D. ARTMENT OF PARKS AND RECREATIO

CITY AND COUNTY OF HONOLULU

650 SOUTH KING STREET
HONOLULU, HAWAII 96813

FRANK F. FASI
MAYOR

WALTER M. OZAWA
DIRECTOR

HIROAKI MORITA
DEPUTY DIRECTOR

March 13, 1990

Mr. Marvin Miura, Director
Office of Environmental Quality Control
465 South King Street, Room 104
Honolulu, Hawaii 96813

Dear Mr. Miura:

Subject: Environmental Assessment for Proposed Hanauma Bay Beach Park Sewer System and Other Site Improvements

Based on comments received during the agency consultation phase for the subject Environmental Assessment (EA), the Department of Parks and Recreation, pursuant to Chapter 343, HRS and Title II, Chapter 200 (Administrative Rules, Department of Health), determines that the proposed action will have no significant environmental impact.

We respectfully request that this negative declaration be published in the OEQC Bulletin at your earliest convenience. Attached are four (4) copies of the Final Environmental Assessment and the OEQC publication form. Agency responses have been included within the Final Environmental Assessment.

If there are any questions on this negative declaration, please contact Mr. Earl Matsukawa or Mr. Michael Baker of Wilson Okamoto & Associates at 531-5261.

Sincerely,

WALTER M. OZAWA, Director

WMO:jf

Attach.

1990-05-08-0A-FRA

FINAL ENVIRONMENTAL ASSESSMENT

FOR

SEWER SYSTEM AND OTHER IMPROVEMENTS

HANAUMA BAY BEACH PARK

Prepared for:

CITY AND COUNTY OF HONOLULU
DEPARTMENT OF PARKS AND RECREATION

Prepared by:

Wilson Okamoto & Associates, Inc.

March 1990

1990-05-08-OA-FRA

FINAL ENVIRONMENTAL ASSESSMENT

FOR

* SEWER SYSTEM AND OTHER IMPROVEMENTS

HANAUMA BAY BEACH PARK *

Prepared for:

CITY AND COUNTY OF HONOLULU
DEPARTMENT OF PARKS AND RECREATION

Prepared by:

Wilson Okamoto & Associates, Inc.

March 1990

ENVIRONMENTAL ASSESSMENT

FOR

SEWER SYSTEM AND OTHER IMPROVEMENTS

AT

HANAUMA BAY BEACH PARK

TMK #3-9-12:02

Prepared for
City and County of Honolulu
Department of Parks and Recreation

Prepared by
Wilson Okamoto and Associates, Inc.

March, 1990

TABLE OF CONTENTS

Exhibit B-3 - City and County of Honolulu Land Use Ordinance Zoning District Classification Map

Exhibit C - Existing Site Plan

Exhibit D - Historical/Archaeological Site Survey

Exhibit E - Sewer Adequacy Study

Exhibit F - Engineering Report

Agency Responses

I. BACKGROUND

A. Applicant: Department of Parks and Recreation, City and County of Honolulu

B. Owner of Record: City and County of Honolulu

C. Approving Authority: Department of Parks and Recreation City and County of Honolulu

This environmental assessment is prepared pursuant to Chapter 343, Hawaii Revised Statutes (HRS) and Chapter 200 of Title 11, Administrative Rules, Department of Health (DOH), State of Hawaii. Specifically, the Chapter 343, HRS requires assessment of several classes of action, including two which apply to the applicant's request:

1. Any use within any land classified as Conservation District by the State Land Use Commission under Chapter 205, Hawaii Revised Statutes; and

2. Any use within the shoreline area as defined in Section 205-31. Hawaii Revised Statutes.

D. Agencies Consulted:

City and County of Honolulu:

Department of Public Works

Department of Land Utilization

State of Hawaii:

Department of Land and Natural Resources

Department of Health

II. PROJECT DESCRIPTION

A. Location

The project site is located within Hanauma Bay Beach Park, Tax Map Key #3-9-12:2 (Exhibit A), Maunalua, Honolulu District, Island of Oahu. See Figure 1. Hanauma Bay Beach Park is one of several public recreational areas within the City and County of Honolulu's Koko Head Regional Park including: Koko Head District Park, Halona Blow Hole, Koko Crater Botanic Garden, Koko Head Rifle Range, Sandy Beach Park, and Koko Head Playground.

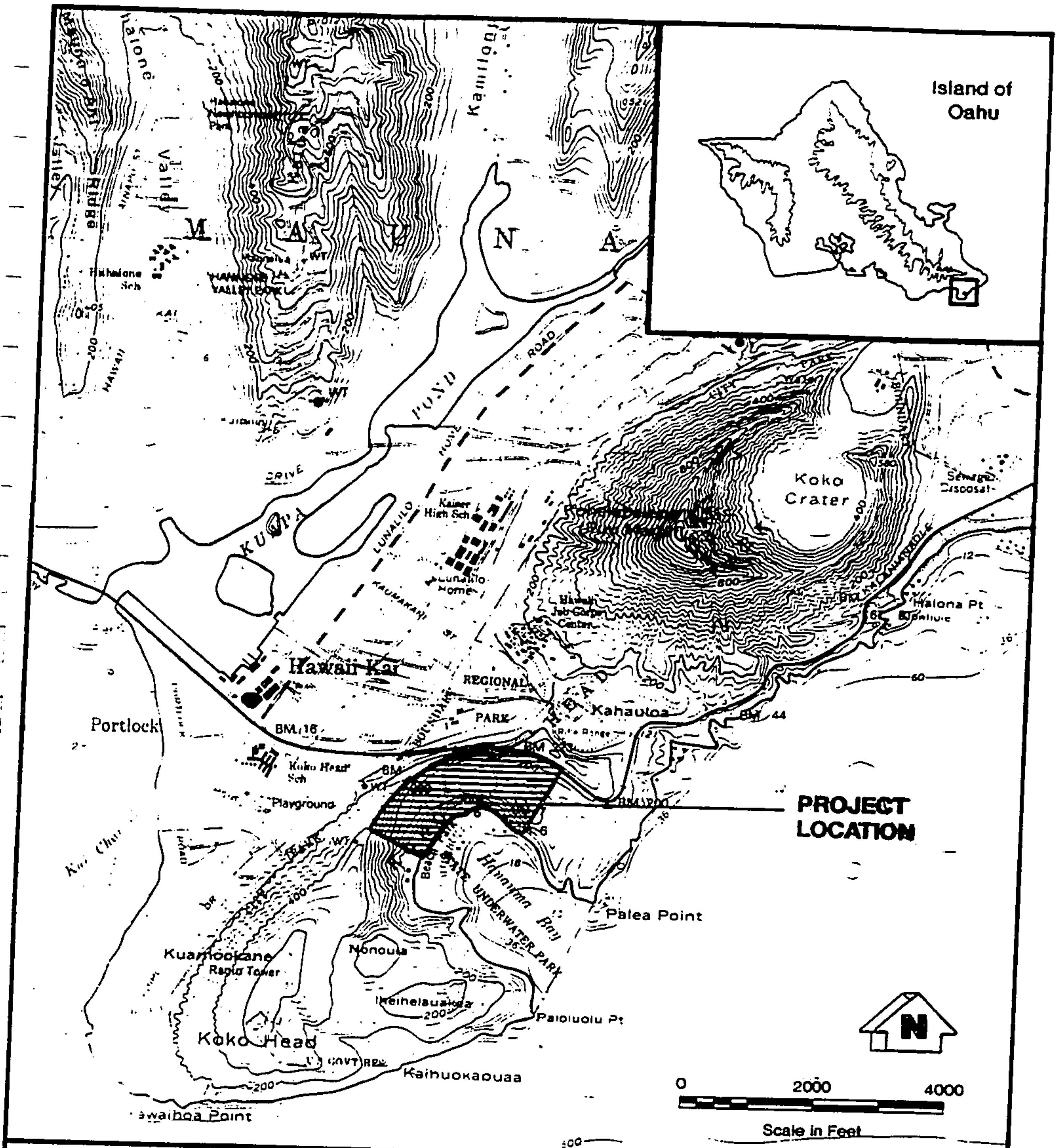


Fig. 1

LOCATION MAP

HANAUMA BAY BEACH PARK
SEWER SYSTEM AND OTHER IMPROVEMENTS

Prepared for :

CITY AND COUNTY OF HONOLULU
DEPARTMENT OF PARKS AND RECREATION

Prepared by :

Wilson Okamoto & Associates, Inc.

B. Proposed Action

The applicant proposes to improve the existing sewage disposal system for Hanauma Bay Beach Park by constructing new lift station facilities and transmission lines which will convey sewage out of the park to the East Honolulu Community Services, Inc., sewer collection and disposal system. See Figure 2.

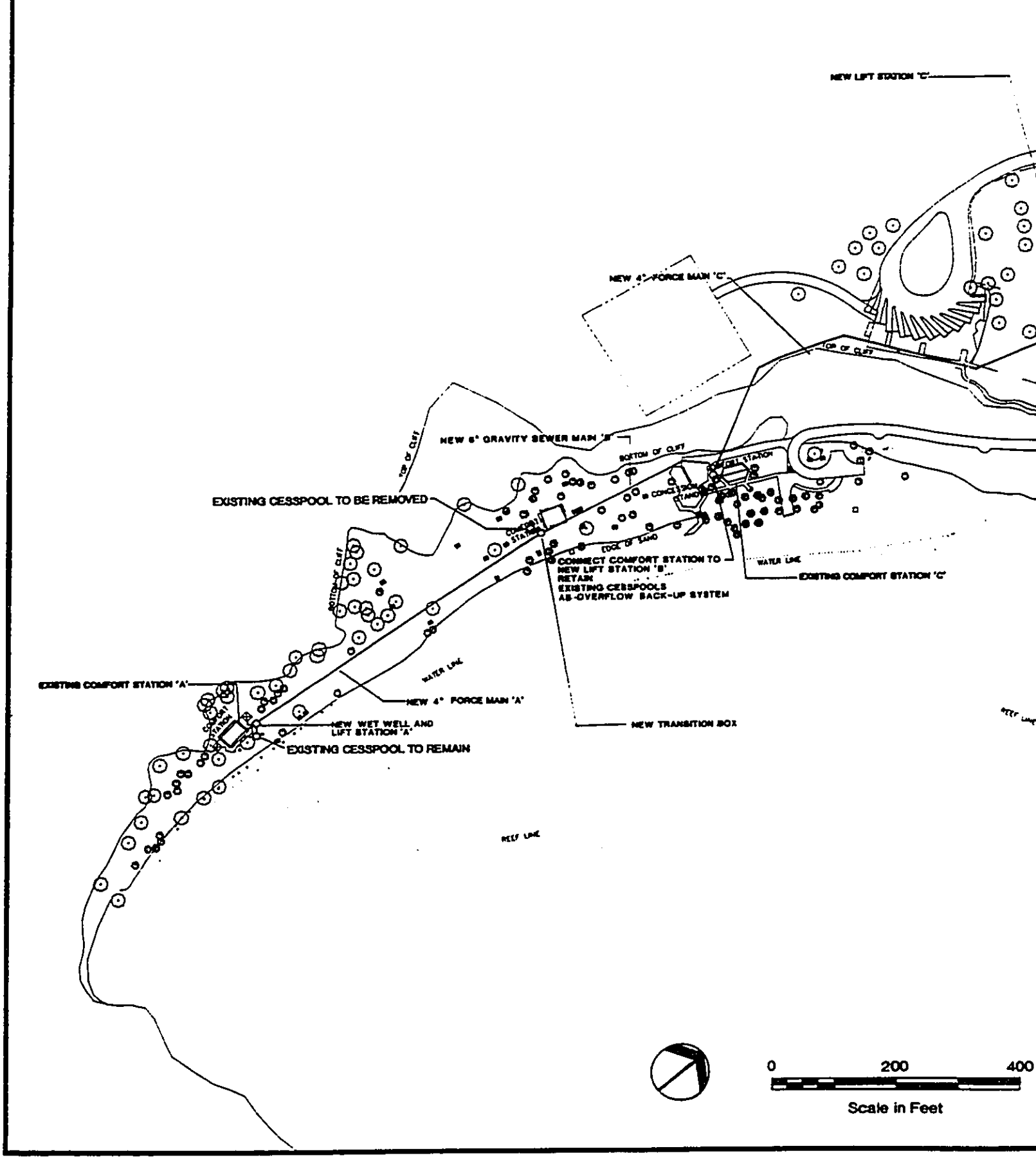
This project will convert the park's existing cesspool system to a system which will provide a safer and more efficient disposal method that removes sewage wastes completely from Hanauma Bay Beach Park. The project's purposes are to:

- o prevent further degradation of the nearshore waters and bay environment,
- o protect Marine Life Conservation District resources, and
- o promote environmental conditions conducive to public health and safety.

This project implements improvement "Phases I and II" from the 1977 Master Plan for Hanauma Bay Beach Park and completes the improvements added in 1987. Initial Phases of the 1977 Master Plan were approved for CDUA permit on February 27, 1981. The SMA Permit was granted on October 8, 1980. In addition to the sewer improvements, the project also contains provisions included in Phases I and II for minor improvements to traffic and pedestrian circulation through the installation of walkways, traffic/parking signs and landscaping. See Figure 3.

C. Existing Conditions

At present, sewage is disposed on site in a series of cesspools. Wastewater is generated by three comfort stations at the beach level of the park and by a fourth station at the upper park level. At the beach level, wastewater from the Makapuu-end comfort station near the bottom of the beach access road is routed through two preloader tanks and cavitettes, then conveyed to several cesspools for disposal through injection wells. A manually operated valve controls the routing of sewage to the cesspools. Wastes from the central beach area comfort station are disposed through a preloader tank then to a cesspool. Wastewater from the Honolulu-end beach comfort station and the upper level comfort station runs directly to cesspools. No chlorination is performed at any of the comfort stations.


NEW LIFT STATION 'C'
NEW 4" FORCE MAIN 'C'
NEW 6" GRAVITY SEWER MAIN 'B'
TOP OF CLIFF
BOTTOM OF CLIFF
EXISTING CESSPOOL TO BE REMOVED
CONCRETE STAIRS
CONCRETE STAIRS
EDGE OF SAND
CONNECT COMFORT STATION TO NEW LIFT STATION 'B'
RETAIN EXISTING CESSPOOLS AS OVERFLOW BACK-UP SYSTEM
WATER LINE
EXISTING COMFORT STATION 'C'
EXISTING COMFORT STATION 'A'
NEW 4" FORCE MAIN 'A'
NEW WET WELL AND LIFT STATION 'A'
EXISTING CESSPOOL TO REMAIN
REEF LINE
NEW TRANSITION BOX
0
200
400
Scale in Feet

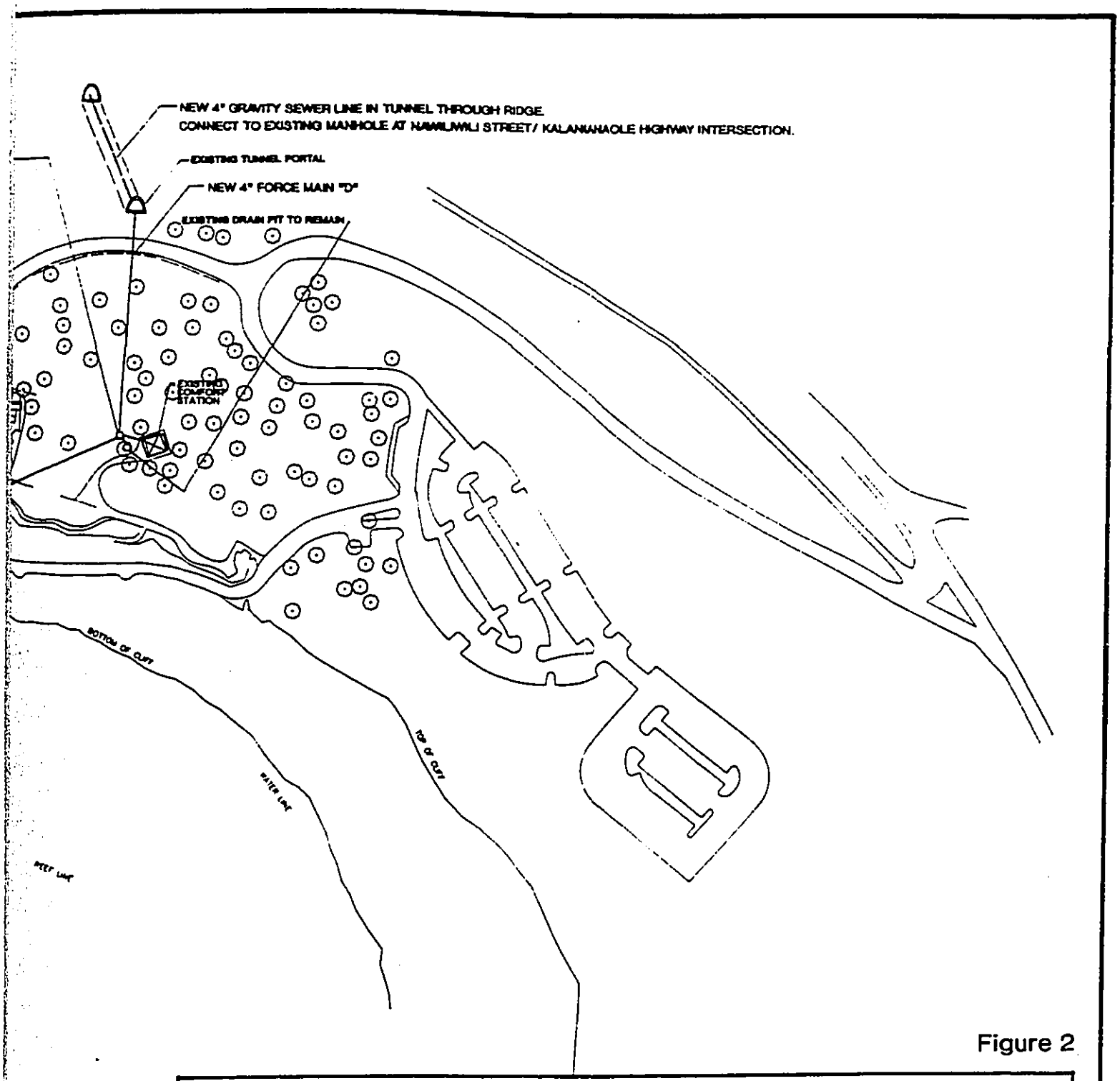
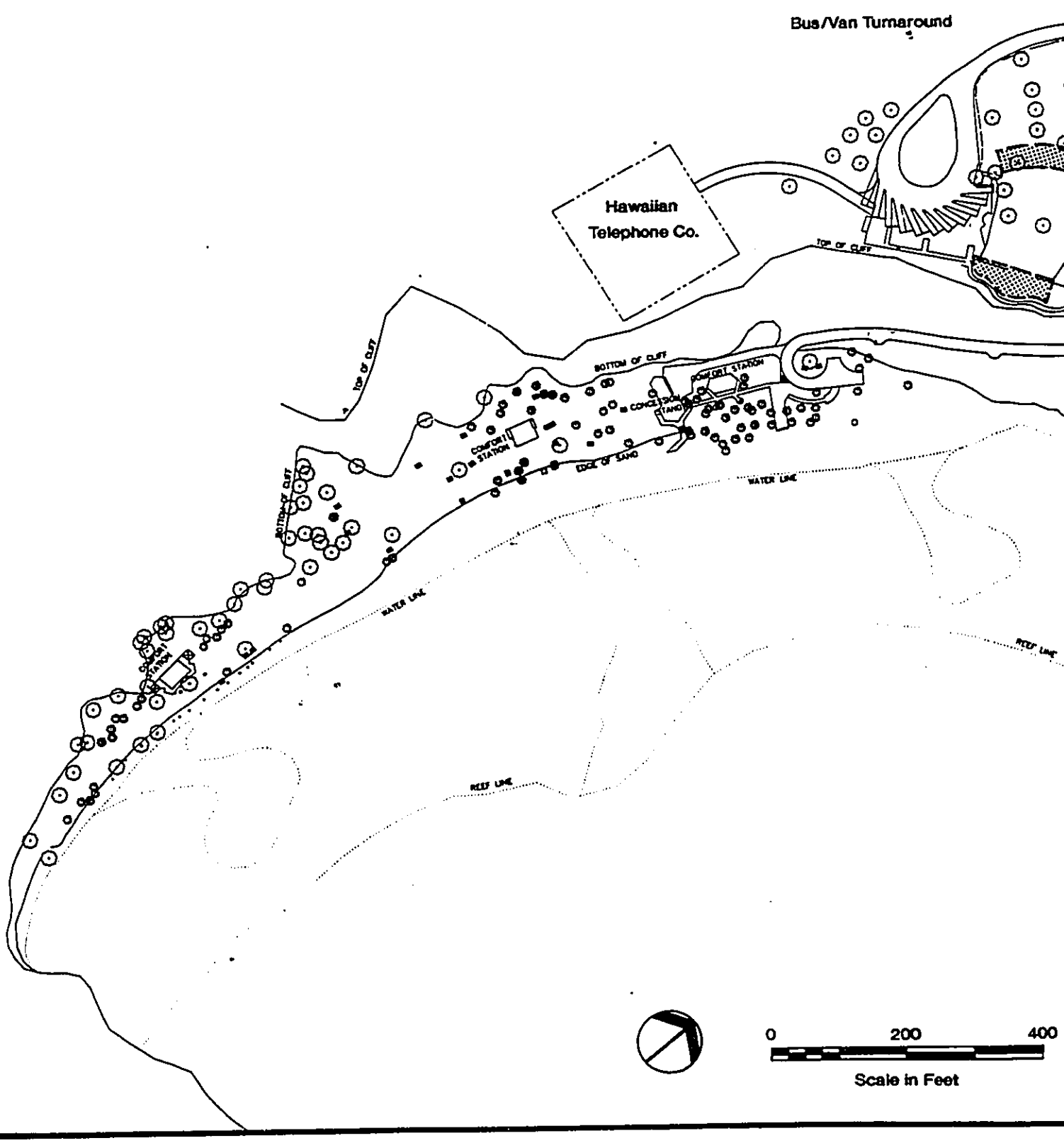


Figure 2

HANAUMA BAY BEACH PARK
SEWER SYSTEM AND OTHER IMPROVEMENTS
SEWERAGE SYSTEM IMPROVEMENTS

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

Prepared by :
Wilson Okamoto & Associates, Inc.


Bus/Van Turnaround
Hawaiian
Telephone Co.
TOP OF CLIFF
BOTTOM OF CLIFF
COMFORT STATION
CONCESSION STAND
COMFORT STATION
EDGE OF SAND
WATER LINE
REEF LINE
0
200
400
Scale in Feet

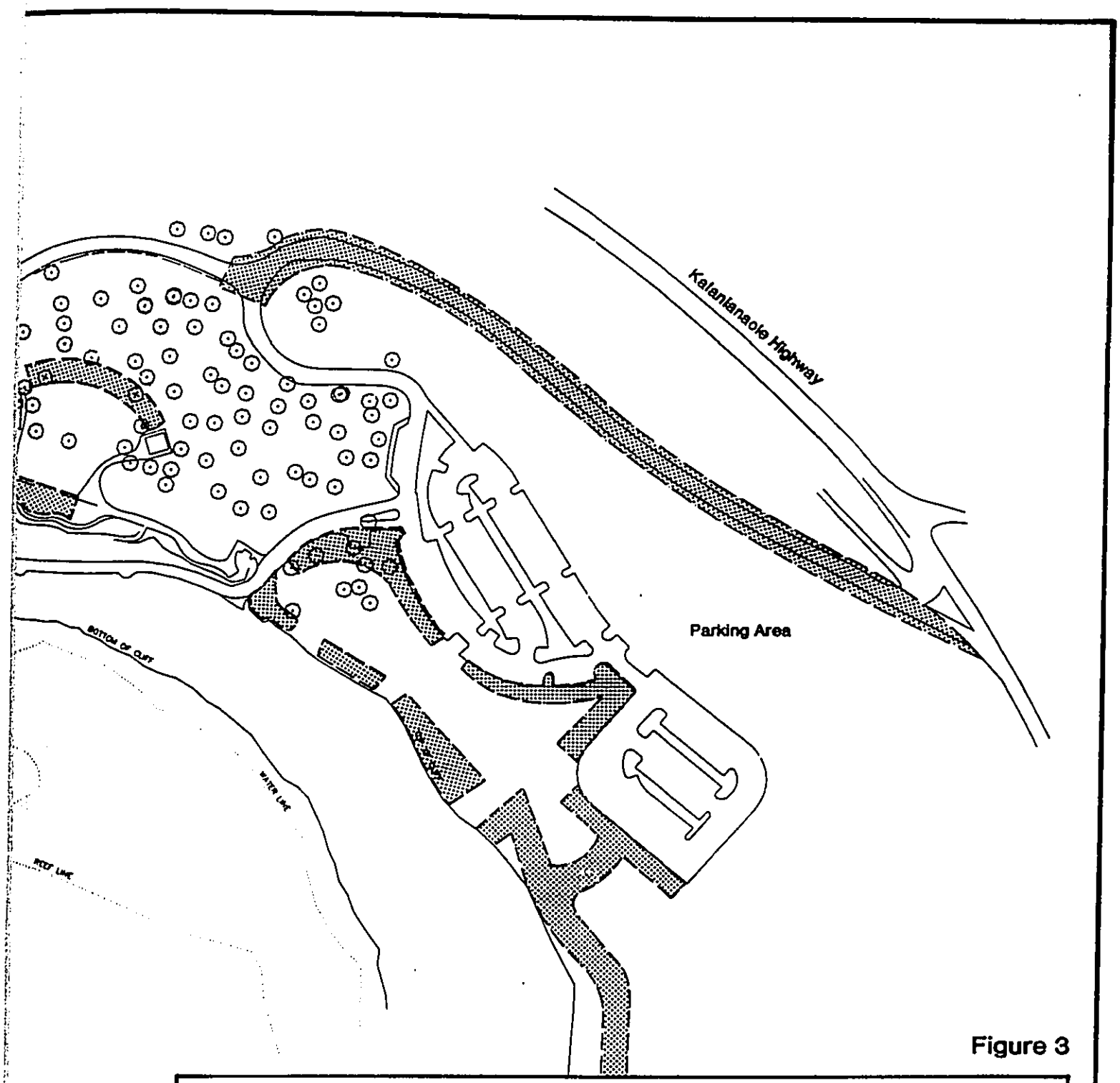


Figure 3

HANAUMA BAY BEACH PARK
SEWER SYSTEM AND OTHER IMPROVEMENTS

ADDITIONAL SITE IMPROVEMENTS

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

Prepared by :
Wilson Okamoto & Associates, Inc.

The most heavily used comfort stations are the upper level facility, which serves both sightseers and beach users and the Makapuu-end comfort station at the bottom of the beach access road fronting the prime beach area.

These cesspools appear to function adequately. However, the central beach level comfort station is subject to periodic overflows and requires pumping as often as several times per week, particularly during the high-use summer months.

Records at the Maintenance Branch of the Division of Wastewater Management (DWWM) show that 70 loads of sewage were trucked from park cesspools during 1988, at an average interval of once every 5 days. Through April of 1989, 51 loads have been removed, at an average of every 2.4 days. The pump truck is not able to respond immediately upon receipt of an overflow report, and park caretakers often "place an order" in advance of holidays and long weekends when the cesspools are expected to overflow. The DWWM bills the Parks Department directly at a rate of $24.50 per load. The estimated 1989 cost for cesspool pumping is $3700.

D. Need for Action

The long-range goals of the State Department of Health (DOH) are to protect coastal and groundwater resources from contamination, to prevent pollution of any valuable water resource, and to insure that wastewater disposal does not become a hazard to the public health, safety and welfare. To this end, the DOH has set a goal for eliminating cesspool use by the year 2000 (refer to State of Hawaii, Department of Health memorandum of December 28, 1988 concerning "Policy Relating to Wastewater Disposal"). These goals are to be implemented through a program of expansion of regional wastewater facilities, and in areas where this is not possible, encourage the construction and use of private facilities providing at least secondary level treatment in critical wastewater areas and no subsurface disposal in highly critical wastewater disposal areas.

The pressing need in sewage disposal for Hanauma Bay Beach Park is to control and eliminate cesspool overflows at the beach level comfort stations. Proposals for wastewater disposal must meet with Chapter 62 of the DOH regulations which contain requirements for wastewater treatment and disposal.

The Hawaii Administrative Rules, Chapter 62, have recently been amended to include a policy on Oahu permitting no new cesspools in a "critical wastewater disposal area". Critical areas are being officially delineated by DOH and will include areas having (a) a high water table, (b)

impermeable soil formation, (c) steep terrain, (d) location within a flood zone, (e) permeable substructure adjacent to surface water bodies, (f) known high cesspool failure, and (g) groundwater contamination.

Chapter 62 further requires all public buildings to be connected to a treatment works or individual wastewater system, except that facilities located in a Conservation District are exempt provided that the facilities are consistent with Conservation District use intent.

The proposed sewage disposal system at the lower beach park will contain the following elements:

- a duplex lift station at the Honolulu-end comfort station, discharging into a 4-inch force main leading to a transition box at the central comfort station;
- a 6-inch gravity sewer line from the transition box to a wet well at the Makapuu-end comfort station;
- a duplex lift station and 4-inch force main leading up the cliff to a wet well at the upper level comfort station;
- a duplex lift station at the upper level comfort station with a 4-inch force main to convey sewage to the closest collection system junction, a sewer manhole at the intersection of Kalanianaole Highway and Nawiliwili Street. The manhole is part of the East Honolulu Community Services (EHCS) sewer collection system. See Exhibit G, Sewer Adequacy Study; and
- a series of four (4) existing cesspools to remain as an emergency overflow system.

The project cost for upgrading the sewer disposal system at Hanauma Bay Beach Park is estimated at about $935,000. Completion of the project is scheduled for Fall, 1991.

III. ALTERNATIVES

The Environmental Assessment prepared to implement the 1977 Master Plan for Hanauma Bay Beach Park considered four separate alternatives for the handling of wastewater in the park. The status of the 1977 alternatives listed below have been reevaluated, revised and augmented with a fifth "No Action" option below.

A. On-site Treatment and Ocean Disposal

The treatment plant alternative was considered cost prohibitive and difficult for disposal of the treated effluent.

An on-site treatment and disposal facility remains impractical due to the prohibitive costs and restrictions in disposing treated effluent directly into the Bay's Class AA waters.

B. On-site Treatment and Land Disposal

The land disposal alternative was rejected because the park lacked suitable open space (leach field area) in which treated effluent could be discharged. Daily visits by 10,000 people per day would require about six million square feet of leach field for effluent disposal area.

Consideration of an aerobic wastewater treatment system would also be inappropriate because wastewater levels presently generated at the park would require installation of a 360,000 gallon capacity aeration tank for the park. Available land area also precludes installation of an aeration unit of this size.

C. Septic Tank System

The septic tank/injection well alternative was chosen as the recommended method of disposal for the 1977 Master Plan and comprises the present system requiring replacement at the Bay. The septic tank/seepage well system was considered the most practical and economical approach for "the irregular flow loadings expected."

The existing series of septic tank/cesspools has since proven to be inadequate for servicing present levels of wastewater generation in the park.

D. Pumping Wastewater Off-site for Treatment and Disposal

Off-site treatment involving the construction and installation of sewer lines, a lift station, and payment of service fees was dismissed previously as too expensive compared to the septic tank and seepage well alternative.

This recommended off-site treatment and disposal alternative is now considered the most reliable and effective long-term means of wastewater disposal, given the constraints on the other methods available. This recommended system has been described in section I, paragraph B - "Proposed Action".

E. "No Action Option"

While appearing inexpensive, this option would not: a) offset the cost to the environment and public health that recurring overflows create, and b) not offer a long term solution. A build up of pathogenic bacteria and other water quality-reducing organisms associated with the infusion of untreated waste in to the nearshore waters of the bay could present a serious health hazard to park visitors.

IV. AFFECTED ENVIRONMENT

A. Natural Environment

Steep slopes of 100 percent dominate Hanauma Bay Beach Park with relatively small portions of the lower beach park and the upper park areas having slope gradients of less than 5 percent.

Soils on the upper slope of the site are classified by the U.S. Soil Conservation Service as "rock land, stony steep land, suitable for pasture, wildlife habitat and urban development, consisting of rock outcrops and shallow, sticky plastic soil." At the bottom of the slope within the lower beach park, a sand beach fronting the bay (approximately 1,800 feet long and ranging from 20 to 150 feet wide). Beach sand is composed of quarried sands from the windward side of Oahu, mixed with naturally occurring coral rubble and silt deposited from the steep crater slopes above. Coconut and banyan trees, grass, and beach naupaka form much of the vegetation line between the sand beach and the cliff base. The Honolulu-end of the beach and shoreline contains large ash boulders and coral fragments, while the Makapuu-end marks a location where beach sand meets the wave-cut lava shelf surrounding the bay.

The Detailed Land Classification Map for the Island of Oahu prepared by the Land Study Bureau classifies the soils within Hanauma Bay Beach Park as:

1. Lower Beach Park Area:

   E-10 - Medium texture, 0-10 percent slope, non-expanding, well drained, non-stony.

2. Slopes above and behind the Lower Beach Park Area

   E-114 - Rocky, greater than 80 percent slope, variable expansion, well drained.

3. Gently sloping hill sides within the Upper Park Area

E-33 - Medium texture, 0-10 percent slope, non-expanding, well drained, non-stony.

E-102 - Rocky, 0-35 percent slope, non-expanding, well drained

E-103 - Rocky, 36-80 percent slope, variable expansion, well drained.

Vegetation in the park area is predominantly salt and wind tolerant. Park plant life consists mainly of Australian saltbush, Bermuda grass, kiawe, haole koa, coconut palms, banyans, and naupaka. Hialoa and ilima represent plant species indigenous to the bay.

Mammals inhabiting the park include the mongoose, rats, house mice and feral cats. Birds species include the mynah, white eye, mourning dove, lace-necked dove, barred dove, sparrow, and the cardinal.

The nearshore waters fronting the project site are shallow with a sandy bottom veneer in hollows or "keyholes" in the raised, flat barrier reef. The water usually ranges from very clear to murky conditions within one day. The build-up of trash and ocean-borne debris often gather in the nearshore eddies of the bay by mid-day.

The marine waters beyond the nearshore zone of Hanauma Bay contain a variety of aquatic habitats, ranging from a protective barrier reef and calm water conditions, to the wave-washed outer margins of the barrier reef, to the basalt cliffs of the outer coastal reaches of the bay. Coral-studded rock ledges above a sand floor comprises the outer bay bottom environment which reaches a depth of nearly 100 feet.

Among the common fish species to be found in the bay are the: parrot, surgeon, goat, and butterfly fishes, though wrasse appear to be the most numerous species present. Crab, lobsters, octopus, and the Hawaiian Green Sea Turtle are also found in bay waters.

As a Marine Life Conservation District, animals, plants, coral and basalt rock structures within bay waters are protected from collection by the State. The Department of Land and Natural Resources (DLNR) monitors marine faunal and floral communities and the Department of Health (DOH) monitors water quality in its efforts to manage the bay environment. The DOH classifies the marine waters of Hanauma Bay as "Class AA" waters.

V. SOCIAL/ECONOMIC ENVIRONMENT

A. Land Use/Zoning

Hanauma Bay and Hanauma Bay Beach Park are located within the boundaries of the Koko Head Park which is classified by the State Land Use Commission as a State Conservation District. See Exhibit B-1. The Conservation District extends from Kawaihoa Point on the tip of Koko Head, past Halona Point to Sandy Beach. The waters of Hanauma Bay and the submerged lands beneath also lie within a Marine Life Conservation District.

Lands adjacent to Koko Head Park are classified by the State Land Use Commission as Urban. These areas consist predominately of single-family and town-home dwelling units, and include the communities of Portlock, Hawaii Kai, Kamiloiki, Kamehameha Ridge and Kalama Valley.

The semi-circular portion of land fronting Hanauma Bay is designated for recreational use by the City and County of Honolulu. The remainder of the Park is designated as Preservation in the Development Plan. See Exhibit B-2.

The City and County of Honolulu's Land Use Ordinance Zoning District classification for Hanauma Bay is Preservation-Restricted (P-1). See Exhibit B-3. The purpose of preservation districts is to preserve and manage major open space and recreation lands and lands of scenic and other natural resource value.

Since the entire project site lies within a State Conservation District and the City and County of Honolulu Special Management Area, all uses and development must comply with the objectives, policies, and guidelines of Chapter 205A, Hawaii Revised Statutes, and Chapter 33, Revised Ordinances of Honolulu, respectively.

B. Recreation

Recreational activities at Hanauma Bay include swimming, snorkeling, scuba diving, sunbathing, picnicking, sightseeing and hiking. Certain activities, not allowed within the waters of the Bay for safety reasons include: windsurfing, surfing, boogie boarding, sailing, and motorboating. Also prohibited are all types of fishing and collecting of marine resources. Prohibited recreational activities in the landward portions of the park include camping, ball games, and other organized team sports. Use of off-road vehicles, bicycling, and motorcycle riding is also prohibited.

Park attendance has increased dramatically in recent years. Life guard beach counts in 1975 revealed 384,000 beach users at Hanauma Bay. By 1986, attendance figures increased to 2,038,000. Attendance figures in 1989 have climbed to 3,000,000 visitors annually, or about 8,200 visitors per day.

Because of heavy visitor use, a variety of alarming problems threaten to degrade and deplete Hanauma Bay's unique natural resources. Pollution of the bay waters, the inadequacy of existing park facilities, lack of a resource management planning, access by unrestricted numbers of park visitors and the negative impacts they cause take their toll on the park environment and public enjoyment.

C. Historical/Archaeological

On May 17, 1952, the Hanauma Shelter, was excavated by a archaeological reconnaissance field team from the University of Hawaii. Located at the cliff base along the wave-cut shelf on the Makapuu-end of Hanauma Bay, the shelter (Site 80-15-03) yielded extensive midden remains and many fishing-related artifacts judged to be of prehistoric origin. Although the shelter appeared to have been completely excavated, it was later placed on the Hawaii Register of Historic Places on July 6, 1971.

On July 30, 1980, further archaeological field survey was conducted at the request of the City and County of Honolulu, Department of Parks and Recreation. The survey was performed to comply with Hawaii State Historic Preservation Office requirements prior to planned development of certain areas within the park. The survey included but was not limited to an area of approximately 47 acres encompassing Hanauma Bay Beach Park.

The Hanauma Shelter site survey revealed no surface remains of prehistoric Hawaiian culture. The survey concluded that planned developments scheduled for construction at Hanauma Bay would not adversely affect the Hanauma Shelter site since it had already been completely excavated.

D. View Planes/Aesthetics

The scenic value of Hanauma Bay lies in the physical contrast between the waters of Hanauma Bay and its surrounding arid landscape. The Koko Head Viewshed, as defined in the City and County's Coastal View Study which includes Hanauma Bay, is recognized for its unique visual and environmental qualities. Maintaining the visual integrity of this coastal area should remain a high priority.

E. Water Quality

Marine waters of Hanauma Bay are classified as Class AA waters by the State Department of Health Administrative Rules, Chapter 54 - Water Quality Standards. The objective of the Class AA ranking is to allow these waters to remain in a natural pristine state as nearly as possible with an absolute minimum of pollution or alteration of water quality from any human-caused source or actions. Marine Life Conservation District waters automatically carry the "AA" classification.

In recent years, periodic testing of bay waters has revealed heightened levels of the bacterial precursors to more hazardous pathogenic organisms. Bay water quality is suspected of being affected by runoff of pathogen-infused soils and other nonpoint pollution sources. Garbage left by visitors on the beach and along the shore line may also contribute to an infusion of pathogens into the nearshore waters of the bay.

F. Flood Hazard

The lower beach park area of Hanauma Bay below the 50 foot elevation lies within the tsunami inundation zone. The Flood Insurance Rate Map (FIRM)) shows that the entire beach park is located in Flood Zone D, an area in which flood hazards are undetermined and no flood boundaries are indicated.

VI. SUMMARY OF MAJOR IMPACTS

A. Short Term

During construction, the areas immediately surrounding the site may be subject to noise, dust, and vehicle traffic, and other construction-related impacts. Control over noise levels in the vicinity of the project site will be the responsibility of the contractor who must comply with the State Department of Health Administrative Rules, Chapter 42 - Vehicular Noise Control for Oahu and Chapter 43 - Community Noise Control for Oahu. Accordingly, the contractor shall be responsible for properly maintaining mufflers and other noise attenuating equipment, as necessary.

Airborne dust shall be controlled with appropriate dust control measures, such as water spraying and sprinkling.

To minimize adverse impacts to Hanauma Bay waters, site preparation shall be conducted in compliance with applicable

State and City and County regulations governing grading and erosion control activities.

Increased traffic from construction-related vehicles will cause temporary disruptions to beach users and sightseers, resulting in some minor inconveniences in the immediate vicinity of the construction areas. Entry and egress of construction vehicles shall be timed to avoid heavy visitor arrival and departure periods. Signs, barricades, and if necessary, security personnel and police officers will be employed to insure public safety and to adequately separate the public from construction activities.

B. Long Term

Long term impacts of constructing the project will be the efficient removal of wastewater through improvements to the existing sewage disposal system for Hanauma Bay Beach Park. Project impacts are described below in relation to relevant objectives, policies and guidelines of the Hawaii Coastal Zone Management Law (Chapter 205-a, Hawaii Revised Statutes), the Hawaii Administrative Rules, Chapter 62, of the State Department of Health, and the City and County of Honolulu's Special Management Area Ordinance (Chapter 33, Revised Ordinances of Honolulu). In view of the limited scope of this project, only those portions of the impact guidelines directly applicable to the project are considered below.

Recreation

OBJECTIVE: (A) Provide coastal recreational opportunities accessible to the public.

POLICY: (2) Provide adequate, accessible, and diverse recreational opportunities in the coastal zone management area by;

(i) Protecting coastal resources uniquely suited for recreational activities that cannot be provided in other areas;

(iii) Providing an adequate supply of shoreline parks and other recreational facilities suitable for public recreation;

(vi) Adopting water quality standards and regulating point and non-point sources of pollution to protect and where feasible, restore the recreational value of coastal waters.

GUIDELINES: (1) All development in the special management area shall be subject to reasonable terms and conditions set by the council to insure that:

(C) Provisions are made for solid and liquid waste treatment, disposition, and management which will minimize adverse effects upon special management area resources; and

(D) Alterations to existing land forms and vegetation, except crops, and construction of structures shall cause minimum adverse effect to water resources and scenic and recreational amenities...

(3) The council shall seek to minimize, where reasonable:

(E) Any development which would adversely affect water quality, existing areas of open water free of visible structures, existing and potential fisheries and fishing grounds, [and] wildlife habitats...

DISCUSSION: The proposed project is designed to more effectively and efficiently remove wastewater from the park through improvements to the present wastewater disposal system. The effect will be to maintain recreational value of coastal resources by preventing further degradation to water quality through the removal of existing and potential contamination hazards associated with sewage entering the nearshore marine waters of Hanauma Bay.

Coastal Ecosystems

OBJECTIVE: (A) Protect valuable coastal ecosystems from disruption and minimize adverse impact on all coastal ecosystems,

POLICY: (B) Preserve valuable coastal ecosystems of significant biological or economic importance;

(C) Promote water quantity and quality planning and management practices which reflect the tolerance of fresh water and marine ecosystems and prohibit land and water uses which violate State water quality standards.

GUIDELINES: (1) All development in the special management area shall be subject to reasonable terms and conditions set by the council to insure that:

(C) Provisions are made for solid and liquid waste treatment, disposition, and management which will minimize adverse effects upon special management area resources;

(D) Alterations to existing land forms and vegetation, except crops, and construction of structures shall cause minimum adverse effect to water resources...;

(2) No development shall be approved unless the council has first found that:

(A) the development will not have any substantial, adverse environmental or ecological effect except as such adverse effect is minimized to the extent practicable and clearly outweighed by public health and safety, or compelling public interest. Such adverse effect shall include, by not be limited to the potential cumulative impacts of individual developments, each on of which taken in itself might not have a substantial adverse effect and the elimination of planning options.

(3) The council shall seek to minimize, where reasonable:

(E) Any development which would adversely affect water quality, existing areas of open water free of visible structures, existing and potential fisheries and fishing grounds, wildlife habitats, or potential or existing agricultural uses of land.

DISCUSSION: With respect to the preservation of valuable coastal ecosystems, the ocean waters fronting the project have long been impacted by the effects of recreational use, periodic heavy storm runoff, and the buildup of wind and ocean-borne flotsam and trash in the nearshore waters of the bay.

Improvements to the existing system represents a conversion from on-site collection in cesspools to a system which will ultimately allow for the collection and removal of sewage out of the park and to the nearest treatment plant. The elimination of subsurface injection wells and cesspools in the lower beach park will insure that water quality in the bay will not be degraded further or become a hazard to the public health, safety and welfare.

Scenic and Open Space Resources

OBJECTIVE: Protect, preserve and, where desirable, restore or improve the quality of coastal scenic and open space resources.

POLICIES: (1) Identify valued scenic resources in the coastal zone management area;

(2) Insure that new developments are compatible with their visual environment by designing and locating such developments to minimize the alteration of natural landforms and existing public views to and along the shoreline;

(3) Preserve, maintain and where desirable improve and restore shoreline open spaces and scenic resources.

DISCUSSION: Construction of sewage disposal facilities will cause minimum effects to scenic and recreational amenities since the improvements will primarily involve installation of underground pipes. The project will include the installation of three cylindrical above-ground (3-4 feet high, 6-8 foot diameter) sewage lift stations. Two lift station structures will be added in the lower beach park area and one to the upper park, which should not alter the existing vegetation or affect scenic vistas. The concern for developing measures supporting public health and safety should significantly offset any adverse visual concerns.

The project will also include the construction of additional walkways in the upper park area and scenic overlooks to improve the view for park visitors and aesthetic qualities of the park.

Economic Uses

OBJECTIVE: Provide public or private facilities and improvements important to the State's economy.

POLICIES: (2) Insure that coastal dependent development such as harbors and ports, visitor industry facilities, and energy generating facilities are located, designed, and constructed to minimize adverse social, visual, and environmental impacts in the coastal zone management area.

DISCUSSION: Hanauma Bay Beach Park is a major tourist destination on the Island of Oahu and in the State of Hawaii. Tourism is the State of Hawaii's single largest industry. Preserving and improving the quality of the terrestrial and marine environments of the bay will insure that the bay will remain one of the visitor industry's prime attractions in the State of Hawaii.

Managing Development

OBJECTIVE: Improve the development review process, communication, and public participation in the management of coastal resources and hazards.

POLICIES: (3) Communicate the potential short and long-term impacts of proposed significant coastal developments early in their life cycle and in terms understandable to the general public to facilitate public participation in the planning and review process.

DISCUSSION: No significant adverse impacts are expected to result from the proposed project. Although there will be some minor, temporary impacts during the construction of the improved facilities, they will be more than offset by the benefits the project will provide for the health and safety of the general public.

Development of the property will be coordinated with appropriate State and County agencies, organizations and individuals. Information on the project will be disclosed under provisions of Chapter 343, Hawaii Revised Statutes.

C. Proposed Mitigation Measures

Mitigation measures have been incorporated in the project to address potential impacts on shoreline processes and aesthetic views as follows:

1. In mitigating potential impacts to shoreline processes, the scope of improvements will only involve upgrades to existing sewage handling facilities and removal of wastewater from the park.

2. The project involves shallow trenching for pipelines which will take place well away from the beach and vegetation line within the grassy picnic area. Only small portions of the project will fall within the 40 foot shoreline setback area.

3. To mitigate visual impacts of the project, landscaping will be provided to screen new sewer facilities above the ground surface (e.g., lift stations) in keeping with the established vegetation in the lower beach park.

4. The removal of approximately ten feet of existing pipeline may, in the short-term, create disagreeable odors during project construction. In the long term, the proposed sewage system will not allow wastewater to lie stationary long enough to become septic and therefore odorous. Above-ground components of the system will be covered to prevent the escape of odors should they occur.

EXHIBIT A

TAX MAP KEY

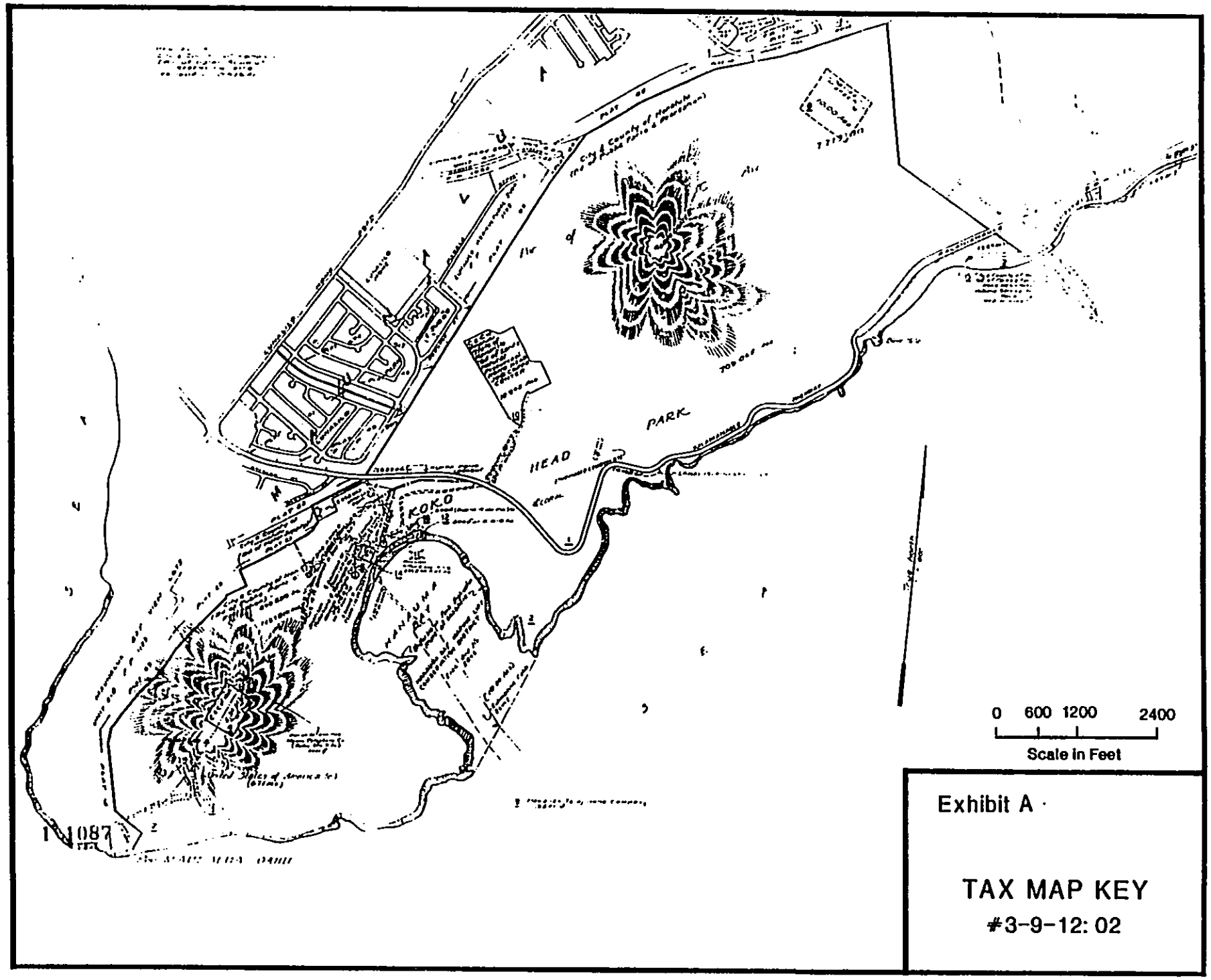


Exhibit A

TAX MAP KEY
#3-9-12: 02

EXHIBIT B

LAND USE MAPS

EXHIBIT B-1

STATE LAND USE DISTRICT MAP

Exhibit B-1

STATE LAND USE DISTRICT BOUNDARY MAP

EXHIBIT B-2

CITY AND COUNTY OF HONOLULU

DEVELOPMENT PLAN MAP

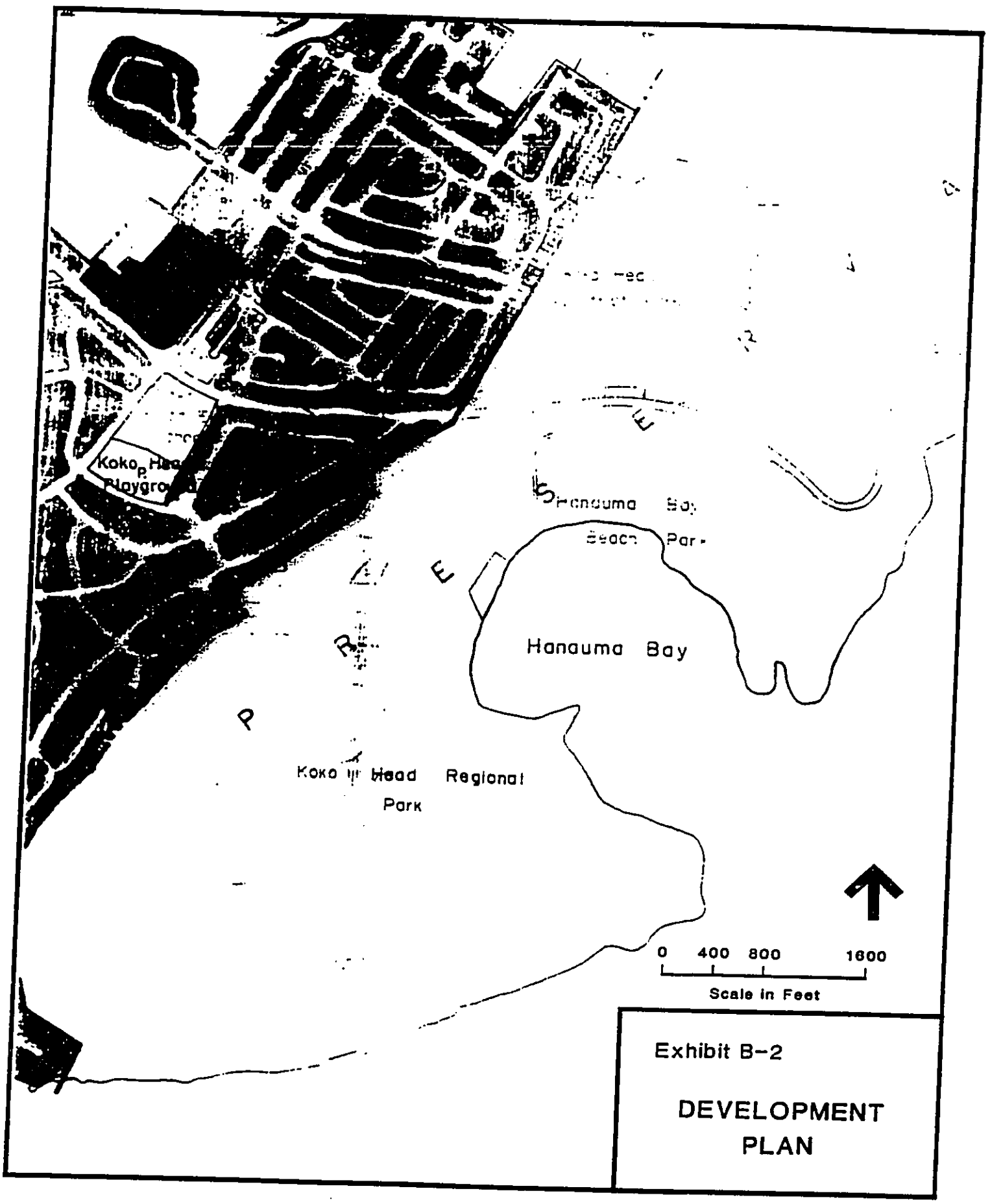


Exhibit B-2

DEVELOPMENT PLAN

EXHIBIT B-3

CITY AND COUNTY OF HONOLULU

LAND USE ORDINANCE

ZONING DISTRICT CLASSIFICATION MAP

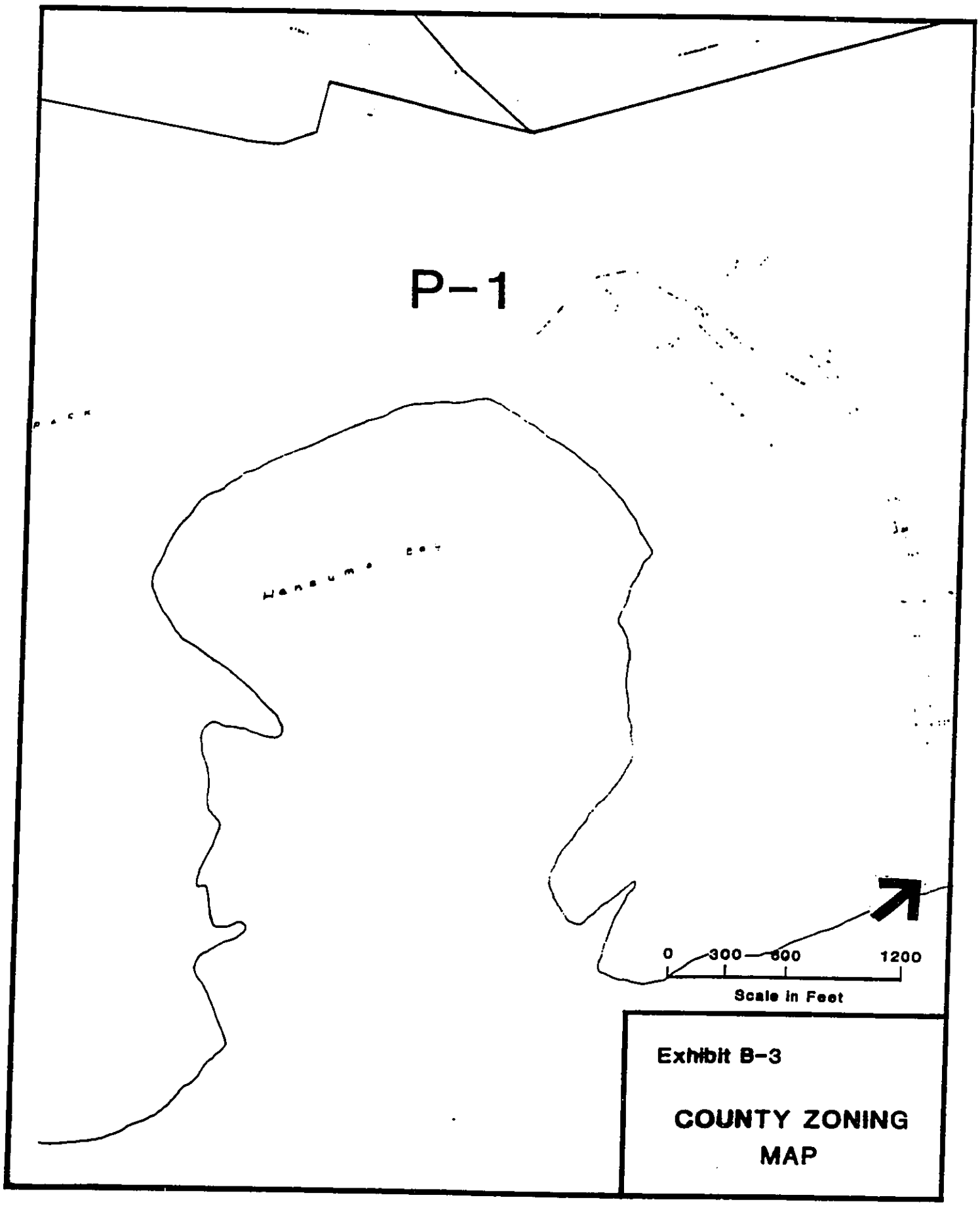


Exhibit B-3

COUNTY ZONING MAP

EXHIBIT C

EXISTING SITE PLAN

Prepared by
CITY A
DEPAR

0 200 400
Scale in Feet

Exhibit C

HANAUMA BAY BEACH PARK
SEWER SYSTEM AND OTHER IMPROVEMENTS

EXISTING SITE PLAN MAP

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

Prepared by :
Wilson Okamoto & Associates, Inc.

400

EXHIBIT D

HISTORICAL/ARCHAEOLOGICAL SITE SURVEY

ARCHAEOLOGICAL RECONNAISSANCE SURVEY AT THE HANAUMA BAY BEACH PARK SITE (TMK:3-9-12:2,6,12 portion) HANAUMA BAY, ISLAND OF OAHU

by

Robert D. Connolly III

Prepared for

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

September 1980

Archaeological Research Associates
Honolulu Office
1130 Hassinger Street, 1G
Honolulu, Hawaii 96822

Ms. 2-090180

INTRODUCTION

BACKGROUND

At the request of the City and County of Honolulu, Department of Parks and Recreation, an archaeological reconnaissance survey of the Hanauma Bay Beach Park at Hanauma Bay, Oahu, was conducted by the Honolulu office of Archaeological Research Associates. This survey was undertaken to comply with Hawaii State Historic Preservation Office requirements prior to planned development of certain areas within the park. Survey was not, however, restricted only to those areas scheduled for immediate development, but included the entire 47 acre parcel on the plateau above the beach at Hanauma Bay.

Survey field work was conducted on July 30, 1980, by the author. On August 4, 1980, an oral preliminary report of findings and tentative recommendations was given to Mr. Miyuki Matsuno and Mr. Paul Nagamine of the City and County of Honolulu, Department of Parks and Recreation (Facilities Development Division), and to Mrs. Patricia Beggerly of the Hawaii State Historic Preservation Office. The present report comprises the final report on the reconnaissance survey and includes final archaeological recommendations concerning the site.

SCOPE OF WORK

After a preliminary discussion with Mrs. Beggerly concerning previous work done in the general area (see PREVIOUS ARCHAEOLOGICAL WORK section) it was decided that an archaeological reconnaissance surface survey of the Hanauma Bay Beach Park area would be a necessary first step.

The basic purpose of a reconnaissance survey is to locate any sites or features of possible archaeological significance. A reconnaissance survey

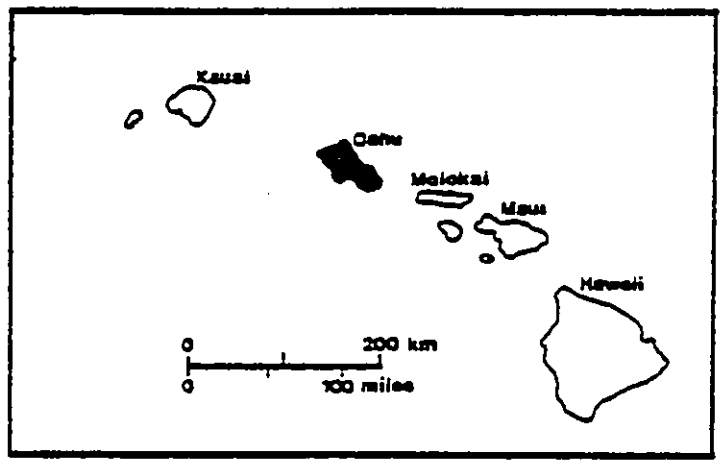
is basically a walk-through survey--extensive rather than intensive in scope--conducted to determine the presence or absence of archaeological resources within a specified project area. A reconnaissance survey (1) permits a preliminary evaluation of archaeological resources, and (2) facilitates formulation of realistic recommendations and estimates--time and money--for any further archaeological work that might be necessary. Such additional work could include intensive survey--detailed recording of sites and features, and selected test excavations; and possibly subsequent mitigation--salvage or research excavations, interpretive planning, and/or preservation of sites and features with significant research, interpretive, and/or preservation value.

DESCRIPTION OF PROJECT AREA

The Hanauma Bay Beach Park site (Figures 1 & 2) consists of approximately 47 acres located in Maunalua ahupua'a, Honolulu District, Oahu Island (TMK:3-9-12:2,6,12 portion). The park site lies within the boundaries of Koko Head Natural Park, classified by the State Land Use Commission as a Conservation District. The beach park is also classified under the City and County General Plan, as Open Space.

The survey area is located on the makai (seaward) side of Kalaniaaole Highway and the FAA Access Road. The west end of the survey area is marked by the Hawaiian Telephone Company Terminal Building site; the south boundary is the cliff edge overlooking the sand beach area; and the east boundary is a line extending southwest from a point approximately 1,250 feet east along Kalaniaaole Highway from the entrance to the park area, to a point approximately 900 feet southeast of the planned summit lookout.

The survey area is located on the side of the volcanic crater which forms the horseshoe-shaped basin called Hanauma Bay. The general topography



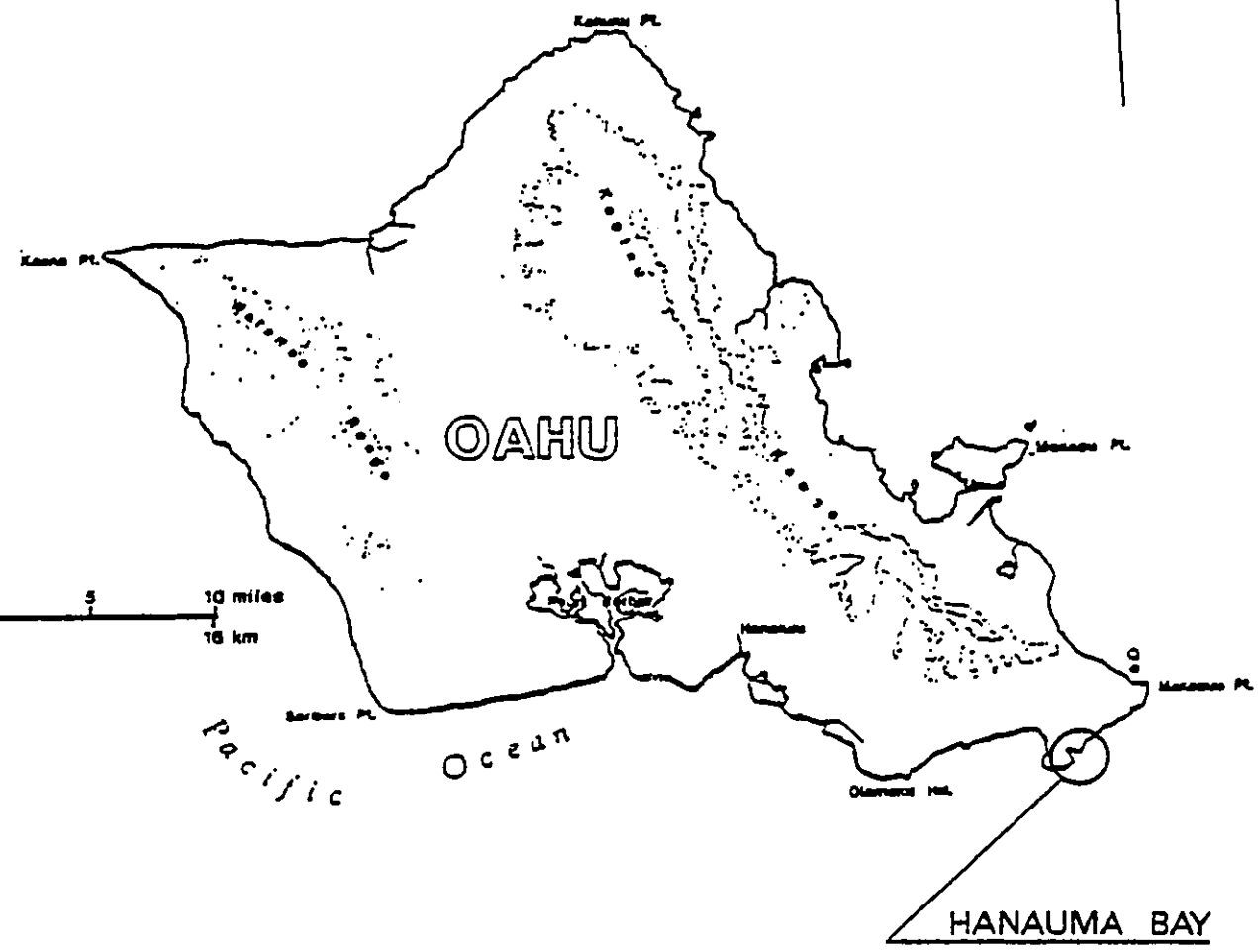


Figure 1. Project Location.

Taken from
Hanauma Bay Beach Park Site Development Plan

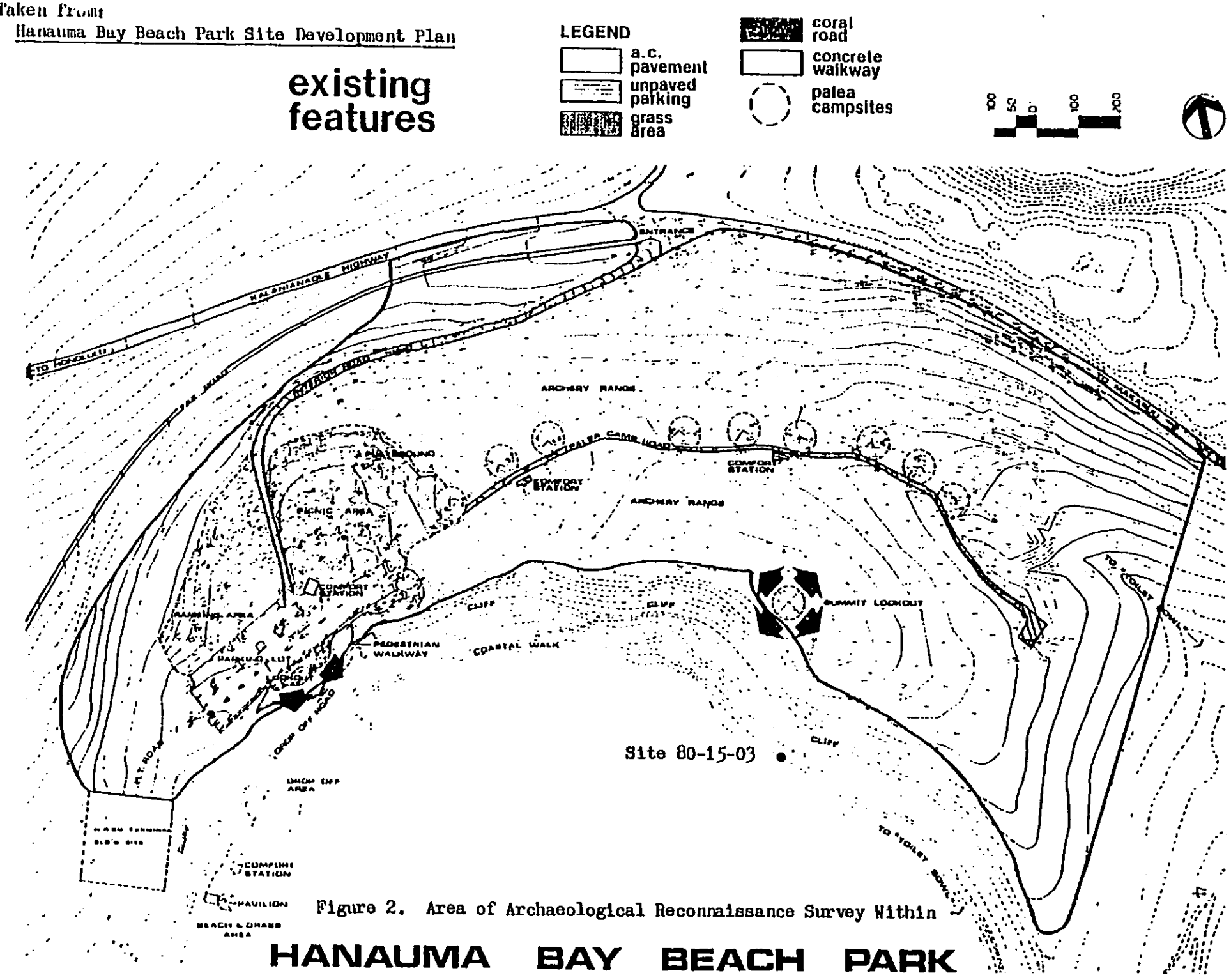


Figure 2. Area of Archaeological Reconnaissance Survey Within

of the survey area consists of a plateau lying between the summit of the crater rim and the cliff edge which drops to the beach. Portions of the upper rim were also included within the survey area.

The park site, which receives less than 30 inches of rain per year and has temperatures ranging from 70 to 90 degrees F., can best be described as very dry and hot; although northeasterly tradewinds sometimes provide relief from the stifling mid-day heat.

The following paragraphs from a report by Fewell Geotechnical Engineering, Ltd. describe the geology and soils of the site area:

> The Hanauma Bay Crater is formed largely of palagonite tuff deposited as volcanic ash during a portion of the Honolulu Volcanic Series and contains some coral fragments torn from the reefs during the original volcanic explosions. The southeastern rim of the crater has been removed by erosion and is now open to the sea forming Hanauma Bay.
>
> The soils at the site, generally lying within the swale area between ridges of tuff, are classified by the U.S. Soil Conservation Service as Koko Silt Loam (KsB) and consist of well-drained soils washed from weathering deposits of volcanic ash, cinders and tuff. The representative profile consists of a surface layer, approximately 16 inches thick, of reddish brown silt loam and a subsoil layer, about 32 inches thick, consisting of a similar soil but with a subangular blocky structure. The depth to weathered tuff generally ranges from 37 to 56 inches (1978:3).
>
> The reddish-brown clayey silt is apparently a wind and water deposited soil originating from the weathering of the Tuff in the surrounding higher elevations. It has been deposited in the swale area which comprises the center portion of the proposed development area. This soil is generally loose at the surface but changes to very stiff to hard with depth. It is predominantly moist to dry.
>
> The weathered tuff varie(s) from a light brown granular soil to essentially unweathered and unaltered hard rock (Ibid.:5).

Vegetation in the survey area consists primarily of California grass (Brachiaria mutica), Bermuda grass (Cynodon dactylon), and Guinea grass (Panicum maximum); the shrub Illima (Sida fallax); and the trees Haole Koa (Leucaena leucocephala) and Keawe (Prosopis pallida). For a more thorough

environmental discussion, as well as a complete list of the flora located within the survey area, see the Hanauma Bay Beach Park Site Development Plan (Wilson Okamoto & Associates, Inc., 1977).

Of the 47 total acres within the project site area, approximately eight or nine have already been extensively developed. Included in the improvements to the site are an access road from Kalaniamaole Highway to the parking lot/lookout area, an unpaved parking area, a large picnic area/ playground, and a comfort station.

PREVIOUS ARCHAEOLOGICAL WORK

A Bernice P. Bishop Museum survey, done in 1931 by J.G. McAllister, located several sites near Hanauma Bay, but none within the present park boundaries. These adjacent sites are:

Site 44--petroglyphs in a cave on the Sandy Beach side of "Toilet Bowl."

Site 45--a platform on the side of Kohelepelepe Ridge, which McAllister was unable to locate.

Site 46--a fishing shrine consisting of a stone near the water.

Sites 47 and 48--two fishing shrines, each roughly square in shape and about 17 feet across, located on the Honolulu side of Koko Head Ridge.

Site 49--Keahupua-o-Maunalua Fishpond, also known as Kuapa Pond (now Hawaii Kai). McAllister states that in 1851 the pond was recorded by Webster as being 523 acres in size; and that in 1822, this pond was recorded by Mathison as having a village of "perhaps one hundred huts" on its shore (McAllister, 1933:69).

In 1952, Hanauma Shelter, a cave shelter below the cliff on the beach at Hanauma Bay, was excavated by a field team from the University of Hawaii, under the direction of Dr. Kenneth P. Emory. The area excavated was

approximately 210 square feet. The extensive midden remains and 121, primarily fishing-related, artifacts indicate that the cave was used by the prehistoric Hawaiians as a temporary shelter while collecting from the vast marine resources in the bay (Emory and Sinoto, 1961). The shelter (Site 80-15-03), which has apparently been completely excavated, was placed on the Hawaii Register of Historic Places on July 6, 1971.

SURVEY METHODS AND PROCEDURES

To expedite survey, the project site was divided into 3 sections: Area I, the section west of the present paved parking lot, and unpaved parking area; Area II, the section makai (seaward) of the Palea Camp Road; and Area III, the section mauka (inland) of the Palea Camp Road. Survey commenced in Area I with the author beginning at the cliff edge above the beach and proceeding mauka, criss-crossing the terrain, until the slope of the cliff rimming the central plateau of the park area became too steep to traverse safely. The next section to be surveyed was Area II, presently used as a public field archery range. This section was surveyed from west to east, starting at the northeast end of the paved parking lot and walking towards the summit lookout. The final sweep was from the summit lookout, traveling east to the terminus of the Palea Camp Road, and then west through Area III (which also includes part of the public field archery range), to the picnic area.

Photographs were taken from the summit lookout to record the terrain and the present state of park development (Figures 3

SURVEY FINDINGS

Archaeological reconnaissance survey of the Hanauma Bay Beach Park site revealed the presence of absolutely no surface remains (structural or otherwise) of prehistoric Hawaiian culture. Of the area surveyed, approximately

50 percent consists of unweathered bedrock with little to no ground cover. The other 50 percent, located in the central portion of the survey area appeared to be culturally sterile soil washed down from surrounding higher elevations.

It was noted during the survey that two historic structures, the two comfort stations on the makai side of the Palea Camp Road, have fallen into disrepair, but they still appear to be structurally sound.

CONCLUSIONS AND RECOMMENDATIONS

The lack of surface prehistoric cultural remains (habitational or agricultural) within the site area cannot be considered unusual in light of the harsh environmental conditions present--high temperatures, low rainfall, and poorly developed soils. The prehistoric utilization of the Hanauma Bay area was most probably oriented toward manipulation of the rich marine resources of the bay. Related activities would, therefore, logically take place at the base of the cliff, on the beach, rather than on the hot, dry plateau, some 120 feet above the resources. This hypothesis would seem to be confirmed by the excavation (referred to above) of the Hanauma Shelter in 1952. The agricultural potential of the plateau area is less than marginal when compared with the rich aquacultural and agricultural resources of the Kuapa Pond area--now Hawaii Kai--which were located but a short walk away. It should be noted that what scanty remains there might have been on the plateau would very probably have been eliminated by erosional factors and extensive historic utilization of the area as a public park.

It is not expected that the presently planned development, and associated additional use of the park area, will adversely affect Hanauma Shelter, since it has already been completely excavated. Neither is it expected that

the other previously known sites within the general area but outside the park boundaries (McAllister's sites 44,45,46,47,48 and 49), will be affected by expanded use of the park.

This evaluation is given on the basis of the findings of a surface reconnaissance survey, and with the general qualification that during any development activity involving the modification of the land surface there is always the possibility that previously unexpected or unknown subsurface cultural features or deposits might be encountered. Since it is our understanding that the planned site improvement work will entail shallow trenching, and cuts and fills, it is recommended that an archaeologist be retained to monitor the excavations. This will insure that if prehistoric cultural remains <u>are</u> encountered, they will be properly recorded and/or salvaged.

REFERENCES

Emory, Kenneth P. and Yosihiki H. Sinoto
1961 Hawaiian Archaeology: Oahu Excavations. B. P. Bishop Museum Special Publication 49. Bishop Museum Press, Honolulu.

Fewell Geotechnical Engineering, Ltd.
1978 Soils Investigation Report, Proposed Hanauma Beach Park Improvements, Hanauma Bay, Oahu, Hawaii. For: Wilson Okamoto & Associates, Inc., Honolulu.

Foote, Donald E., Elmer L. Hill, Sakuichi Nakamura, and Floyd Stephens
1972 Soil Survey of the Islands of Kauai, Oahu, Maui, Molokai, and Lanai, State of Hawaii. United States Dept. of Agriculture, Soil Conservation Service. Washington, D.C.

McAllister, J. Gilbert
1933 Archaeology of Oahu. B. P. Bishop Museum Bulletin 104. Bishop Museum Press, Honolulu.

Wilson Okamoto & Associates, Inc.
1977 Hanauma Bay Beach Park Site Development Plan. For: City and County of Honolulu, Department of Parks and Recreation. Honolulu.

Figure 3. Hanauma Bay Beach Park Site Survey Area facing approximately east. Bare bedrock is shown in the foreground, Kalanianaole Highway in the background.

Figure 4. Hanauma Bay Beach Park Site Survey Area facing north, with Koko Head summit in the background.

Figure 5. Hanauma Bay Beach Park Site Survey Area facing approximately northwest. The park entrance can be seen in the upper right corner.

Figure 6. Hanauma Bay Beach Park Site Survey Area facing approximately west. The parking lot is shown on the left. The F.A.A. Road runs along the ridge from the left to the right.

EXHIBIT E

SEWER ADEQUACY STUDY

SEWER ADEQUACY STUDY
OF A PORTION OF THE
EAST HONOLULU COMMUNITY SERVICES
COLLECTION AND TREATMENT SYSTEM
TO SERVE THE
HANAUMA BAY BEACH PARK SEWERAGE IMPROVEMENTS

prepared for:

Department of Parks and Recreation
City and County of Honolulu

prepared by:

Wilson Okamoto and Associates, Inc.
1150 S. King St., Ste 800
Honolulu, Hawaii 96814

OCTOBER 1989

DRAFT

PURPOSE AND SCOPE

This study is conducted to verify the capacity and adequacy of a portion of the existing East Honolulu Community Services (EHCS) sewer collection and treatment system to receive additional effluent from the Hanauma Bay Beach Park. Specifically, the calculations herein seek to estimate the current flow and determine the reserve capacity in three specific areas: gravity sewers from the intersection of Kalanianaole Highway and Nawiliwili Street to Pump Station 1 (PS 1); as-built capacity and actual flow at PS 1; and the Hawaii Kai Sewage Treatment Plant.

The computations herein will rely solely on available information for flow calculation; no field measurements or inspections will be conducted. It is not the intent of this study to do exhaustive calculations for all sewer line segments on the flow path; rather to examine only those lines which by nature of low slope or small diameter, could pose a limitation to the flow capacity. It is further assumed that force and gravity sewers downstream of PS 1 have been designed and constructed to convey the full design flow of PS 1. The tributary area served is assumed to be fully developed, with little or no significant land area available for future development which would create additional flows.

This study is modeled after a similar report prepared for the U. S. Department of Labor, to connect the Job Corps facility to the EHCS collection and treatement system.

EXISTING SYSTEM

The City and County of Honolulu desires to construct a sewerage system to serve the Hanauma Bay Beach Park in East Honolulu. The general area is depicted in Figure 1. The existing park sanitary facilities drain to several cesspools whose capacity has been exceeded by the number of visitors and residents using the park. It has been decided to implement a system of sanitary sewer collection and disposal, consisting of wet wells, lift stations, force and gravity sewer lines. Wastewater will be pumped from the Park to an existing EHCS sewer manhole at the intersection of Kalanianaole Highway and Nawiliwili Street.

The existing sewers from the proposed point of connection to PS 1 are detailed in Figure 2. The consist of 8- and 12-inch diameter gravity lines from the intersection of Nawiliwili Street and Kalanianaole Highway, along Kalanianaole Highway, to Kalalau Street, to Lunalilo Home Road, along Poipu Drive and Pilaa Street, and to PS 1. The upper fifteen segments are 8-inch diameter lines; the last two are 12-inch lines. Slopes in the 8-inch lines range from minimum (0.6 percent) to about 6.8 percent. Slopes in the 12-inch diameter lines are 0.73 and 1.05 percent.

Sewage Pump Station 1 contains three pumps with a rated capacity of 1,000 gallons per minute (gpm) each. Current records indicate that the pumps operate only several hours per day. The discharge force main from PS 1 leads along Kalanianaole Highway and up Lunalilo Home Road to a transition manhole, from which a gravity sewer leads along Lunalilo Home Road. A series of gravity lines, pump stations and force mains collect sewage from Hawaii Kai and its' environs and convey it to the Hawaii Kai Sewage Treatment Plant.

The wastewater treatement facility is located in Kalama Valley and discharges secondary level effluent through an offshore outfall.

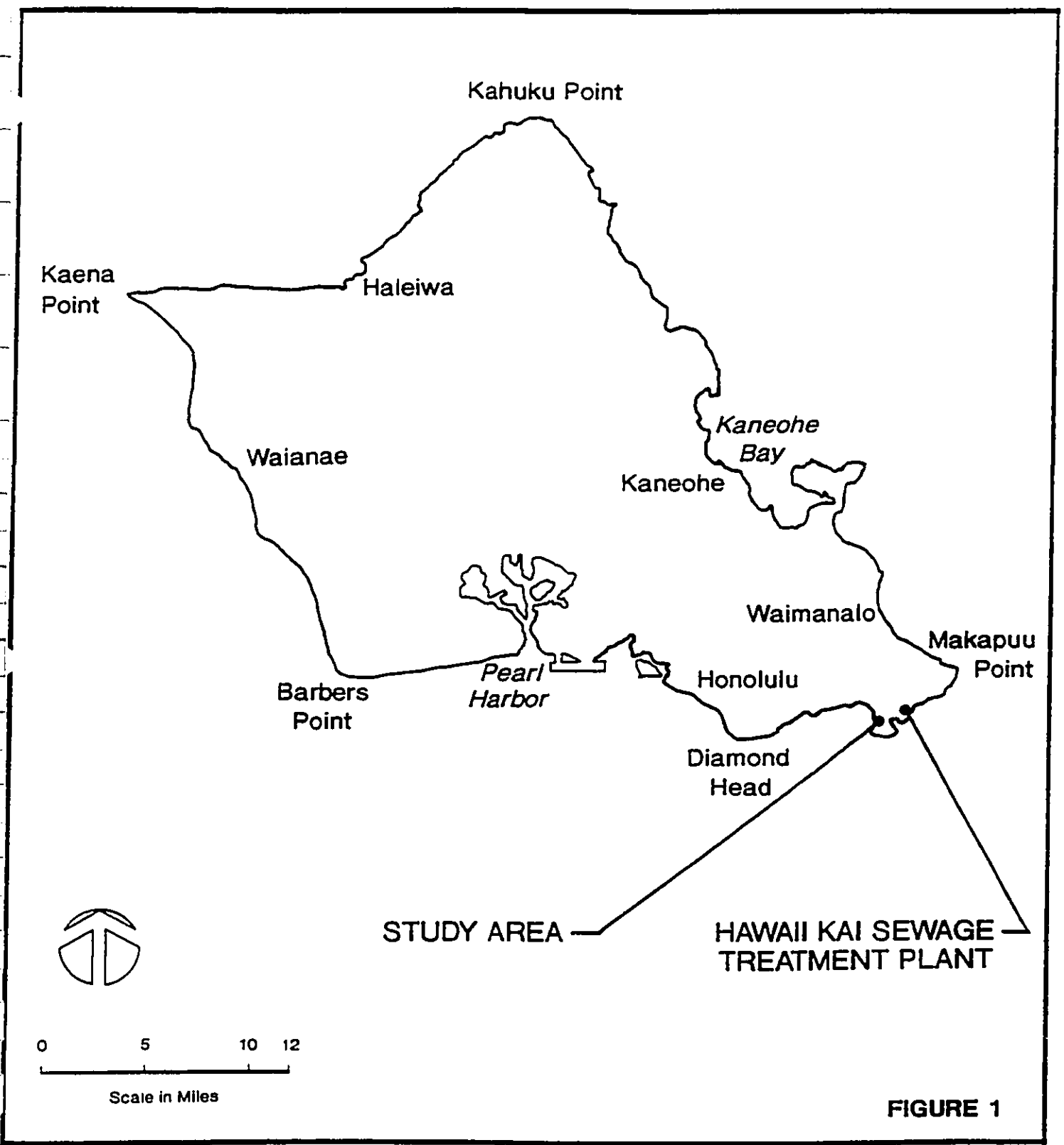


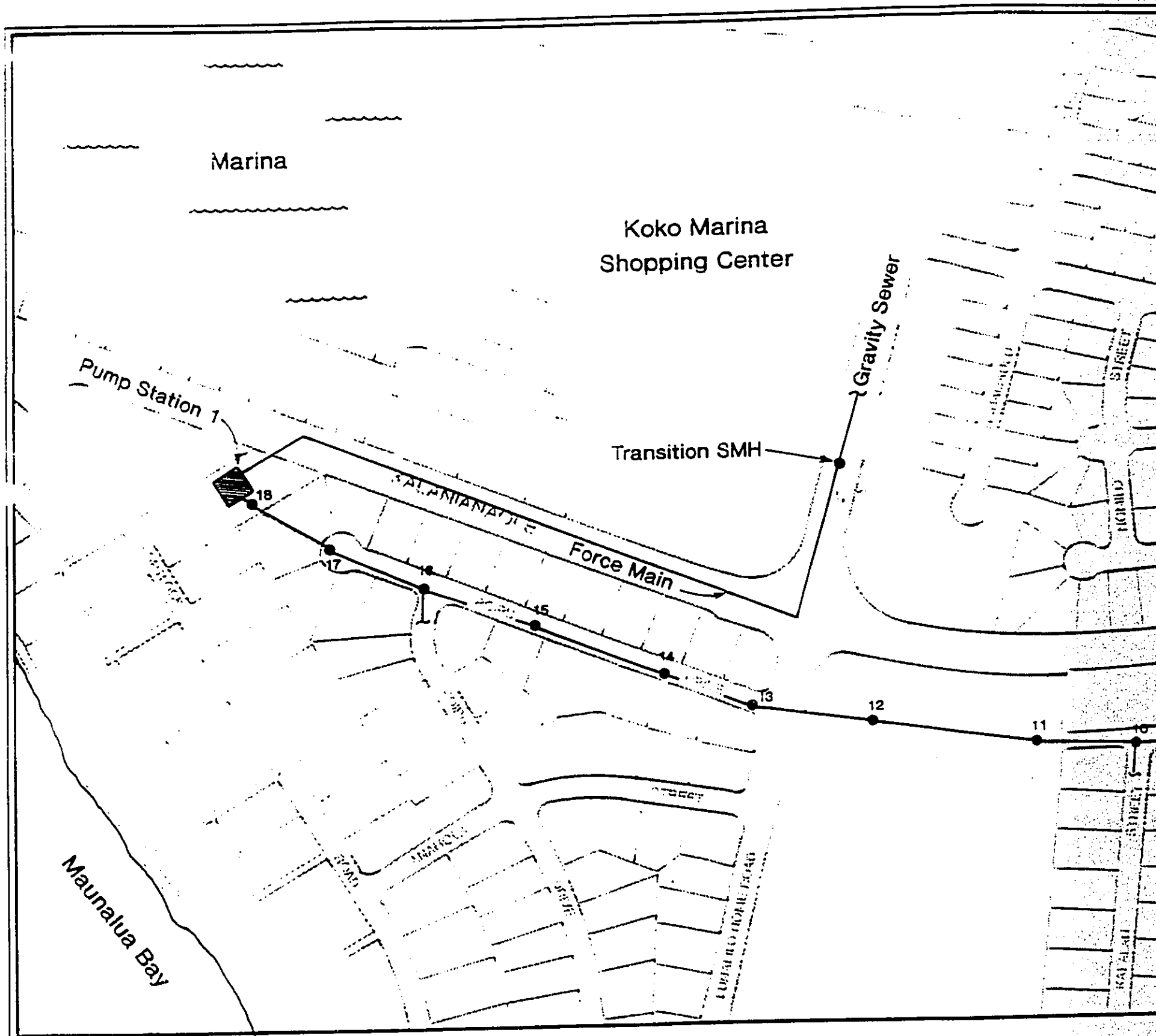
FIGURE 1

SEWER ADEQUACY REPORT FOR HANAUMA BAY BEACH PARK SEWERAGE IMPROVEMENTS

PROJECT LOCATION MAP

Prepared by:

WILSON OKAMOTO & ASSOCIATES, INC.



SEWER ADEQUACY REPORT FOR HANAUMA BAY BEACH PARK SEWERAGE IMPROVEMENTS

Figure 2

GRAVITY SEWER SCH

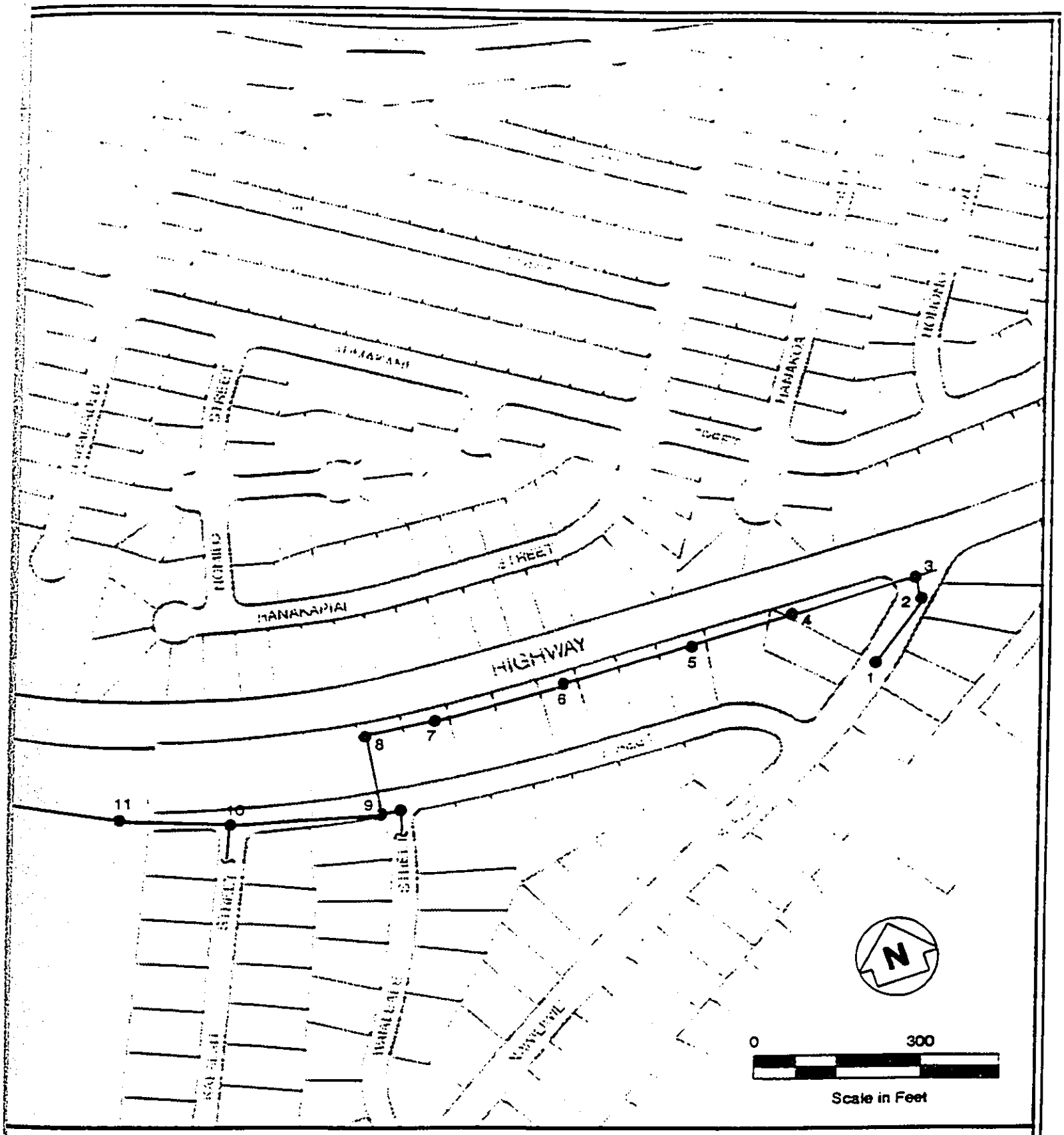


Figure 2

SEWER SCHEMATIC

Prepared by:

WILSON OKAMOTO
& ASSOCIATES, INC.

ADEQUACY CALCULATIONS FOR EXISTING GRAVITY COLLECTION SYSTEM

The consideration of the adequacy of the existing gravity conduits follows the calculations performed for the prior Job Corps study. In that report, peak capacity of the minimum sewer was determined from a formula in the "Handbook of Hydraulics" (King and Brater, eds.), and compared to the generated flow from the new facility. Where peak capacity was greater than the new flow it was concluded that sewer capacity was available.

This study will use a similar approach, augmented by calculation of full flow by use of the Manning Equation and the Design Standards of the Division of Wastewater Management (DWWM) of the Department of Public Works (Reference 1). A Manning's "n" value of 0.015 is used. The King and Brater peak flow formula consistently yields a higher capacity than does the Manning Formula for full flow, as the peak capacity of a closed conduit does not occur at full flow.

Existing sewage flows in the gravity lines are estimated by DWWM procedures which calculate average flow, maximum flow, dry and wet weather infiltration/inflow (I/I) allowances, and peak flow. The flow figures are based on the number of residences served and tributary area in acres. Average flows are based on 4 persons per residence, with a per capita flow of 80 gallons per day. A maximum factor is calculated from the Babbit formula and applied to the daily average figure to yield maximum daily flow. The addition of average flow and a dry weather I/I allowance produces the design average flow; design maximum flow is the sum of maximum flow and dry weather I/I. An allowance for wet weather I/I is added to the design maximum flow to yield peak flow.

Adequacy of gravity lines is then determined by comparing the full flow and peak flow figures to the sum of existing flow and that proposed to be added by the new facility. In all cases, the reserve capacity in the flow path was greater than the sum of existing and proposed additional flow thus sufficient reserve capacity is available to accept the additional flow. The results of the adequacy calculations for the existing gravity sewers are presented in Table 1.

TABLE 1: CALCULATION OF GRAVITY SEWER CAPACITY AND EXISTING FLOWS

References for Flow Capacity Calculation:

(1) Design Standards, Division of Wastewater Management, Dept. of Public Works, City and County of Honolulu.

(2) King and Brater, "Handbook of Hydraulics"

Average per capita flow based on 4 persons per residence, 80 gallons per capita per day.
Maximum Factor per Babbit Formula, DWWM Design Standards.

Units used Diameter - inches Sewage flows - MGD
Slope - percent Area - acres

Manhole From	To	Dia.	Slope	Line Capacity (1)	(2)	Lots Served	Average Flow	Maximum Factor	Maximum Flow	Dry Infilt.	Design Average Flow	Design Maximum Flow	Tributary Area	Wet Infilt.	Design Peak Flow	-- Available -- Reserve Capacit (1)	(2)
1	2	8	4.15	1.376	1.705											1.376	1.705
2	3	8	2.13	0.986	1.222											0.986	1.222
3	4	8	5.27	1.550	1.922											1.550	1.922
4	5	8	6.82	1.764	2.186											1.764	2.186
5	6	8	4.31	1.402	1.738											1.402	1.738
6	7	8	2.58	1.085	1.345											1.085	1.345
7	8	8	3.10	1.189	1.474											1.189	1.474
8	9	8	0.60	0.523	0.648	17	0.0054	5.00	0.027	0.0003	0.006	0.028	7.19	0.009	0.037	0.487	0.612
9	10	8	6.20	1.682	2.084											1.682	2.084
10	11	8	3.13	1.195	1.481											1.195	1.481
11	12	8	4.07	1.363	1.689											1.363	1.689
12	13	8	1.71	0.883	1.095											0.673	0.885
13	14	8	0.67	0.553	0.685	97	0.0310	5.00	0.155	0.0019	0.033	0.157	42.16	0.053	0.210	0.343	0.475
14	15	8	0.70	0.565	0.700											0.565	0.700
15	16	8	2.30	1.024	1.269											1.024	1.269
16	17	12	0.84	1.825	2.265	594	0.1901	4.21	0.799	0.0119	0.202	0.811	270.62	0.338	1.150	0.676	1.115
17		12	1.05	2.041	2.532											2.041	2.532

CONCLUSION: IN ALL CASES, RESERVE CAPACITY EXCEEDS THE PROPOSED ADDITIONAL FLOW OF 0.05 MGD, THEREFORE LINES ARE SUFFICIENT.

ADEQUACY OF PUMP STATION 1

PS 1 contains three pumps of 1,000 gpm capacity each, one of which is a standby pump. Current records indicate operating time for the two main pumps over the past year of record has ranged from about 1.9 to 2.1 hours per day. In that Division of Wastewater Management Standards limit operating time to a maximum of 16 hours per day, sufficient pump capacity exists for considerably more flow than is currently received.

ADEQUACY OF HAWAII KAI SEWAGE TREATMENT PLANT

The EHCS office was contacted to determine the design capacity and current amount of sewage treated at the Hawaii Kai Treatment Plant. As of this writing their response has not been received.

TABLE 2: SUMMARY OF PUMP STATION 1 OPERATING HOURS DATA

Pump No.	1988 Jul	Aug	Sept	Oct	Nov	Dec
1	44.2	54.5	52.5	56.7	53.8	61.3
2	18.5	7.6	1.4	0.1	0.2	0.2
3	44.3	51.8	54.4	51.3	55.1	56.2
Total/Mo.	107.0	113.9	108.3	108.1	109.1	117.7
Total/Day	3.5	0.4	3.6	3.5	3.6	3.8

Pump No.	1989 Jan	Feb	Mar	Apr	May	Jun	Jul
1	53.7	52.4	55.0	55.0	57.4	54.2	62.4
2	0.3	0.8	0.0	0.0	0.2	0.0	0.1
3	58.3	48.5	59.3	57.0	54.3	51.8	50.2
Total/Mo.	112.3	101.8	114.3	112.0	111.9	106.0	112.7
Total/Day	3.6	3.6	3.7	3.7	3.6	3.5	3.6

AVERAGE PUMP OPERATING TIME (Hours, After Aug. 1988)

	Monthly Minimum	Monthly Average	Monthly Maximum	Daily Minimum	Daily Average	Daily Maximum
Pump 1:	55.9	55.9	62.4	1.9	1.9	2.1
Pump 2:	0.3	0.3	1.4	0.0	0.0	0.0
Pump 3:	54.2	54.2	59.3	1.8	1.8	1.9

TOTAL FLOW PER PUMP (gpd)

Pump No.	1988 Jul	Aug	Sept	Oct	Nov	Dec
1	8,839.6	8,894.1	8,948.8	9,003.3	9,057.1	9,118.4
2	10,735.9	10,743.5	10,744.9	10,745.0	10,745.2	10,745.4
3	10,583.3	10,645.1	10,899.5	10,750.8	10,805.9	10,882.1

Pump No.	1989 Jan	Feb	Mar	Apr	May	Jun	Jul
1	9,172.1	9,224.5	9,279.5	9,334.5	9,391.9	9,448.1	9,508.5
2	10,745.7	10,746.5	10,745.5	10,746.5	10,746.7	10,746.7	10,746.8
3	10,920.4	10,969.0	11,028.3	11,085.3	11,139.6	11,191.4	11,241.6

FLOW SUMMARY (Gallons Per Pump After Aug. 1988)

	Monthly Minimum	Monthly Average	Monthly Maximum	Daily Minimum	Daily Average	Daily Maximum
Pump 1:	8,839.6	9,170.8	9,508.5	300.1	308.9	317.0
Pump 2:	10,735.9	10,744.9	10,746.8	358.2	358.2	358.2
Pump 3:	10,583.3	10,934.0	11,241.6	358.4	367.1	374.7

EXHIBIT F

ENGINEERING REPORT

ENGINEERING REPORT FOR

HANAUMA BAY SEWERAGE IMPROVEMENTS

prepared for:

Department of Parks and Recreation
City and County of Honolulu

prepared by:

WILSON OKAMOTO AND ASSOCIATES, INC.
1150 S. KING ST., STE 800
HONOLULU, HAWAII 96814

November 1989

INTRODUCTION

This report in prepared to document the engineering design of sewerage improvements for Hanauma Bay, pursuant to the requirement of the Division of Wastewater Management (DWWM) Design Standards. This report will present the design requirements and parameters for the lift stations, gravity and pressure sewer lines to be installed.

EXISTING CONDITION

Hanauma Bay Beach Park, located on the southeast tip of Oahu, is one of the most heavily used City parks, with upwards of 8,000 visitors per day. Currently, four comfort stations serve park visitors. Three are located at the beach level and a fourth near the upper level picnic area. The three beach level stations are located at the Honolulu end, center, and Waimanalo end of the beach level, will be referred to as Stations A, B, and C respectively; the upper level station is identified as Station D. All four installations are provided with male and female toilet areas which drain to cesspools. Due to the intensity of usage, sewage from Comfort Station B and occasionally Station C, will overflow the cesspools, particularly during the summer months.

There exists no sewer collection system within the Beach Park boundaries or along its' perimeter. The nearest potential point of connection to a sewerage system leading to a treatment plant is the East Honolulu Community Services (EHCS) manhole at the intersection of Nawiliwili Street and Kalanianaole Highway. The EHCS system is privately owned and operated, serving the residents and business of the Hawaii Kai and Kalama Valley areas.

The recently enacted Chapter 62 regulations of the Department of Health preclude construction of additional cesspools to handle the sewage flows. Further, insufficient land area is available for onsite treatment and disposal. The remaining alternative, then, is collection of sewage and pumping it from the park to the EHCS sewerage system.

This report summarizes the requirements of the DWWM and presents the engineering parameters used in design of a sewerage collection and disposal system for the Hanauma Bay Beach Park.

SEWERAGE PLAN

It is planned to construct a sewerage system consisting of lift stations, force mains and gravity sewer lines to collect and convey sanitary wastewater from the park to the EHCS collection system. At comfort station A, Lift Station "A" will convey sewage to a transition box at comfort station B. From the transition box, a gravity line will carry sewage from comfort stations A and B to the Lift Station B wet well at comfort station C. A force main will carry sewage to the wet well of Lift Station C, at the upper level comfort station. Lift Station C will convey sewage across the upper level of the park, through

an existing tunnel to the Hawaii Kai side of the ridge enclosing the Park and to an existing EHCS sewer manhole. A schematic of the proposed system is presented in Figure 1.

The basic parameters of the requirements of the Division of Wastewater Management, are presented below, followed by a description of the method used to calculated wastewater generation rates, and discussion of each lift station. Supporting calculations and schematics for the lift station elements are found in Appendix A.

DWWM REQUIREMENTS

The pertinent standards of the DWWM, excerpted from the Design Standards, are summarized as follows for gravity sewers:

> Gravity sewers shall be designed to carry peak flow without surcharging and transport suspended solids so that deposits and odor nuisances are minimized.
>
> The Manning Formula, with an "n" value of 0.015 shall be used for lines less than 15 inches in diameter.
>
> A flow velocity of 2 feet per second (fps) minimum, 10 fps maximum, shall be designed for.
>
> Sewers shall be laid on constant grade and straight alignment between manholes.
>
> Minimum cover of 4 feet under pavement, 3 feet under sidewalks and 2 feet in areas not subjected to vehicle loads shall be maintained.

The following requirements for pressure flow are extracted from the referenced Standards:

> Force mains shall not be less than 4 inches in diameter.
>
> Velocity of flow shall be 1.75 fps (absolute minimum), 3 fps (desirable minimum) and 10 fps maximum.
>
> Total dynamic head (TDH) should not exceed 100 feet.

For wastewater pumping station wet wells, the following requirements are pertinent:

> Maximum detention time in wet well: 30 minutes.
>
> Minimum pump cycle time: 5 minutes
>
> Minimum wet well inside diameter = 5 feet. High water level is the invert of the incoming sewer; lowest level is the top of the pump casing; minimum vertical distance between pump start and stop levels is 6 inches.

Wet well floors shall have a 1:1 minimum slope

FLOW GENERATION

Peak flow figures are derived from the fixture unit count for each building and the Uniform Plumbing Code ((UPC). The counts and flows derived from Chart A-3 of the for the comfort stations are summarized below:

Structure	Fixture Units	Production GPM	
Beach Comfort Stations:			
Honolulu end (Station A)	52	16	
Center (Station B)	34	12	
Waimanalo end (Station C)	81	25	
Caretaker's Residence	12	6	
Food Concession	6	5	
Total gpm at beach level		64	
Upper Park Comfort Station	45	15	(current)
	67	22	(est. future)
Total sewage generated =		86	gpm (future)

WET WELLS AND LIFT STATIONS

All wet wells will be circular reinforced concrete structures provided with an interior plastic liner to prevent deterioration of concrete exposed to repeated wet-dry cycles. High water alarms will be provided at all wet wells. Each wet well will be provided with an overflow line leading to existing cesspools.

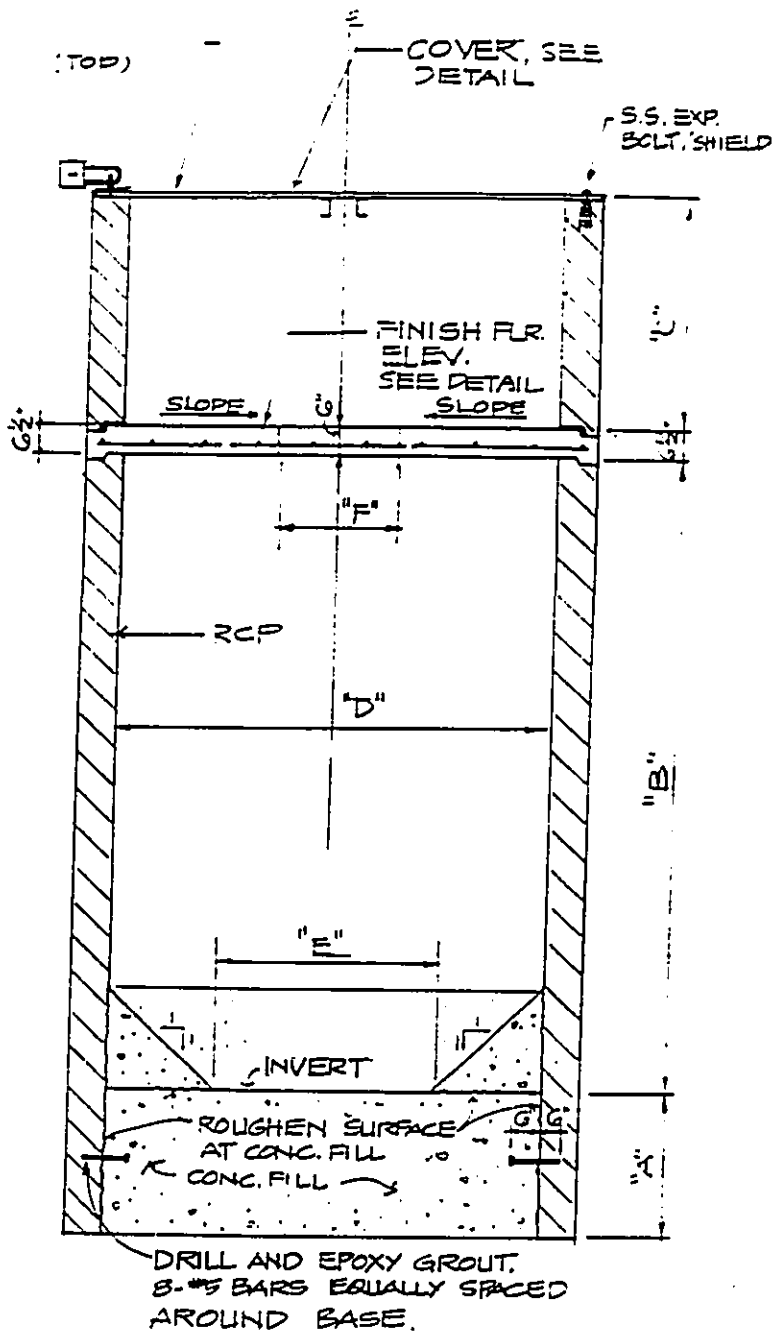
Pumps will be of the column type, with motors located at ground level driving a submerged pump. A schematic of a typical wet well is provided in Figure 2.

LIFT STATION A

Sizing of the lift station wet wells is controlled by the 30-minute maximum detention time parameter for incoming effluent. Thus for Lift Station A, the incoming 16 gpm flow yields a 480-gallon capacity wet well. Using a selected wet well inside diameter of 6 feet to minimize site excavation and disturbance to the park requires a working capacity of 2.27 vertical linear feet. The incoming hydrograph, wet well sizing and pump cycle calculations are included in Appendix A.

The minimum force main velocity and diameter determine the smallest allowable pump size: 1.75 fps flow in a 4-inch force main yields a 70 gpm minimum pump size.

The total dynamic head (TDH) for the pump is calculated by summing the static, friction and minor losses. The TDH calculation is included in



TYPICAL SECTION

PUMP STATION - SCHEDULE									
STA. NO	PUMP STATION DIMENSIONS							ELEVATIONS	
	A	B	C	D	E	F *		MIN FL.	INV.
A	1.42	6.58	3.0	6.0	3.0	2.16		7.0	-0.12
B	3.61	12.39	4.5	8.0	4.0	4.5		14.1	1.17
C	2.86	13.14	3.5	8.0	4.0	2.16		127.5	113.82

Appendix A.

Pump cycling is calculated considering the inflow hydrograph, wet well storage and pump rate. The selected pumps have 70 gpm capacity; the effective rate is the capacity less the inflow, or 54 gpm. Given a pump rate of 70 gpm with 16 gpm incoming flow the wet well will be emptied in 8.9 minutes and take 30 minutes to refill. Each pump will run for 8.9 minutes, rest while the wet well refills (30 minutes), rest while the other pump empties the well (8.9 minutes), and the wet well refills (30 minutes). Thus, each pump will run for 8.9 minutes and rest 69 minutes. The cycle time for each pump is thus 77.9 minutes from pump start to start.

Lift Station A will discharge to a 4-inch diameter force main crossing the grass area of the lower park. Sufficient pipe cover will be provided to enable the line to withstand traffic loading as will occur from maintenance vehicles. Force main "A" will be wrapped in polyethylene sheeting to retard external corrosion.

The Lift Station A wet well will be provided with an gravity overflow line to the existing cesspool. A high water level alarm will be tripped if the sewage level exceeds the soffit of the overflow line.

TRANSITION BOX AT COMFORT STATION B

A transition box will be provided at Comfort Station B as a junction for the 4-inch force main from Lift Station A, effluent from Comfort Station B, and an outgoing 6-inch ductile iron gravity line leading to the Comfort Station C wet well.

The transition box will be shallow to minimize excavation for the gravity line to the Lift Station C wet well and to minimize excavation at Lift Station B, while maintaining sufficient ground cover to provide protection for the sewer lines. The 6-inch gravity line will be wrapped in polyethylene sheeting to prevent corrosion.

The transition box will receive 70 gpm while the Lift Station A pump is running, and 12 gpm peak continuous flow from Comfort Station B. Maximum flow in the downstream 6-inch ductile iron gravity sewer line from the transition box to Lift Station B is thus 82 gpm.

LIFT STATION B

The wet well at Comfort Station C will receive effluent from Comfort Stations A, B and C as well as from the caretaker residence and concession. One cycle of the incoming hydrograph includes 118 gpm for 8.9 minutes while the Lift Station A pumps are running, followed by 48 gpm for 30 minutes from Comfort Stations B, C, the caretaker residence and concession stand.

To achieve desired minimum 3 fps velocity in the 4-inch force main, a

pump size of 120 gpm is selected. The estimated total dynamic head for the Lift Station B pumps is 131 feet. The TDH calculation is included in Appendix A.

In order to pump down the accumulated wet well volume in the 30-minute period between pumping from Lift Station A, each pump will run alternately for 20.75 minutes and rest 18.15 minutes while the wet well refills. The start to start pump cycle time for each of the two pumps at Lift Station B will be 77.8 minutes.

An minimum effective wet well capacity of 1,494 gallons is indicated to be required. To minimize excavation in sewage saturated sands, a wet well diameter of 8 feet is selected. The required 1,494 gallon working capacity will require 3.97 vertical feet.

In the event of total pump failure or line blockage, a high level alarm and overflow line to the existing cesspools will be provided.

A 4-inch diameter force main will lead from Lift Station B, traverse the cliff to the upper park level and terminate in the wet well at Lift Station C. The main will use flange joint ductile iron pipe where it is laid above ground and for a sufficient distance below grade to ensure adequate pipe anchorage. Above grade portions of the force main will be anchored to the slope face by two concrete piers in each pipe length. Below grade sections of the force main will use mechanical joint pipe where flange pipe is not required.

LIFT STATION C

The wet well for Lift Station C is sized from the incoming wastewater hydrograph. The wet well will receive 120 gpm from Lift Station B for 20.75 minutes. The present 15 gpm continuous flow from Comfort Station D and is master planned to be increased to about 22 gpm. Other master plan activities include relocating the concession and caretaker residence to the upper level. Additionally, a park administrator residence may be added. One cycle of the wet well incoming hydrograph will flow 148 gpm for 20.75 minutes followed by 28 gpm 18.15 minutes.

In order to pump down accumulated wastewater between pump operation times at Lift Station B and achieve sufficient velocity in the force main, a pump of 200 gpm is selected.

Based on the incoming hydrograph and pump rate, the time to empty the wet well will be 17.9 minutes. Pump operation will consist of 17.9 minutes running followed by 21.01 minutes refill. Start to start pump cycle time at peak flow is thus 77.8 minutes.

Lift Station C will discharge to a force main crossing the picnic area, the bus/van overlook access road, and traverse an existing tunnel in the ridge separating Hanauma Bay and Hawaii Kai. A combination air/vacuum relief valve will be provided at the force main high point at the Hanauma Bay side tunnel portal. The downstream tunnel portal is located adjacent to the junction of Kalanianaole Highway and a Board of

Water Supply reservoir access road. The main will parallel Kalanianaole Highway and outlet into a new transition manhole in the Nawiliwili Street intersection. A six-inch ductile iron pipe gravity sewer will lead to the existing EHCS sewer manhole.

The downstream transition manhole is lower than the Lift Station D wet well. Provision of the air relief valve on the force main will prevent the force main from operating as a siphon.

The collection system connected to is the property of East Honolulu Community Services, Inc. (EHCS). A separate adequacy report analyzing the capacities of the existing collection system downstream of the connection manhole has been prepared, which verifies the capacity and adequacy of lines leading to EHCS' Sewage Pumping Station 1, located adjacent to Kalanianaole Highway across from the Koko Marina branch of First Hawaiian Bank. The adequacy report also verifies the adequacy of the EHCS pump station.

APPENDIX A -- CALCULATIONS

Wet Well A Sizing, Force Main A, Pump Sizing
Wet Well Hydrograph -- Lift Station A
Friction Loss Chart

Transition Box at Comfort Station B
Transition Box and Sewer Line B Flow

Wet Well Hydrograph -- Lift Station B
Water Hammer and Pipe Thickness Calculation

Wet Well Hydrograph -- Lift Station C
Force Main C Flow Calculation

ARCHITECTURAL
STRUCTURAL
CIVIL
PLANNING

WILSON OKAMOTO & ASSOCIATES
ENGINEERS, ARCHITECTS AND PLANNERS

COMPUTED BY: CS
CHECKED BY
DATE 6-24 1982

Hawaiian Sewerage
STATION 'A'

PROJECT 2801-3

SHEET NO. ___ OF ___ SHEETS

WET WELL, LIFT STATION A

REQUIRED: MAX 30 minute detention
Incoming flow: 16 GPM

Storage capacity = 16 x 30 = 480 gallons

Size: Select 6' ϕ.

Working depth = (480/7.481)/π3² = 2.27 W.D.
Add 2 feet to depth to slope invert 2.00
4.27'

Incoming sewer invert = 4.15
Subtract working depth & slope -4.27
wet well invert -0.12

FORCE MAIN A: 4" ϕ, 70 GPM, 560 LF, 1.75 FPS
(TO ACHIEVE MINIMUM VELOCITY IN MINIMUM SIZE MAIN)

PUMP SIZING: 70 GPM (MINIMUM)

TOTAL DYNAMIC HEAD = STATIC + FRICTION + MINOR LOSS

1. STATIC HEAD = TRANSITION AT WELL + FM TO WET WELL
= 3.30 - (4.15 - 0.12) = 7.47'

2. FRICTION: LOSS IN 4" PIPE @ 70 GPM, 1.75 FPS
= 5.63 FT / 100 LF.
FORCE MAIN LENGTH = 560'
∴ LOSS = 5.6 x 0.63 = 3.53'

3. MINOR LOSS: ALLOW 1.0'

TDH = 7.47 + 3.53 + 1.0 = 11.95' SAY 12'

ARCHITECTURAL
STRUCTURAL
CIVIL
PLANNING

WILSON OKAMOTO & ASSOCIATES
ENGINEERS. ARCHITECTS AND PLANNERS

COMPUTED BY CS
CHECKED BY
DATE 5-17 19 89

Kihei Sewerage

PROJECT 2251-01

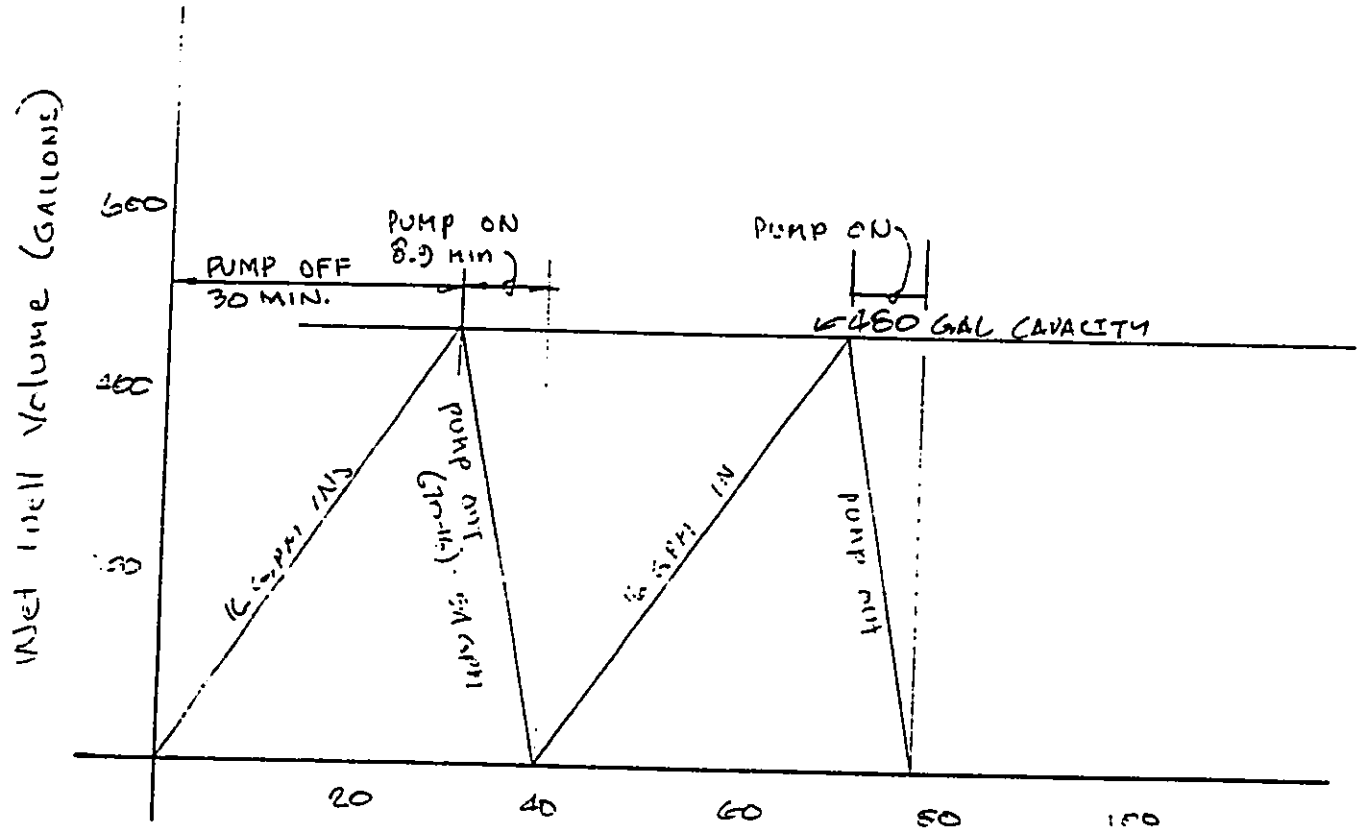
SHEET NO. ___ OF ___ SHEETS

WET WELL @ COMFORT STATION 'A' = LIFT STATION 'A'

Incoming flow 16 GPM

Wet Well Storage = 30 min. x 16 GPM = 480 GAL

Pumps: 2 @ 70 GPM (DWWM min. Force main velocity)



FRICTION LOSS OF WATER IN FEET PER 100 FEET LENGTH OF PIPE. BASED ON WILLIAMS & HAZEN FORMULA USING CONSTANT 100. SIZES OF STANDARD PIPE IN INCHES

U.S. Gals. per min.	½" Pipe		¾" Pipe		1" Pipe		1¼" Pipe		1½" Pipe		2" Pipe		2½" Pipe		3" Pipe		4" Pipe		5" Pipe		6" Pipe		U.S. Gals. per min.
	Vel. ft. per Sec.	Loss in Feet	Vel. ft. per Sec.	Loss in Feet	Vel. ft. per Sec.	Loss in Feet	Vel. ft. per Sec.	Loss in Feet	Vel. ft. per Sec.	Loss in Feet	Vel. ft. per Sec.	Loss in Feet	Vel. ft. per Sec.	Loss in Feet	Vel. ft. per Sec.	Loss in Feet	Vel. ft. per Sec.	Loss in Feet	Vel. ft. per Sec.	Loss in Feet	Vel. ft. per Sec.	Loss in Feet	
2	2.10	7.4	1.20	1.9																			2
4	4.21	27.0	2.41	7.0	1.49	2.14	.86	.57	.63	.26													4
6	6.31	57.0	3.61	14.7	2.23	4.55	1.29	1.20	.94	.56	.61	.20											6
8	8.42	98.0	4.81	25.0	2.98	7.8	1.72	2.03	1.26	.95	.82	.33	.52	.11									8
10	10.52	147.0	6.02	38.0	3.72	11.7	2.14	3.05	1.57	1.43	1.02	.50	.65	.17	.45	.07							10
12			7.22	53.0	4.46	16.4	2.57	4.3	1.89	2.01	1.23	.79	.78	.23	.54	.10							12
15			9.02	80.0	5.60	25.0	3.21	6.5	2.36	3.00	1.53	1.08	.98	.36	.68	.15							15
18			10.84	108.2	6.69	35.0	3.86	9.1	2.83	4.24	1.84	1.49	1.18	.50	.82	.21							18
20			12.03	136.0	7.44	42.0	4.29	11.3	3.15	5.20	2.04	1.82	1.31	.61	.91	.25	.51	.06					20
25					9.30	64.0	5.36	16.6	3.80	7.30	2.55	2.73	1.63	.92	1.13	.38	.64	.09					25
30					11.15	89.0	6.43	23.0	4.72	11.0	3.06	3.84	1.96	1.29	1.36	.54	.77	.13	.49	.04			30
35					13.02	119.0	7.51	31.2	5.51	14.7	3.57	5.10	2.29	1.72	1.59	.71	.89	.17	.57	.06			35
40					14.88	152.0	8.58	40.0	6.30	18.8	4.08	6.6	2.61	2.20	1.82	.91	1.02	.22	.65	.08			40
45							9.65	50.0	7.08	23.2	4.60	8.2	2.94	2.80	2.04	1.15	1.15	.28	.73	.09			45
50							10.72	60.0	7.87	28.4	5.11	9.9	3.27	3.32	2.27	1.38	1.28	.34	.82	.11	.57	.04	50
55							11.78	72.0	8.66	34.0	5.62	11.8	3.59	4.01	2.45	1.58	1.41	.41	.90	.14	.62	.05	55
60							12.87	85.0	9.44	39.6	6.13	13.9	3.92	4.65	2.72	1.92	1.53	.47	.98	.16	.68	.06	60
65							13.92	99.7	10.23	45.9	6.64	16.1	4.24	5.41	2.89	2.16	1.66	.53	1.06	.19	.74	.076	65
70							15.01	113.0	11.02	53.0	7.15	18.4	4.58	6.2	3.18	2.57	1.79	.63	1.14	.21	.79	.08	70
75							16.06	129.0	11.80	60.0	7.66	20.9	4.91	7.1	3.33	3.00	1.91	.73	1.22	.24	.85	.10	75
80							17.16	145.0	12.59	68.0	8.17	23.7	5.23	7.9	3.63	3.28	2.04	.81	1.31	.27	.91	.11	80
85							18.21	163.8	13.38	75.0	8.68	26.8	5.56	8.1	3.78	3.54	2.17	.91	1.39	.31	.96	.12	85
90							19.30	180.0	14.71	84.0	9.19	29.4	5.88	9.8	4.09	4.08	2.30	1.00	1.47	.34	1.02	.14	90
95									14.95	93.0	9.70	32.6	6.21	10.8	4.22	4.33	2.42	1.12	1.55	.38	1.08	.15	95
100	8" PIPE								15.74	102.0	10.21	35.8	6.54	12.0	4.54	4.96	2.55	1.22	1.63	.41	1.13	.17	100
110									17.31	122.0	11.23	42.9	7.18	14.5	5.00	6.0	2.81	1.46	1.79	.49	1.25	.21	110
120									18.89	143.0	12.25	50.0	7.84	16.8	5.45	7.0	3.06	1.71	1.96	.58	1.36	.24	120
130									20.46	166.0	13.28	58.0	8.48	18.7	6.91	8.1	3.31	1.97	2.12	.67	1.47	.27	130
140	.90	.08							22.04	190.0	14.30	67.0	9.15	22.3	6.35	9.2	3.57	2.28	2.29	.76	1.59	.32	140
150	.96	.09									15.32	76.0	9.81	25.5	6.82	10.5	3.82	2.62	2.45	.88	1.70	.36	150
160	1.02	.10									16.34	86.0	10.46	29.0	7.26	11.8	4.08	2.91	2.61	.98	1.82	.40	160
170	1.08	.11	10" PIPE								17.36	96.0	11.11	34.1	7.71	13.3	4.33	3.26	2.77	1.08	1.92	.45	170
180	1.15	.13									18.38	107.0	11.76	35.7	8.17	14.0	4.60	3.61	2.94	1.22	2.04	.50	180
190	1.21	.14									19.40	118.0	12.42	39.6	8.63	15.5	4.84	4.01	3.10	1.35	2.16	.55	190
200	1.28	.15									20.42	129.0	13.07	43.1	9.08	17.8	5.11	4.4	3.27	1.48	2.27	.62	200
220	1.40	.18	.90	.06							22.47	154.0	14.38	52.0	9.99	21.3	5.62	5.2	3.59	1.77	2.50	.73	220
240	1.53	.22	.98	.07							24.51	182.0	15.69	61.0	10.89	25.1	6.13	6.2	3.92	2.08	2.72	.87	240
260	1.66	.25	1.06	.08							26.55	211.0	16.99	70.0	11.80	29.1	6.64	7.2	4.25	2.41	2.95	1.00	260
280	1.79	.28	1.15	.09									18.30	81.0	12.71	33.4	7.15	8.2	4.58	2.77	3.18	1.14	280
300	1.91	.32	1.22	.11									19.61	92.0	13.62	38.0	7.66	9.3	4.90	3.14	3.40	1.32	300
320	2.08	.37	1.31	.12	12" PIPE								20.92	103.0	14.52	42.8	8.17	10.5	5.23	3.54	3.64	1.47	320
340	2.18	.41	1.39	.14									22.22	116.0	15.43	47.9	8.68	11.7	5.54	3.97	3.84	1.62	340
360	2.30	.45	1.47	.15			14" PIPE						23.53	128.0	16.34	53.0	9.19	13.1	5.87	4.41	4.08	1.83	360
380	2.43	.50	1.55	.17	1.08	.069							24.84	142.0	17.25	59.0	9.69	14.0	6.19	4.66	4.31	2.01	380
400	2.60	.54	1.63	.19	1.14	.075							26.14	156.0	18.16	65.0	10.21	16.0	6.54	5.4	4.55	2.20	400
440	2.92	.68	1.84	.23	1.28	.96									20.40	78.0	11.49	19.8	7.35	6.7	5.11	2.74	450
500	3.19	.82	2.04	.28	1.42	.113	1.04	.06							22.70	98.0	12.77	24.0	8.17	8.1	5.68	2.90	500
550	3.62	.97	2.24	.33	1.66	.138	1.16	.07							24.96	117.0	14.04	28.7	8.99	9.6	6.25	3.96	550
600	3.84	1.14	2.46	.39	1.70	.159	1.25	.08							27.23	137.0	15.32	33.7	9.80	11.3	6.81	4.66	600
650	4.16	1.34	2.65	.45	1.84	.19	1.37	.09									16.59	39.0	10.62	13.2	7.38	5.40	650
700	4.46	1.54	2.86	.52	1.99	.22	1.46	.10									17.87	44.9	11.44	15.1	7.95	6.21	700
750	4.80	1.76	3.06	.59	2.13	.24	1.68	.11	16" PIPE								19.15	51.0	12.26	17.2	8.50	7.12	750
800	5.10	1.90	3.26	.66	2.27	.27	1.67	.13									20.42	57.0	13.07	19.4	9.08	7.96	800
850	5.48	2.20	3.47	.75	2.41	.31	1.79	.14	1.36	.08							21.70	64.0	13.89	21.7	9.65	8.95	850
900	5.75	2.46	3.67	.83	2.56	.34	1.88	.16	1.44	.084	20" PIPE						22.98	71.0	14.71	24.0	10.20	10.11	900
950	6.06	2.87	3.88	.91	2.70	.38	2.00	.18	1.52	.095									15.52	26.7	10.77	11.20	950
1000	6.38	2.97	4.08	1.03	2.84	.41	2.10	.19	1.60	.10	1.02	.04							16.34	29.2	11.34	12.04	1000
1100	7.03	3.52	4.49	1.19	3.13	.49	2.31	.23	1.76	.12	1.12	.04							17.97	34.9	12.48	14.55	1100
1200	7.66	4.17	4.90	1.40	3.41	.58	2.52	.27	1.92	.14	1.23	.05							19.61	40.9	13.61	17.10	1200
1300	8.30	4.85	5.31	1.62	3.69	.67	2.71	.32	2.08	.17	1.33	.06									14.72	18.4	1300
1400	8.95	5.50	5.71	1.87	3.98	.78	2.92	.36	2.24	.19	1.43	.064	24" PIPE								15.90	22.60	1400
1500	9.58	6.24	6.12	2.13	4.26	.89	3.15	.41	2.39	.21	1.63	.07									17.02	25.60	1500
1600	10.21	7.00	6.53	2.39	4.65	.98	3.34	.47	2.66	.24	1.65	.08									18.10	26.9	1600
1800	11.50	8.78	7.35	2.96	5.11	1.21	3.75	.58	2.87	.30	1.84	.10	1.28	.04	30" PIPE								1800
2000	12.78	10.71	8.16	3.59	6.68	1.49	4.17	.71	3.19	.37	2.04	.12	1.42	.05									2000
2200	14.05	12.78	8.98	4.24	6.25	1.81	4.69	.84	3.51	.44	2.25	.15	1.56	.06									2200
2400	15.32	14.2	9.80	6.04	6.81	2.08	5.00	.99	3.83	.52	2.45	.17	1.70	.07	1.09	.02							2400
2600			10.61	6.81	7.38	2.43	5.47	1.17	4.15	.60	2.66	.20	1.84	.08	1.16	.027							2600
2800			11.41	6.70	7.95	2.75	5.84	1.32	4.47	.68	2.86	.23	1.98	.09	1.27	.03							2800
3000			12.24	7.62	8.52	3.15	6.01	1.49	4.79	.78	3.08	.27	2.13	.10	1.37	.037							3000
3200			13.05	7.8	9.10	3.61	6.68	1.67	6.12	.88	3.27	.30	2.26	.12	1.46	.041							3200
3500			14.30	10.08	9.95	4.16	7.30	1.97	6.59	1.04	3.59	.35	2.49	.14	1.66	.047							3500
3800			15.61	13.4	10.80	4.90	7.98	2.36	6.07	1.20	3.88	.41	2.69	.17	1.73	.05							3800
4200					11.92	5.88	8.76	2.77	6.70	1.44	4.29	.49	2.99	.20	1.91	.07							4200
4500					12.78	6.90	9.45	3.22	7.18	1.64	4.60	.66	3.20	.22	2.04	.08							4500
5000					14.20	8.40	10.50	3.92	8.01	2.03	5.13	.68	3.64	.27	2.26	.09							5000
5500							11.55	4.65	8.78	2.39	5.64	.82	3.90	.33	2.50	.11							5500
6000							12.60	5.50	9.58	2.79	6.13	.94	4.25	.38	2.73	.13							6000
6500							13.65	6.45	10.39	3.32	6.64	1.10	4.61	.45	2.96	.15							6500
7000							14.60	7.08	11.18	3.70	7.15	1.25	4.97	.52	3.18	.17							7000
8000									12.78	4.74	8.17	1.61	6.68	.66	3.64	.23							8000
9000									14.37	5.90	9.20	2.01	6.35	.81	4.08	.28							9000
10000									15.96	7.19	10.20	2.44	7.07	.98	4.54	.33							10000
12000											12.25	3.41	8.60	1.40	5.46	.48							12000
14000											14.30	4.64	9.95	1.87	6.37	.63							14000
16000													11.38	2.40	7.28	.81							16000
18000													12.76	2.97	8.18	1.02							18000
20000													14.20	3.60	9.10	1.23							20000

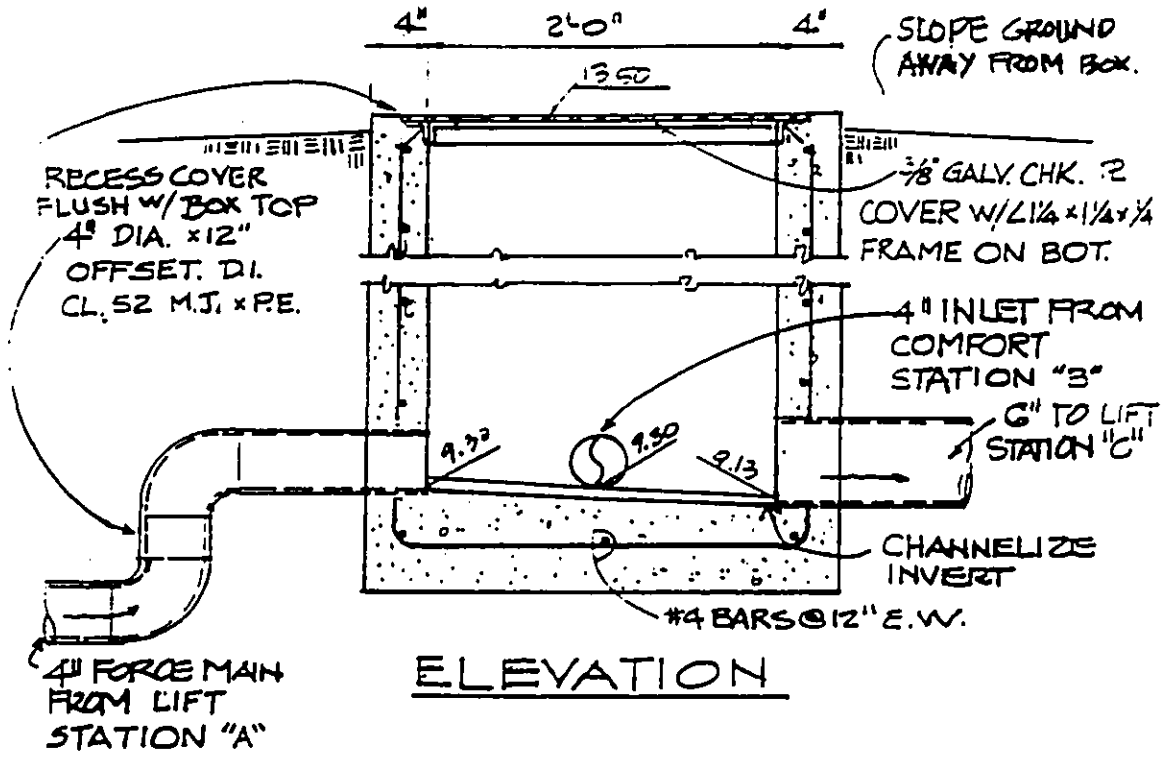
ARCHITECTURAL
STRUCTURAL
CIVIL
PLANNING

WILSON OKAMOTO & ASSOCIATES
ENGINEERS. ARCHITECTS AND PLANNERS

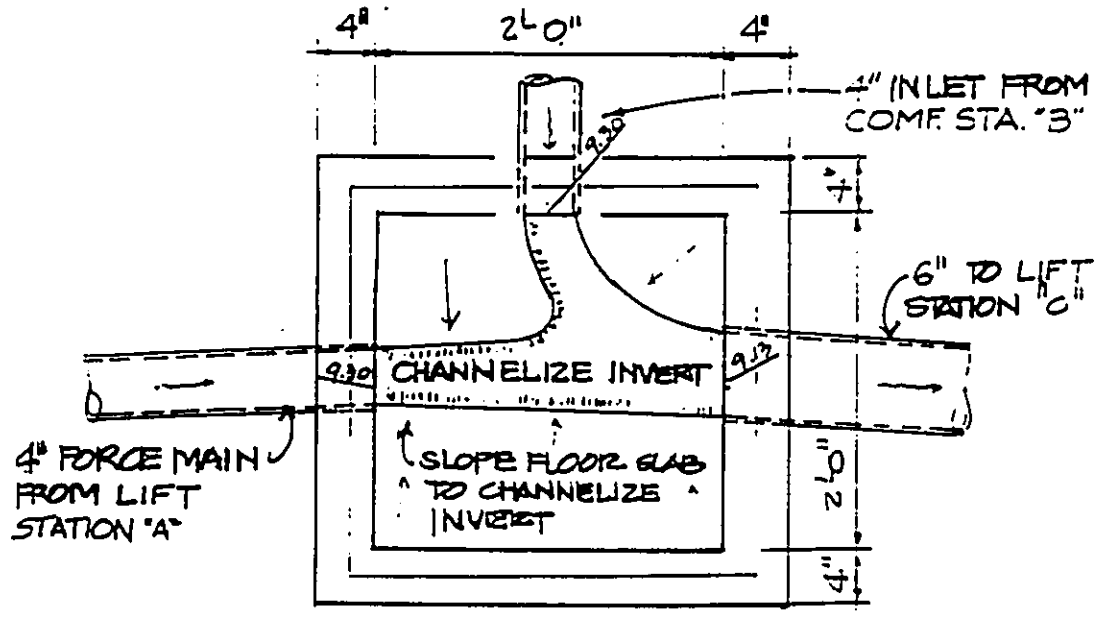
COMPUTED BY ES
CHECKED BY
DATE 11-27 1980

TRANSITION BOX

PROJECT
SHEET NO. ___ OF ___ SHEETS



ELEVATION



CAULK PIPE CONNECTIONS WITH EPOXY CAULK.

PLAN

TRANSITION BOX

ARCHITECTURAL
STRUCTURAL
CIVIL
PLANNING

WILSON OKAMOTO & ASSOCIATES
ENGINEERS, ARCHITECTS AND PLANNERS

COMPUTED BY: [illegible]
CHECKED BY:
DATE: [illegible] 19[illegible]

[illegible] Sewerage

PROJECT: [illegible]
SHEET NO. 2 OF ___ SHEETS

TRANSITION BOX AND 6" GRAVITY LINE FLOW

1. FROM LIFT STATION 'A' = 70 gpm intermittent flow

2. From Comfort Station 'B' 12 gpm constant flow

3. MAX Flow = 70 + 12 = 82 GPM
   Min Flow = 12 GPM

FLOW IN 6" gravity Line @ S = 0.006 (min.)

$Q_{full} = 2178\sqrt{S} = 2178\sqrt{.006} = 168$ GPM
$V_{full} = (1.486/.015)(r/2)^{2/3}\sqrt{.006} = 1.92$ fps

depth of flow @ 82 gpm : $d/D = .493 \therefore d = 2.9$"
Velocity " " " " " : $V/V_f = .994 \therefore V = 1.9$ fps

depth of flow @ 12 gpm : $d/D = .18 \therefore d = 1.08$"
Velocity " " " " : $V/V_f = .578 \therefore V = 1.1$ fps

☐ ARCHITECTURAL
☐ STRUCTURAL
☐ CIVIL
☐ PLANNING

WILSON OKAMOTO & ASSOCIATES
ENGINEERS. ARCHITECTS AND PLANNERS

COMPUTED BY CS
CHECKED BY
DATE 10 20 19 89

Wastewater Sewerage

PROJECT 1901

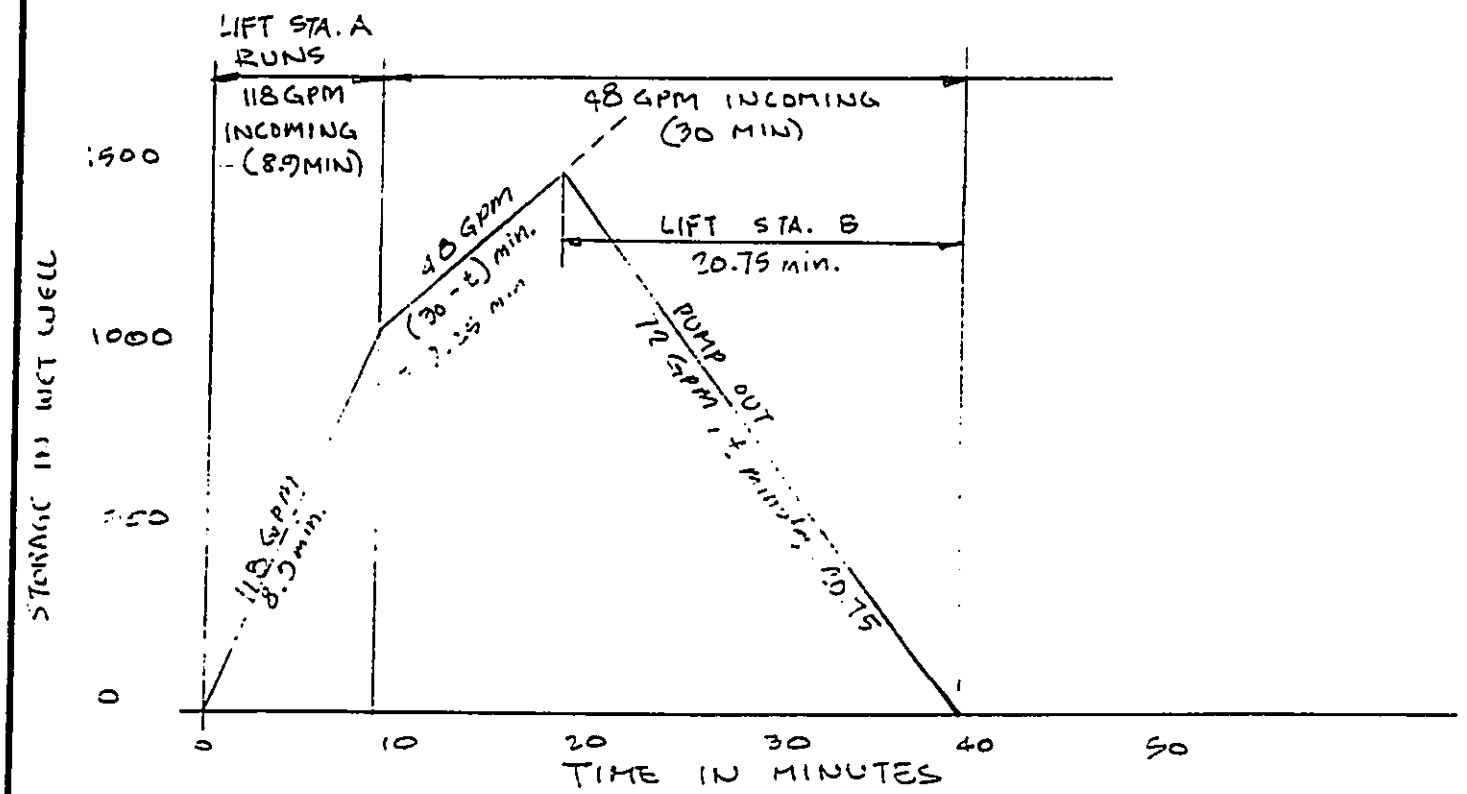
SHEET NO. 1 OF 1 SHEETS

WET WELL / LIFT STATION 3

INCOMING FLOW: 45 GPM CONTINUOUS
70 GPM INTERMITTENT = 8.9 MIN. ON, 30 MIN. OFF

SELECT PUMP SIZE = 120 GPM TO ACHIEVE 3 FPS IN 4" FORCE MAIN

SIZE WET WELL SO PUMPS CAN DRAW DOWN WATER LEVEL BETWEEN INCOMING SLUGS FROM LIFT STATION A



Calculate operation time at lift station 3:

Volume in wet well = $118 \times 8.9 + 48(30-t) - 72t = 0$

$1050.2 + 1440 - 48t - 72t = 0$

$2490.2 = 120t$

$20.75 = t$

A 120 GPM PUMP WILL REQUIRE 20.75 minutes every 38.9 minutes.

Maximum wet well volume = $118 \times 8.9 + 48(30 - 20.75) =$ 1494 GALLONS.

ARCHITECTURAL
STRUCTURAL
CIVIL
PLANNING

WILSON OKAMOTO & ASSOCIATES
ENGINEERS. ARCHITECTS AND PLANNERS

COMPUTED BY CS
CHECKED BY
DATE 10 24 1984

Kahauma Sewerage

PROJECT

SHEET NO. 1 OF 2 SHEETS

Wet Well B Dimensions

Required storage 1494 GALLONS; use 8' I.D. wet well.

Working storage = (1494 / 7.481) / $\pi 4^2$ = 3.97 VLF

Low WATER LEVEL = INCOMING INVERT - 3.97'
= 7.33 - 3.97 = 3.36'

Wetwell invert 2' lower to allow sloping sidewall: 3.36 - 2 = 1.36

FORCE MAIN C

Flow = 120 GPM @ 3.0 fps, 752 LF.

FRICTION LOSS IN FORCE MAIN = 1.17 FT/100 LF;

Total friction loss = 7.52 × 1.17 = 8.80 FT

TOTAL DYNAMIC HEAD

STATIC =	120.64
FRICTION =	8.80
MINOR =	1.0
TOTAL	130.4, SAY 131 FEET

ARCHITECTURAL
STRUCTURAL
CIVIL
PLANNING

WILSON OKAMOTO & ASSOCIATES
ENGINEERS, ARCHITECTS AND PLANNERS

COMPUTED BY CS
CHECKED BY
DATE 10 JU 1989

Hanauma Bay Sewerage
LIFT STA. C

PROJECT 185-1

SHEET NO. 1 OF 2 SHEETS

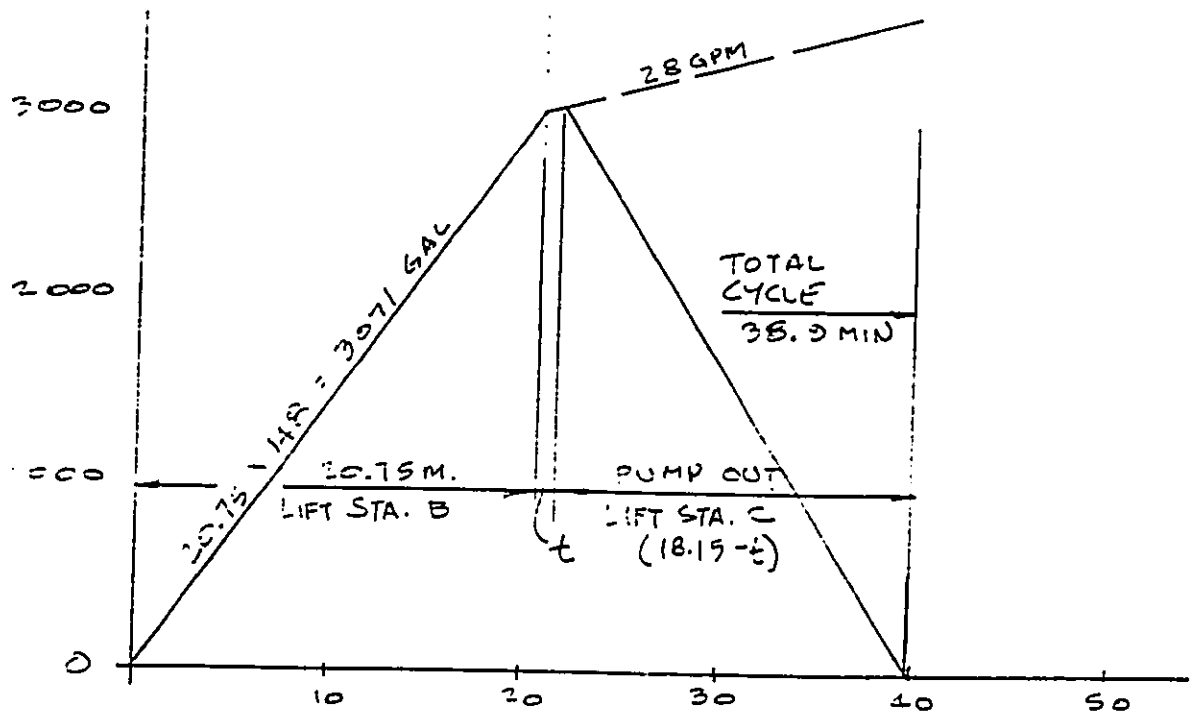
WET WELL / LIFT STATION C

Incoming flow: 28 GPM (Includes future expansion of Comfort Station 0 and future park administrator residence. Continuous flow)

70 GPM from Lift Station B, duration 20.75 min
rest 18.15 min

Select Pump Size 200 GPM TO ACHIEVE 5 FPS IN FORCE MAIN.

SIZE WET WELL TO EMPTY BETWEEN INCOMING SLUGS FROM LIFT STATION B (38.9 minute cycle)



Wet Well Volume = $(20.75 \times 148) + 28t - 172(18.15 - t) = 0$

$3071 + 28t - 3121.8 + 172t = 0$

$200t = 50.8$

$t = 0.25$ min

Thus maximum storage will occur at (20.75 + 0.25) = 21 minutes

$(20.75 \times 148) + 0.25 \times 28 = 3078$ GAL

Use 8' ϕ wet well: Working capacity = $(3078/7.481)/\pi 4^2 = 8.15$ VL

Incoming invert = 124.00

Low water level = 124 - 8.18 = 115.8

Subtract sloping invert = 115.8 - 2 = 113.8

ARCHITECTURAL
STRUCTURAL
CIVIL
PLANNING

WILSON OKAMOTO & ASSOCIATES
ENGINEERS. ARCHITECTS AND PLANNERS

COMPUTED BY CS
CHECKED BY
DATE 10 24 1989

Hanauma Sewerage
LIFT STA. C

PROJECT 2301-1

SHEET NO. 2 OF 2 SHEETS

PUMP OPERATION CYCLE

1. REST WHILE WET WELL FILLS: 20.75 - 0.25 = 21 MIN.
2. PUMP OUT = (18.15 - 0.25) = 17.9 Minutes

FORCE MAIN D

$\phi = 4"$, L = 375 LF, (to high point / ARV)

Q = 200 GPM, V = 5.11 fps, $H_L = 4.4$ FT/100 LF

FRICTION LOSS = 4.4 × 3.75 = 16.5 FT

T.D.H.

STATIC HEAD (132 - 115.8) =		16.2
FRICTION		16.5
MINOR		1.0
TDH =		33.7 SAY 34 FT

SIPHON FLOW

FORCE MAIN D FROM HIGH POINT AT HANAUMA SIDE OF TUNNEL WILL FLOW TO TRANSITION MANHOLE AT KALANIANAOLE HIGHWAY AND NAWILIWILI STREET.

HIGH POINT = INV. 132
TRANSITION SMH = INV. 94.42
LOW WATER AT LIFT STATION C = 15.8

POTENTIAL SIPHON HEAD = 115.8 - 93.42 = 21.38 FT.

AN AIR RELIEF VALVE MUST BE INSTALLED AT THE HIGH POINT TO BREAK THE POTENTIAL SIPHON FLOW, WHICH COULD LEAD TO OVER-RUNNING THE PUMPS AT LIFT STATION C, AND TO ALLOW THE MAIN PAST THE HIGH POINT TO DRAIN ONCE THE PUMPS SHUT OFF.

A COMBINATION AIR RELIEF VALVE WILL BE PROVIDED AT THE HIGH POINT ON FORCE MAIN D.

AGENCY RESPONSES

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

FRANK F. FASI
MAYOR

JOHN P. WHALEN
DIRECTOR

BENJAMIN B. LEE
DEPUTY DIRECTOR

LU11/89-7653(RF)

December 27, 1989

Mr. Alan Suwa
Wilson Okamoto & Associates
1150 South King Street
Honolulu, HI 96814

Dear Mr. Suwa:

Hanauma Bay Beach Park
Proposed Sewer System and Additional
Site Improvements, Maunalua, Oahu, Hawaii
Tax Map Key: 3-9-12: 02

We have reviewed your letter and submittals of November 6, 1989 regarding the subject improvement at Hanauma Bay Beach Park.

We find that the proposed improvements fall within the scope of the master plan approved by City Council under Resolution No. 80-290 (File No. 80/SMA-27). Moreover, we find that the proposed improvements will have no adverse effect on Special Management Area resources. In fact, the proposed sewage collection and pumping system will transport sewage out of the park to be treated at the East Honolulu Community Services, Inc. plant. This is an improvement over the current method of sewage disposal via onsite cesspools, and it is also better than the previously-proposed cesspool/ injection well system.

Therefore, the proposed sewer system and additional site improvements are hereby accepted as minor modifications to the Special Management Area Use Permit granted by Resolution No. 80-290.

If you have any questions, please contact Mr. Robin Foster of our staff at 527-5027.

Very truly yours,

JOHN P. WHALEN
Director of Land Utilization

JPW:sl
0293N/31

cc: DPR

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

REPLY TO
ATTENTION OF

January 19, 1990

Operations Branch

Mr. Alan Suwa
Wilson Okamoto & Associates
P. O. Box 3530
Honolulu, Hawaii 96811

Dear Mr. Suwa:

In response to your January 11, 1990 request, we have reviewed the Environmental Assessment for Hanauma Bay Beach Park Sewer System and Additional Site Improvements. Based on the document, the project does not include any work in the waters of the United States; therefore a Department of the Army permit is not required for the project.

We appreciate the opportunity to comment on the document. If there are any questions on this determination, please contact the Operations Branch at 438-9258.

Sincerely,

Stanley T. Arakaki
Chief, Operations Branch
Construction-Operations Division

DEPARTMENT OF GENERAL PLANNING
CITY AND COUNTY OF HONOLULU
650 SOUTH KING STREET
HONOLULU, HAWAII 96813

FRANK F. FASI
MAYOR

Benjamin B. Lee
CHIEF PLANNING OFFICER

VW/DGP 1/90-136

January 29, 1990

Wilson Okamoto & Associates, Inc.
P.O. Box 3530
Honolulu, Hawaii 96811

Attention: Mr. Alan Suwa

Gentlemen:

Environmental Assessment for Hanauma Bay Beach Park
Sewer System and Additional Site Improvements

We have reviewed the subject Environmental Assessment and are in accord with the purposes of the proposed project, specifically:

1) To prevent further degradation of the near-shore waters and bay environment;

2) To protect the Marine Life Conservation District resources; and

3) To promote environmental conditions conducive to public health and safety at Hanauma Bay.

We also agree with the alternative that you recommend for handling wastewater in the park--pumping wastewater off-site for treatment disposal instead of the current method of on-site disposal via a series of septic tanks and injection wells. The efficient removal of wastewater from the recreational waters of Hanauma Bay via the proposed sewer system improvements will surely outweigh the short-term negative impacts of noise, dust and traffic inconveniences during the construction phase.

The Development Plan Public Facilities Map for East Honolulu designates the site for publicly funded Park/Modification, within six years and site determined. The planned improvements are consistent with this designation.

Therefore, we have no objections to the improvements to the sewer system and additional site improvements (minor improvements to pedestrian and traffic circulation) proposed in the Environmental Assessment.

Furthermore, based on the assessed impacts of the project, we feel that the proposal should receive a Negative Declaration determination.

If you have any questions, please contact Verne Winquist at 527-6044.

Sincerely,

BENJAMIN B. LEE
Chief Planning Officer

BBL:js

901

JOHN WAIHEE
GOVERNOR OF HAWAII

WILLIAM W. PATY, CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES

DEPUTIES
Keith W. Ahue
MANABU TAGOMORI
RUSSELL N. FUKUMOTO

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

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

February 9, 1990

Alan Suwa, Planner
Wilson Okamoto & Associates, Inc.
P.O. Box 3530
Honolulu, Hawaii 96811

RECEIVED
FEB 14 1990
WILSON OKAMOTO & ASSOCIATES

Dear Mr. Suwa:

SUBJECT: **Environmental Assessment for Hanauma Bay Beach Park Sewer System and Site Improvements Maunalua, Honolulu District, O'ahu TMK: 3-9-12: 2**

Thank you for the opportunity to comment on this Environmental Assessment.

Although the archaeological survey attached to this document addresses only surface remains, we believe that the study is valid in its assessment of the archaeological potential of the non-beach areas of the park. We would note, however, while it is believed that site 80-15-03, the Hanauma Shelter, was completely excavated, this is not necessarily true. This excavation took place many years ago and was not reported in a format which would allow, by today's standards, such a conclusion.

Therefore, in order for this project to be in compliance with Chapter 6E-8, we recommend that the site and the immediate surrounding area be avoided. On the plans provided with the EA, it does not appear that construction and trenching are proposed in this area, and avoidance should therefore be no problem.

Given avoidance of the Hanauma Shelter, we believe that the project will have "no effect" on significant historic sites.

Sincerely,

DON HIBBARD, Director
Historic Preservation Program

2701

DEPARTMENT OF TRANSPORTATION SERVICES

CITY AND COUNTY OF HONOLULU

HONOLULU MUNICIPAL BUILDING
650 SOUTH KING STREET
HONOLULU, HAWAII 96813

FRANK F. FASI
MAYOR

ALFRED J. THIEDE
DIRECTOR

JOSEPH M. MAGALDI, JR
DEPUTY DIRECTOR

TE-247
PL90.1.017

February 13, 1990

Mr. Alan Suwa, Planner
Wilson Okamoto & Associates
P. O. Box 3530
Honolulu, Hawaii 96811

Dear Mr. Suwa:

Subject: Hanauma Bay Beach Park
Environmental Assessment for Sewer
System Improvements
TMK: 3-9-12: 02

This is in response to your letter of January 9, 1990 requesting our review and comments on the subject project.

Our comments are as follows:

1. During construction when working on force main "D," access to the bus parking area should be open at all times.

2. Buses and auto traffic should be separated to minimize congestion and confusion.

Should you have any questions, please contact Wayne Nakamoto of my staff at 523-4190.

Very truly yours,

ALFRED J. THIEDE
Director

MB ✓
AS ✓
G.O.

2901-01
February 27, 1990

TELEPHONE MEMORANDUM

SUBJECT: Agency Responses to the Environmental Assessment for Hanauma Bay Beach Park Sewer System and Other Site Improvements

PERSON CONTACTED: Mr. Calvin Sunada, Division of Environmental Resources, State Department of Health, 543-8337

INFORMATION ITEMS:

1. Informed Mr. Sunada that no response letter had been received by WOA regarding the subject project. Indicated to Mr. Sunada that the conditional 30-day response period had lapsed. Asked if the Division of Environmental Resources wished to make a statement.

2. Mr. Sunada indicated that to date, his office and the Wastewater Branch had concurred with the plan to pump wastewater out of the park to the Kaiser facility.

3. Mr. Sunada had not received responses from the Sanitation or the Clean Water Branches regarding the subject project EA.

4. Mr. Sunada indicated that the Division questioned whether the Kaiser facility had adequate capacity for accepting wastewater from Hanauma Bay Beach Park.

Mike Baker

Mike Baker, Planner

cc: Mr. Wallace Mitsunaga, DPR - Environmental Design Branch
Ms. Kathy Tilton, DLNR - Conservation and Environmental Affairs Branch

JOHN WAIHEE
GOVERNOR OF HAWAII

JOHN C. LEWIN, M.D.
DIRECTOR OF HEALTH

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

In reply, please refer to:
EPHSD

March 6, 1990

Mr. Alan Suwa, Planner
Wilson Okamoto & Associates, Inc.
P.O. Box 3530
Honolulu, Hawaii 96811

Dear Mr. Suwa:

WILSON OKAMOTO & ASSOCIATES

SUBJECT: Environmental Assessment
Sewer System and Other Improvements
Hanauma Bay Beach Park
TMK: 3-9-12: 02
Owner: City and County of Honolulu

We have reviewed the subject assessment and strongly concur with the proposal to transmit the wastewater generated from the park to the East Honolulu Community Service Inc. wastewater treatment plant.

Any and all plans to expand facilities or services at the park should only proceed on the basis that the proposed connection is implemented.

Sincerely,

Bruce S. Anderson

BRUCE S. ANDERSON, PH.D.
Deputy Director for
Environmental Health