of O‘ahu showing the location of the Honolulu Zoo and project areas

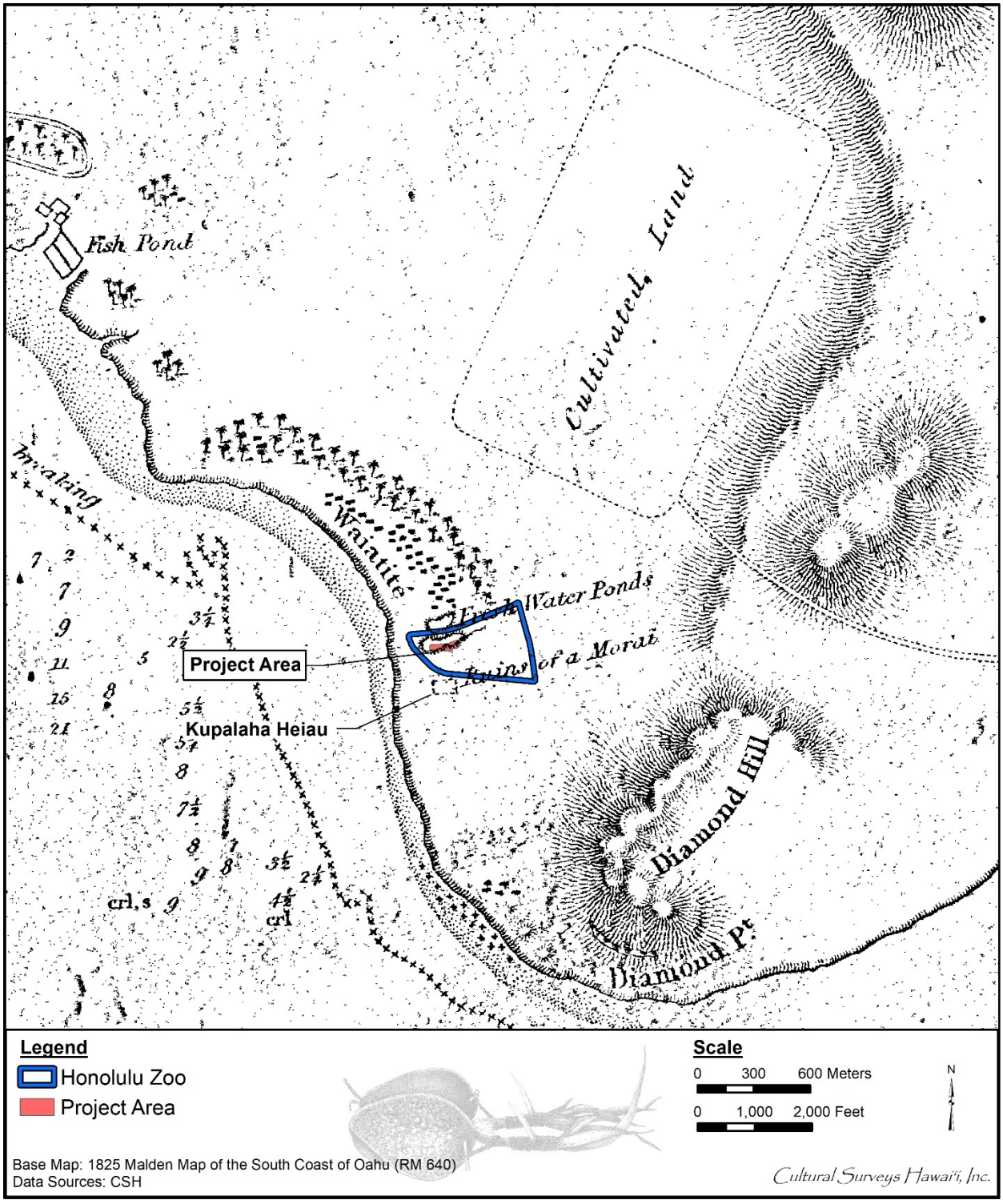

Figure 7. 1825 Malden map of the south coast of O‘ahu showing the project area(s)

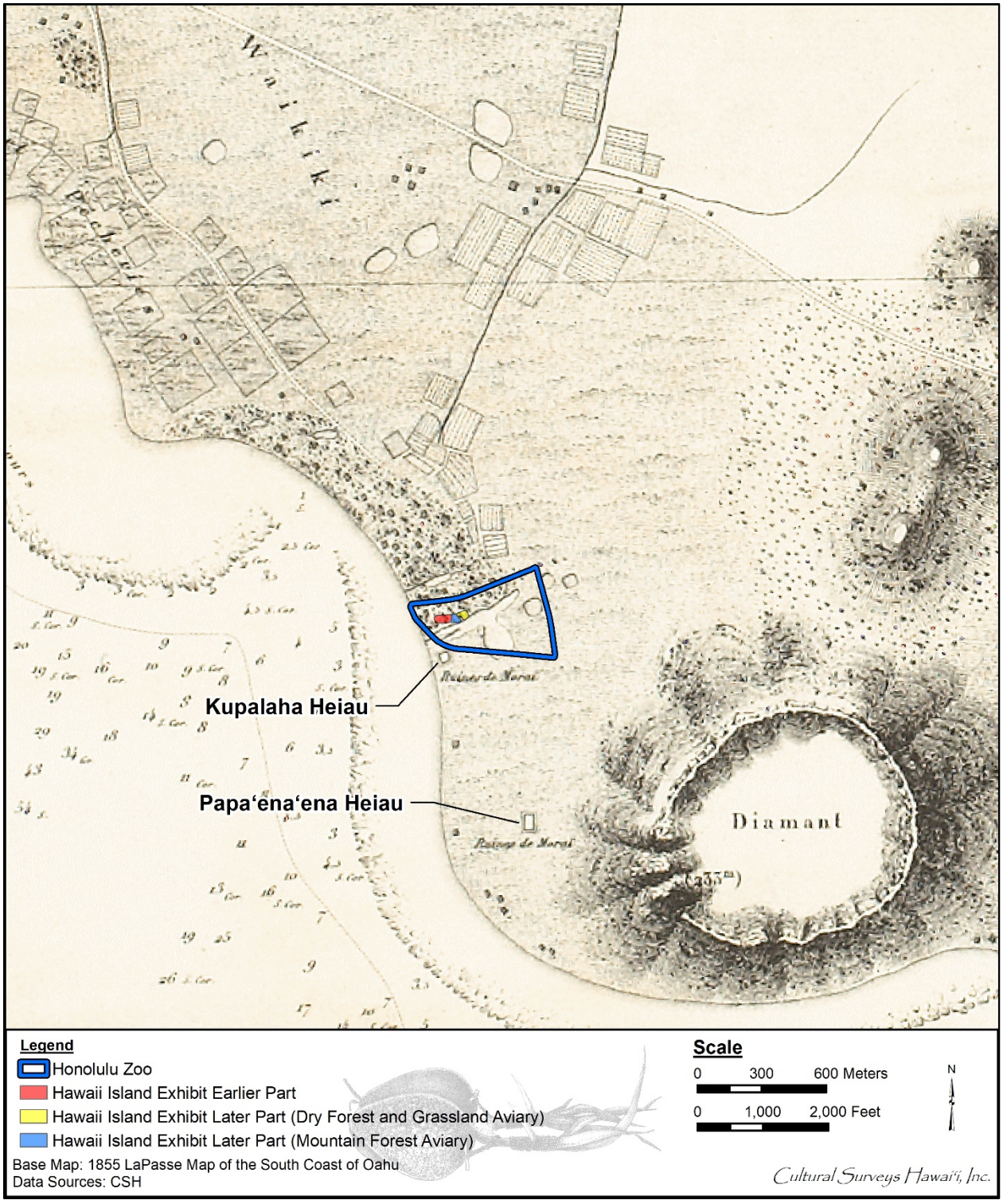

Figure 8. 1855 LaPasse map of the South Coast of O‘ahu showing the project area(s)

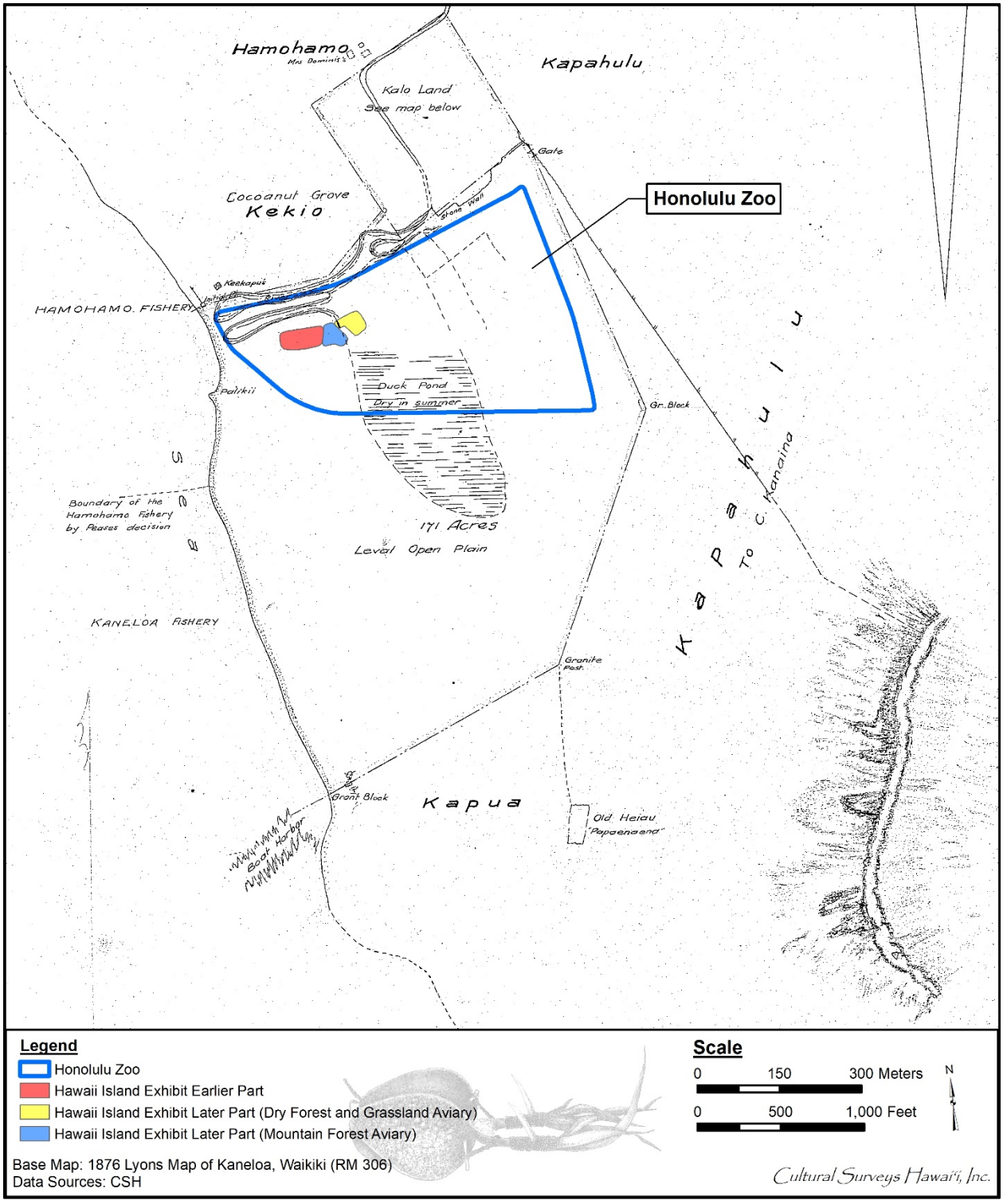

Figure 9. Portion of 1876 Lyons map of Kaneloa, Waikiki showing the location of the project area; the Dry Forest and Grassland Aviary exhibit falls within an area labelled “duck pond, dry in summer”

2.1.1 The Māhele and the Kuleana Act

The Organic Acts of 1845 and 1846 initiated the process of the Māhele, the division of Hawaiian lands, which introduced private property into Hawaiian society. In 1848, the crown and the *ali‘i* (chiefly class) received their land titles, while the common people (*maka‘āinana*) began to receive their *kuleana* awards (individual land parcels) in 1850. It is through Land Commission Awards (LCA) records generated as a result of the Kuleana Act following the Māhele that much of the first specific documentation of life in Hawai‘i as it had evolved up to the mid-nineteenth century came to light. Although many Hawaiians did not submit or follow through on claims for their lands, the distribution of LCAs can provide insight into patterns of residence and agriculture. Many of these patterns likely had existed for centuries past; however, no *kuleana* LCAs were in the immediate vicinity of the current project area.

2.1.1 Mid- to Late 1800s

As the nineteenth century progressed, Waikīkī was becoming a popular site among foreigners, particularly Americans, who had settled on O‘ahu. An 1865 article in the *Pacific Commercial Advertiser* mentioned a small community that had developed along the beach. The area continued to be popular with the *ali‘i*, and several notables had residences there. A visitor to O‘ahu in 1873 described Waikīkī as “a hamlet of plain cottages, whither the people of Honolulu go to revel in bathing clothes, mosquitoes, and solitude, at odd times of the year” (Bliss 1873).

The 1876 Lyons map (see Figure 9) indicates that in the mid-1870s, the Waikīkī area at the base of Diamond Head contained a large duck pond and open plain; however, during the second half of the nineteenth century, several changes dramatically altered the landscape of Waikīkī. These included the improvement of the road connecting Waikīkī to Honolulu (the present route of Kalākaua Avenue) and the opening of Kapi‘olani Park. Kapi‘olani Park was created by a consortium of prominent businessmen that included Archibald Cleghorn, John O. Dominis, and James Makee. The park stockholders acquired the property through a lease with two landholders of the area: King Kalākaua, who held a lease on approximately 150 acres in the land known as Kāneloa, and a Swedish-born immigrant to Hawai‘i named Allen Herbert, who leased the neighboring parcel of Kapua.

The park was dedicated on 11 June 1877 (Kamehameha Day) and was named for King Kalākaua’s wife, Queen Kapi‘olani. Its original configuration included an open field and horse racing track, surrounded by private estates (Figure 10 and Figure 11). Early alterations to Kapi‘olani Park were undertaken to create “conventional park scenery” (Weyeneth 1991:12). Like the rest of Waikīkī prior to the 1920s, the park contained wetlands, where the streams of the Ko‘olau Mountains reached the sea. The watercourse on the northwest side of the Zoo, approximating the *makai* portion of present day Kapahulu Avenue, was famous for a trysting spot known as Makee Island named after a prominent trader, rancher, and ship captain James Makee (see Figure 10 and Figure 12). The natural ground surface of the north end of Kapi‘olani Park where the zoo would be established appears to have been quite close to the water table (see Figure 9 and Figure 11) until it was filled in in 1921 (see Figure 16). This was probably a factor explaining why so many members of Hawaii’s *ali‘i* (Queen Emma, Queen Lili‘uokalani, Queen Kapi‘olani) established homes to the northwest on what was probably naturally drier land (see Figure 12).

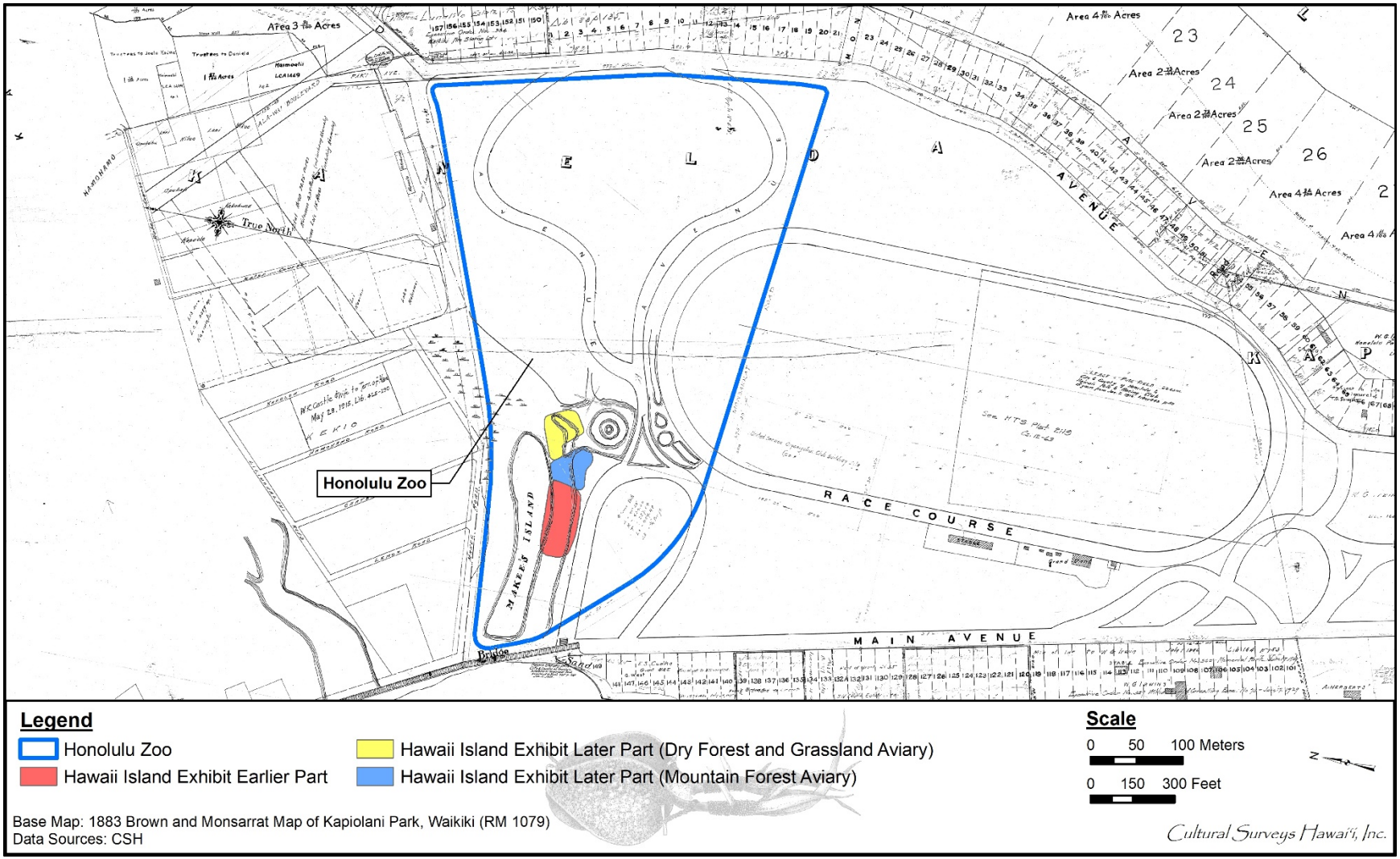

Figure 10. 1883 Brown and Monsarrat map of Kapiolani Park, Waikiki showing the development of Kapi‘olani Park in the vicinity of the project area

Figure 11. 1890 photograph of Kapi‘olani Park, view from the slopes of Diamond Head northwest to Honolulu and Punchbowl Crater; note the “pond” in the northern section of park and the diagonal line across the park that may delineate the former boundary of the larger ca. 1870s extent of the duck pond/wetland (Hedemann 1890, Bishop Museum Archives, reprinted in Grant and Hymer 2000:151)

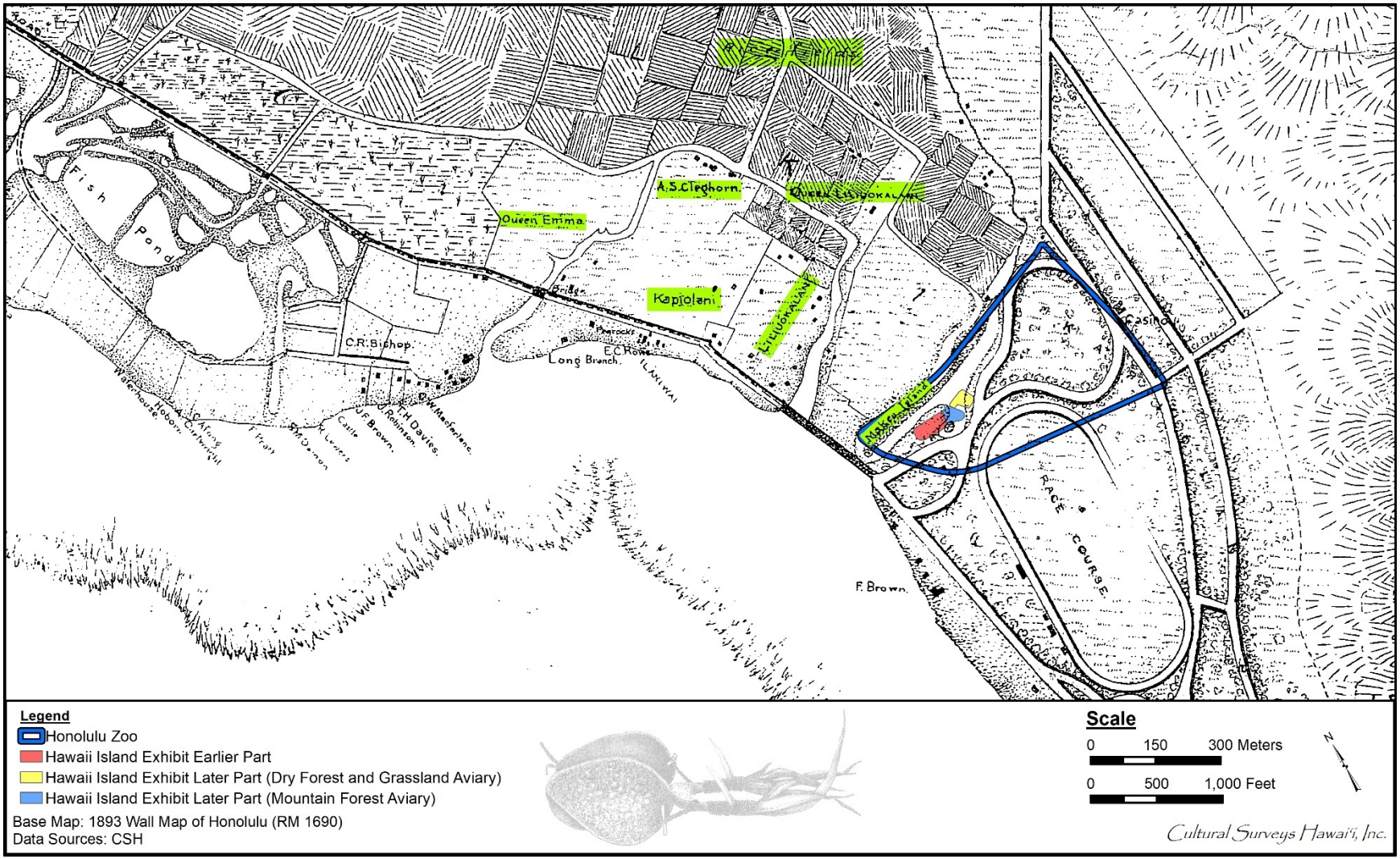

Figure 12. 1893 Wall map of Honolulu showing the project area(s)

In 1898, Kapi‘olani Park became an encampment for U.S. military servicemen. The original camp, Camp Otis, was in the infield of the fenced race track (Figure 13). Camp Otis was superseded by Camp McKinley, which was “in the scrub brush closer to the slopes of Diamond Head” (Weyeneth 2002:58). Sources indicate Camp McKinley was in the “Irwin Tract” on the east side of Kapi‘olani Park (Greguras 2005). The camp remained on the park premises for nine years, during America’s involvement in the Philippines. The park was again utilized by the U.S. military during World War II.

2.1.1 1900s

Annexation brought a building boom to Waikīkī, which included construction of beach homes for the wealthy along the coast toward the base of Diamond Head and the development of middle class housing subdivisions (Kapahulu Tract, Kapiolani Park Addition) inland of the lands that would become the Honolulu Zoo (Figure 14). Streets and new homes were rapidly expanded inland in Waikīkī (Figure 15).

During the early twentieth century, recreational interests at Kapi‘olani Park changed. The park’s attractions switched from horse racing to polo matches and other ventures, such as baseball and auto racing (Abel 1992:5). Horses used for polo matches were kept at stables, which were once within the Diamond Head side of the park; however, the stables had been removed by the early 1960s, when the Diamond Head Tennis Center was built. The city assumed control of the park in 1913 and constructed the first iteration of the Honolulu Zoo in 1915. In 1992, Kapi‘olani Park (State Inventory of Historic Places [SIHP] # 50-80-14-9758) was listed on the National Register of Historic Places (NRHP). The Honolulu Zoo is within the Kapi‘olani Park historic boundary.

During the early twentieth century, the Waikīkī landscape was continually altered. Historic maps indicate development as well as the presence of several roads, paths, and structures surrounding the project area (see Figure 14 and Figure 15). A major driving force of this change was the construction of the Ala Wai Drainage Canal, begun in 1921 and completed in 1928, which resulted in the draining and filling in of the remaining ponds and irrigated fields of Waikīkī, including the waterscape at the ‘Ewa end of Kapi‘olani Park, in the present location of the Honolulu Zoo (Figure 16). According to Weyeneth (1991:29), “the lagoons were filled with the dredged material and the artificial islands disappeared. It was on this site that the city built the present Honolulu Zoo, beginning in 1948.”

2.1.1 Contemporary Land Use

During the period of rapid Waikīkī urbanization, the Honolulu Zoo experienced alternating periods of neglect and development. During the Depression of the 1930s, the Honolulu Zoo suffered greatly, with its grounds and facilities in perpetual decline (Waikīkī.com 2014). The Zoo lands remained largely without further development in the 1930s (Figure 17) and early 1940s (Figure 18). It was only after World War II, in 1948, that the City and County of Honolulu began construction of a modern zoo facility on the drained and filled former waterscape.

In 1947, the donation of a camel, elephant, chimpanzees, and deer by the Dairymen’s Association sparked a renewal for the Honolulu Zoo. The subsequent approval of a Master Plan by the City and County of Honolulu determined the boundaries of the present 42-acre site at the north end of Kapi‘olani Park (Waikīkī.com 2014). The expansion of the Honolulu Zoo began with the hiring of its first full-time director, Paul Breese, and a staff of 13. The animal collection, which

Figure 13. 1898 photograph of Camp Otis in racetrack interior and Camp McKinley, south and east of the racetrack (Hawai‘i State Archives 1898)

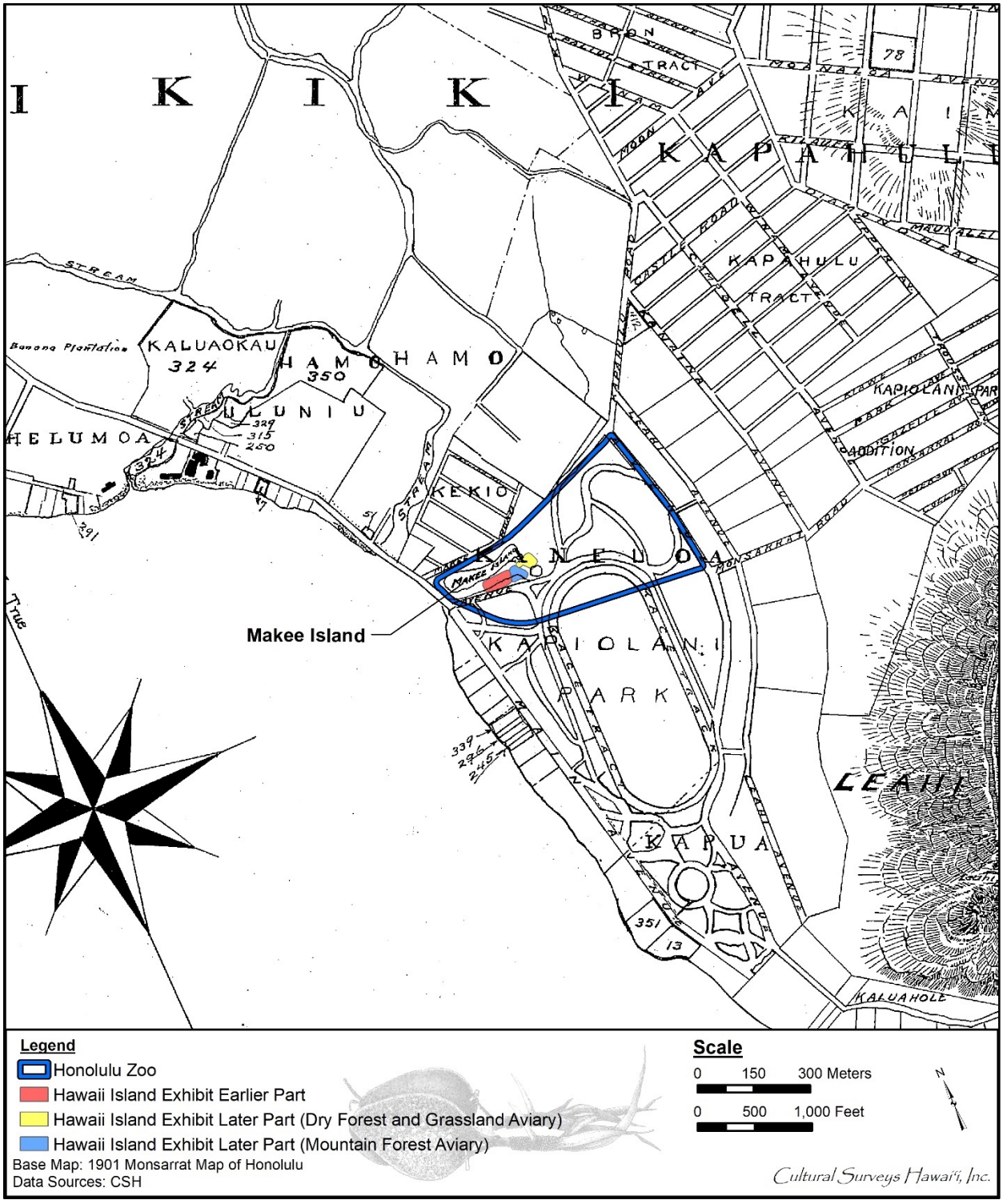

Figure 14. 1901 Monsarrat map of Honolulu showing the project area(s)

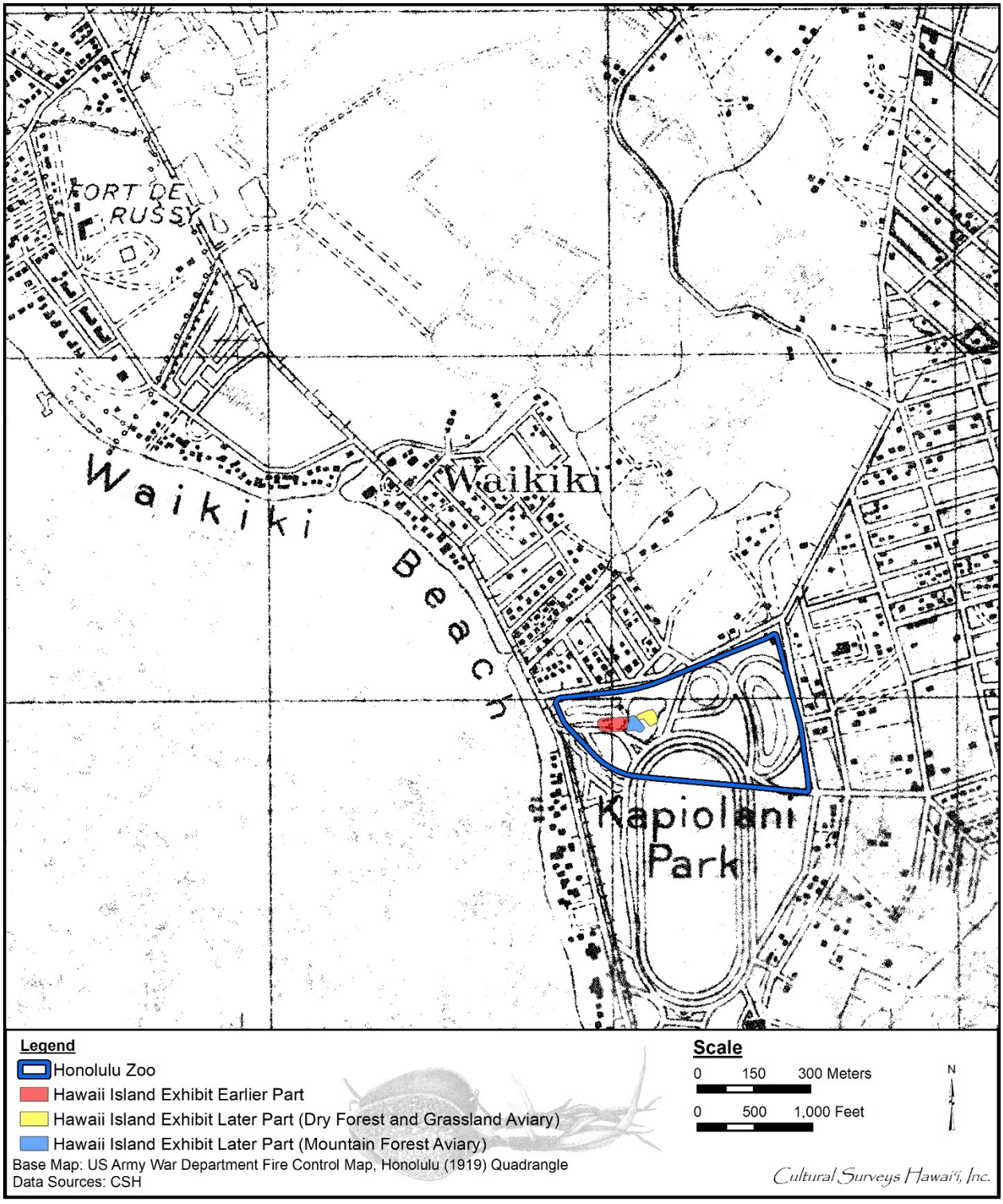

Figure 15. 1919 U.S. Army War DepartmentfFire control map, Honolulu quadrangle showing the project area(s)

Figure 16. 1921 photograph of Kapi‘olani Park; the entire wetland (northern end of the racetrack) is in-filled with dredged coral fill material (Hawai‘i State Archives)

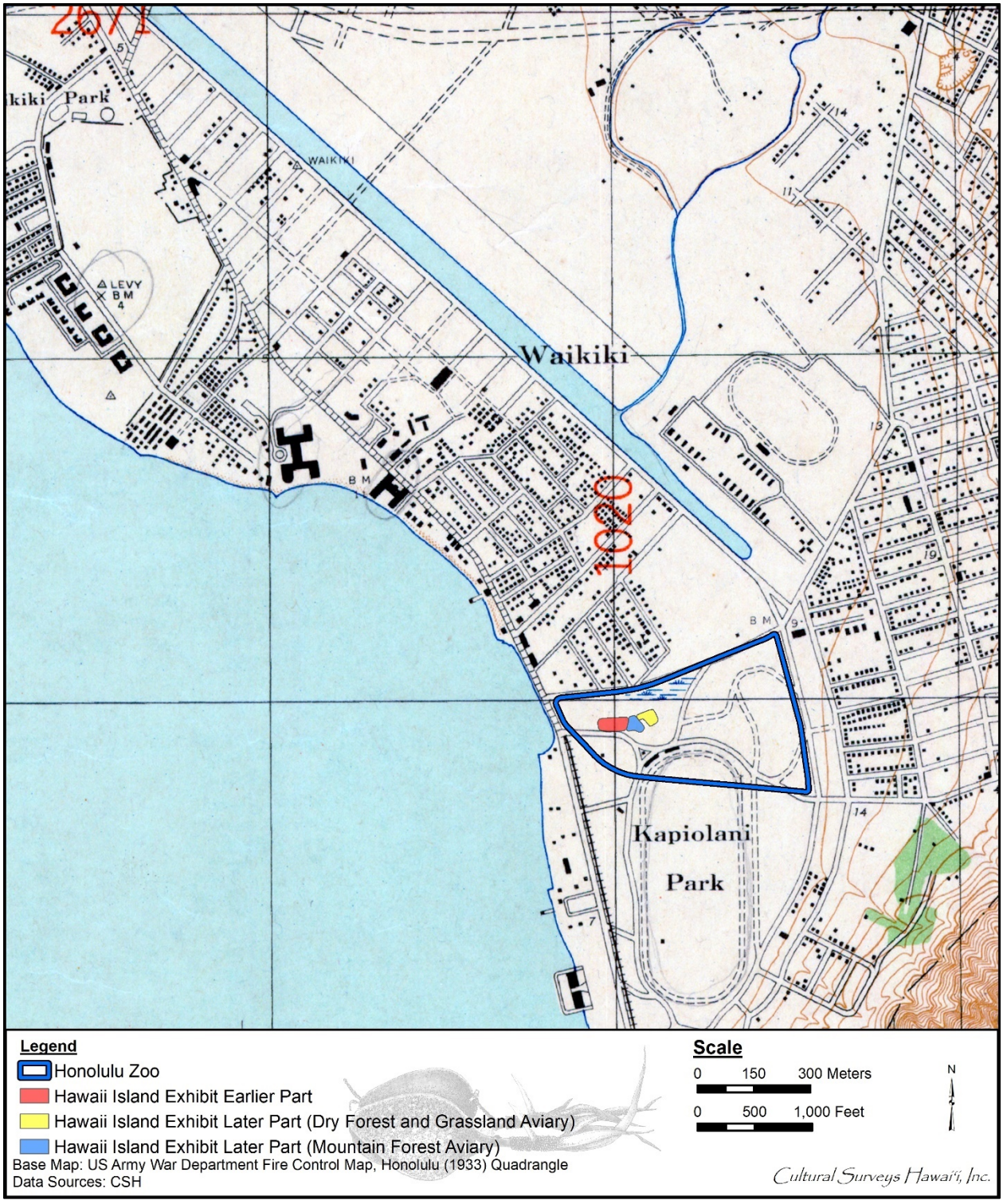

Figure 17. 1933 U.S. Army War Department fire control map, Honolulu quadrangle showing the project area(s)

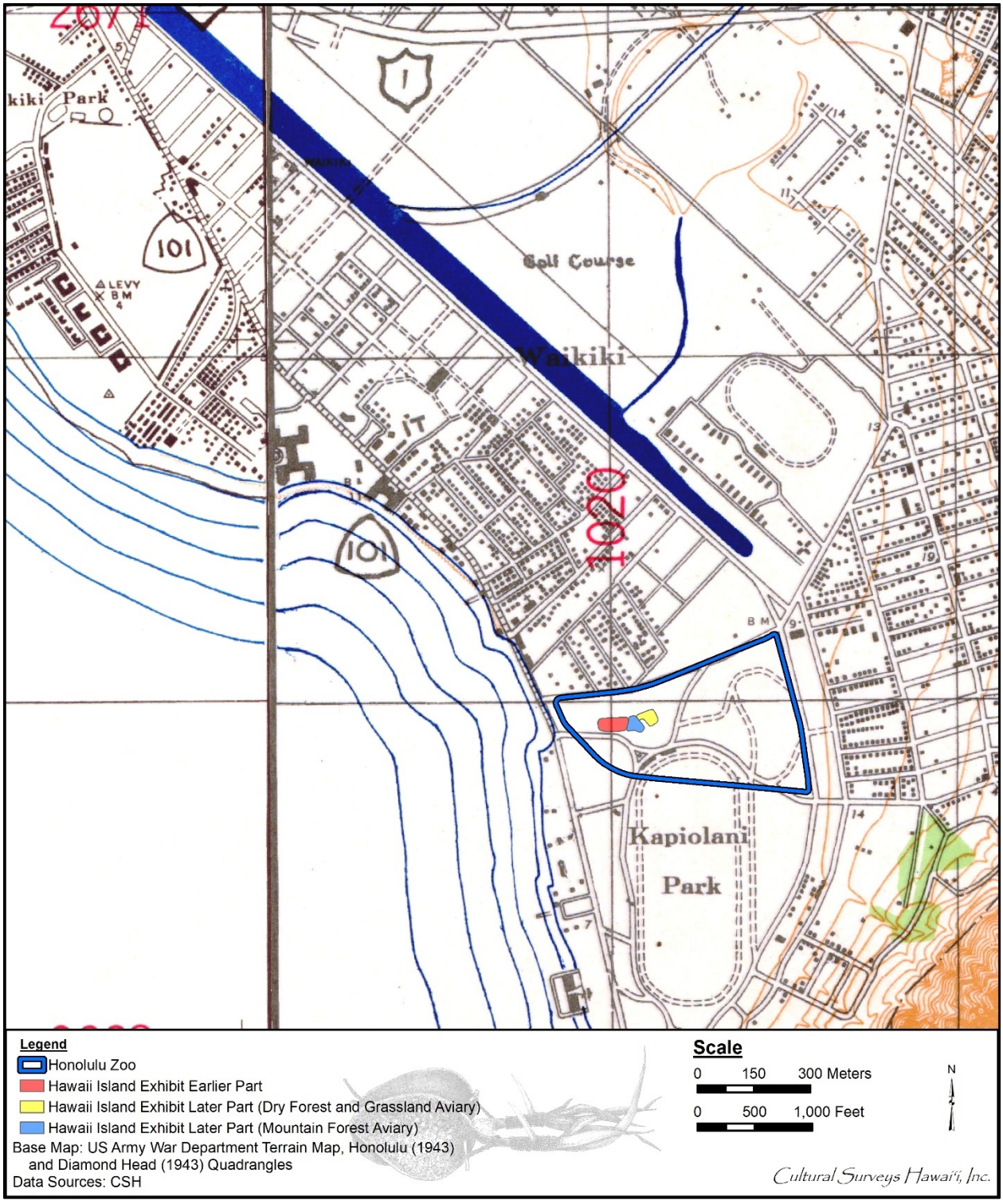

Figure 18. 1943 U.S. Army War Department terrain map, Honolulu and Diamond Head quadrangles showing project area(s)

increased through purchase, trade, and donations, was housed in newly constructed facilities, some of which still provide foundations for newer exhibits (Waikīkī.com 2014) (Figure 19). According to information provided by Paul Breese, the only current zoo structures that date to the 1940s or earlier are some birdcages (McDermott and Chiogioji 2001). The zoo has had a fairly dynamic program of redevelopment (compare Figure 19 through Figure 23).

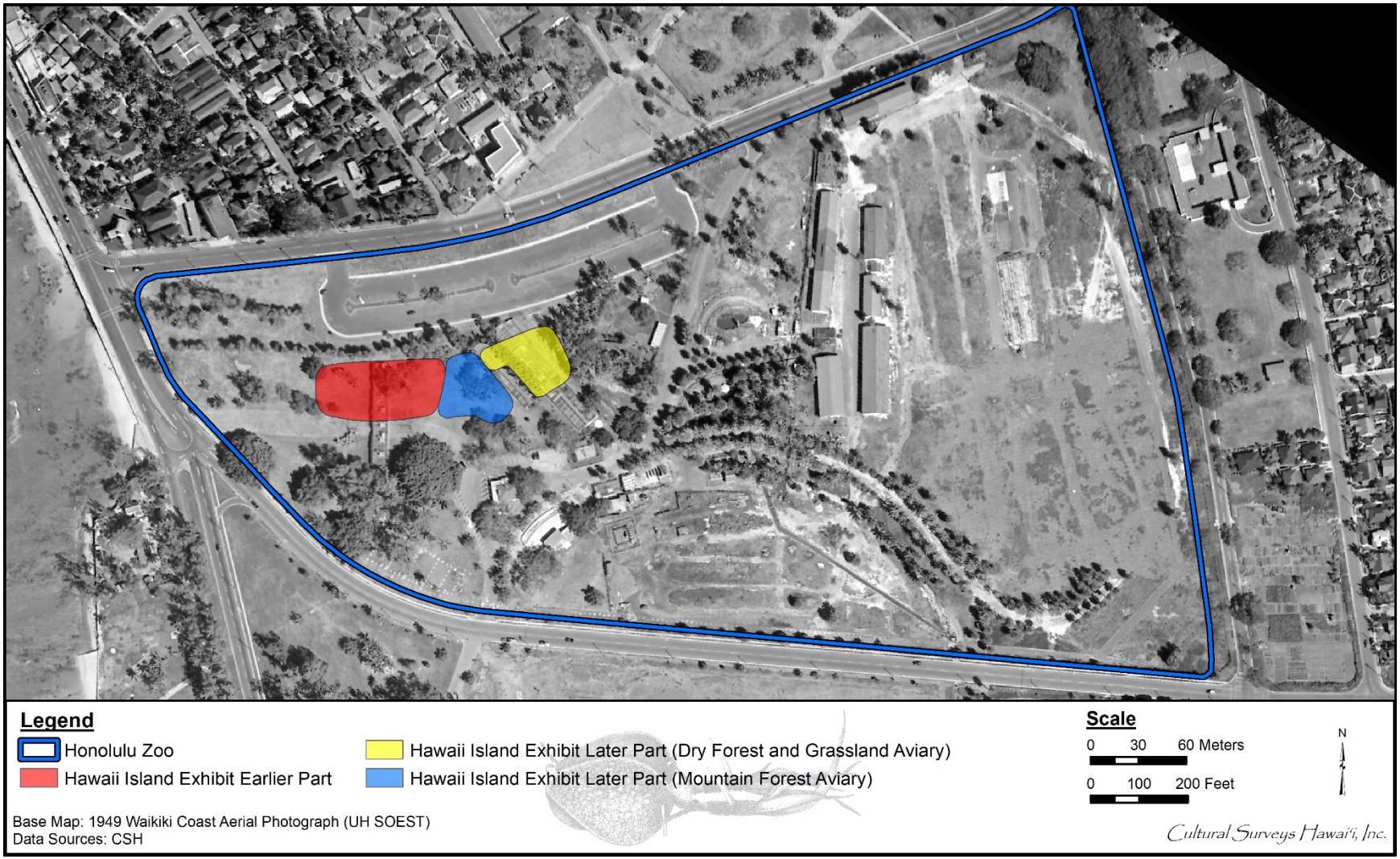

Figure 19. 1949 Waikiki Coast Aerial Photograph (UH SOEST) showing project area(s)

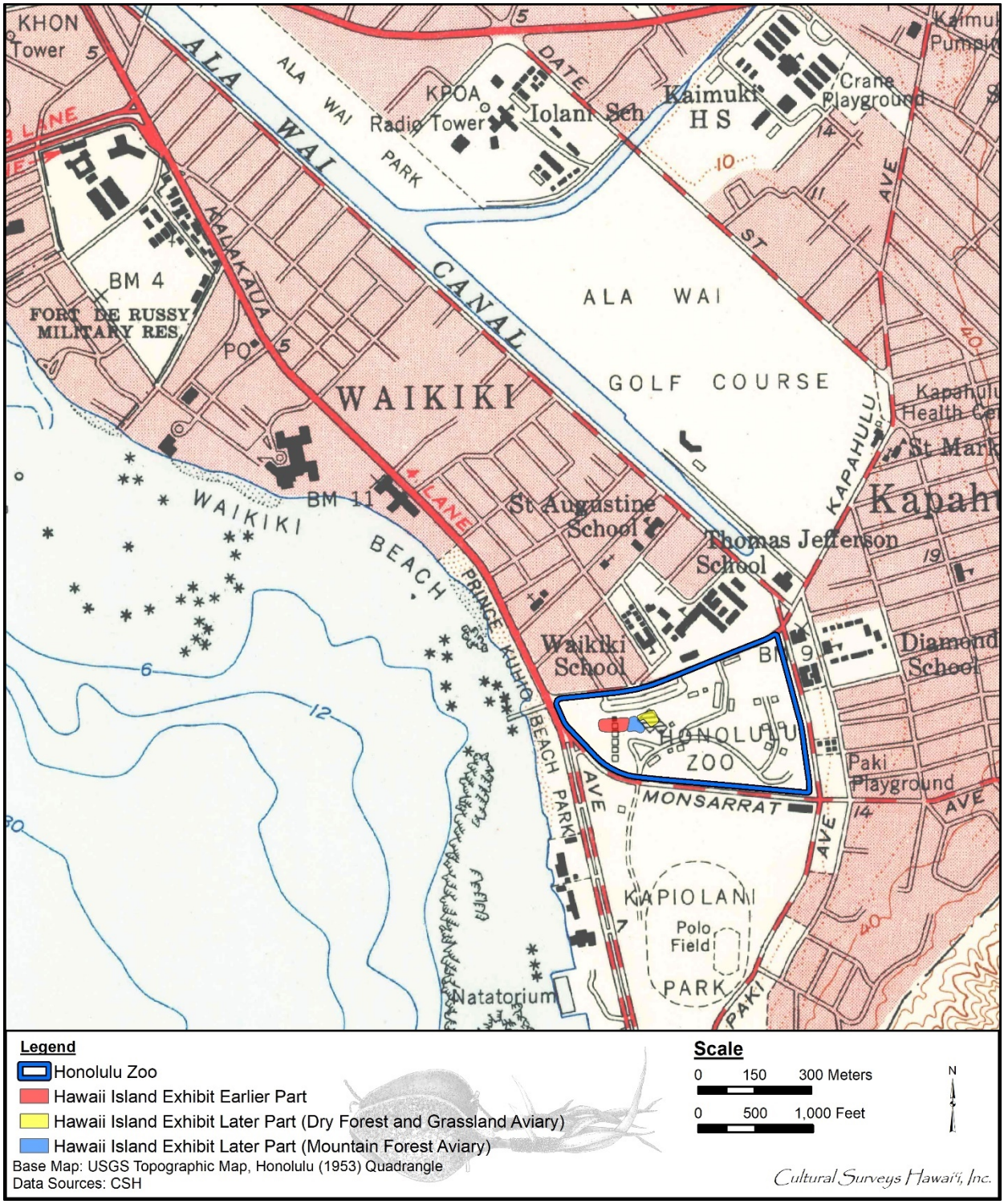

Figure 20. 1953 Honolulu USGS topographic quadrangle showing project area(s)

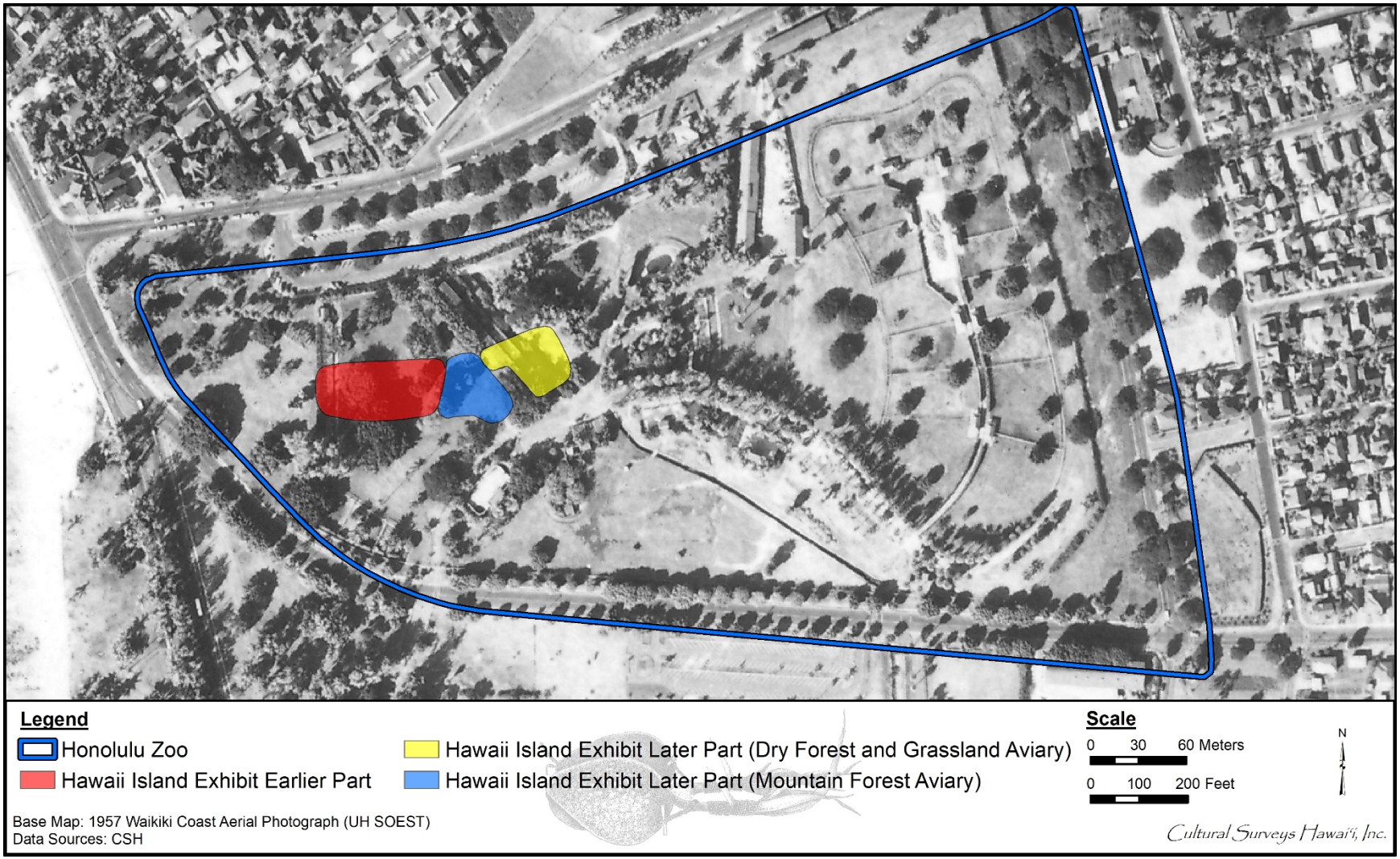

Figure 21. 1957 Waikiki Coast Aerial Photograph (UH SOEST) showing project areas

Figure 22. 1969 Waikiki Coast Aerial Photograph (UH SOEST) showing project areas

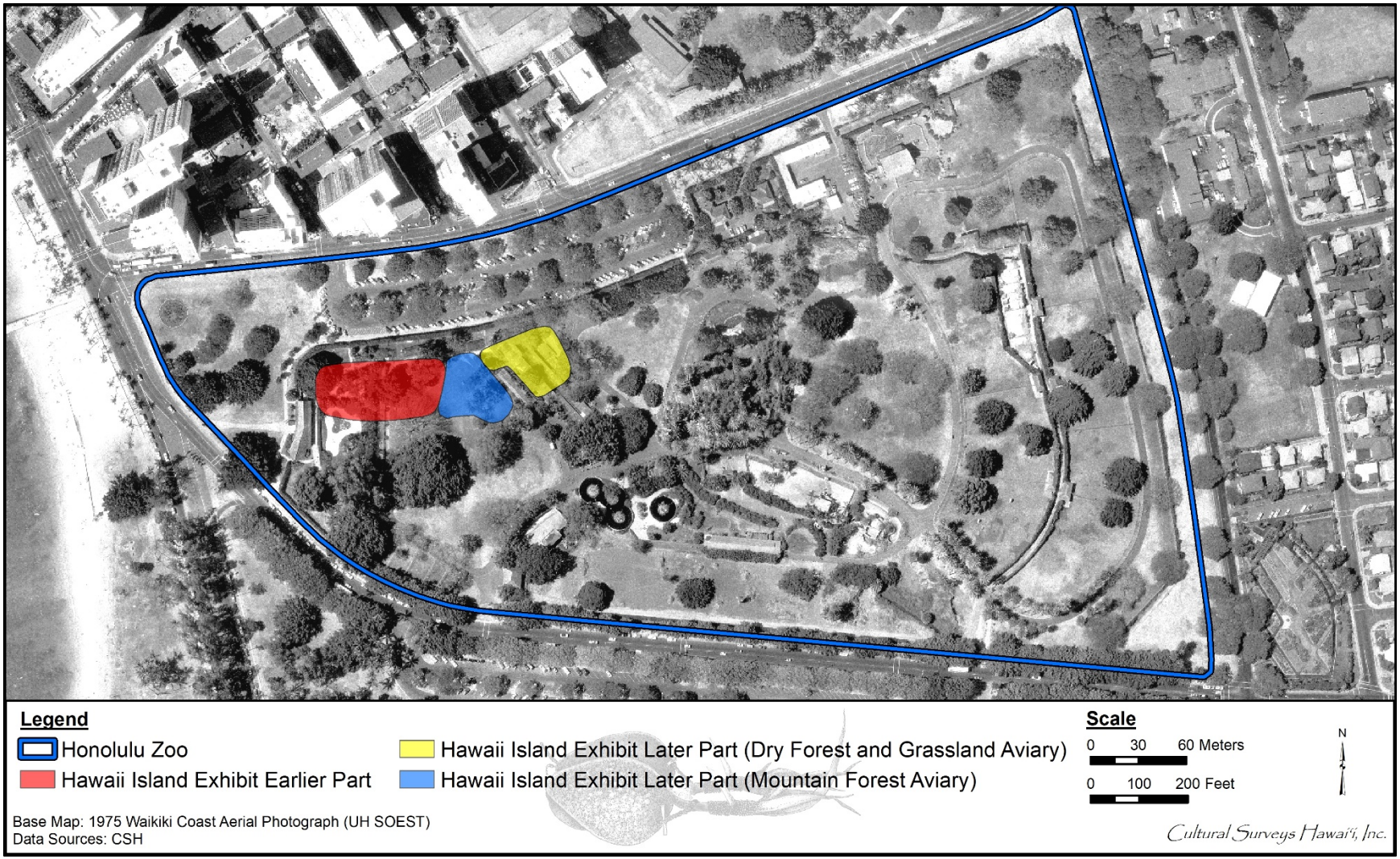

Figure 23. 1975 Waikiki Coast Aerial Photograph (UH SOEST) showing project area(s)

2.2 **Previous Archaeological Research**

2.2.1 Previous Archaeological Studies

The Honolulu Zoo is within SIHP # 50-80-14-9758, Kapi‘olani Park. Previous archaeological studies within the Honolulu Zoo boundaries are depicted on Figure 24 and are summarized in Table 1. Archaeological historic properties identified within the zoo parcel are depicted on Figure 25 and are presented in Table 2. Studies with significant findings are summarized below.

In 2013/2014, Pacific Consulting Services, Inc., reported on the results of archaeological monitoring at three locations within the zoo. Monitoring of entrance improvements (Walden et al. 2013) at the west end of the zoo resulted in the designation of a new historic property, SIHP # -7208, for 12 observed features resembling pits and post molds. Although the Walden et al. (2013) report documents archaeological monitoring at 23 designated profile locales, the 12 designated features were relatively closely clumped at just three profile locations (Profile Locales 9, 10, and 11).

No dating was established for these features, and it remains unclear if they are pre-Contact and/or date to the 1800s or 1900s. Three mundane twentieth century artifacts were recovered as well.

The Walden et al. monitoring report (2013) concluded that

> Based on the presence of these 12 features, it is likely that this site has the potential to yield additional information regarding the age and function of this site.
>
> The partial destruction of these features by these road improvement excavations has had an adverse impact on their integrity of location (see Hawaii Administrative Rules [HAR] 13-275-6); however, they likely still possess enough archaeological data to contain ‘information important in prehistory and history’ (HAR 13-275-6). Thus, Site 7208 is recommended eligible for the Hawai`i Register of Historic Places (NRHP) under Criterion D of HAR §13-275-6. As such, if future construction activities are scheduled to occur in the vicinity of the Honolulu Zoo’s entrance area, and within the vicinity of Site 7208, archaeological data recovery of remaining portions of Site 7208 is recommended. This work should focus on determining more precisely the age, horizontal extent, and function of this site, with the interpretations offered here to be used as working hypotheses. [Walden et al. 2013:70]

Monitoring in support of elephant enclosure construction (Mintmier et al. 2013) identified no new historic properties. Some 45 historic artifacts were recovered, consisting mostly of glass and ceramic fragments, the oldest of which appear to date to ca. AD 1900. Monitoring in support of parking lot improvements (Clark et al. 2014) identified one presumed post-Contact feature associated with the previously designated (see Walden et al. 2013) SIHP # -7208. The study concludes, “Because the subsurface features of Site 7208 are likely located on Makee Island, it is recommended that this site number now include Makee Island itself” (Clark et al. 2014:51). No artifacts were reported.

Subsequently, CSH (Farley and Hammatt 2018) reported on archaeological monitoring for a reptile exhibit at the zoo. Modest quantities of historic bottle glass and ceramics were observed in

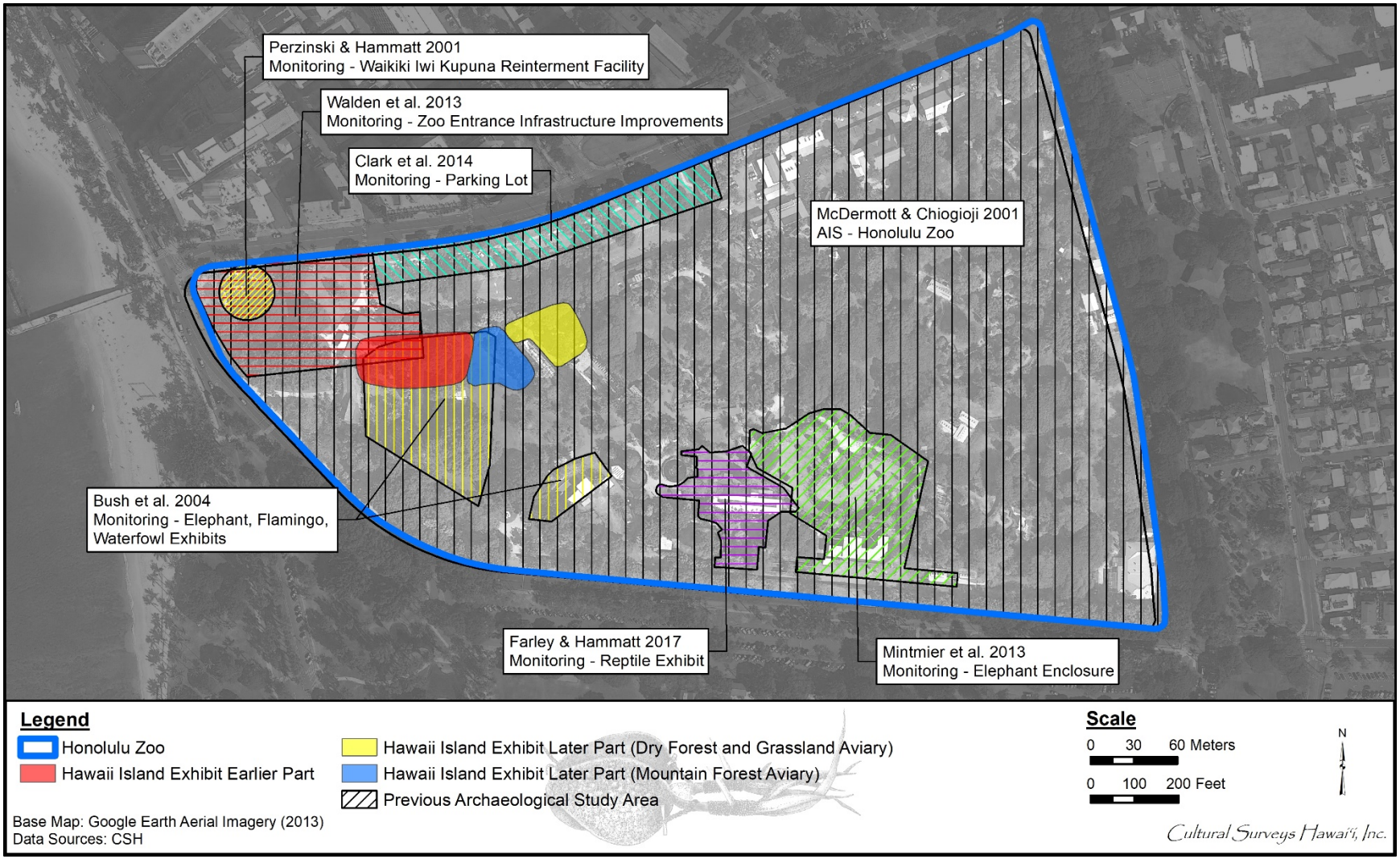

Figure 24. Previous archaeological studies within the Honolulu Zoo

Table 1. Previous archaeological studies in the Honolulu Zoo parcel

Reference	Type of Study	Location	Results (SIHP # 50-80-14****)
Perzinski and Hammatt 2001	Archaeological inventory survey (lack of finds reported as an archaeological assessment)	Honolulu Zoo parcel	No significant finds
McDermott and Chiogioji 2001	Archaeological inventory survey	Honolulu Zoo parcel	No significant finds
Bush et al. 2004	Archaeological monitoring	Portions of Honolulu Zoo parcel	No significant finds
Mintmier et al. 2013	Archaeological monitoring	Honolulu Zoo elephant enclosure	No traditional Hawaiian materials or features; a wide range of twentieth century artifacts (e.g., bottles, jars, tableware) observed
Walden et al. 2013	Archaeological monitoring	Honolulu Zoo entrance	Identified SIHP # -7208, consisting of 12 subsurface features for which chronological information is not available (may be pre-Contact pits and post molds but thought more likely to date to late 1800s or early 1900s)
Clark et al. 2014	Archaeological monitoring	Northern half of Honolulu Zoo parking lot	Identified one presumed post-Contact feature associated with previously designated SIHP # -7208 (see Walden et al. 2013 above)
Farley and Hammatt 2018	Archaeological monitoring	Honolulu Zoo Reptile House	Two additional components of existing SIHP # -9758, Kapi‘olani Park designated Feature 1, manhole containing a U.S. military communication line, and Feature 2, concrete culvert

Figure 25. Previously identified historic properties within the Honolulu Zoo

Table 2. Historic properties previously identified within the project area

SIHP # 50-80-14	Site Type/ Name	Source
-7208	Subsurface cultural deposit (pit features) and McKee’s Island	Walden et al. 2013, Clark et al. 2014
-9758	Kapi‘olani Park; infrastructure remnants identified within the south central portion of the zoo	Hawai‘i Register of Historic Places, Farley and Hammatt 2018

imported fill deposits; no traditional Hawaiian cultural material was observed. Gleyed silty clay sediment, likely associated with a former duck pond depicted on historic maps (see Figure 9), was observed above BOE in several excavations. Two additional components of existing SIHP # -9758, Kapi‘olani Park, were also identified. SIHP # -9758 Feature 1 is a manhole containing a U.S. military communication line, and SIHP # -9758 Feature 2 is a concrete culvert. No further archaeological investigation was recommended for the features.

2.2.1 Historic Properties Previously Described at the Zoo

SIHP # 50-80-14-7208

SIHP # 50-80-14-7208 was designated to include “12 downward extensions of Layer I grayish brown to very dark grayish brown loamy sand deposits into the very pale brown very fine to medium coral sands of Layer II” (Walden et al. 2013:68) These 12 features (depicted in Figure 26 and described in Table 3) were relatively close together in the west (*makai*) portion of the zoo and approximately 15 m northwest of the northwest corner of the present project area(s). The lead hypothesis was that these features “are located on Makee Island, and that they are associated with activities on the island, dating to the late 1800’s into the early 1900’s” (Walden et al. 2013:68).

The following year, Clark et al. (2014) used this site designation for an additional pit feature, identified in the west portion of the zoo parking lot along Kapahulu Avenue and sequentially numbered Feature 13 (depicted in Figure 27 and summarized sequentially in Table 3) identified and associated this designation with the entirety of the former Makee’s Island. The outline of Makee’s Island appears differently on different historic maps (see present Figure 8 through Figure 10, Figure 12, Figure 14 above, and Figure 15) and may have changed shape and size over time (being of the nature of a sandbar) but was approximately 50 m by 200 m.

Walden et al. (2013:70) concluded “Site 7208 is recommended eligible for the Hawai‘i Register of Historic Places (NRHP) under Criterion D of HAR §13-275-6” and Clark et al. (2014:52) concluded Makee Island can be considered significant under (HAR 13-275-6) Criteria a and b as well as d. The two studies are consistent in recommending that

> . . . if future construction activities are scheduled to occur in the vicinity of the Honolulu Zoo’s entrance area or parking lot, and within the vicinity of Site 7208, archaeological monitoring and sampling is recommended. This work should focus on determining more precisely the age, horizontal extent, and function of Site 7208, as well as the horizontal extent of Makee Island, with the interpretations offered here to be used as working hypotheses. [Clark et al. 2014:52]

SIHP # 50-80-14-9758

Two additional components of existing SIHP # -9758, Kapi‘olani Park, were identified in the Farley and Hammatt 2018 study. SIHP # -9758 Feature 1 is a manhole containing a U.S. military communication line, and SIHP # -9758 Feature 2 is a concrete culvert. No further archaeological investigation was recommended for the features.

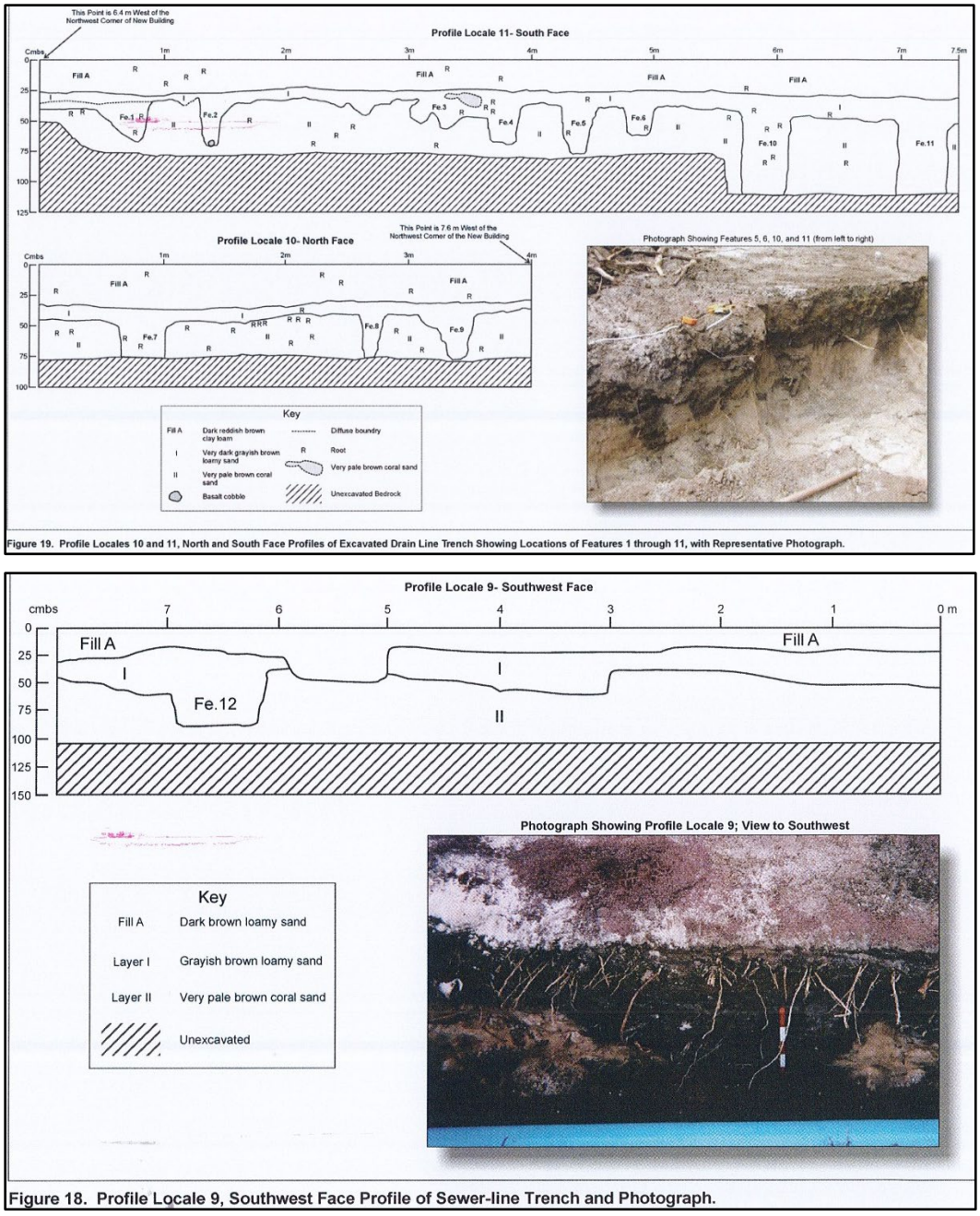

Figure 26. Views of designated SIHP # -7208 features (Features 1 through 6, 10, and 11 at Profile Locale 11; Features 7 through 9 at Profile Locale 10; and Feature 12 in Profile Locale 9) (adapted from Walden et al. 2013:37, 38)

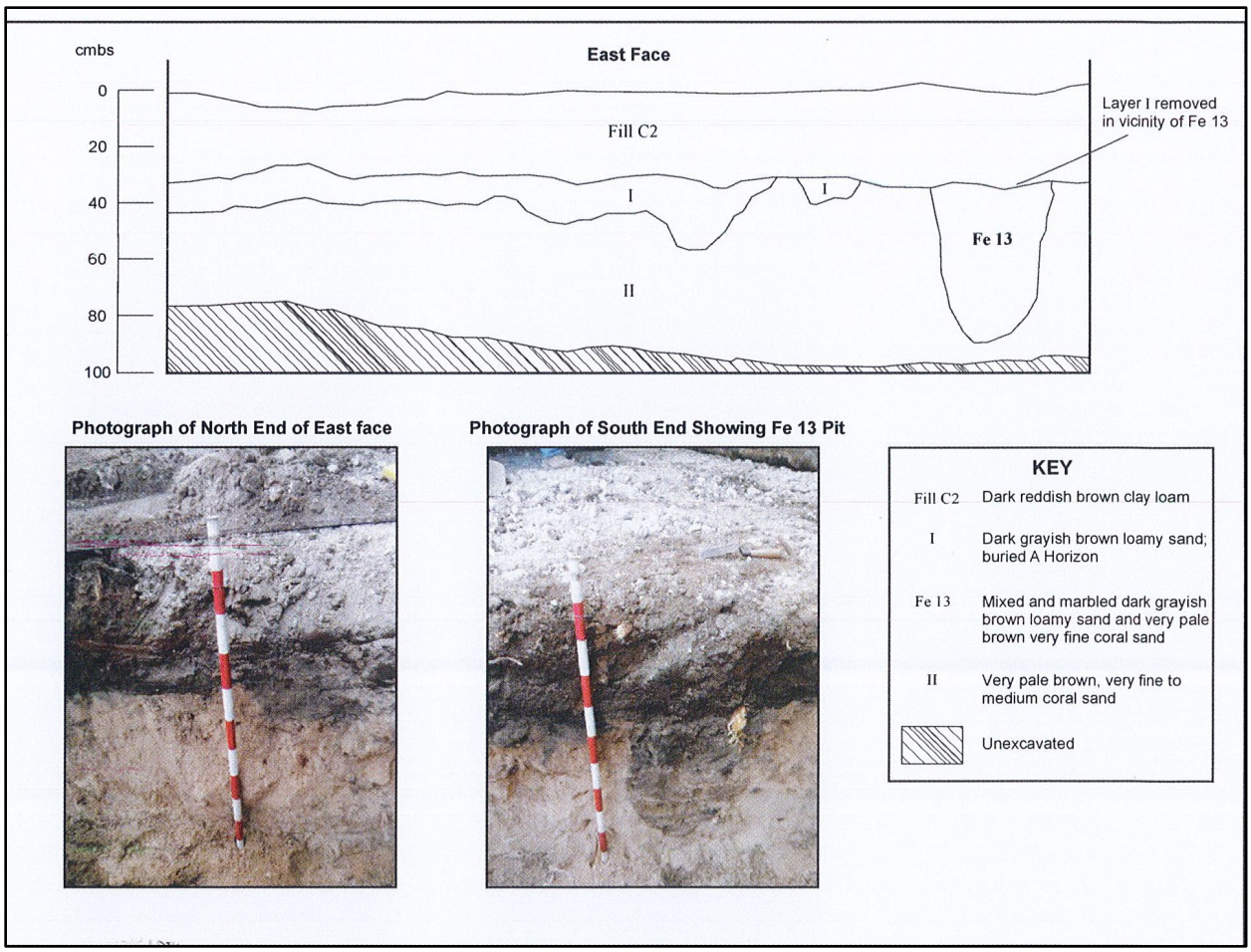

Figure 27. Profile of designated SIHP # -7208 Feature13 in Profile Locale 6 in the west half of the Honolulu Zoo parking lot (from Clark et al. 2014:33)

Table 3. Summary of SIHP # 50-80-14-7208 Features (Features 1–12 adapted from Walden et al. 2013:40, 41; accounts of designated Features 13 and Makee Island adapted from Clark et al. 2014:33, 34)

Feature No.	Feature Type	Trench/PL No./Layer/ Depth Range (cmbs)	Maximum Size (cm)	Comments
1	Possible pit	North face of DT/PL11/Layer I 30.0-66.0	44.0 x 36.0	Extends 36.0 cm into Layer II; base of feature roughly pointed; east side of pit slopes to north; north side nearly vertical; fill is very dark grayish brown (10YR 3/2, moist) loamy sand with charcoal flecking at base, and includes mixed Layer I and Layer II sediments; no artifacts or faunal remains observed
2	Possible post mold	North face of DT/PL11/Layer I 30.0-68.0	24.0 x 38.0	Extends 38.0 cm into Layer II; base is flat and contains sparse charcoal and a basalt cobble; both sides nearly vertical; fill is very dark grayish brown (10YR 3/2, moist) loamy sand, and includes mixed Layer I and Layer II sediments; no artifacts or faunal remains observed
3	Unknown	North face of DT/PL11/Layer I 34.0-54.0	45.0 x 17.0	Consists of two, small adjacent downward extensions; easternmost measures 20.0 x 15.0 cm and has a sloping, roughly pointed base; westernmost measures 18.0 x 14.0 cm and has a more rounded base; fill in both extensions is very dark grayish brown (10YR 3/2, moist) loamy sand, and includes mixed Layer I and Layer II sediments; an isolated mottle of very pale brown sand present near top of this feature; no charcoal, artifacts or faunal remains observed
4	Possible post mold	North face of DT/PL11/Layer I 35.0-68.0	30.0 x 33.0	Extends 33.0 cm into Layer II; base is roughly flat and slopes slightly to the west; both sides nearly vertical but slope inward slightly; fill is very dark grayish brown (10YR 3/2, moist) loamy sand, and includes mixed Layer I and Layer II sediments; no charcoal, artifacts or faunal remains observed
5	Possible post mold	North face of DT/PL11/Layer I 35.0-74.0	30.0 x 43.0	Extends 33.0 cm into Layer II; base is flat; both sides nearly vertical but slope inward slightly; fill is very dark grayish brown (10YR 3/2, moist) loamy sand, and includes mixed Layer I and Layer II sediments; no charcoal, artifacts or faunal remains observed

Feature No.	Feature Type	Trench/PL No./Layer/ Depth Range (cmbs)	Maximum Size (cm)	Comments
6	Possible pit	North face of DT/PL11/Layer I 35.0-58.0	28.0 x 23.0	Extends 23.0 cm into Layer II; base is flat; both sides nearly vertical but slope inward slightly; fill is very dark grayish brown (10YR 3/2, moist) loamy sand, and includes mixed Layer I and Layer II sediments; no charcoal, artifacts or faunal remains observed; similar to Feature 4
7	Possible pit	South face of DT/PL10/Layer I 35.0-58.0	45.0 x 26.0+	Extends 26.0 cm into Layer II; base of feature not reached during excavation of DT; sides nearly vertical in upper portions; fill is very dark grayish brown (10YR 3/2, moist) loamy sand, and includes mixed Layer I and Layer II sediments; no charcoal, artifacts or faunal remains observed
8	Possible post mold	South face of DT/PL10/Layer I 40.0-74.0+	15.0 x 35.0	Extends 35.0 cm into Layer II; base of feature not reached during excavation of DT; sides nearly vertical; fill is very dark grayish brown (10YR 3/2, moist) loamy sand, and includes mixed Layer I and Layer II sediments; sparse charcoal present; no artifacts or faunal remains observed
9	Pit	South face of DT/PL10/Layer I 35.0-74.0	40.0 x 35.0	Extends 35.0 cm into Layer II; base of feature is rounded; sides slope inward; fill is very dark grayish brown (10YR 3/2, moist) loamy sand, and includes mixed Layer I and Layer II sediments; sparse charcoal present; no artifacts or faunal remains observed
10	Pit	North face of DT/PL11/Layer I 40.0-115.0+	40.0 x 66.0+	Extends 66.0+ cm into Layer II; base of feature was not reached; sides nearly vertical; upper portions of fill are very dark grayish brown (10YR 3/2, moist) loamy sand and includes mixed Layer I and Layer II deposits; lower portions of fill are very pale brown (10YR 6/3, dry) very fine to medium coral sand and include Layer II sediments; no charcoal, artifacts or faunal remains observed

Feature No.	Feature Type	Trench/PL No./Layer/ Depth Range (cmbs)	Maximum Size (cm)	Comments
11	Pit	North face of DT/PL11/Layer I 45.0-115.0+	45.0 x 68.0+	Extends 66.0+ cm into Layer II; base of feature not reached; sides are nearly vertical; upper portions of fill are very dark grayish brown (10YR 3/2, moist) loamy sand and includes mixed Layer I and Layer II deposits; lower portions of fill are very pale brown (10YR 6/3, dry) very fine to medium coral sand and include Layer II sediments; no charcoal, artifacts or faunal remains observed
12	Unknown	Southeast face ST/PL9/Layer I 41.0-87.5	65.0 x 54.0	Extends from 30.0 to 49.0 cm into Layer II base of feature is fairly flat; sides are nearly vertical; top of feature slopes; feature fill consists of grayish brown loam sand with sparse charcoal flecking
13	Subsurface pit	PL 6 in east face of water line trench in west half of zoo’s parking lot	Ranges from 33.0 to 41.0 cm wide and 55.0 cm deep	Subsurface pit with a rounded base, no subsurface archaeological materials (artifacts faunal/floral remains) observed in the feature fill
Former “Makee’s Island”	Former island in a watercourse	Zoo’s parking lot	Size and shape differ on different historic maps but approx. 50 m by 200 m	Because subsurface features of Site 7208 are likely located on Makee Island, it is recommended that this site number now include Makee Island itself. Through their research, Weyeneth (1999; 2002) and de Silva (2009) have demonstrated that this island is 1. associated directly with the creation and development of Kapi‘olani Park; 2. indirectly and directly associated with the lives of persons important to Hawai‘i’s past (King David Kalākaua, James Makee, Archibald Cleghorn to name a few); and 3. indirectly associated with activities that occurred after the overthrow of the Hawaiian Kingdom (soldiers of the new republic conducting training exercises on Makee Island) as such, Makee Island can be considered significant under Criteria a and b as well as d

Section 3 Field Inspection Results

A brief field inspection was carried out by David W. Shideler, M.A. on December 20, 2019. An archaeologists track log is presented in Figure 28. Access to the project area was via the main entrance to the Honolulu Zoo; with the project area extending immediately *mauka* (east) from the zoo entrance and gift shop area (Figure 29). The *makai* ("Hawaii Island Exhibit Earlier Part") and central ("Hawaii Island Exhibit Later Part: Mountain Forest Aviary") project areas lie on the south side of a main concrete access path. The *mauka*-most ("Hawaii Island Exhibit Later Part: Dry Forest and Grassland Aviary) project area lies mostly to the south of this path but also includes a present (relatively undeveloped) exhibit area on the north (Kapahulu Avenue) side of the path (Figure 30). Significant portions of the project area are within existing developed exhibits (Figure 31) but large portions of the project area are in relatively undeveloped Hawaiian garden (Figure 32) or lawn (Figure 33 and Figure 34) areas.

Nothing suggestive of a pre-Zoo historic property was observed. Most of the walkways, curb, guideway fencing (Figure 31), and Hawaiian garden (Figure 32 and Figure 34) infrastructure appeared to be less than fifty years old. Some of the cage foundations (Figure 31) may well be over fifty years old and a feature of a potential Honolulu Zoo historic property (as potentially distinct from a Kapi‘olani Park historic feature).

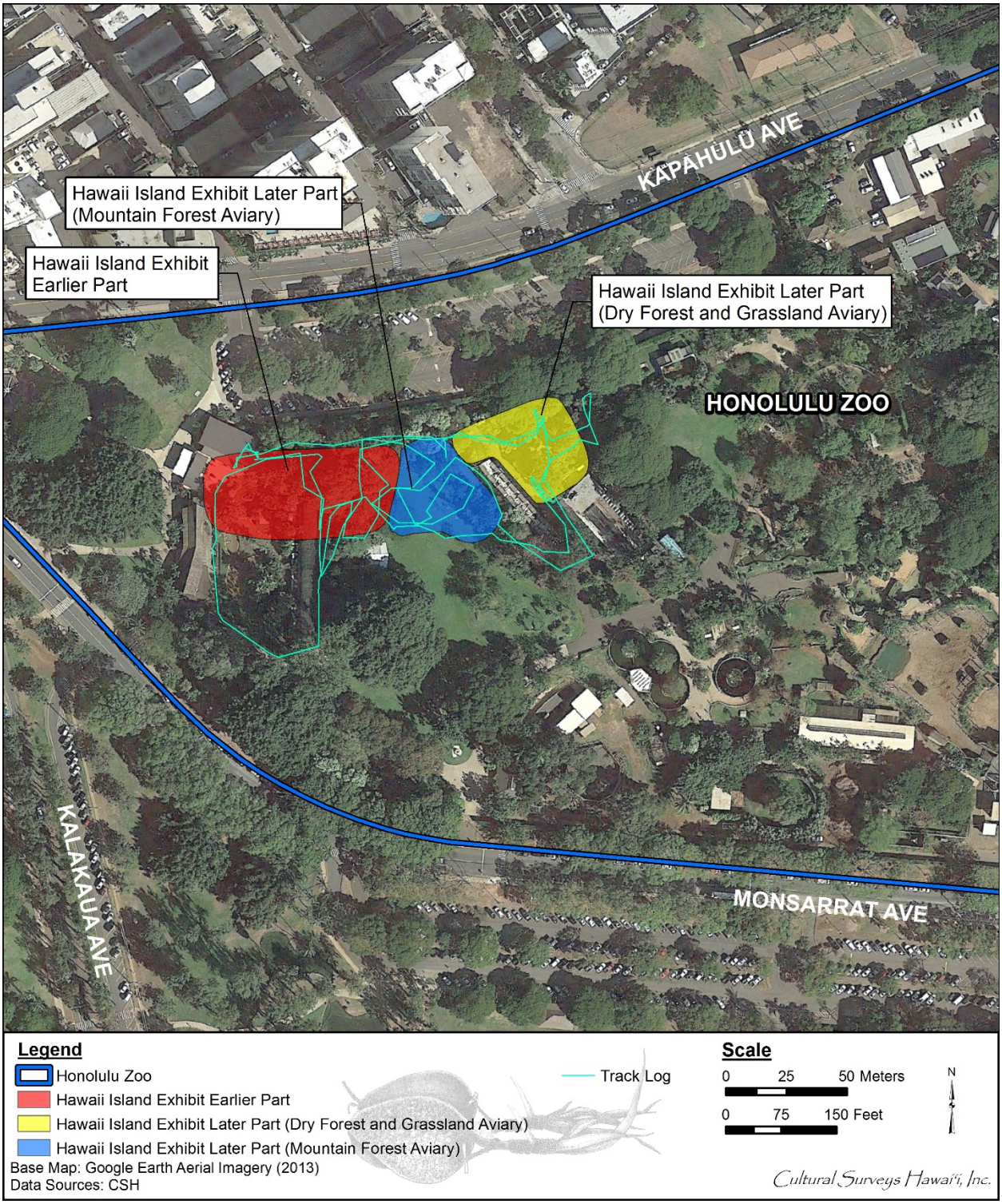

Figure 28. Archaeologist’s tracklog

Figure 29. General view of the (*makai*) “Hawaii Island Exhibit Earlier Part” portion of the Honolulu Zoo project area from the northwest corner (from the entrance and gift shop area), view to east

Figure 30. General view of the (*mauka*) “Hawaii Island Exhibit Later Part (Dry Forest and Grassland Aviary)” portion of the Honolulu Zoo project area from the north east corner, view to west

Figure 31. View of typical concrete path, curbs, and older cages within the project area

Figure 32. General view of the (central) “Hawaii Island Exhibit Later Part (Mountain forest Aviary)” portion of the Honolulu Zoo project area from the central north side, view to south

Figure 33. General view of the southern portion of the project area, view to northwest

Figure 34. General view of the central portion of the project area, view to northwest .

Section 4 Summary and Recommendations

4.1 Summary and Evaluation

During pre-Contact times, the *ahupua‘a* of Waikīkī was an intensely utilized area with abundant natural and cultivated resources that supported a large population. In the nineteenth and early twentieth centuries, after a period of depopulation, Waikīkī was reanimated by Hawaiians and foreigners residing there. In the 1920s, the construction of the Ala Wai Canal drained the remaining ponds and irrigated fields to make way for urban development. During this time, the former ponds at the northwest end of Kapi‘olani Park (present-day Honolulu Zoo) were also filled (see Figure 16).

Kapi‘olani Park, SIHP # -9758, was constructed in 1877. Although intended as a recreational area, the park was utilized by military personnel in the late nineteenth and early twentieth centuries. An NRHP form was prepared in 1992 (included here as Appendix A). Aspects that contribute to the significance of the park are discussed but specific feature designations were not made at the time of historic property designation.

SIHP # -9758 Feature 1, identified by Farley and Hammatt (2018), is a manhole associated with a military communication line. Therefore, it is possible additional features and/or subsurface deposits associated with U.S. military activity exist within the Honolulu Zoo, including possibly within the current project area. These deposits may include trash pits and postholes among fire pits.

In addition, recent studies (Clark et al. 2014; Walden et al. 2013) have identified 13 subsurface features assigned under a new historic property designation, SIHP # -7208. These features comprise pits and post molds, although their dating remains unclear. Walden et al. 2013 concluded that “Site 7208 is recommended eligible for the Hawai‘i Register of Historic Places (HRHP) under Criterion D of HAR §13-275-6” and Clark et al. (2014:52) included the entirety of the former Makee’s Island under this designation and concluded, “Makee Island can be considered significant under (HAR 13-275-6) criteria ‘a’ and ‘b’ as well as ‘d’.”

Based on background research and previous archaeological studies, pre- and post-Contact subsurface historic properties may exist within the project area. Evidence of pre-Contact land use may include, but not be limited to, human burials, midden deposits, and artifacts. Evidence of post-Contact land use may include human burials, trash pits, privies, roadways, building foundations, and remnants of former infrastructure. Historical maps also indicate the project area is within the margins of a former duck pond. Gleyed sediment interpreted as pond sediment was identified in several excavations by Farley and Hammatt (2018); hence, pond sediment is also anticipated for the current project area(s).

4.1.1 Ramifications of the Project Area being within Kapi‘olani Park, SIHP # 50-80-14-9758

This study documents that the project area (and the entire Honolulu Zoo) is within Kapi‘olani Park designated as SIHP # -9758 for which an NRHP form was prepared in 1992 (included here as Appendix A). No other historic properties have been identified in the project area per se.

While not using the phrase character-defining features contributing elements, the NRHP form discusses a number of aspects that contribute to the significance of the park. These are summarized below with a discussion of the impacts of the proposed project:

- Outdoor recreation The zoo project(s) contribute to the vitality of the zoo as animal habitat supporting the zoo as a premier locus of outdoor recreation within Kapi‘olani Park.
- Association with the Royal Hawaiian Band The project(s) will have no anticipated impact on the performances of the Royal Hawaiian Band.
- Art mart at the zoo fence The project(s) will have no anticipated impact on the art mart at the zoo fence.
- The (reconstructed) Honolulu Rapid Transit shelter The project(s) will have no anticipated impact on the Honolulu Rapid Transit shelter (located at some distance).
- The Dillingham fountain The project(s) will have no anticipated impact on the Dillingham fountain (located at some distance).
- Splendid (central) open space The NRHP form acknowledges the splendid open space is particularly in the central portion of the park. The project(s) will have no anticipated impact on the open space of the park.
- Long oval race course Traces of the long oval race course alignment are discernible within the Honolulu Zoo but the project(s) will have no anticipated impact on the oval race course alignment.
- The Waikīkī-end waterscape As the NRHP form notes, the 1928 construction of the Ala Wai cut off the fresh water streams. There are no natural waterscapes left. The re-creation of waterscapes within the present project will return some of this ambiance.
- At the Diamond Head end the geometric pattern of winding carriage roads The project(s) will have no anticipated impact on the pattern of carriage roads (located at some distance).
- Kalākaua Avenue with mature ironwood trees The project(s) will have no anticipated impact on Kalākaua Avenue with mature ironwood trees (located at some distance).
- The aquarium, athletic fields, bandstand, food concessions, beach park, and bath house The project(s) will have no anticipated impact on these park amenities.
- Waikīkī war memorial/Natatorium The project(s) will have no anticipated impact on the Waikīkī war memorial/Natatorium.
- The Kodak Hula Show A distant memory.
- Date palms The project(s) will have no anticipated impact on date palms.
- Bouganvillea at the Kapi‘olani Beach Center The project(s) will have no anticipated impact on the bouganvillea at the Kapi‘olani Beach Center.
- Views of Diamond Head The project(s) will have no, or minimal, anticipated impact on the views of Diamond Head.

For the reasons enumerated above, the conclusion of this study is that the proposed project will have no adverse effect on the designated SIHP # -9758 Kapi‘olani Park.

4.1.2 Ramifications of Designations of SIHP # 50-80-14-7208 (including Makee’s Island)

While the Clark et al. (2014) and Walden et al. (2013) studies have identified 13 subsurface features assigned under historic property designation SIHP # -7208, this site designation was expanded to include the entirety of the former Makee’s Island. This historic property has been recommended eligible for listing on the Hawai‘i Register of Historic Places (NRHP) under Criterion D of HAR §13-275-6 and Clark et al. (2014:52) included the entirety of the former

Makee's Island under this designation and concluded, "Makee Island can be considered significant under (HAR 13-275-6) criteria 'a' and 'b' as well as 'd'."

The location of the pit features designated as component features of SIHP # -7208 are understood as all outside (to the northwest and north) of the present project area (see Figure 25). The inclusion of the former Makee Island under this historic property is somewhat problematic as maps differ in portraying its location and configuration, which likely changed over time. Most maps (see the 1893 map, Figure 12) indicate it was exclusively north of the present project area in what is now Kapahulu Avenue and the main Honolulu Zoo parking lot. Our overlays on the relatively detailed 1883 map (see Figure 10) suggest a very slight overlap.

We conclude there was no overlap of the present project area with the identified pit features of SIHP # -7208 and that there was little, if any, overlap with the former Makee Island component of SIHP # -7208.

4.2 **Recommendations**

The two studies are consistent in recommending that

> . . . if future construction activities are scheduled to occur in the vicinity of the Honolulu Zoo's entrance area or parking lot, and within the vicinity of Site 7208, archaeological monitoring and sampling is recommended. This work should focus on determining more precisely the age, horizontal extent, and function of Site 7208, as well as the horizontal extent of Makee Island, with the interpretations offered here to be used as working hypotheses. [Clark et al. 2014:52]

It is understood that the SHPD was in accord with these recommendations in accepting these studies. It is suggested that the present project area(s) are in the vicinity of the Honolulu Zoo's entrance area or parking lot and that thus archaeological monitoring is appropriate.

This is consistent with a city determination (under HAR 13-275-7[a]) of "No historic properties affected." A recommendation of an archaeological monitoring program for the purpose of identification is indicated in order to conform with the (SHPD-accepted) prior recommendation (noted above). If monitoring could define that the north side of the project area is fill to the water table (and hence is south of the former Makee Island), then that may be grounds for suggesting future excavations in the vicinity need to be accompanied by on-site monitoring.

Initial monitoring would serve to better document the present zoo exhibit layout – some components of which may well be more than fifty years old.

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NRHP Registration Form Kapiolani Park

NPS Form 10-900
(Oct. 1990)

OMB No. 10024-0018

United States Department of the Interior
National Park Service

National Register of Historic Places Registration Form

COPY

ORIGINAL

This form is for use in nominating or requesting determinations for individual properties and districts. See instructions in *How to Complete the National Register of Historic Places Registration Form* (National Register Bulletin 16A). Complete each item by marking "x" in the appropriate box or by entering the information requested. If an item does not apply to the property being documented, enter "N/A" for "not applicable." For functions, architectural classification, materials, and areas of significance, enter only categories and subcategories from the instructions. Place additional entries and narrative items on continuation sheets (NPS Form 10-900a). Use a typewriter, word processor, or computer, to complete all items.

1. Name of Property

historic name Kapiolani Park

other names/site number Kaneloa; Kapua

2. Location

street & number 3833 Paki Avenue ☐ not for publication

city or town Honolulu ☐ vicinity

state Hawaii code HI county Honolulu code 003 zip code 96815

3. State/Federal Agency Certification

As the designated authority under the National Historic Preservation Act, as amended, I hereby certify that this ☐ nomination ☐ request for determination of eligibility meets the documentation standards for registering properties in the National Register of Historic Places and meets the procedural and professional requirements set forth in 36 CFR Part 60. In my opinion, the property ☐ meets ☐ does not meet the National Register criteria. I recommend that this property be considered significant ☐ nationally ☐ statewide ☐ locally. (☐ See continuation sheet for additional comments.)

Signature of certifying official/Title Date

State of Federal agency and bureau

In my opinion, the property ☐ meets ☐ does not meet the National Register criteria. (☐ See continuation sheet for additional comments.)

Signature of certifying official/Title Date

State or Federal agency and bureau

4. National Park Service Certification

I hereby certify that the property is: Signature of the Keeper Date of Action

☐ entered in the National Register.
☐ See continuation sheet.

☐ determined eligible for the National Register
☐ See continuation sheet.

☐ determined not eligible for the National Register.

☐ removed from the National Register.

☐ other, (explain:) _____

Kapiolani Park
Name of Property

Honolulu, HI
County and State

5. Classification

Ownership of Property
(Check as many boxes as apply)

- ☐ private
- ☐ public-local
- ☒ public-State
- ☐ public-Federal

Category of Property
(Check only one box)

- ☐ building(s)
- ☐ district
- ☒ site
- ☐ structure
- ☐ object

Number of Resources within Property
(Do not include previously listed resources in the count.)

Contributing	Noncontributing	
0	4	buildings
1	0	sites
0	10	structures
2	4	objects
3	18	Total

Name of related multiple property listing
(Enter "N/A" if property is not part of a multiple property listing.)

N/A

Number of contributing resources previously listed in the National Register

1

6. Function or Use

Historic Functions
(Enter categories from instructions)

LANDSCAPE: park
RECREATION AND CULTURE: outdoor recreation

Current Functions
(Enter categories from instructions)

LANDSCAPE: park
RECREATION AND CULTURE: outdoor recreation

7. Description

Architectural Classification
(Enter categories from instructions)

N/A

Materials
(Enter categories from instructions)

foundation N/A
walls N/A
roof N/A
other N/A

Narrative Description
(Describe the historic and current condition of the property on one or more continuation sheets.)

NPS Form 10-900-a
(8-86)

OMB Approval No. 1024-0018

United States Department of the Interior
National Park Service

National Register of Historic Places Continuation Sheet

Section number 7 Page 1

Kapiolani Park
Honolulu, HI

Description

Kapiolani Park is a recreational open space of 160 acres located on the southern coast of the island of Oahu, three and one half miles south southeast of downtown Honolulu. It is situated between the world famous Waikiki Beach resort area and the equally well known Diamond Head State Monument and the National Natural Landmark. Since the time of Western contact with the Hawaiian Islands, the Kapiolani Park area has been in continuous use as a location for recreational activities. It offers a strip of beach along the shore, backed by an extensive flat hinterland. This topography coupled with Hawaii's mild climate encourages a wide variety of outdoor activities throughout the year.

Moving inland away from the beach, the park was originally a sandy plain with sparse vegetation. At the Waikiki end, however, streams created a swampy marshland. By the 1890s an estimated ten thousand tree (mostly ironwood, but also kiawe, banyan, coconut palm, date palm, cypress, mimosa, monkey pod and umbrella) had been planted throughout the park, and the swampy section had been modified by drains and canals to create a pleasing water landscape of ponds, lagoons and islands. The landscape design of the park at this time consisted of three major components. Dominating the layout was the mile long oval of the race track with associated buildings. At the Waikiki end was the previously described waterscape. At the Diamond Head end was a geometric pattern of winding carriage roads. Surrounding all the above were the homes of many wealthy and prominent people.

Over the years the park has evolved to become the major urban park in Honolulu. Today, a sandy, safe beach extends south southeast from the groin at the foot of Kapahulu Avenue, past the popular Waikiki Aquarium to the Waikiki Natatorium and beyond until a cluster of hotels is reached. Inland and parallel to the beach is Kalakaua Avenue, a boulevard bordered by rows of mature ironwood trees, certainly one of the most unique features of the park. Continuing inland is the informal bandstand with food concession and restrooms behind (on the Monsarrat Avenue

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(8-86)

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United States Department of the Interior
National Park Service

National Register of Historic Places Continuation Sheet

Section number 7,8 Page 2

Kapiolani Park
Honolulu, HI

Description (continued)

side). The Royal Hawaiian Band, the oldest municipal band in the country, has played at the park since its dedication in 1877. The band has outlasted three different bandstands and is still going strong with concerts every Sunday. This is one of the most popular recreational entertainments for visitors and residents alike. Trees shade the bandstand area and another double row of ironwoods lies beyond. Then a large grassy expanse leads to the Waikiki Shell amphitheater which hosts a variety of entertainment. To the north, across Monsarrat Avenue from the bandstand/shell parking lot is the Honolulu Zoo. An art mart is held along the Monsarrat Avenue zoo fence every weekend. This is another pleasure for visitors and residents. The far north side of the zoo is bounded by another parking lot and by Kapahulu Avenue which marks the start of the intensely developed Waikiki hotel zone. Continuing inland beyond the shell, the park extends past Paki Avenue and ends at Leohi Avenue. Moving south from the shell one encounters a golf driving range and extensive athletic fields. The Diamond Head Tennis Center protrudes toward the slope on Paki Avenue, while another group of courts is located across the park, inland from Kalakaua Avenue. The reconstructed Honolulu Rapid Transit shelter is located nearby as is a marker for Diamond Head State Monument. Views of Diamond Head from almost anywhere in the park are magnificent. Farther south on Kalakaua, Dillingham fountain fills the air with a misty spray that may create a rainbow, another benevolent feature of nature so characteristic of leeward Oahu. Poni Moi Road and the houses beyond it marks the far southern limit of the park.

All in all, Kapiolani Park is a splendid open space conducive to relaxation in the midst of urban development. It buffers Waikiki and provides a foundation and setting which nicely complement Diamond Head.

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(8-86)

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United States Department of the Interior
National Park Service

National Register of Historic Places Continuation Sheet

Section number 8 Page 3

Kapiolani Park
Honolulu, HI

Statement of Significance

Kapiolani Park is historically significant for its past association with indigenous Hawaiian culture and royalty. Hawaiian King Kalakaua envisioned the park as a place of recreation for all and named it after his famous Queen, Kapiolani. Since its dedication in 1877 it has been in continuous use as a location for recreational activities valued by local residents and visitors alike. It provides a sense of place to a special part of Honolulu and is identified with the world famous image of Hawaii as a recreational resort. Over the years it has been the scene of a variety of sports and leisure time activities that reflects the recreational development of Honolulu and Hawaii into the modern world.

Historical background and significance:

Long before the park was established, the Waikiki/Kapiolani park area was the center of Hawaiian culture on Oahu. Agricultural cultivation, fishponds, coconut groves and indigenous settlements dotted the area. Ancient Hawaiian sports such as wrestling were played here and offshore surfing sites were reserved for the royal class. Several religious shrines and temples were noted including Kupalaha near the intersection of Kalakaua and Monsarrat Avenues. By about 1800, however, the center of power and settlement shifted to Honolulu, which offered a better port site to serve rapidly increasing commercial activity. Gradually, the Waikiki/Kapiolani Park area became a refuge for Hawaiians and foreign elite who wanted to escape the heat, dust and hassle of downtown Honolulu.

In 1876 the Kapiolani Park Association was formed by a group of wealthy businessmen to establish an exclusive suburban development including a park with a horse racing track at the Diamond Head end of Waikiki. King David Kalakaua offered a lease of crown land to the association for a nominal fee. The association also acquired some adjoining land. The initial park boundaries exceeded the park's current 170 acres. The association's charter stated it had a purpose "of adorning and putting in order, a tract of land in the vicinity of Honolulu

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National Park Service

National Register of Historic Places Continuation Sheet

Section number 8 Page 4

Kapiolani Park
Honolulu, HI

Statement of Significance (continued)

as a place of public resort, and of promoting Agricultural and Stock Exhibitions, and healthful exercise, recreation and amusements." The association also planned to sell lots on or near the beach and develop a fashionable residential suburb. On 11 June 1877, King Kalakaua dedicated the park in honor of Queen Kapiolani, and described it as "a resort and place of innocent refreshment." James Makee, President of the Kapiolani Park Association stated that a civilized, modern city needed a large public park where people could enjoy "refreshment and recreation" in the kindly influences of nature. In speaking about the social utility of a public recreation ground, Kalakaua and Makee reflected the ideals of the emerging American park movement. Their discussion of the natural pleasures of the park were similar to the ideals of reformers in American cities who hoped that the pastoral nature of parks would provide wholesome leisure activity for the working classes. Emulating Frederick Law Olmstead and other supporters of scenic urban parks, municipal reformers urged that "contemplative recreations" like quiet strolls among park greenery with the family would steer the working man away from drink.

When the association took control of the park site, it acquired property that had a variety of features. Part of the parcel was sandy with rather sparse vegetation while the Waikiki end contained wetlands where streams from the mountains flowed into the Pacific Ocean. Archibald S. Cleghorn, brother in law of King Kalakaua and father of Princess Kaiulani directed the laying out of the park. At its inception the park featured a horse racing track in the center, surrounded by tree lined drives and walkways. The current zoo site was graced with lagoons, islands with ornamented gardens and fanciful connecting bridges. These early undertakings required road building, drainage, and extensive plantings of ironwood, banyan, date palm, and other trees. Residential lots were leased along the beach and on the slopes of Diamond Head. During the 1876 - 1896 period of association management, great progress was made in making the site accessible, usable and attractive.
From 1896 to 1913 management of Kapiolani Park was done by the

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National Register of Historic Places Continuation Sheet

Section number 8 Page 5

Kapiolani Park
Honolulu, HI

Statement of Significance (continued)

Honolulu Park Commission, a public agency charged by legislative mandate with operating the site as a public recreation ground for all citizens of Honolulu. Early in this period, beachfront and some perimeter parcels were lost to private individuals reducing the size of the park, but in 1905 some oceanfront lots were reacquired. When the Republic of Hawaii was annexed by the United States in August 1898, U.S. troops established a temporary military camp there for several months damaging the race course and park drives. Horse racing was prohibited at the turn of the century and polo soon became a popular attraction for the horsey set. By 1907 the former racetrack was used as an auto raceway. The park also became the location of one of the first airfields in Hawaii. A number of the most familiar features of the park today had their origins in facilities introduced between 1896 and 1913: the aquarium, athletic fields, the bandstand, food concessions, and the beach park and bathhouse. All of the original structures have since been removed. Today their legacy survives only in the form of their modern replacements. In 1975, a turn of the century trolley stop was reconstructed to recall the Honolulu Rapid Transit Company's electric tramway which connected the park to downtown in 1904.

In 1913, the Territory of Hawaii transferred administrative authority over the park to the City and County of Honolulu. The city continues to manage the park today through its Department of Parks and Recreation. Shortly after city take over, the nucleus of Hawaii's first public zoo was started at the park. In 1919 one of the previously lost coastal parcels was reacquired as location of the Waikiki War Memorial and Natatorium. It opened in 1927 as both a commemorative structure to World War I servicemen and as a salt water pool for swimming competition. Duke Kahanamoku, Buster Crabbe, and Johnny Weissmuller all participated in swimming competitions at the Natatorium in the 1920s. Construction of the nearby Ala Wai Canal in 1928 cut off the fresh water streams that fed the park's waterscape area. The ponds and lagoons became stagnant and were eventually filled. During World War II, portions of the

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National Park Service

National Register of Historic Places Continuation Sheet

Section number 8 Page 6

Kapiolani Park
Honolulu, HI

Statement of Significance (continued)

park and its facilities again became a military encampment. Like many of Honolulu's parks, Kapiolani Park was deteriorated by the war's end. A major redevelopment ensued, including installation of a massive sprinkler system in 1948. In the same year, the Honolulu Zoo became established at its present forty two acre site between Kapahulu and Monsarrat Avenues, which had been the location of the earlier waterscape. The Waikiki Shell, an outdoor amphitheater, was built in 1953 and a new Waikiki Aquarium was started in 1955 next to the Natatorium. The Natatorium has fallen into disrepair and its future is in doubt even though it has been the only site in the park listed on the National Register of Historic Places since 1980. The Kodak Hula show originated in 1937 at Sans Souci Beach and moved in 1969 to the Waikiki Shell grounds where it continues to delight visitors.

The chief design feature of the early park continues to dominate the appearance of Kapiolani Park today, in the form of the central open space. Date palms that once ringed the race course survive in three sections, suggesting to the careful observer the outline of the old track. Evidence of the former berm is also visible. The central open space preserves about one half the area of the track's original oval and is a contributing resource to the integrity of the site. The roads along the perimeter continue to define the borders of the park, even though many of the internal drives have been replaced by lawns.

Kalakaua Avenue was the main street of the early park and its impressive rows of ironwood trees are a contributing resource that date back to Cleghorn's original design. Several of the large banyan trees in the park are believed to be early plantings. Another extant contributing resource is the bougainvillea at the Kapiolani Beach Center. It survives from the plantings for a pergola constructed during the renovation of the public baths in the 1930s, even though the baths themselves no longer exist. Views of Diamond Head towering above the open spaces of the park continue to be a dominant feature of the landscape design. The peak itself has never been part of the park, but its dramatic silhouette has always been integral to the distinctive "feel" of Kapiolani Park.

Kapiolani Park
Name of Property

Honolulu, HI
County and State

8. Statement of Significance

Applicable National Register Criteria
(Mark "x" in one or more boxes for the criteria qualifying the property for National Register listing.)

- [X] **A** Property is associated with events that have made a significant contribution to the broad patterns of our history.
- [ ] **B** Property is associated with the lives of persons significant in our past.
- [ ] **C** Property embodies the distinctive characteristics of a type, period, or method of construction or represents the work of a master, or possesses high artistic values, or represents a significant and distinguishable entity whose components lack individual distinction.
- [ ] **D** Property has yielded, or is likely to yield, information important in prehistory or history.

Criteria Considerations
(Mark "x" in all the boxes that apply.)

Property is:

- [ ] **A** owned by a religious institution or used for religious purposes.
- [ ] **B** removed from its original location.
- [ ] **C** a birthplace or grave.
- [ ] **D** a cemetery.
- [ ] **E** a reconstructed building, object, or structure.
- [ ] **F** a commemorative property.
- [ ] **G** less than 50 years of age or achieved significance within the past 50 years.

Areas of Significance
(Enter categories from instructions)
Entertainment / Recreation

Period of Significance
1877-1942

Significant Dates
1877, 1896, 1898, 1913, 1919
1927, 1928, 1930s

Significant Person
(Complete if Criterion B is marked above)

Cultural Affiliation
N/A

Architect/Builder
N/A

Narrative Statement of Significance
(Explain the significance of the property on one or more continuation sheets.)

9. Major Bibliographical References

Bibliography
(Cite the books, articles, and other sources used in preparing this form on one or more continuation sheets.)

Previous documentation on file (NPS):

- [ ] preliminary determination of individual listing (36 CFR 67) has been requested
- [ ] previously listed in the National Register
- [ ] previously determined eligible by the National Register
- [ ] designated a National Historic Landmark
- [ ] recorded by Historic American Buildings Survey # _____
- [ ] recorded by Historic American Engineering Record # _____

Primary location of additional data:

- [ ] State Historic Preservation Office
- [ ] Other State agency
- [ ] Federal agency
- [ ] Local government
- [X] University
- [ ] Other

Name of repository:
U of Hawaii Manoa, Libraries

Kapiolani Park
Name of Property

Honolulu, HI
County and State

10. Geographical Data

Acreage of Property 170 acres

UTM References
(Place additional UTM references on a continuation sheet.)

	Zone	Easting	Northing
1	04	2191100	5297530
2	04	225260	5329550
3	04	225790	5276240
4	04	224930	5228850

☐ See continuation sheet

Verbal Boundary Description
(Describe the boundaries of the property on a continuation sheet.)

Boundary Justification
(Explain why the boundaries were selected on a continuation sheet.)

11. Form Prepared By

name/title Joseph A. Abel

organization _____ date May 12, 1992

street & number 98-810 Leihulu Place telephone (808) 487-1118

city or town Aiea state HI zip code 96701

Additional Documentation
Submit the following items with the completed form:

Continuation Sheets

Maps

A **USGS map** (7.5 or 15 minute series) indicating the property's location.

A **Sketch map** for historic districts and properties having large acreage or numerous resources.

Photographs

Representative **black and white photographs** of the property.

Additional Items
(Check with the SHPO or FPO for any additional items)

Property Owner
(Complete this item at the request of SHPO or FPO.)

name City and County of Honolulu, Department of Parks and Recreation

street & number 650 South King Street telephone 527-6343

city or town Honolulu state HI zip code 96813

Paperwork Reduction Act Statement: This information is being collected for applications to the National Register of Historic Places to nominate properties for listing or determine eligibility for listing, to list properties, and to amend existing listings. Response to this request is required to obtain a benefit in accordance with the National Historic Preservation Act, as amended (16 U.S.C. 470 *et seq.*).

Estimated Burden Statement: Public reporting burden for this form is estimated to average 18.1 hours per response including time for reviewing instructions, gathering and maintaining data, and completing and reviewing the form. Direct comments regarding this burden estimate or any aspect of this form to the Chief, Administrative Services Division, National Park Service, P.O. Box 37127, Washington, DC 20013-7127; and the Office of Management and Budget, Paperwork Reductions Projects (1024-0018), Washington, DC 20503.

NPS Form 10-900-a
(8-86)

OMB Approval No. 1024-0018

United States Department of the Interior
National Park Service

National Register of Historic Places Continuation Sheet

Section number 8,9,10 Page 7

Kapiolani Park
Honolulu, HI

Statement of Significance (continued)

The Diamond Head Tennis Center has replaced the horse stables and soccer, softball and rugby are now played where polo once ruled. But the park's essential qualities, its open space, trees and views of Diamond Head remain to refresh all. In an area of dense urbanization, Kapiolani Park is an open recreational oasis that has continuously served the people of Honolulu. The development of the park is associated with broad patterns of local recreational history and with Hawaiian royalty. Kapiolani Park contributes positively to the quality of life of Honolulu and projects a unique sense of place.

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UTM References

5 04224510 5180240
6 04212401 5174200
7 04220610 5213530
8 04219650 5211440

Verbal boundary justification

Boundaries provided are those historically associated with Kapiolani Park based on above bibliographic references and USGS, DOD and State of Hawaii Taxation Maps.

APPENDIX E

"Honolulu Zoo Master Plan 2019" Priorities Update
Honolulu Zoo Administration (2019)

Honolulu Zoo Master Plan
2019

Established in 1947 within Kapiolani Park, the Honolulu Zoo, located just across Waikiki Beach, has grown into one of Hawaii's most popular attractions for both visitors and residents alike. Situated at the base of Diamond Head, the area was once a wetland. This educational treasure has become a centerpiece of the community. The positive changes that are currently taking place at the Zoo today provide the community with a place to learn and appreciate the living world.

The Honolulu Zoo is 42 acres with a diverse group of tropical animals and botanical gardens. It is our vision to be recognized as a premier zoo and conservation entity in the Pacific. Our mission has been updated to provide meaningful experiences of conservation and education to our community. The Zoo's location provides an excellent opportunity for the community to learn and experience our rich cultural heritage with the flora and fauna on its grounds.

The purpose of the Honolulu Zoo is found in its mission:

Mission – To inspire stewardship of our living world by providing conservation, education, and meaningful experiences to our community. The Zoo emphasizes Pacific tropical island ecosystems and our traditional values of mālama (caring) and ho`okipa (hospitality).

*****

E pulama mau i na waiwai o keai aina aloha e
malama pono a keia no na kau akau.

"Cherish the natural resources of this beloved land and
forever protect them for future generations."

*****

Sustained Capital Improvements

Prioritization and funding of major capital improvements must support modern zoological practices and philosophies.

The City's Capital Budget Program should be utilized as the planning document for the scheduling of funds.

Identify Zoo improvement needs for organizations and partners to support in achieving the Zoo's goals.

Education

Ensure education program interpretation and messaging methods are current, appropriate, and accurate. Components encourage lifetime and inquiry-based learning, while incorporating best practice standards.

Expand education programs to incorporate concepts of biodiversity and conservation as innovative and dynamic conveyors of science-based goals to motivate interest, involvement, and ultimately, action.

Grow education efforts internally and externally to communicate the importance of sustainability.

Identify and implement education programs to provide for special-needs populations and encourage learning to make global conservation issues relevant to them personally.

Conservation

Implement green practices to reflect both physical and philosophical initiatives and potentiate outcomes.

Continue to grow ex-situ and in-situ conservation programs to ensure long term survival of species.

Ex-Situ
Breeding captive wildlife to preserve genetics for species survival.

In-Situ
Establish native Hawaiian fauna specialist group and incorporate into the Hawaiian Plant Specialist Group to assess native species populations for IUCN Red Listing to mandate habitat protection.

Professional Development in Supporting Best Practices

Provide sufficient levels of staffing to support the Zoo's animal, veterinary, maintenance, grounds, education, guest services and administrative needs.

Invest in training and development to ensure diverse programming needs are met.

Publish and present documents to share with the zoo and conservation communities.

Continuous review and assessment of demonstrations, presentations and application of knowledge to determine long-term effectiveness of trainings.

Capital Improvements Program

Initiate projects to support Zoo modernization efforts.

Prioritize projects that focus on conservation efforts to preserve native habitat and species, which stimulates the community's understanding of sustainability.

Redesign habitats based on priority species identified from the Institution Collection Plan.

Design exhibits and facilities to provide for user efficiencies, be more functional and durable, and incorporate modernization to meet and exceed animal welfare standards.

Animal care and welfare standards, native collections (flora and fauna) should be incorporated to the planning of all major improvements

APPENDIX F

FEA / FONSI, Environmental Notice Publication
Office of Environmental Quality Control (2000)

DEPARTMENT OF DESIGN AND CONSTRUCTION
CITY AND COUNTY OF HONOLULU
650 SOUTH KING STREET, 11TH FLOOR
HONOLULU, HAWAII 96813
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JEREMY HARRIS
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DIRECTOR

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DEPUTY DIRECTOR

May 15, 2000

Ms. Genevieve Salmonson, Director
Office of Environmental Quality Control
235 South Beretania Street, Room 702
Honolulu, Hawaii 96813-2437

Dear Ms. Salmonson:

Subject: Final Environmental Assessment
Finding of No Significant Impact
Honolulu Zoo Master Plan
Waikiki, Oahu
TMK: 3-1-43: 1 (portion of Kapiolani Regional Park)

We are writing to respectfully request publication of the enclosed notice of determination in the next regular Environmental Notice.

The Department of Design and Construction of the City and County of Honolulu has reviewed the comments received during the public comment period which began on September 23, 1996. The agency has determined that the project will not have significant environmental effects and has issued a Finding of No Significant Impact (FONSI). Please publish this notice in the May 23, 2000 OEQC Environmental Notice.

We have enclosed a completed OEQC Publication Form and four copies of the Final Environmental Assessment. If you or your staff have any questions regarding the determination, please call me at (808) 523-4564.

Sincerely,

FOR GARY Q. L. YEE, AIA
Director

GQLY:ct

Enclosures

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Oahu Notices

JUNE 8, 2000

Final Environmental Assessments/Findings of No Significant Impacts (FONSI)

(2) Honolulu Zoo Master Plan

District: Honolulu
TMK: 3-1-43:1 (portion of Kapiolani Regional Park)
Applicant: City and County of Honolulu
Department of Design and Construction
650 South King Street, 2nd Floor
Honolulu, Hawaii 96813
Contact: Jim Nakasone (527-6306)
Approving Agency/Accepting Authority: Same as above.
Consultant: Belt Collins Hawaii
680 Ala Moana Boulevard, Suite 100
Honolulu, Hawaii 96813
Contact: Cheryl Palesh (521-5361)
Public Challenge Deadline: July 10, 2000
Status: FEA/FONSI issued, project may proceed.
Permits Required: Minor Special District; SMA Use; height variance; grading; building

The Department of Design and Construction of the City and County of Honolulu has embarked on a plan to reorganize the basic layout of the Honolulu Zoo. This plan will broaden the recreational and educational experience encountered by visitors and expand the on-site breeding and research facilities with the existing zoo area. The proposed project will provide the visitor with an educational story line consisting of four main ecological environments. The Project design will maximize visitors' educational and recreational experience since they will be totally immersed in each of the ecological environments and will be able to experience the difference between each environment as they proceed through the zoo.

New facilities to be constructed as part of the Project total 41 buildings, four open-sided structures, 11 aviaries, seven restroom facilities, a food concession, operational/ support facilities, a green house, and expanding recreation visitor parking.

(3) Opaeula Watershed Protection Project

District: Waialua
TMK: 1-6-3-01
Applicant: Kamehameha Schools
567 South King Street, Suite 200
Honolulu, Hawaii 96813
Contact: Manabu Tagomori (534-3866)
Approving Agency/Accepting Authority: Department of Land and Natural Resources
1151 Punchbowl Street, Room 220
Honolulu, Hawaii 96813
Contact: Sam Lemmo (587-0381)
Public Challenge Deadline: July 10, 2000
Status: FEA/FONSI issued, project may proceed.
Permits Required: BLNR permit

Kamehameha Schools Bishop Estate, in a cooperative effort with the U.S. Army Garrison-Hawaii, the U.S. Fish and Wildlife Service, and the State of Hawaii Division of Forestry and Wildlife, proposes to construct a pig exclosure fence in the uppermost portion of the Opaeula Stream drainage, Ko'olau Mountains, Oahu. The project includes the construction of approximately 2.25 miles of 42" hogwire fence and construction of a 12' by 16' wooden platform to serve as a tent pad for resource management crews. The project will enclose about 150 acres of native Ko'olau wet forest. The project is part of ongoing efforts to protect native forest ecosystems, and rare, threatened and/or endangered flora and fauna found in the area. Eight species of listed, proposed, candidate, or rare plant species and two endangered tree snail species are found in the project area.

Construction of this fence will require hand clearing a 10 foot wide corridor through vegetation for the fence line. The proposed project is expected to generate short term impacts to soil quality along the fence line, some impacts to common native vegetation, and may slightly change the Ko'olau summit trail alignment. These short-term impacts will be mitigated through the long-term benefit to the ecosystem by the removal of the negative impacts of feral pigs within the project area. The integrity of the Ko'olau summit trail will be retained. The fence route will be surveyed by Botanists and recognized snail experts to ensure that no rare, threatened, or endangered plant or animal is within the area cleared for the fence.