Sunset Beach Imp.

DEPARTMENT OF DESIGN AND CONSTRUCTION

CITY AND COUNTY OF HONOLULU

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DEPUTY DIRECTOR

September 9, 1998

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

Dear Mr. Gill:

Subject: Finding of No Significant Impact
Proposed Beach Improvement at Sunset Beach Park
Oahu, Hawaii
Tax Map Keys 5-9-01: Pors. 37 & 38; 5-9-02 Por. 72
and Ke Nui Road/Hoalua Street Remnant
First Division

Pursuant to Chapter 343, Hawaii Revised Statutes, we submit herewith four (4) copies of a Final Environmental Assessment (FEA) for the restoration of vegetation and provision of other landscape improvements at Sunset Beach Park on the North Shore of Oahu.

We have reviewed the comments received during the 30-day public comment period which began on March 23, 1998. We have determined that the proposed project will not have significant environmental effects and have issued a Finding of No Significant Impact. Please publish this notice in your September 23, 1998 OEQC Environmental Notice.

Copies of the FEA will also be transmitted to agencies, organizations, and individuals who have specifically requested a copy. Included also with this submittal is a completed OEQC Publication Form.

10%

If there are any questions, please contact Mr. Glen Koyama of Belt Collins Hawaii at 521-5361.

Sincerely,

RANDALL K. FUJIKI
Director

RKF:ei

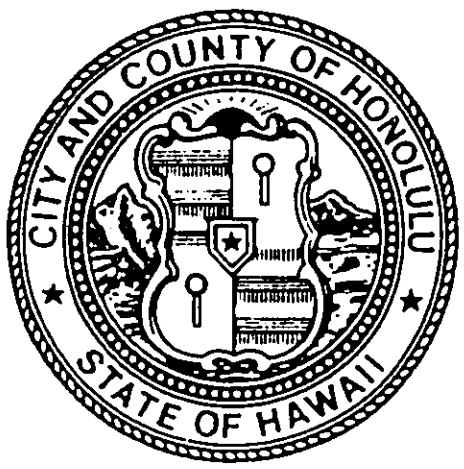
Enclosures

1998-09-23-OA-FEA-Sunset Beach Improvement

FINAL ENVIRONMENTAL ASSESSMENT

SUNSET BEACH IMPROVEMENTS

Koolauloa, Oahu, Hawaii



Department of Design and Construction
City and County of Honolulu

FINAL ENVIRONMENTAL ASSESSMENT

SUNSET BEACH IMPROVEMENTS

Koolauloa, Oahu, Hawaii
Tax Map Key 5-9-15

September 9, 1998

Proposing Agency:

Department of Design and Construction
City & County of Honolulu

Consultant:

Belt Collins Hawaii
Honolulu, Hawaii

TABLE OF CONTENT

LIST OF FIGURES

I. PROPOSED ACTION

The proposed action calls for restoring and improving the vegetation area at Sunset Beach on the North Shore of Oahu (see Figures 1 & 2). The Tax Map Key for the project site is 5-9-01: portions of 37 & 38; 5-9-02: portion of 72; and Ke-Nui Road/Hoalua Street right-of-way remnant.

II. PROPOSING AGENCY

The proposing agency is the Department of Design and Construction, City and County of Honolulu.

Purpose of Document

The Department of Design and Construction is preparing this Environmental Assessment for the proposed action in accordance with the provisions of Chapter 343, Hawaii Revised Statutes. The proposed action involves the use of public funds and land.

III. APPROVING AGENCY

The proposed action is an agency action. Therefore, the Department of Design and Construction is responsible for preparing this environmental assessment, reviewing the document, submitting the document to the Office of Environmental Quality Control for publication, and issuing a Notice of Determination (NOD). The NOD is a letter that accompanies the environmental assessment stating that the proposed action will either have no significant impact, resulting in the issuance of a Negative Declaration (Findings of No Significant Impact) or have significant impact resulting in the issuance of an Environmental Impact Statement Preparation Notice.

IV. AGENCIES AND COMMUNITY GROUPS CONSULTED

The public agencies and community groups consulted during the pre-consultation period are listed below. Consulted parties were contacted by letter, at public meetings or by individual contact.

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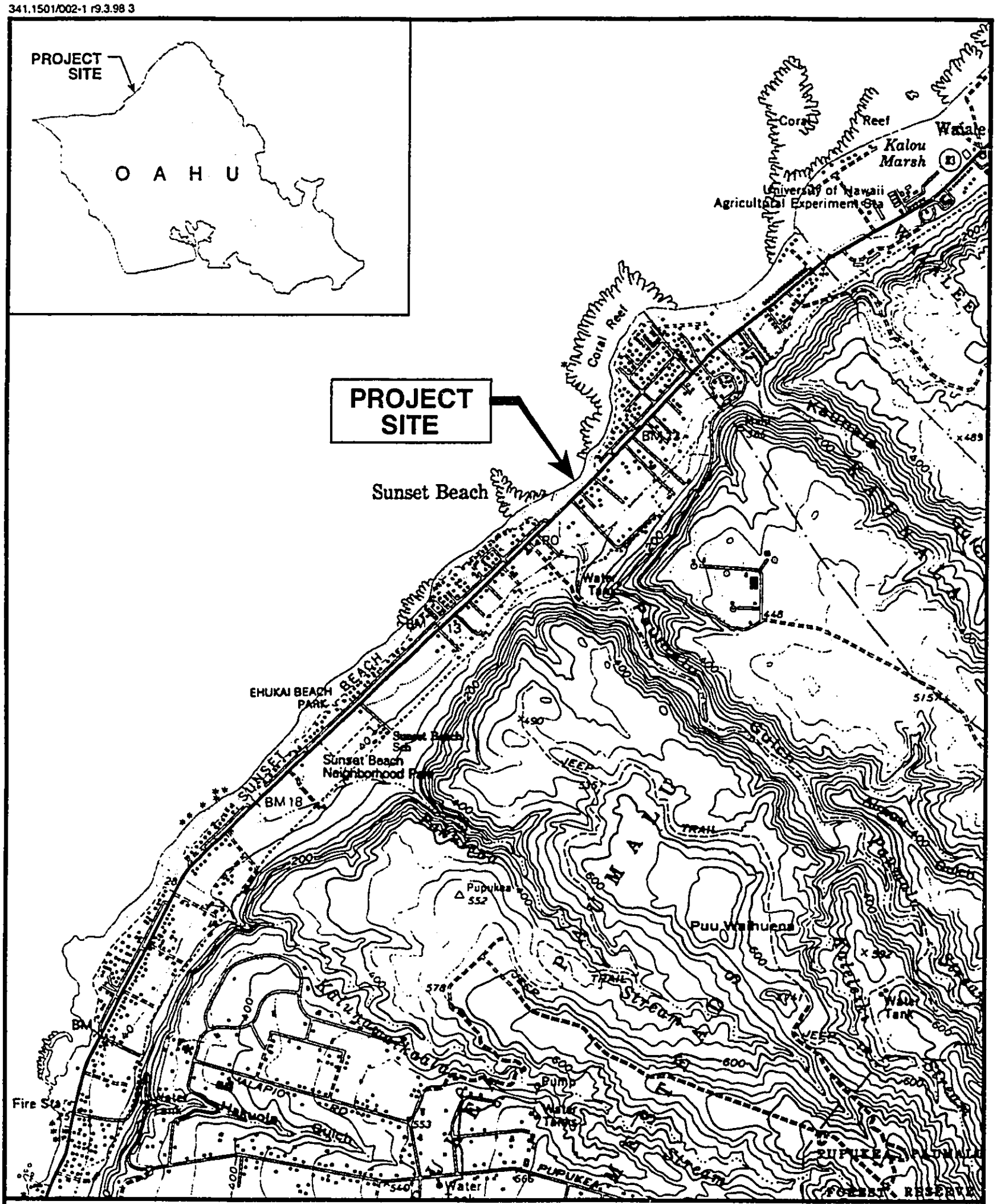

Prepared for: Department of Design and Construction
Prepared by: Belt Collins Hawaii

Figure 1
LOCATION MAP

SUNSET BEACH IMPROVEMENTS
Koolauloa, Oahu, Hawaii

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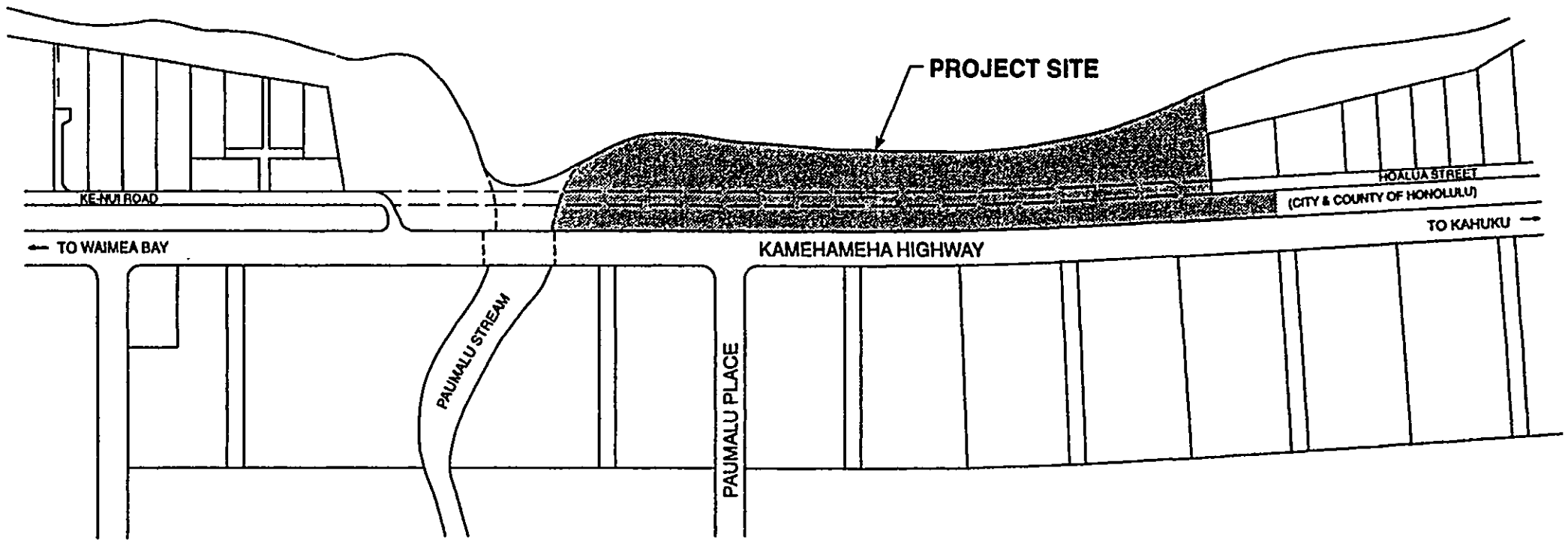


Prepared for: Department of Design and Construction
Prepared by: Belt Collins Hawaii

NORTH

0 100 200
SCALE IN FEET

Figure 2
PROJECT SITE

SUNSET BEACH IMPROVEMENTS
Koolauloa, Oahu, Hawaii

3

EE82 4200 0000

Federal:
U.S. Army Corps of Engineers

State of Hawaii:
Department of Transportation
Department of Land and Natural Resources, Land Division
Department of Land and Natural Resources, State Historic Preservation Division
Department of Health
UH Environmental Center

City and County of Honolulu:
Department of Public Works
Department of Land Utilization
Department of Transportation Services
Planning Department
Civil Defense Agency
Police Department
Fire Department
Board of Water Supply
Department of Wastewater Management

Community Groups:
North Shore Neighborhood Board
Sunset Beach Community Association

V. GENERAL DESCRIPTION OF PROPOSED ACTION'S CHARACTERISTICS

Statement of Objective

Vegetation on the mauka section of Sunset Beach has gradually diminished over the past 40 years. This is probably the result of a combination of occasional extreme surf conditions, frequent pedestrian foot traffic and general heavy use by beachgoers. The loss of vegetation has allowed increased exposure and consequent erosion of the beach backshore where the high beach storm berm is located. The City Department of Design and Construction is proposing to restore and maintain Sunset Beach to its previous condition so it can continue to provide the sand and surf amenity enjoyed by the public over the years. As provided in the City and County of Honolulu General Plan, Policy 2 of Natural Environment Objective A, the City should "seek the restoration of environmentally damaged areas and natural resources".

Description of the Proposed Action

Landscape Planting:

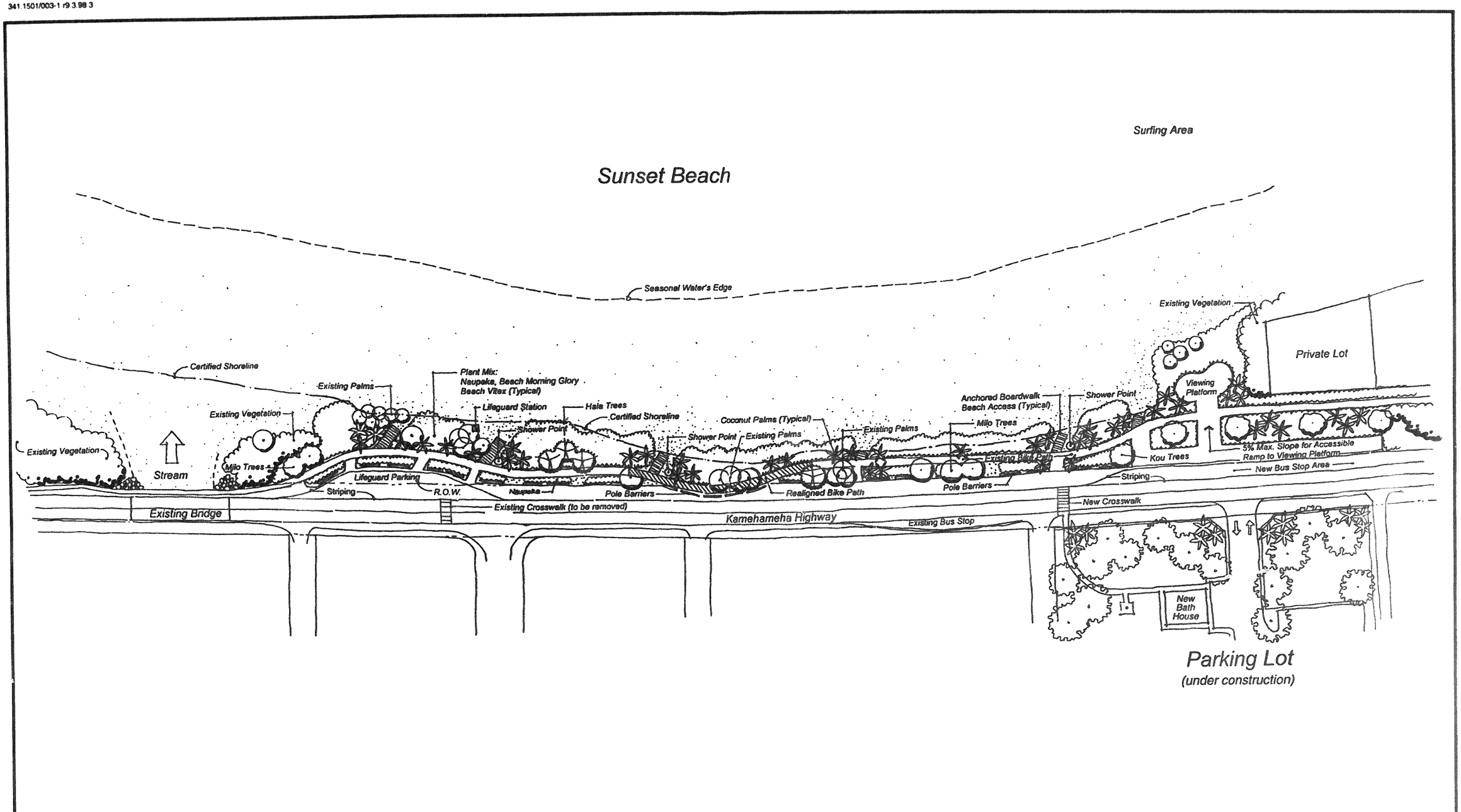
The Department of Design and Construction is proposing to restore the vegetation on the mauka slope of Sunset Beach to stabilize the beach storm berm and minimize beach loss. The vegetation in the project area is currently sparse and comprises of beach naupaka, coconut palms and date palms. The proposed action (see Figure 3) will involve filling in the areas that are void of vegetation with primarily beach naupaka, beach morning glory, beach vitex (pohinahina), hala tree, milo and coconut palm. The replanting area, which will comprise an area of approximately 29,300 sq. ft., will extend from the adjacent Kamehameha Highway right-of-way to the shoreline, certified by the Board of Land and Natural Resources, State of Hawaii . In some areas, the planting may extend even further makai of the certified shoreline. An automatic irrigation system will be installed as part of the improvement to ensure that adequate water reaches the plants during the initial growing period.

Several passageways will be provided through the landscaped area to allow pedestrian access from the highway to the beach. These passageways will consist of a light-weight, moveable, board walkway to minimize the erosional effect that is expected to occur from constant pedestrian foot-traffic over the beach's mauka berm crest. Recycled plastic would be considered as an alternative to wooden board walks if it is proven to be more durable and suitable for pedestrian use. Wooden bollards will be placed at the entrance to these passageways to restrict vehicles from entering the beach.

An existing public bike path is located along the proposed landscaped area. During a high surf in 1995, a small segment of the bike path was undermined causing partial collapse. The City has since repaired the damage, but, as a permanent solution, is proposing to shift this small segment (approximately 150 feet), which is most vulnerable to damage from high surf, slightly mauka to a safer alignment farther from the water's edge. This would be consistent with Policy 5 of General Plan Natural Environment Objective A, which states that the City should locate such structures sufficiently away from unstable shoreline areas to avoid the future need for protective structures.

In addition to stabilizing the beach, the landscape restoration would provide a buffer for the highway and mauka residential properties against occasional severe onshore surges caused by extreme surf conditions.

And finally, the proposed replanting would enhance the visual appearance of the beach by providing much needed greenery and sun shades.



Prepared for: Department of Design and Construction
Prepared by: Belt Collins Hawaii

NORTH

0 40 80
SCALE IN FEET

Figure 3
PROPOSED IMPROVEMENTS

SUNSET BEACH IMPROVEMENTS
Koolauloa, Oahu, Hawaii

Beach Maintenance Program:

Supplementing the planting treatment, the Department Parks and Recreation Services is proposing to implement a periodic beach maintenance program involving occasional but continued restoration of the mauka storm berm. This program is intended to restore and maintain the beach after degradation from seasonal storms. Sand deposited on the lower slopes of the beach by wave action will be pushed up by a tractor to re-establish the upper slopes.

Viewing Deck:

To accommodate Sunset Beach's popularity made famous by its annual surfing tournaments, the City is proposing to install a viewing deck for visitors on a bluff at the north end of the property. It will be constructed of a wood or concrete platform of approximately 1,390 sq. ft. on wood or concrete posts and include landscaping on the surrounding slope for stabilization. A portion of the deck will be sitting on the knoll while the remainder will be on posts minimizing alteration to the site contours and allowing the natural shoreline process to work in the area. The deck will have railings and features that meet the Americans with Disabilities Act (ADA) requirements.

An accompanying bus pull-over area along Kamehameha Highway will be provided for visitors. It will include room for at least two vehicles and, for safety purposes, be clearly outside of the highway right-of-way. The deboarding and boarding area will include landscaping and a pedestrian pathway to the viewing deck. The existing City bus stop will be relocated behind (Kahuku side) of the proposed visitor bus stop.

Accessory Facilities:

Approximately two to four outdoor showers and drinking fountains and a number of enclosed trash receptacles to replace existing trash cans will be placed in the new landscaped area. The showers, each consisting of a pipe stand with four shower heads, and drinking fountains will be designed to meet ADA standards. The new trash receptacles will be placed in wood enclosures to provide an aesthetically pleasing appearance.

Highway Right-of-Way and Parking:

The proposed plan also calls for placement of pole barriers or vehicle barriers on the mauka side of the proposed vegetation and along the highway right-of-way. These barriers are intended to keep vehicles from encroaching into the planted area. A portion of the proposed realigned bike path will extend into the

Kamehameha Highway right-of-way but will be more than 5 feet from the highway travel lanes. Pole barriers will be installed between the highway and bike path for addition safety.

The shoulder area of the highway may be paved to improve the stability and safety of the roadside as well as improve the highway frontage appearance. The shoulder area is wide enough for on-street parallel parking, however the City is not encouraging parking in the area. The shoulder area is under the jurisdiction of the Highways Division of the State Department of Transportation which has specific uses for major roadways around the island and has a genuine safety and liability concern if any traffic accidents occur as a result of parking in the area. Thus, parking in front of Sunset Beach will continue to be at the option and risk of the individual motorist.

It is acknowledged that hazardous traffic and parking conditions prevail in front of Sunset Beach during the popular weekends and surfing days. To improve this situation, a new off-street public parking facility is under construction across the highway from the beach. This new facility, which is not part of the current beach improvement project but is associated with it, was earlier planned and approved by the City .

To serve the emergency needs of the beach lifeguard, a new pull-over parking area will be provided at the south end of the beach. It will be situated off the highway and adjacent to the existing lifeguard station. The parking is expected to be adequate for up to four vehicles and a jet ski. The existing bus stop will continue to operate in front of the present lifeguard station and proposed pull-over area.

Construction Schedule

All land use permits and approvals are expected to be secured in 1999. Construction is projected to begin before the end of 1999 and be completed within nine months after commencement. All improvements are planned to be done in one phase.

Construction Cost

The proposed project is expected to cost approximately $280,000, which includes landscaping, hardscape, irrigation and 90-day maintenance. The estimated cost does not include construction design.

VI. DESCRIPTION OF THE AFFECTED ENVIRONMENT

Regional and Project Setting

The name "Sunset Beach" refers formerly to the approximately two-mile continuous beach between Sunset Point and Sharks Cove. John R. K. Clark describes this as the longest stretch of wide beach on Oahu. Its sand is continuous and its width, on average, is 200 feet; it is particularly wide during the summer months. Outcrops of lava rock and raised sections of reef at the water line are exposed seasonally, especially during the winter months. Notably, in this three- to four-month period, high surf can erode parts of the beach and create a steep, narrow foreshore. Seasonal variations in beach width can be well over 100 feet. Recreational swimming can be dangerous, but board surfing can be ideal during this time.

Clark mentions that with the rise in popularity of surfing during the late 1950s, many sections of the long beach were given specific names to designate favorite surfing sites. He indicates that, today, the name "Sunset Beach" refers to only one particular surfing spot in Paumalu approximately 2.7 miles northwest of Waimea Bay. This is the location of the applicant's proposed beach improvements. The beach is renown for its big wave surfing and is frequently used for surfing tournaments during the winter season.

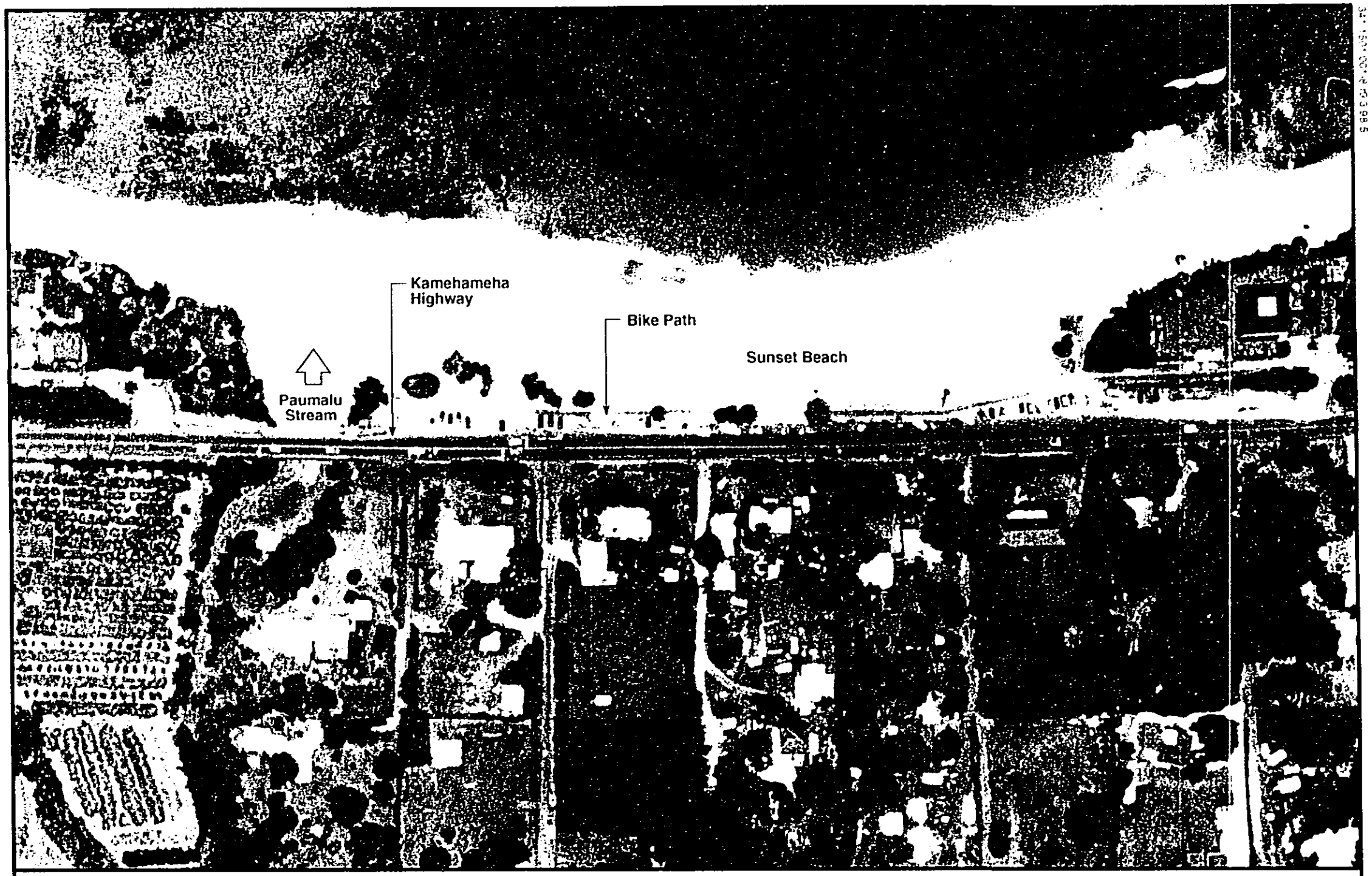
Existing Land Use

Sunset Beach and its surrounding areas are predominantly in open space, agricultural and low-density residential uses (see Figure 4). The properties immediately across the highway from the beach are primarily one-acre residential lots. Most of these lots are presently occupied by residences. To the north and south on the same side of the highway as the shoreline are oceanfront and ocean-oriented homes on smaller 5,000 to 10,000 sq. ft. properties.

Land Tenure

From Kamehameha Highway to the shoreline, Sunset Beach occupies three properties: a narrow strip seaward of the highway owned by the City; a parallel strip formerly a road owned also by the City; and the beach land which, too, is owned by the City. The area seaward of the shoreline is considered State marine waters and is under the jurisdiction of the State.

The recently constructed public bike path, which is located in the back portion or mauka section of Sunset Beach, is within City land and does not require an easement. No utility or other easements currently occupy the property.



Prepared for: Department of Design and Construction
Prepared by: Belt Collins Hawaii

NORTH

0 100 200
SCALE IN FEET

Figure 4
AERIAL PHOTO OF PROJECT SITE

SUNSET BEACH IMPROVEMENTS
Koolauloa, Oahu, Hawaii

Physiography

Sunset Beach is relatively wide during the summer, but narrower and somewhat steeper during the winter. Figure 5 provides a plan view of the beach's topography, and Figure 6 provides a cross-section of the area during mild wave conditions. These figures show a beach width of about 200 feet and a mauka elevation at the highway right-of-way of about 27 feet above mean sea level (MSL). On the cross-section figure, the drawing shows two berms: a mauka storm berm -- stable and subject to little shifting, and a makai berm -- dynamic and subject to daily, monthly and yearly fluctuations.

Mauka of the highway are residential properties with elevations lower than the right-of-way. At some locations, the mauka properties are as much as 10 feet below the road pavement. The topography of these properties, however, continue to rise up the coastal plain and, at approximately 400 feet from the highway, start to match the height (in elevation) of the road.

In a larger perspective, the project site is part of a coastal plain that extends approximately 1,200 feet from the shoreline to the base of the Paumalu plateau. The topography of this plain is relatively level with an overall slope of less than 3 percent. Nearer the foot of the plateau, the slope increases to about 10 to 20 percent and the elevation reaches to about 30 to 80 feet. Paumalu plateau rises above the coastal plain to an elevation of about 410 feet and extends up to the Pupukea Paumalu Forest Reserve in the Koolau Range.

Hydrology

The coastal area of the Paumalu plain is lined with white sand beaches formed over centuries of interaction between the offshore marine waters and nearshore coral environment. Paumalu Stream, which originates from Paumalu Gulch and a shallow ravine to the east of the gulch, traverses the coastal plain, crosses Kamehameha Highway beneath a concrete bridge, and discharges into the waters of Sunset Beach. The outlet is located in the central southwestern section of the project site, and its mouth is closed to the sea during most of the year. The intermittent stream connects with the sea only during high surf and periods of heavy rainfall. According to the Flood Insurance Rate Map (September 4, 1987) prepared by the Federal Emergency Management Agency, the shoreline is located in Zone VE, a coastal flood area that has velocity hazard. The base flood elevation is identified as 19 to 20 feet (MSL). Further upslope, the beach is located in Zone AE. The base flood elevation here is also 19 to 20 feet (MSL). These projected flood elevations are based on a 100-year flood.

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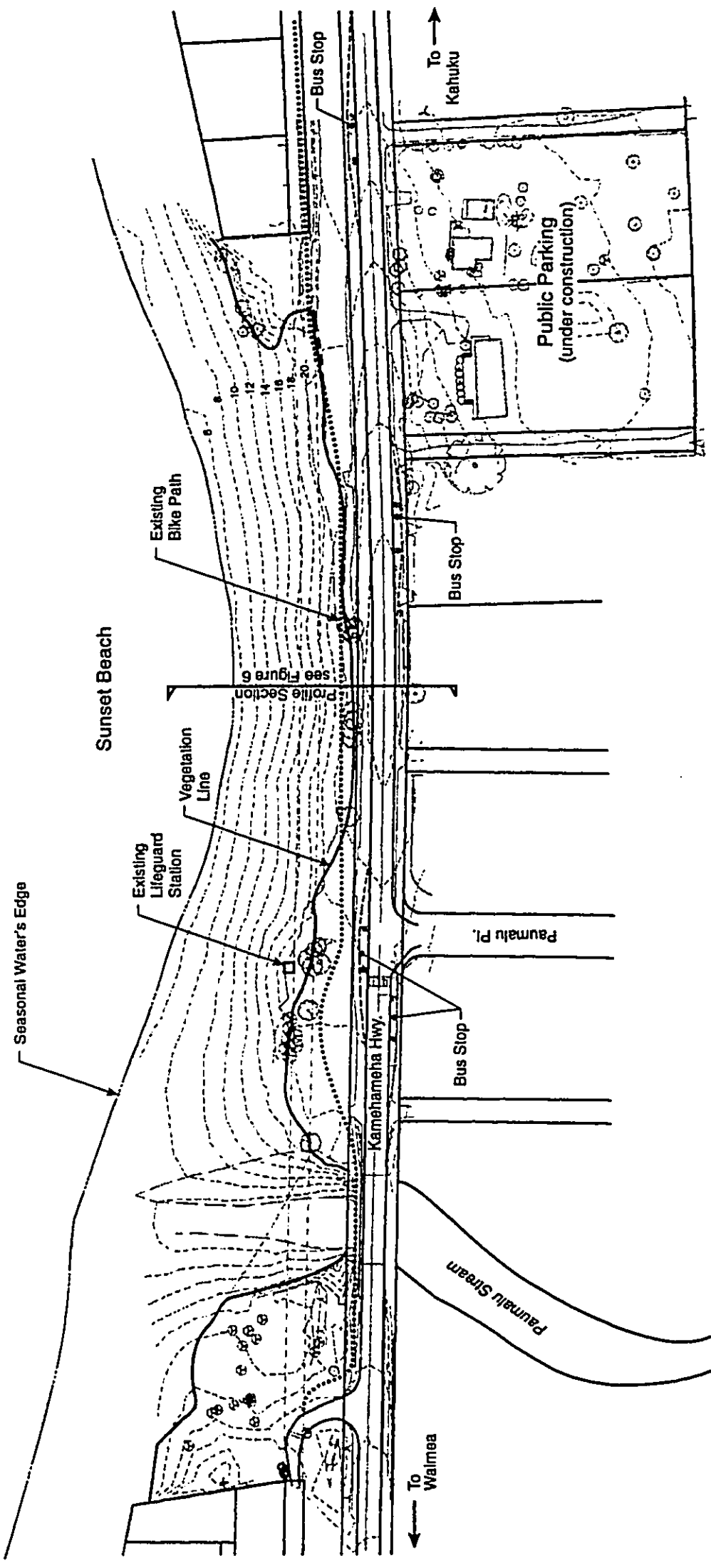
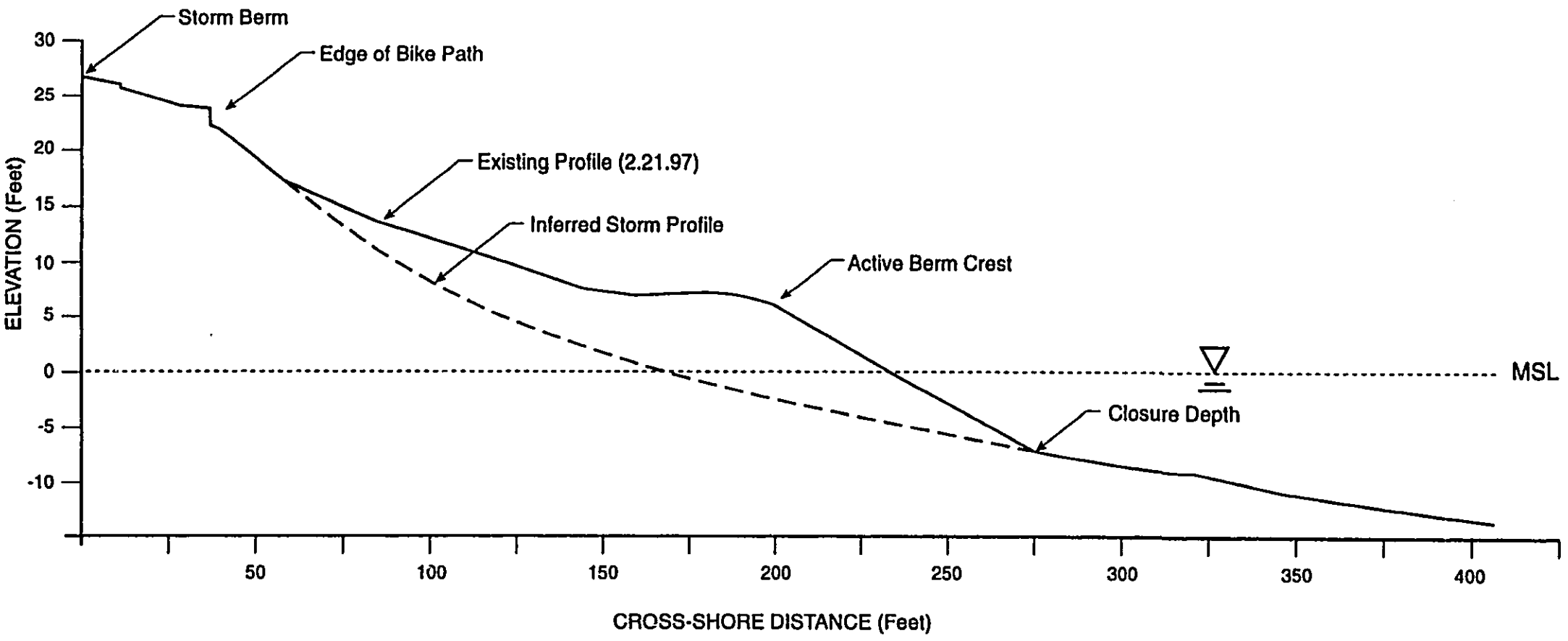


Figure 5
EXISTING SITE CONDITIONS
SUNSET BEACH IMPROVEMENTS
Koolauloa, Oahu, Hawaii

Prepared for: Department of Design and Construction
Prepared by: Belt Collins Hawaii



Note: See Figure 5 for location of profile.

Source: Sea Engineering, Inc.

Prepared for: Department of Design and Construction
Prepared by: Belt Collins Hawaii

Figure 6
BEACH PROFILE

SUNSET BEACH IMPROVEMENTS
Koolauloa, Oahu, Hawaii

Paumalu Stream is located within a floodway that is approximately 200 feet wide at approximately 300 feet mauka of Kamehameha Highway. The base flood elevation at that location is estimated to be 18 feet (MSL). The projected flood would have minimum impact on the proposed improvements which are located to the side of the projected flood plain area.

Other than Paumalu Stream, there are no other distinct water features on the property. On-site drainage generally percolates quite rapidly into the porous ground. Near the highway where the soil is well compacted, especially from the continuous maneuvering and parking of vehicles, drainage flows toward the beach by sheet flow and then percolates into the soft sand. There are no evidences of on-site pondings, artesian wells or springs.

The proposed improvements will require initial landscape irrigation to nurture vegetative growth. The new planting will require soil additives to establish an adequate ground condition for holding moisture and providing improved nourishment for the plants.

Beach and Surf Characteristics

Sunset Beach is characterized as being very dynamic. According to Sea Engineering, Inc., Sunset Beach is subject to the normal seasonal surf or wave energy that shifts sand up and down the beach slope (Appendix A). Surges from the seasonal surf occur on the beach's lower slopes. But during the winter season, extreme surges reach the vegetation on the upper slope. It is not unusual for a substantial amount of beach width to disappear practically overnight from these extreme surges. Hence, the width, profile and stability of Sunset Beach are very dependent on existing wave conditions, i.e., wave height, wave period, and wave direction.

The general profile of Sunset Beach consists of a storm berm that gently slopes down toward the water's edge. The crest of this berm is at elevation 27 feet (MSL) and is located at the center of Kamehameha Highway. Between the highway and vegetation line are a number of land uses including Kamehameha Highway shoulder, roadside parking, concrete parking barriers, bike path and natural vegetation. Downslope of this area is the active profile section of the beach that consists of one or more beach berms (see Figure 6). These berms are formed during periods of normal wave action.

Seasonal surges also affect the makai slope, creating variations in beach width and shoreline location. During the summer months, beach width may be approximately 200 feet from the highway right-of-way to the water's edge. Figure 6, which shows a profile of Sunset Beach measured during mild wave conditions, indicates that the mean sea level shoreline can change more than 65 feet between

mild surf conditions and high surf conditions. The apparent change in the shoreline will be greater as wave runup and wave setup during high surf conditions contribute to higher average water line elevations.

A wave runup study conducted by Sea Engineering, Inc., calculated recurrence intervals for severe wave-induced surges and found that the bike path and vegetation line may be inundated on a yearly basis. Also, Kamehameha Highway, which is on the crest of the storm berm, may be overtopped approximately once every 10 years. In previous years, the extreme surges have flooded the mauka properties, undermined the highway pavement and created hazardous conditions for moving traffic. Needless to say, they have caused significant damage to the vegetation on the beach, as well.

Sea Engineering, Inc. analyzed recent changes to the shoreline area from past aerial photographs. A 1967 photograph of Sunset Beach showed dense vegetation between the highway and vegetation line, but a 1969 photo, taken just after a major storm, showed vegetation visibly reduced. The vegetation line is still intact, but the planting area is covered with sand and is less dense in plant material. Subsequent photos, taken in 1971, 1974 and 1995, showed that vegetation underwent partial restoration but has continued to be degraded to where only remnants of the vegetation line are still visible.

In addition to the strong surges that have affected vegetation on the beach, pedestrian traffic has had possible effects. In the 1970's, surfing, in general, saw an explosion in popularity and a lot of the action took place on the North Shore of Oahu. The popularity of Sunset Beach and its heavy use by beachgoers and surfers probably prevented the normal re-establishment of the beach vegetation.

The proposed project is intended to re-establish vegetation on the beach which previously had served to stabilize the mauka beach slope. The additional features that will be provided with the vegetation will be designed to be sensitive to the dynamics of the beach and surf conditions. The pedestrian board walk will be light-weight and mobile and have the ability to move with wave surges that reach the upper elevations of the project area. The board walk will be anchored at its ends to hold it in place.

The vehicle barriers will be constructed of a horizontally laid wood pole on short concrete pedestals. These common parking barriers will allow the flow of water to pass beneath its structure.

At the north end of the project area, the viewing deck will be located at approximately the 22-foot elevation. The FIRM indicates a potential 100-year storm would generate a flood level with a 19- to 20-foot elevation (MSL) over the beach. This would be below the viewing deck elevation. Additionally, the slope

around the viewing deck will be planted with groundcover to increase the stability of the bluff and protect the foundation of the visitor platform from erosion.

Soils

According to the U.S. Soil Conservation Service, soils on the property are comprised of Beaches and Jaucas Sand, 0 to 15 Percent Slopes. "Beaches" occur as sandy, gravelly or cobbly areas. They are subject to tides and ocean waves. The sand beaches consist mainly of light-colored sand derived from coral and seashells.

"Jaucas Sand" is excessively drained and calcareous and occurs as a narrow strip on coastal plains adjacent to the ocean. It is developed in wind- and water-deposited sand from coral and seashells. In a representative profile, this soil is single grain, pale brown to very pale brown, sandy, and more than 60 inches deep. The surface layer is dark brown as a result of accumulation of organic matter and alluvium.

Additionally, Jaucas sand is neutral to moderately alkaline throughout its profile. Its permeability is rapid, runoff is very slow to slow, and water erosion hazard is slight, but its wind erosion characteristic is severe where vegetation is absent. Its available water capacity is 0.5 to 1.0 inch per foot of soil, and its workability is slightly difficult because soil in the area is loose and lacks stability.

To improve the stability of the sand in the proposed planting area, a bio-degradable jute mesh will be placed beneath the surface of the sand. It will hold plant roots in place and minimize the erosional effect of wave surges on the sand area in front of the proposed landscaping.

Flora

Vegetation previously had a major presence on the mauka section of Sunset Beach. Shown on a 1948 aerial photograph, plant growth occupied the full length of the property fronting Kamehameha Highway. Its width from the highway to its makai edge on the beach was as much as 50 to approximately 100 feet. This area is now sparsely occupied by beach naupaka, date palm and coconut palm. According to Sea Engineering, Inc., it is unclear what contributed to the loss of vegetation, but it is probably a combination of seasonal erosion from high waves, and degradation due to foot traffic and heavy use.

Sea Engineering, Inc., reviewed historical photographs of the site and noticed that during the December 1969 storm, the vegetation line had retreated by as much as 10 to 21 feet. By 1988, some areas of the beach showed partial restoration of the vegetation line while other areas showed full restoration with even some accretion.

Although the initial major reduction in vegetation may have resulted from the high waves of the 1996 storm, heavy foot traffic probably prevented re-establishment of the previous vegetation. This condition, in turn, enabled further destruction during subsequent high wave events.

The proposed project is expected to supplement the existing vegetation with extensive planting and to include species that would be compatible with the site. Beach naupaka, beach morning glory and pohinahina would be the primary groundcover, and coconut palms, which do not have thorny fronds such as the existing date palms, milo and hala tree will be used to supplement the groundcover and stabilize the upper slope of the beach.

During the initial growing period, the new plants will be roped off or provided with a similar type of temporary fencing to protect them from pedestrian traffic. The fence will be removed once the plants are firmly established. To help keep the plants in place, a jute mesh or comparable, which is made of natural plant fiber material and biodegradable, will be installed at the base of the vegetation.

Fauna

With a large presence of beachgoers and sparse vegetation, Sunset Beach has a scarcity of wildlife. Lowland urban birds, such as the myna, red-crested cardinal, house finch, bulbul, house sparrow and zebra dove, are common but not particularly abundant at the site. Migratory species are expected to be noticeably absent from the area, however, mammals, such as rats, stray cats and dogs, may wonder through. It is anticipated that the site is not inhabited by any rare or endangered wildlife species and thus, would not be adversely impacted by the proposed project.

Archaeological Sites

The State Historic Preservation Division (SHPD) has reviewed previous studies in the area and found that several human burials were inadvertently discovered in the beach sand near the proposed beach improvements (Appendix B). SHPD indicated that there are also cultural deposits unrelated to burials in the vicinity. Therefore, in order to ensure that the proposed improvements do not have an adverse impact on significant archaeological features in the area, SHPD is recommending that on-site archaeological monitoring be conducted in areas where the ground is expected to be disturbed. This work should be based on an archaeological monitoring plan reviewed and approved by SHPD.

In September of 1997, International Archaeological Research Institute, Inc. (IARII) conducted a subsurface archaeological survey of the project site (See Appendix C). The survey included 33 auger borings and 3 test trenches (see Figure 7). The auger borings revealed cultural deposits at the far northern (Site 5586) and southern (Site 5585) ends of the study area. These areas were further investigated with the excavation of a trench at each location. Analyses of the samples collected from the trenches revealed historic material such as ceramic and glass fragments and precontact remains consisting of basalt flakes, volcanic glass flake, coral abraders, animal bone, charcoal and marine shells. No burials were uncovered.

IARII assessed Sites 5585 and 5586 as significant under the criteria that the sites have yielded, or may likely to yield, information important for research on prehistory or history. Further, IARII indicated that because the sites are significant, care should be taken to avoid any actions that could impact or disturb them. If work is to occur in the area, a Mitigation Plan should be prepared and implemented.

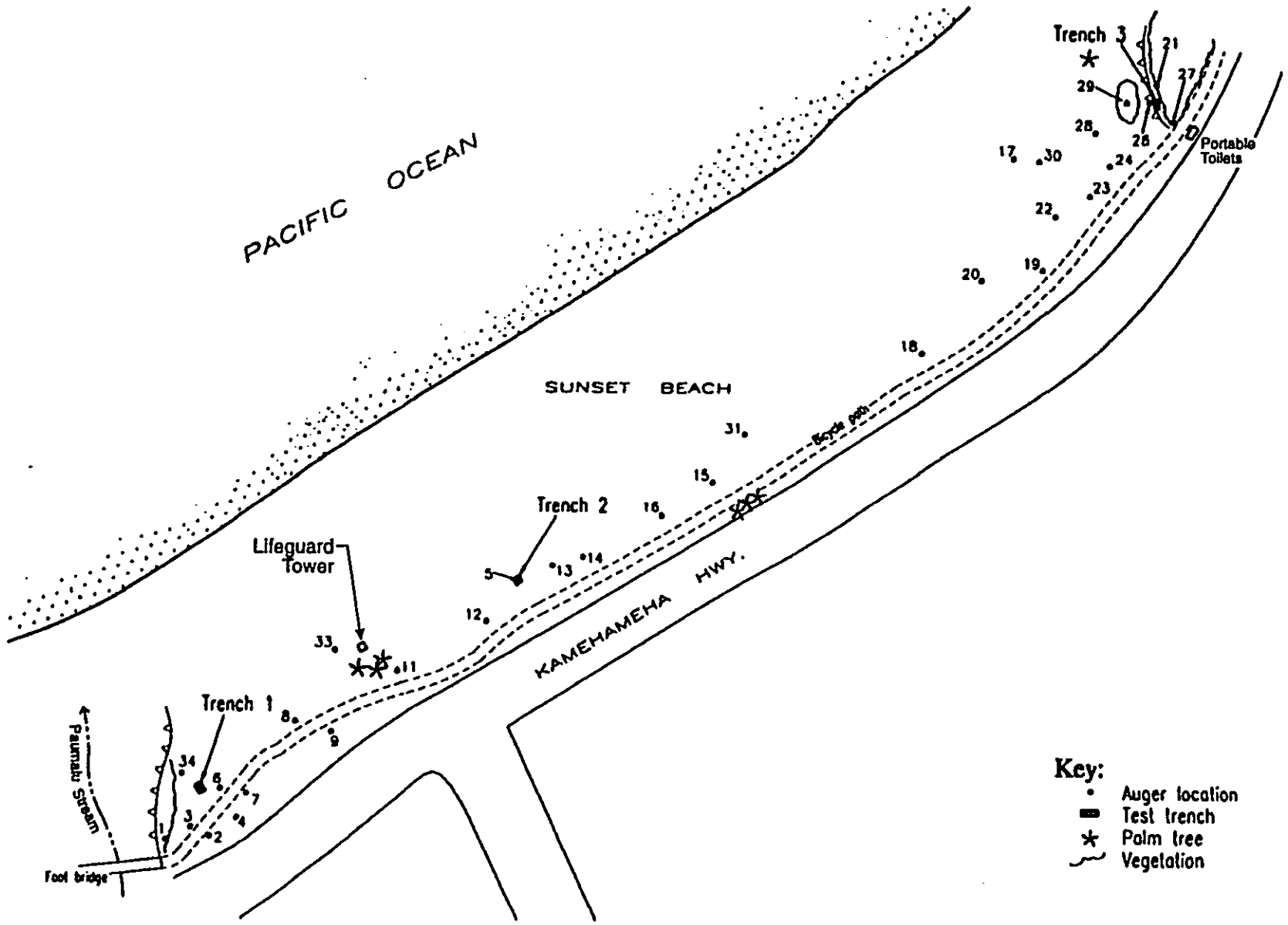
In its final report, IARII indicated that Site 5586 would be impacted by the proposed beach improvements and, thus, should undergo data recovery before any work is done in the area. Site 5585, however, would not be impacted, but, nevertheless, is recommended for undergoing a monitoring program. The reason is that the site is relatively near project construction and in a vicinity of potential human burials. It is suggested also that the Mitigation Plan specify appropriate preservation and short- and long-term protective measures for Site 5585 and any portion of Site 5586 that does not undergo data recovery.

The City Department of Design and Construction plans to work with SHPD to satisfy its archaeological requirements.

Ambient Noise

The primary source of noise in this rural area is the vehicular traffic on Kamehameha Highway and the sounds of surf on the beach. Other sources of noise include the sounds of beachgoers and their activities and neighboring residents operating maintenance equipment in their yards.

The proposed beach improvements will generate noise during the short-term construction phase of the project. Hauling trucks, flatbed trucks with booms, backhoes, graders, cement trucks, and rollers will be generating noise during site preparation and construction. After construction is completed, none of the noise will occur. The finished landscape and hardscape features will be stationary and noiseless. Noise from users traversing this area would be noticed, but not detrimental to area residents.



Source: International Archaeological Research Institute, Inc.

Prepared for: Department of Design and Construction
Prepared by: Belt Collins Hawaii

NORTH

0 50 100
SCALE IN FEET

Figure 7
ARCHAEOLOGICAL TEST PITS

SUNSET BEACH IMPROVEMENTS
Koolauloa, Oahu, Hawaii

A beneficial aspect of the proposed improvement is that the new vegetation along Kamehameha Highway will act as a shield to buffer noise from travelling vehicles making it quieter for beach users on the sand.

Air Quality

The air in the project area is relatively good. There are no sources of major pollutants such as manufacturing plants, agricultural burning operations, or incinerators. The nearest large-scale agricultural activity is located approximately one mile to the northeast. Auto emissions are the only major source that would generate any measurable impact on air quality in the area. However, good northeast tradewinds quickly disperse emissions to reduce their impact.

The proposed project is expected to temporarily impact the quality of air during the construction phase. Emissions from construction equipment, fugitive dust from site preparation and during construction, and exhaust emissions from employee and contractor vehicles are expected to have the most effect.

During the long-term or operational stage of the project, air quality is expected to return to normal levels replicating conditions of the pre-construction days. No direct impact on air quality from the new landscaping or hardscape features is anticipated. The buses, which will stop for their passenger-visitors to view Sunset Beach from the viewing deck, already do so in the same area.

Views

At Sunset Beach, motorists on Kamehameha Highway have an unobstructed view of the shoreline. This observation is also cited in the 1987 Coastal View Study prepared for the City and County of Honolulu. Visitors often stop at roadside to leisurely view the beach and watch the action on the water. Others reduce their speed on the highway to catch glimpses of the surf from their vehicles. These actions often create a hazard for other motorists as well as pedestrians crossing the highway.

The proposed landscaping will alter the visual appearance of the beach. It will include beach naupaka that could grow densely and to heights of approximately 8 to 10 feet. Its growth may partially obstruct view planes from the highway to the shoreline, but would provide a safety benefit. Other planned groundcover will have a lower profile.

Notably, Sunset Beach's attractive scenery draws attention from motorists travelling on Kamehameha Highway. Drivers tend to take their eyes momentarily off the road and often get involved in rear end collisions. If a large number of people are on the beach, especially during special events, there would

be an unavoidable distraction. Compounding this with the surf's spectacular scene, the motorist would be inclined to take his eyes off the road for a longer period of time and increase the likelihood of an accident.

The replanting of vegetation along the highway will create a visual buffer to reduce the exposure of the beach and surf scene. Random openings in the vegetation will allow the motorist to sense the presence of the beach and still appreciate the overall ambience of the coastal environment. The new plants will be similar to the existing plants to blend and harmonize with the existing landscape.

The proposed improvements will include board walkways, vehicle barriers and viewing deck which will not obstruct views along the shoreline nor interfere with views from the beach to the mauka plateaus.

VII. SOCIO-ECONOMIC CONSIDERATIONS

Sunset Beach is a rural recreational area where white sand beaches, parks, open space, and agricultural lands intermix with residential homes scattered along the North Shore of Oahu.

Most of the population in this region are concentrated in the major towns of Haleiwa, Waialua and Kahuku. The Sunset Beach community consists of large and small residential properties along the shoreline and Kamehameha Highway. The boundaries of this community are not clearly defined, but is generally located between Waimea and Waialee. Commercial amenities include a supermarket, two grocery stores, a gift store, a diner, an office, and two gas stations. There are also community and public facilities including an elementary school, beach parks, convalescent home, and two churches.

On Paumalu plateau above Sunset Beach are open space, pasture lands and a telecommunications facility. To the northeast is Waialee, which is a small rural residential area that includes the University of Hawaii Agricultural Experimental Station, and to the southwest is Waimea and its mauka neighbor, Pupukea.

Development of the beach improvement is expected to mobilize employment in the construction industry. The cost of construction is estimated to be approximately $280,000, which is modest in size and therefore would involve a small number of construction workers. The secondary and induced effects of the project are expected to multiply the benefits of construction employment, spending and employee income into the community. These benefits would, thus, provide a much larger economic effect.

The proposed improvement will not displace any existing housing, agricultural activity or community facility. It will occupy space that is currently in use by beachgoers for access and beach activities. These activities, however, may be contributing to the long-term shifting of sand toward the ocean resulting in serious erosional effects on the beach. As previously described, the proposed project is intended to reduce this effect and help restore the beach to its earlier condition. In particular, the proposed project will help to stabilize the sand and re-enforce its buildup on the berm.

VIII. INFRASTRUCTURE

Circulation and Traffic Conditions

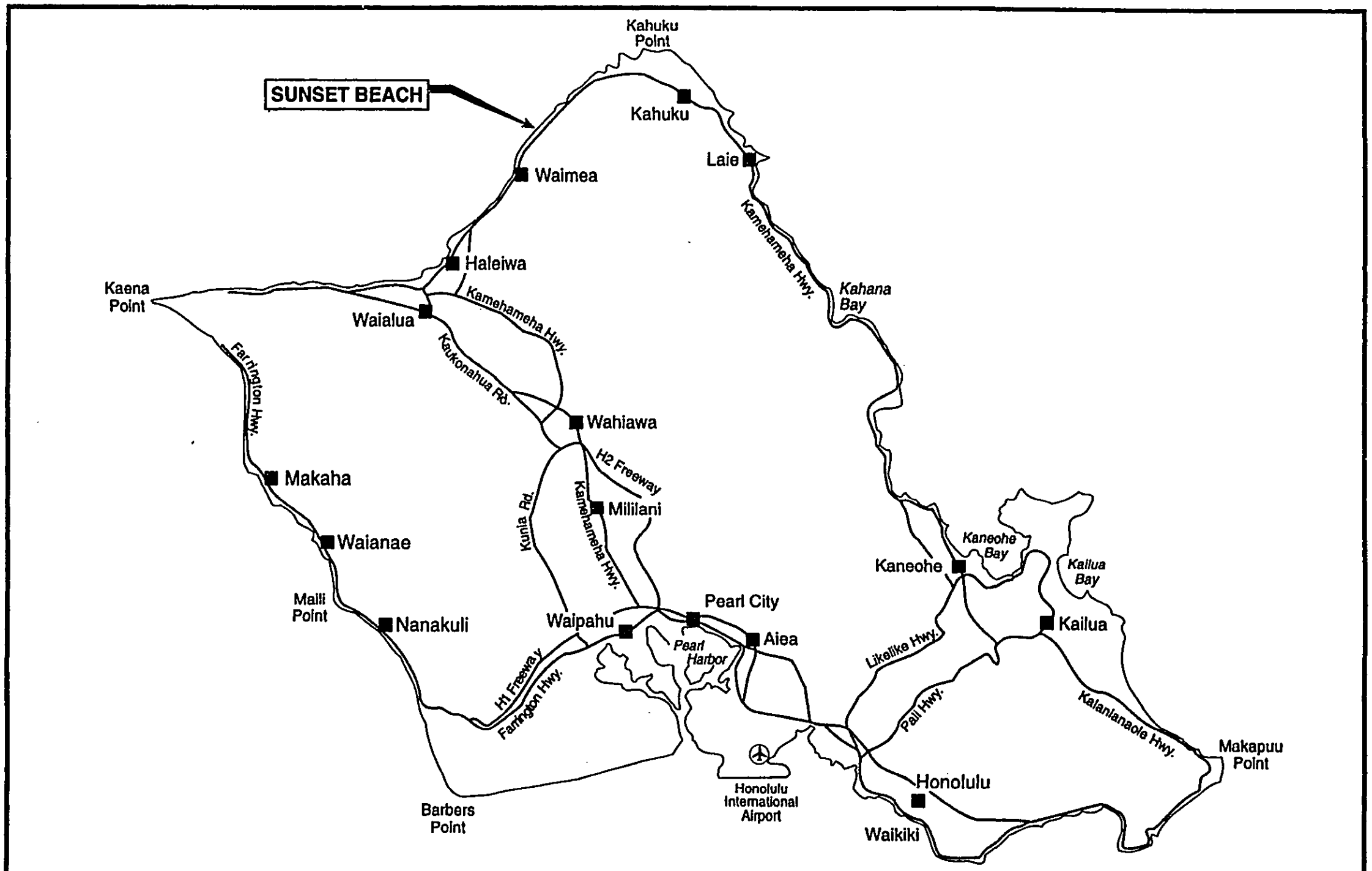
Kamehameha Highway is a circle-island State right-of-way that connects Windward Oahu, North Shore, Central Oahu and West Honolulu (see Figure 8). It serves the outlying communities of Kaneohe, Laie, Kahuku, Haleiwa, Wahiawa, Mililani, Pearl City and Aiea, as well as the Pearl Harbor Naval Base.

At Sunset Beach, Kamehameha Highway is a two-lane facility with unrestricted access. Numerous side roads and direct ingresses/egresses from adjoining properties connect with the right-of-way. There are no traffic lights in the vicinity, and the posted speed limit is 35 mph.

Kamehameha Highway has a pavement width of 20 feet with 4- to 5-foot wide stabilized shoulders within a 50-foot wide right-of-way. Bus stops are located on both sides of the highway and are situated at intervals of various distances.

The nearest 24-hour traffic count taken by the State Department of Transportation on Kamehameha Highway was at Pupukea Road (approximately 6,000 feet to the southwest or Waimea side of the project site) on March 22 and 23, 1994 . (These days fell on a Tuesday and Wednesday of the week.) The count showed a total of 12,315 vehicles passing the intersection. A similar count was taken on Kamehameha Highway at Kuilima Drive of the Turtle Bay Resort on March 23 and 24, 1994 (Wednesday and Thursday). That surveyed showed 6,553 vehicles passing the count station during the 24-hour period.

Peak hour traffic on Kamehameha Highway at the Pupukea Road intersection totaled about 857 vehicles and occurred between 11:00 a.m. and 12:00 noon in the morning. The afternoon peak hour totaled 1,020 vehicles and occurred between 3:45 p.m. and 4:45 p.m.



341.1501/001-7 f9.3.98 6

Prepared for: Department of Design and Construction
Prepared by: Belt Collins Hawaii

NORTH

0 2.5 5
SCALE IN MILES

Figure 8
CIRCULATION

SUNSET BEACH IMPROVEMENTS
Koolauloa, Oahu, Hawaii

During the weekends and holidays, traffic moves slower compared to normal speed (at regular posted speed limit) because more parking maneuvers occur in front of the beach and more tendencies by motorists occur to slow down and look with curiosity at the beach and surf scene. During the winter seasons, traffic is so heavy on surfing tournament days, that it moves at an extremely slow pace.

The proposed project is not expected to increase traffic on Kamehameha Highway. It entails landscape improvements which are not considered traffic generators. No increase in the intensity of beach use is anticipated, and no new use, as a potential traffic generator, is being proposed.

The State Department of Transportation, Highways Division, has plans to widen Kamehameha Highway in the future. Although no specific program has been developed, widening would most likely occur on the mauka side of the highway. This future widening, thus, would not affect the proposed landscape improvements on the beach.

Kamehameha Highway is a regular route for TheBus. Frequency of service is about every 30 minutes throughout the day. Northbound and southbound stops are located along the highway frontage of the beach.

A public bikeway also serves the area. Constructed by the City Department of Transportation Services in 1995, this facility measuring eight to nine feet in width and striped for two-way traffic connects Kaunala with Waimea, a distance of approximately 3.5 miles. Its alignment is on the makai side of the highway and traverses the mauka sand section of the project site. It is a devoted pathway for bicycles, but has also been used by pedestrian as a walkway.

Parking

Parking for beachgoers currently occur along the highway in front of the beach. When conditions are crowded, parking extends beyond the beach and into the adjacent residential areas. During peak days and special events, parking occurs on both sides of the highway. Parking across the highway from the beach, however, may be physically restricted by a narrow road shoulder.

On weekends, the highway frontage of Sunset Beach is typically filled with vehicles. This often creates a dangerous condition when vehicles must enter or leave the unimproved area. Traffic volumes are often heavy, and when northbound vehicles attempt to enter the parking area with a left-turn maneuver or leave the area by reversing out onto the highway, a hazardous condition is created. On such crowded days, it is estimated that as many as 80 vehicles park in front of the beach.

The proposed project will essentially involve improvements on the beach property owned by the City. The highway portion is owned by the State. Presently, motorists park on the highway shoulder within the State right-of-way. Although the State does not have any striping or signs that prohibit parking on the highway shoulder, it is not the State's policy to have parking nor encourage it on a major highway for safety and liability reasons. Thus, parking at the beach, from the public standpoint, will be a choice and at the risk of the individual motorist.

In May of this year, the Department of Design and Construction began construction of a new public bathhouse and parking area across the highway from Sunset Beach. This new facility is designed to provide a safe alternative parking site for the on-street area that currently fronts the proposed beach improvements.

Water

A 12-inch water line is located along Kamehameha Highway and is available for connection to the project site. Approximately 29,675 gallons per week of water will be required for landscape irrigation. Additional water will be required for the outdoor showers and drinking fountains. Projected quantities will vary and depend on the rate of usage by the public. Water from the Board of Water Supply system will be adequate to accommodate the anticipated demand for this project.

Sewer

No City and County sewage collection system is available in the vicinity. Sewage disposal is presently accommodated by individual disposal units such as cesspools or septic tanks.

The City Department of Design and Construction has begun construction of a new public bathhouse that will be located in a new public parking area across Kamehameha Highway from Sunset Beach. The bathhouse, which will be serviced by a septic tank and absorption field, will be completed in early 1999.

Drainage from the proposed outdoor showers will flow into the adjacent vegetation and infiltrate the ground. Drainage from the drinking fountains will flow into a sump at the base of the fountain.

Electricity

Overhead power lines, located along Kamehameha Highway, are accessible to the beach property. Electricity will be required to run the automatic sprinkler system in the proposed planting area.

Telephone

Telephone lines are also located along Kamehameha Highway on the same utility poles that serve the power lines. No telephone service by GTE Hawaiian Tel, however, will be required for the proposed project.

Solid Waste

The City currently removes the trash from rubbish receptacles on the beach via a private waste disposal contractor. Pick-up is seven days a week and all refuse is taken to the City's HPOWER facility. Approximately 42 to 70 trash bags (30- to 33-gallon bags) of solid waste are generated from the beach each week.

The proposed improvements call for placing the existing trash cans in wooden enclosures to provide a more pleasing appearance to the public. The receptacles will be located in the planted area of the beach.

Emergency Service

City lifeguards are on duty at the watch station from 9:00 a.m. to 5:30 p.m. everyday. In the event medical assistance is needed, the lifeguard operates a portable walkie-talkie to contact headquarters where a dispatcher telephones a local emergency service. The Sunset Beach Fire Station, located approximately 1-1/2 miles from the beach, provides first responder medical assistance. It is able to respond to an emergency call from Sunset Beach within 3 to 4 minutes.

For more serious calls, an ambulance would be dispatched from the Kahuku Fire Station to transport emergency victims to the Kahuku Hospital. The hospital, located approximately 7 miles from Sunset Beach, is equipped to handle a wide range of emergency cases. A valuable facility on the hospital grounds is the helipad which is available for medevac operations.

IX. PUBLIC LAND USE POLICIES

Federal Review

The proposed landscape improvements will be located above the high tide line and will not be within the U.S. Department of the Army jurisdiction. The beach maintenance program, however, will involve work in the lower section of the beach. Any beach restoration or enhancement activity below the high tide line would be subject to a General Permit GP 97-001 issued by the Department of the Army.

State Land Use Law

The proposed project is located in the Urban District and is a permitted use under the State Land Use Law. The area makai of the certified shoreline is designated as Conservation District. The proposed planting may extend into this area and, if so, will be subject to the review of a Conservation District Use Application (CDUA) and approval by the State Department of Land and Natural Resources.

State Environmental Policy

The proposed action is consistent with the environmental policies of Chapter 344, HRS, which set forth that the State shall, through its programs, authorities, and resources, conserve the natural resources of the state and enhance the quality of life.

In relation to the guidelines established under Chapter 344, HRS, to implement the policies, the proposed action is consistent particularly with the provisions under "Parks, Recreation and Open Space". They state that all agencies in the development of programs, shall, insofar as practicable, consider the following:

"Establish, preserve and maintain scenic, historic, cultural, park and recreation areas, including the shorelines, for public recreational, educational, and scientific uses."

"Protect the shorelines of the State from encroachment of artificial improvements, structures, and activities."

City and County of Honolulu General Plan

The proposed project is intended to protect and maintain the sand area of Sunset Beach as a natural resource for the area. It is consistent with the policies and objectives of the General Plan.

City and County Development Plan Land Use Map

The proposed project is a restoration and enhancement of an existing land use. It is consistent with the City's "park" land use designation for the area.

City and County Zoning

The proposed project calls for re-establishing existing vegetation and, if possible, to maintain the sand area on the beach. The property's current zoning is

P-2 Preservation. The proposed improvement is permitted under this zoning district.

Special Management Area

The Special Management Area (SMA) extends from the shoreline to an area above the one-acre lots on the mauka side of Kamehameha Highway. All improvements within this area are subject to the SMA Rules and Regulations of the City and County of Honolulu. An SMA Use Permit Petition, therefore, is required for the proposed improvements.

As part of the SMA Petition, a shoreline certification from the State Board of Land and Natural Resources is required. Previous shoreline surveys have been conducted on the property, but a current survey must be conducted and certified for the SMA Petition. This certification is also a requirement of the Shoreline Setback Variance Application, which is described below.

Shoreline Setback

Improvements will be located adjacent to the shoreline and within the 40-foot shoreline setback. A Shoreline Setback Variance under the provisions of Hawaii Revised Statutes, Chapters 205A & 343 and Ordinance of Honolulu 92-34 will be required for the proposed project.

Summary of Permit and Approval Requirements

Required land use permits and approvals for the project are a SMA Use Permit, Shoreline Setback Variance and Certified Shoreline Survey. A CDUA will also be required, if new vegetation is planted below the certified shoreline.

X. SUMMARY OF MAJOR IMPACTS AND PROPOSED MITIGATION MEASURES

Construction Impacts

During construction, temporary or short-term impacts will be generated. Noise and possibly fugitive dust will be generated from the project site during site preparation and construction. Heavy equipment will be used to grade the mauka beach land to establish the necessary berm elevation for the desired long-term topographic contour of the beach profile. Pits will be excavated and backfilled for the planting of the proposed vegetation, and trenches will be dug and backfilled for the installation of the water lines that will service the outdoor showers and irrigation system. It is noted that archaeological deposits may be encountered

during this excavation period. Minor modifications in the existing terrain will be required near the highway and at the northern end of the beach for the realigned bikeway, bus pull-over area and viewing platform.

Construction is expected to occur over an approximate 9-month period, but the noise and dust generated from this construction activity are expected to occur only during a fraction of this period.

Mitigation Measures for Construction Impacts

Precautionary measures will be employed by the construction contractor to insure that the least amount of project impacts occurs on the beach and neighboring properties. Dust control measures, including dust screens, water sprinkling in graded areas, and construction restraints during windy days, would be employed, if necessary. Construction noise will be in compliance with State and City noise control standards and requirements. Compliance would be part of the construction contract and the responsibility of the selected contractor.

Prior to construction, the Department of Design and Construction or the project contractor through an archaeology consultant will prepare an archaeological mitigation plan for review and acceptance by SHPD. During construction, the plan will be implemented to insure that no significant archaeological features are adversely impacted.

Traffic Impacts

During construction, there may be adverse impacts on traffic along Kamehameha Highway. A pullover area for buses, parking for the lifeguards and a realigned bikeway will be constructed along the highway right-of-way. There would be construction activity near the travel lanes resulting in some slowdown in traffic. Temporarily, there may be a slight realignment of the highway in the area of construction. The realignment would be within the existing State right-of-way so no private lands will be affected. It is anticipated that no temporary lane closures will occur.

The number of construction vehicles commuting to and from the project site is expected to be very small. Therefore, the impact on traffic flow is anticipated to be insignificant.

After construction is completed, the roadside area of Kamehameha Highway fronting the beach will have room for only parallel street parking. Although the State is not endorsing any parking within this right-of-way, it is very likely that parking will occur anyway. Since the existing road shoulder physically allows perpendicular parking, it is convenient for southbound and northbound motorists

to maneuver into a parking position. The new configuration, however, would be physically convenient only for southbound motorists.

Mitigation Measures for Traffic Impacts

During construction of the bus pull-over, lifeguard parking and realigned bikeway, construction cones will be placed on the highway edge to demarcate the limits of construction. Construction warning signs will be posted well in advance of the work area. Each day, after work is completed, the traffic cones will be removed to allow the flow of vehicles to resume its normal pattern. All other beach improvements will be undertaken outside of the right-of-way and away from the flow of traffic.

XI. ALTERNATIVES CONSIDERED

No Action

This alternative would involve no action leaving the existing beach park in its present condition. No improvement will be done and no effort will be made to stabilize the beach during its very dynamic periods. The sand area of the beach will continue to shift dramatically throughout the year, and the profile of the area after major storms and swells may leave the beach in an eroded configuration for extended periods of time. This long-term consequence may not serve the public well and may deprive the community from full use of a precious natural recreational resource.

Alternative Design

An alternative to landscape planting is the installation of a more solid feature to provide permanence to the shoreline. Rock revetments buried beneath the sand offer one form of shoreline armoring and protection. There are, however, some negative consequences with this alternative. It may create major scouring on the beach and result in substantial and permanent sand loss. Development of such an obtrusive feature may also affect beaches and shoreline elsewhere on the North Shore.

Other design options were quickly dismissed because they too would have resulted in significant adverse impacts to the environment. Two of these alternatives included the construction of an offshore breakwater and development of nearshore beach groins.

Some plan refinements have been made since the Draft EA was completed. A notable revision is the relocation of the existing bike path. The proposed concept

plan under the Draft EA called for relocating the entire length of the existing bike path from the lifeguard station to the private residence at the north end of the beach. This realignment would have placed the bike path away from the potential surge of high surf and into the State highway right-of-way. It would have also removed roadside parking that was deemed hazardous to travelling motorist on Kamehameha Highway.

After reviewing community input during the project's public comment period, the concept plan was revised to show the existing bike path intact with only a minor realignment. Keeping the bike path largely in place would maintain space on Kamehameha Highway for vehicles to pull over in front of the beach and include landscaping between the bike path and road. Further, a board walkway will now be proposed for the pedestrian passageway, which previously was shown as bare sand. There will also be a greater variety of plants in the vegetation clusters to add interest and character to the area.

XII. IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

Project construction will require irreversible and irretrievable commitment of resources. Public funds, construction labor, construction equipment, landscape materials, and utility services, including energy resources, water sources, wastewater disposal and solid waste disposal, will be needed to construct the proposed project. The beach improvement will not involve displacement of existing residences or structures, and permanent commercial uses will not occur in the area.

After construction is completed, the project will involve long-term commitment of resources including the use of the land for beach purposes, bikeway transportation and visitor viewing. There will be long-term use of supplies for landscape maintenance, and utilities, such as water, electricity, wastewater collection and disposal, and solid waste collection and disposal. Continuous public funding will be required to maintain the operations of these long-term services.

XIII. DETERMINATION

This Draft Environmental Assessment demonstrates that the proposed action will not have significant adverse impacts on the environment and that an Environmental Impact State is not warranted. A Negative Declaration or Findings of No Significant Impact, therefore, is determined for this project.

XIV. FINDINGS AND REASONS SUPPORTING DETERMINATION

The following findings and reasons indicate that the proposed action will have no significant adverse impact on the environment, and consequently, supports the above determination.

- o An archaeological mitigation plan will be prepared and implemented during project construction to insure that no significant archaeological features are adversely impacted.

- o The proposed improvement will physically and visually enhance the beach environment. The beneficial uses of the public beach will not be curtailed.

- o The proposed action is consistent with the State's long-term environmental policies and guidelines as expressed in Chapter 344, HRS.

- o The proposed action is expected to have positive economic effects. Its construction will generate jobs and infuse business and personal income into the local economy. No negative effects on the social welfare of the community are anticipated.

- o The proposed landscape improvement will not result in the use of hazardous materials detrimental to the public health of the community.

- o There will be no significant adverse social impact generated by the proposed project. The proposed action will not change the existing land use nor generate increased resident population. The proposed action will not result in significant negative impacts on traffic or overburden existing public facilities and services.

- o The proposed action is intended to restore the vegetation and stabilize the sand on the upper slope of the beach. No long-term degradation of the natural environment nor negative impacts from a larger project are anticipated.

- o No rare, threatened or endangered wildlife or flora species will be affected by the proposed action.

- o The anticipated impacts associated with project construction, such as dust and noise, are short-term and temporary. These impacts will be minimized by implementation of mitigative measures in accordance with applicable laws, statutes, ordinances, and rules and regulations of the U.S. government, State

of Hawaii, and City and County of Honolulu. Negative impacts on groundwater resources are not anticipated.

- o Although the site is subject to periodic surges from high surf, the proposed improvement is designed to receive surface runups and to allow for their passage through the project area. A follow-up maintenance program will help to provide continuous restoration of the beach.

- o The proposed vegetation restoration will be designed to preserve view corridors while providing visual screens of the beach distractions which could be hazardous to motorists.

- o The proposed project will require only a nominal amount of electrical usage to operate the automatic irrigation system.

XV. COMMENTS FROM AND RESPONSES TO AGENCIES, ORGANIZATIONS AND INDIVIDUALS

A Draft Environmental Assessment for this project was transmitted to the following agencies, organizations and individuals for review and comment. The parties that responded are indicated below and a copy of their correspondence with a response from the proposing agency is attached to this section. Comments from these agencies, organizations and individuals have been incorporated, where applicable, into this Final Environmental Assessment.

Federal Agencies	Agencies Responded	Agencies Responding w/No Comment	Agency Letters and Responses Attached in this Section
U.S. Army Engineer, Operations Branch			
State Agencies			
Department of Health	X	X	
Dept. of Land and Natural Resources, Land Division	X		X
Dept. of Land and Natural Resources, State Historic Preservation Division	X		X

State Agencies (continued)	Agencies Responded	Agencies Responding w/No Comment	Agency Letters and Responses Attached in this Section
Dept. of Transportation, Highways Div.	X		X
Office of Environmental Quality Control	X		X
Office of Hawaiian Affairs	X		X
University of Hawaii, Environmental Center	X		X
City and County Agencies			
Board of Water Supply	X		X
Department of Land Utilization	X		X
Department of Transportation Services			
Department of Wastewater Management	X		X
Fire Department	X		X
Planning Department	X	X	
Police Department	X		X
Organizations			
Sunset Beach Community Association	X		X
North Shore Neighborhood Board No. 27			
Hawaiian Electric Company	X	X	
GTE Hawaiian Tel	X		X
BHP Gas Company	X		X

Individuals	Agencies Responded	Agencies Responding w/No Comment	Agency Letters and Responses Attached in this Section
State Senator Robert Bunda			
State Representative Alexander C. Santiago			
Councilmember Rene Mansho	X		X
Additional Individuals Who Commented			
Marilyn & Schuyler (Lucky) Cole	X		X
Peter V.Z. Cole	X		X
Charles R. Lundy	X		X
Mae Matsuura	X		X
William C. Sickler	X		X

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

LAWRENCE MIKE
DIRECTOR OF HEALTH

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

In reply, please refer to

May 4, 1998

98-063/epo

Mr. Glen T. Koyama
Belt Collins Hawaii Ltd.
680 Ala Moana Boulevard, First Floor
Honolulu, Hawaii 96813-5406

Dear Mr. Koyama:

Subject: Draft Environmental Assessment (DEA)
Sunset Beach Improvements
Sunset Beach, Oahu
TMK: 5-9-15

Thank you for allowing us to review and comment on the subject project. We do not have any comments to offer at this time.

Sincerely,

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

BELT COLLINS

September 4, 1998
98P-266/341.1501

Bruce S. Anderson, Ph.D.
Environmental Health
Department of Health
State of Hawaii
P.O. Box 3378
Honolulu, Hawaii 96801

Dear Dr. Anderson:

Draft Environmental Assessment
Proposed Sunset Beach Improvements
Koolauloa, Oahu, Hawaii

Thank you for your letter of May 4, 1998 regarding the Draft Environmental Assessment for the proposed Sunset Beach improvements. Although you had no comments on the proposed project at this time, we thank you for your time and effort in reviewing the Draft EA document.

Sincerely yours,

BELT COLLINS HAWAII LTD.

Glen T. Koyama

GTK:lf

cc: Donald E. Griffin, C&C Dept. of Design and Construction

BELT COLLINS HAWAII LTD. • 680 ALA MOANA BOULEVARD, FIRST FLOOR, HONOLULU, HAWAII 96813-5406 U.S.A.
TEL: 808 521-5361 FAX: 808 538-7819 EMAIL: hawaii@beltcollins.com WEB: www.beltcollins.com

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

AQUACULTURE DEVELOPMENT PROGRAM
AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
CONSERVATION AND RESOURCES ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
LAND DIVISION
STATE PARKS
WATER RESOURCE MANAGEMENT

April 14, 1998

LD-NAV
REF.:SUNBEACH.RCM

Mr. Glen T. Koyama
Belt Collins Hawaii Ltd.
680 Ala Moana Boulevard 1st Floor
Honolulu, Hawaii 96813-5406

Dear Mr. Koyama:

SUBJECT: Review : Draft Environmental Assessment
Applicant: City and County of Honolulu
Department of Parks and Recreation
Proposal : Sunset Beach Improvements
Location : Koolauloa, Island of Oahu, Hawaii
TMK : 1st/ 5-9-15

Thank you for the opportunity to review and comment on the subject Draft Environmental Assessment.

Our Planning and Technical Services Branch has concerns that some of the proposed improvements may be in the Conservation District. We recommend that you obtain a shoreline certification and if it is shown to be situated in the Conservation District, a Conservation District Use Permit would be required. Also, the bike path should be relocated, away from the Beach.

Should you require more information related to obtaining a Conservation District Use Permit, please feel free to contact Mr. Sam Lemmo, Planner of our Land Division's Planning and Technical Services Branch at 587-0381.

Our Aquatic Resources stated that action should be taken to prevent debris, landscaping chemicals (fertilizers, herbicides, pesticides, etc.), eroded soil, petroleum products and other potential contaminants from flowing blowing or leaching into coastal waters. Significant impacts adverse to aquatic values are not expected from the proposed improvements and landscaping at Sunset Beach.

The Department of Land and Natural Resources has no other comments to offer on the subject matter at this time. Should you have any questions, please contact Nicholas Vaccaro of the Land Division Support Services Branch at 587-0438.

Very truly yours,

DEAN Y. UCHIDA
Administrator

c: Land Board Members
Donald Griffin, C/C Parks and Recreation

BELT COLLINS

September 4, 1998
98P-264/341.1501

Mr. Dean Y. Uchida, Administrator
Land Division
Department of Land and Natural Resources
State of Hawaii
P.O. Box 621
Honolulu, Hawaii 96809

Dear Mr. Uchida:

Draft Environmental Assessment
Proposed Sunset Beach Improvements
Koolauloa, Oahu, Hawaii

Thank you for your letter of April 14, 1998 regarding the Draft Environmental Assessment for the proposed Sunset Beach Improvements. A shoreline certification will be sought from the State Board of Land and Natural Resources as a requirement of the project's SMA Use Permit and Shoreline Setback Variance Applications. The proposed vegetation may extend makai of the certified shoreline of the beach. Should that occur, a Conservation District Use Application will be first filed with your office for review and approval.

Where necessary, precautionary measures will be taken to prevent debris, landscaping chemicals, eroded soil, petroleum products and other potential contaminants from flowing, blowing or leaching into the coastal waters.

We appreciate your comments on the proposed project.

Sincerely yours,

BELT COLLINS HAWAII LTD.

Glen T. Koyama

GTK:lf

cc: Donald E. Griffin, C&C Dept. of Design and Construction

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

AQUACULTURE DEVELOPMENT PROGRAM
AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
CONSERVATION AND RESOURCES ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
LAND DIVISION
STATE PARKS
WATER RESOURCE MANAGEMENT

April 23, 1998

LD-NAV
REF.:2SUNBEACH.RCM

Mr. Glen T. Koyama
Belt Collins Hawaii Ltd.
680 Ala Moana Boulevard 1st Floor
Honolulu, Hawaii 96813-5406

Dear Mr. Koyama:

SUBJECT: Review : Draft Environmental Assessment
Applicant: City and County of Honolulu
Department of Parks and Recreation
Proposal : Sunset Beach Improvements
Location : Koolauloa, Island of Oahu, Hawaii
TMK : 1st/ 5-9-15

This is a follow-up to our letter (Ref.:SUNBEACH.RCM) dated April 14, 1998, regarding the subject matter.

Attached herewith is a copy of our Engineering Branch's comments related to changes to the beach profile and FEMA regulations for the proposed project.

Should have any questions, please feel free to contact Nicholas Vaccaro of the Land Division Support Services Branch at 587-0438

Very truly yours,

DEAN Y. UCHIDA
Administrator

c: Land Board Members
Donald Griffin, C/C Parks and Recreation

COMMENTS

We suggest the City conduct a monitoring plan to examine changes to the beach profile after the proposed project is completed.

We also suggest the consultant meet the following FEMA guidelines (for construction in a flood zone) in designing the proposed viewing deck:

1. Elevation of the structure (bottom of lowest floor beam) be equal to or greater than the wave height (generated by a 100-year frequency flood) determined for the project site.

2. The foundation of the structure have the ability to withstand the force of waves generated by a 100-year frequency flood. The foundation is required to be a concrete footing or similar design capable of withstanding the force of the flood waves.

We confirm that the proposed viewing deck will be located in Zone VE. This is an area within the 100-year flood plain subject to coastal flooding with velocity hazard (wave action), and base flood elevations of 19 to 20 feet.

BELT COLLINS

September 4, 1998
98P-265/341.1501

Mr. Dean Y. Uchida, Administrator
Land Division
Department of Land and Natural Resources
State of Hawaii
P.O. Box 621
Honolulu, Hawaii 96809

Dear Mr. Uchida:

Draft Environmental Assessment
Proposed Sunset Beach Improvements
Kooiauloa, Oahu, Hawaii

Thank you for your follow-up letter of April 23, 1998 regarding the Draft Environmental Assessment for the proposed Sunset Beach improvements. Changes in the beach profile, particularly at Sunset Beach, is very apparent and is continuously ongoing. Lifeguards at the beach, who are employees of the Department of Parks and Recreation Services, are present everyday and have a good mental record of the beach configuration. We anticipate they will be a good resource for providing feedback on the effectiveness of the proposed beach improvements.

Regarding construction in the flood zone, the project engineers will comply with FEMA guidelines for developing the viewing deck in the coastal high hazard area.

We appreciate your comments on the proposed project.

Sincerely yours,

BELT COLLINS HAWAII LTD.

Glen T. Koyama

GTK:lf

cc: Donald E. Griffin, C&C Dept. of Design and Construction

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STATE OF HAWAII

DEPARTMENT OF LAND AND NATURAL RESOURCES

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

June 9, 1998

Mr. Glen Toyama
Belt Collins Hawaii, Ltd.
680 Ala Moana Boulevard, First Floor
Honolulu, Hawaii 96813-5406

LOG NO: 21245
DOC NO: 9806SC08

Dear Mr. Toyama:

SUBJECT: Chapter 6E-8 Historic Preservation Review of a Draft Environmental Assessment for the Proposed Sunset Beach Improvements
Paumalu, Ko'olauloa, O'ahu TMK: 5-9-015

Thank you for the opportunity to comment on the Draft EA prepared for the improvements at Sunset Beach Park on O'ahu. Our review is based on historic reports, maps, and aerial photographs maintained at the State Historic Preservation Division; no field inspection was made of the subject parcel. Our comments are late and we apologize for any inconvenience this may cause you.

The Draft EA includes a draft report documenting the results of an archaeological inventory survey (Athens & Magnuson 1998. Sunset Beach Park Archaeological Inventory Survey, O'ahu, Hawai'i. IARII ms.). We have completed a review of the report and requested some minor revisions be made before it can be accepted as final (see attachment).

We can state at this point, however, that the survey does appear to have been adequate and that a total of 2 historic sites were found: 5585 and 5586, both subsurface cultural deposits, probably pre-Contact in age. We agree that both sites are significant for their information content. We do have concerns about the proposed mitigation, though. Judging from the Draft EA, it appears that the planned improvements will have an "adverse effect" on these sites since a lifeguard parking area and realigned bus stop are to be put in the vicinity of site 5585, and a shower/drinking fountain facility and improved handicapped access in the vicinity of site 5586. In view of these plans, we would recommend that the portions of sites 5585 and 5586 to be impacted undergo archaeological data recovery mitigation. If this occurs, then we believe that any adverse impacts to the sites at those spots will be acceptably mitigated.

Any other ground disturbance in the sand deposits of Sunset Beach need also to be considered for their impacts to these sites. In some cases, data recovery might be needed.

Should you have any questions, please feel free to call Sara Collins at 587-0013.

Aloha,

DON HIBBARD, Administrator
State Historic Preservation Division

ATTACHMENT I: SPECIFIC COMMENTS ON THE REPORT DOCUMENTING THE ARCHAEOLOGICAL INVENTORY SURVEY AT SUNSET BEACH, O'AHU INTERNATIONAL ARCHAEOLOGICAL RESEARCH INSTITUTE, INC.

Previous Archaeology

Pages 9-10: Please include a map showing the locations of the previous surveys and/or previously identified historic sites in the vicinity of the project area.

Field Investigations

General: Please submit clearer copies of the photographs used in the report.

Page 11: Where are sites 50-80-01-5585 and -5586? Please indicate their locations on Figure 4.

Page 12, Paragraph 1: The sediment description for Auger 27 in Table 2 does not indicate the presence of cultural deposits or materials; please explain.

Summary and Mitigation Recommendations

Please separate the Significance Assessments and Recommendations into two, separately titled sections.

We concur with the significance assessments made for both sites.

Page 32, Recommendations: Judging from the draft EA, though, it appears as if the proposed improvements will have an "adverse effect" on Sites -5585 and -5586 because of the ground-disturbing activities that are to take place in the vicinity of each site. In view of this fact, we believe that data recovery is needed. If you agree, please alter this section. If you disagree, please contact our staff to resolve the disagreement, before resubmitted the revised report.

BELT COLLINS

September 4, 1998
98P-267/341.1501

Don Hibbard, Ph.D., Administrator
State Historic Preservation Division
Department of Land and Natural Resources
State of Hawaii
33 South King Street, 6th Floor
Honolulu, Hawaii 96813

Dear Dr. Hibbard:

Draft Environmental Assessment
Proposed Sunset Beach Improvements
Koolauloa, Oahu, Hawaii

Thank you for your letter of June 9, 1998 regarding the Draft Environmental Assessment for the proposed Sunset Beach improvements. Attached for your review is International Archaeological Research Institute Inc.'s (IARII) final archaeological inventory survey report for Sunset Beach. We trust this report adequately addresses your comments and meets with your approval.

Should you have any questions regarding the report, please do not hesitate to contact J. Stephen Athens of IARII at 946-2548 or me at 521-5361.

We appreciate your comments on the proposed project.

Sincerely yours,

BELT COLLINS HAWAII LTD.

Glen T. Koyama

GTK:lf

cc: Donald E. Griffin, C&C Dept. of Design and Construction

Attachment

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BRIAN K. MINAAI
GLENN M. OKIMOTO

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
869 PUNCHBOWL STREET
HONOLULU, HAWAII 96813-5097

IN REPLY REFER TO:
HWY-PS
2.8841

APR 15 1998

Mr. Glen T. Koyama
Belt Collins Hawaii
680 Ala Moana Boulevard, First Floor
Honolulu, Hawaii 96813

Dear Mr. Koyama:

Subject: Draft Environmental Assessment
Sunset Beach Improvements
Koolauloa, Oahu, Hawaii, TMK: 5-9-15

Thank you for your transmittal of March 20, 1998, requesting our comments regarding the above subject project.

The proposed improvements on the makai side of Kamehameha Highway for the Sunset Beach Park will not adversely impact our highway facility. However, the parking lot on the mauka side of Kamehameha Highway may be affected, in the future, if we widen the highway. For your information, the 2020 Oahu Regional Transportation Plan does not identify the need for this widening.

Please note that plans for work done within our highway rights-of-way must be submitted for our review and approval.

Very truly yours,

KAZU HAYASHIDA
Director of Transportation

BELT COLLINS

September 4, 1998
98P-255/341.1501

Mr. Kazu Hayashida, Director
Department of Transportation
State of Hawaii
869 Punchbowl Street
Honolulu, Hawaii 96813-5097

Dear Mr. Hayashida:

Draft Environmental Assessment
Proposed Sunset Beach Improvements
Koolauloa, Oahu, Hawaii

Thank you for your letter of April 15, 1998 regarding the Draft Environmental Assessment for the proposed Sunset Beach improvements. When construction plans are completed for the proposed bikeway realignment, copies will be transmitted to your office for review and approval.

The off-street parking on the mauka side of the highway, which is currently under construction, was reviewed by your department a few years ago. The parking design took into consideration the potential future widening of the highway.

We appreciate your comments on the proposed project.

Sincerely yours,

BELT COLLINS HAWAII LTD.

Glen T. Koyama

GTK:lf

cc: Donald E. Griffin, C&C Dept. of Design and Construction

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BENJAMIN J. CAYETANO
GOVERNOR

GARY GILL
DIRECTOR

STATE OF HAWAII
OFFICE OF ENVIRONMENTAL QUALITY CONTROL
236 SOUTH BERETANIA STREET
SUITE 702
HONOLULU, HAWAII 96813
TELEPHONE (808) 586-4185
FACSIMILE (808) 586-4186

April 22, 1998

Mr. William D. Balfour, Director
Department of Parks and Recreation
City and County of Honolulu
650 South King Street, 10th Floor
Honolulu, Hawai'i 96813

Dear Mr. Balfour:

Having reviewed the Draft Environmental Assessment (DEA) for Proposed Beach Improvements, Sunset Beach, Paumalu, Ko'olauloa, O'ahu, Tax Map Key, 1st Division, 5-9-15, we submit the following comments for your response.

1) Please provide structural details on the viewing deck and its foundations, especially with regard to nature and extent to which concrete and fill material will be used support such a deck and its related appurtenances.

2) Please provide details (including locations and type of structures) of the proposed outdoor shower facilities.

3) Please discuss the impacts and mitigative measures of the deck and other proposed "hardened" structures on shoreline processes and answer applicable questions in the attached draft shoreline hardening policy.

4) Please discuss what mitigative measures (i.e., pedestrian overpass/underpass, traffic signalization, speed bumps), will be undertaken to ensure that park users have safe and unimpeded access to the park from the mauka parking lot.

5) Please provide a list of all permits and approvals, including their current status and expected issuance dates.

6) Please consult with the State Department of Transportation and the Federal Highway Administration as to whether the road and parking improvements constitute a constructive use of the park lands subject to Section 4(f) of the Federal Department of Transportation Act of 1966.

7) Please describe the nature of the vegetation being used to stablize the beach area and minimize beach loss. Please indicate whether native strand vegetation will be used to revegetate the beaches.

8) On page 5, mention is made that the Department is proposing to implement a periodic beach maintenance program involving occasional but continued restoration of the mauka storm berm.

Please describe: the mauka storm berm; the estimated volumes of sand to be moved; what equipment other than the tractor would be used to transport the sand; the frequency at which this will occur; and the direct, indirect and cumulative effects, if any, of such a program on the natural physical environment.

Please include a copy of this letter, any other comment letters and your responses in the final environmental assessment for this project. If there are any questions, please call Leslie Segundo of my staff at 586-4185. Thank you for the opportunity to comment.

Sincerely,

for GARY GILL
Director of Environmental Quality Control

Attachments

c: Donald E. Griffin, DPR
Glen Koyama, Belt Collins Hawai'i Ltd.

Draft Shoreline Hardening Policy

I. Definition of Problem.

Coastal property owners bear tremendous risks. Their property is vulnerable to tsunamis, storm surges, floods and hurricanes. In addition, owners along the shoreline bear the risk that their property may erode. Under common law, a riparian land owner "loses title to lands that are submerged through the process of erosion." R.R. Powell 5A Powell on Real Property § 66.01 [2] (1994). The Hawaii Supreme Court has held that "registered ocean front property is subject to the same burdens and incidents as unregistered land, including erosion....[T]he precise location of the high water mark on the ground is subject to change and may always be altered by erosion." County of Hawaii v. Sotomura. 55 Haw. 176, 180 (1973). Because the land seaward of the upper reaches of the wash of the waves -- including the beach -- is a public trust resource (Application of Sanborn. 57 Haw. 585, 562), the state, as trustee, can restrain those activities that damage the resource. Orion Corp. v. State 747 P.2d 1062 (Wash. 1987); U.S. v. State Water Resources Control Board. 227 Cal. Rptr 161 (Cal. App. 1 Dist 1986); State Dept. of Environmental Protection v. Jersey Central P & C Co. 308 A.2d 671 (N.J. Super L. 1973). A private property owner does not have the right to impair public trust resources.

Tide gauges maintained by the National Oceanic and Atmospheric Administration demonstrate that our islands are experiencing a relative rise in sea level due to both global sea-level rise and local geologic factors (Fletcher, 1992). In many places, the rise in water causes natural beach retreat that leads to coastal land erosion. Erosion is a natural process whereby the coastal environment responds to sea-level rise by shifting landward. Shoreline movement may occur slowly at an average annual rate, or it may occur episodically associated with storms at unpredictable times and rates. Erosion is only a problem needing mitigation where near-shore development interferes with the natural process.

Armoring the shoreline with seawalls or revetments often stops the erosion of coastal land mauka of the structure. However, where beaches are undergoing long-term retreat, shoreline hardening eventually leads to beach narrowing, followed by beach loss (Hall, 1964; Birkemeier, 1981; Fischer, 1986; Hanson and Kraus, 1986; Komar and McDougal, 1988; Kraus, 1988; Tait and Griggs, 1990 and others). A hardened structure tends to shift the focus of erosion from the land to the beach fronting the wall. Seawalls and revetments are not a cure for the cause of erosion, but rather a defensive mechanism to mitigate land loss without regard for resulting impacts to adjacent environments such as the beach or the laterally adjacent shoreline (Raynor, 1953; U.S. Army Corps of Engineers, 1964; Walton and Sensabaugh, 1983; Tait and Griggs, 1990). Shoreline hardening not only leads to beach loss where beaches are undergoing long-term retreat, but it may also exacerbate the erosion problem (McDougal, Sturtevant and Komar, 1987). Shoreline hardening devices may trap dune and upper beach sand that formerly aided the process of beach recovery following storms and during erosive seasons (Terich, 1975; Wood, 1988; Kraus, 1988; Komar and McDougal, 1988).

Studies of historical vegetation line movement in Hawaii indicate that many coasts are experiencing long-term retreat (Hwang, 1981; Sea Engineering, 1988; Makai Ocean Engineering and Sea Engineering, 1992) and that many of these coasts have been hardened as a result of the need to stop land loss. The trend of hardening has led to beach narrowing and beach loss on all islands (Hwang and Fletcher, 1992), especially on the islands of Oahu and Maui, where the combination of sea-level rise and extensive coastal development has resulted in significant beach loss (Hwang and Fletcher, 1992; Mullane and Fletcher, 1995).

II. General Policy.

Hardening of the shoreline should be avoided. In addition, development near the shoreline should be avoided in order to:

- prevent the inevitable need to harden the shoreline and resulting loss of public beaches, lateral shoreline access, open space and view corridors;
- mitigate threats to inhabited structures from coastal hazards; and
- avoid the need for future public expenditures in responding to damage caused by hurricanes and other coastal hazards;

III. Response to applications for seawalls, groins and revetments.

All decision makers should discourage the construction of seawalls, revetments or other shoreline hardening devices that have the potential to lead to beach loss.

As an alternative to a hardened structure, applicants should consider the applicability of coastal dune enhancement, beach replenishment, sand recycling and other "soft" approaches to mitigating coastal erosion. Applicants should also evaluate the potential for moving dwellings and other structures away from the shoreline as a means of mitigating the effects of erosion. Finally, any application should include the information requested in the attached letter from the OEQC.

If after a thorough analysis of an application, the decision maker finds by clear and convincing evidence that the impact on public trust resources would be negligible, alternatives to hardening would be impractical, substantial hardship to the applicant is real, and these compelling reasons dictate that a hardened structure should be approved, any approval that is granted should be conditioned on the applicant monitoring shoreline response to the structure for thirty years. Monitoring should be conducted using standard coastal surveying techniques to document short-term and long-term changes in the beach profile both on the subaerial beach and offshore. In order to ensure that planning authorities

retain the ability to protect our beaches and because future events may require the removal of seawalls, revetments or groins, all variances and permits should either have an expiration date (subject to renewal), or be revocable upon a finding of environmental impact. In other words, the variance or permit should not confer a vested right to keep the structure in perpetuity.

In general, a variance should be viewed as an extraordinary exception which should be granted sparingly. The reasons to justify approval must be substantial, serious and compelling. R.R. Powell 6 Powell on Real Property § 79c.16[1] (1995).

IV. Response to existing illegal seawalls, revetments and groins.

In assessing whether to remove existing seawalls, revetments and other shoreline hardening devices that have been constructed without proper review and approval, decision makers should consider:

(1) the impact the structure is having on shoreline processes and access;
(2) the impact of removal of the structure on the beach;
(3) the immediate impact of removal of the structure on nearby dwellings; and
(4) alternatives to the structure which can mitigate erosion impacts.

Removal should be encouraged where removal will lead to restoration or improvement of beach resources.

V. Long term: response to development near the shoreline.

So long as construction is allowed too close to the shoreline, landowners will attempt to protect their structures with seawalls and revetments. A long-term solution will require that land use decision makers use whatever discretionary authority they may have to push new development and redevelopment mauka. When state land use classifications are changed, CDUAs and SMA applications approved, zoning amended or subdivisions approved, conditions should be attached that restrict an applicant's (re)development proposals to the area as far landward on the lot as feasible.

Counties should also consider developing guidelines and procedures for creating coastal overlay districts with enhanced opportunities for funding and implementing a combined beach-land preservation management system with long-term planning as the central tenet.

If sea-level continues to rise, strategic retreat from the coastline is ultimately the least expensive response to erosion.

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Any Environmental Assessment prepared in conjunction with an application to construct a seawall, revetment or similar structure should be accompanied by appropriate justification and detailed studies including, but are limited to, the following:

1. A Historical Shoreline Analysis of coastal erosion and accretion rates. This should include a description of all movements of the neighboring shoreline over at least the past 30 years. This analysis should be based, at least in part, on aerial photographs available through government agencies and private vendors. The analysis should provide a detailed history of erosion and accretion patterns using all available evidence.

2. A description of the nature of the affected shoreline, whether sandy, rocky, mud flats or any other configuration. The history and characteristics of adjoining sand dunes and reefs should be included.

3. Site maps that clearly show the current certified shoreline, previous certified shorelines, the private property line and the location of the proposed structure. Any nearby public access right-of-way should also be depicted.

4. Beach profiles that extend off shore at appropriate intervals along the beach indicating the width and slope of both the submerged and dry portions of the beach.

5. An analysis of any existing nearby walls or revetments and their cumulative impacts on the shoreline.

6. A description of structures and improvements (such as homes or swimming pools) on the subject property, their distance from the property line and shoreline, and how they may be affected by the construction of the proposed hardening project.

7. Awave and storm frequency analysis for the area in question. This should include any relevant coastal processes such as longshore currents and seasonal wave patterns.

8. An analysis that predicts the location of future shorelines with and without the proposed wall at least 30 years into the future or over the expected life of the hardening project.

9. Photos of the site that illustrate past and present conditions and locate the proposed structure.

10. All alternatives to shoreline hardening should be thoroughly researched and analyzed. These alternatives should include beach replenishment, dune-scaping, retreat from the shoreline by moving existing structures inland, and a no action alternative.

The inclusion of this information will help make an Environmental Assessment complete and meet the requirements of Chapter 343, HRS. Only after thorough study and analysis should any permit for shoreline hardening be considered.

BELT COLLINS

September 4, 1998
98P-270/341.1501

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

Dear Mr. Gill:

Draft Environmental Assessment
Proposed Sunset Beach Improvements
Kooiauloa, Oahu, Hawaii

Thank you for your letter of April 22, 1998 to William D. Balfour regarding the Draft Environmental Assessment for the proposed Sunset Beach improvements. Our response to your comments is as follows.

1. Details on the deck platform construction will be prepared during the project design stage. Meanwhile, the concept for the viewing deck shows that it will be located on a knoll at the northernmost end of Sunset Beach fronting Kamehameha Highway. It will consist of a wood or concrete platform of approximately 1,390 sq. ft. on wood or concrete posts with possibly metal railings around the perimeter. The selected form of construction will be more suitable than concrete slab on grade. It will be more adaptable to the dynamics of the beach and knoll. Further, the slope around the viewing deck will be stabilized with natural groundcover that is common to the area.

2. There will be two to four outdoor showers and drinking fountains located in the pedestrian passageways through the vegetation clusters. Each shower fixture will include four shower heads on a pipe stand on a concrete pad. Drainage from the showers will go into the adjacent vegetation. A standard drinking fountain will be located approximately 5 to 6 feet away. Excess water from the fountain will drain into a drainage sump or pit. These fixtures will be designed to meet ADA requirements.

3. The proposed viewing deck will be located on a knoll above the certified shoreline and above the typical high seasonal surges that occur on the beach slope. The deck will not act as a shoreline hardening feature, such as a seawall, rock revetment or groin, which could cause reflection of wave energy and beach damage elsewhere. The viewing deck is a landscape feature of a small nature which would generate, if any, only a minor degree of impacts, particularly during construction.

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The platform will occupy less than 6 percent of the beach frontage and will have no significant impact on beach erosion at the site or elsewhere along the North Shore. The platform is not located in an area where the shoreline is significantly retreating whereby it would result in beach erosion if shoreline hardening were to occur.

The proposed platform will not be a structure for habitation nor a substantial facility that would be costly to replace or repair in the event of a hurricane, tsunami or other coastal hazard.

4. The proposed project, as described in the Draft EA, is for the beach area improvements. The mauka parking area and its access to the beach were covered in an earlier EA published in September 1995.

5. A description of the required permits is provided on page 26 of the Draft EA. We have identified a SMA Use Permit and Shoreline Setback Variance as required for the proposed project. In the Final EA, we will mention that a Conservation District Use Application may also be required if the City decides to extend planting makai of the certified shoreline. Should funding be secured for the proposed improvements by next year's City administration, permit applications could be filed in 1999 with possible approvals by the end of that year.

6. The proposed project is not being financed, in whole or in part, by the federal government. Thus, review of the proposed project under Section 4(f) of the Federal Department of Transportation Act of 1966 is not applicable.

7. Beach naupaka, an indigenous species, is an effective plant for controlling beach erosion. It was a dominant plant that extensively occupied the project area until a big storm in 1969 brought heavy surges and caused major damage to the shoreline vegetation. Ensuing years of heavy use by beachgoers on the beach may have caused the slow recovery of the earlier vegetation.

   In addition to holding the sand in place, beach naupaka has the characteristics of causing normal wave surges to deposit sand on the ocean side of the beach vegetation. In the long-term, this would result in a build-up of the beach profile and an increase in the width of the beach.

   Other vegetation, that is being proposed, include beach morning glory, pohinahina (beach vitex), hala tree, milo, kou, and coconut palm.

8. On Figure 6 of the Draft EA, a storm berm and active berm crest are identified. The mauka storm berm is identified as the area between these two berms just below the makai edge of the bike path. The volume of sand that would be moved is difficult to estimate since it will depend on the pre-maintenance condition and desired profile of the beach. Also, the amount of sand to be

moved will not be placed in hauling trucks or containers that can be easily measured. It will be merely shifted from one location to another on the beach. The area of anticipated activity, however, is estimated to be approximately 2.2 acres.

The use of a bulldozer or tractor will provide a heavy-duty equipment that can easily and quickly move sand to its desired location. This type of equipment will be similar to the one that is presently used on an as-need basis. The proposed operation would occur probably more frequently than the existing operation and will work in unison with the growing period of the new landscape plants so that a good beach profile can be maintained. This stepped-up operation may occur up to about once or twice a year.

Noise and emissions from bulldozer exhaust will be noticeable during the one- or two-day operation. The sand movement will occur during the daylight hours so as not to disturb neighboring residents at night. Typical winds in the area could quickly disburse exhaust emissions from the dozer. Additionally, the maintenance activity could be scheduled for slow user days and scheduled in sections, so that the entire beach would not require closing. Oil leaks from the dozer would not occur in well-maintained equipment which will be the responsibility of the contractor.

We appreciate your comments on the proposed project.

Sincerely yours,

BELT COLLINS HAWAII LTD.

Glen T. Koyama

GTK:lf

cc: Donald E. Griffin, C&C Dept. of Design and Construction

STATE OF HAWAI'I
OFFICE OF HAWAIIAN AFFAIRS
711 KAPIOLANI BOULEVARD, SUITE 500
HONOLULU, HAWAI'I 96813-5249
PHONE (808) 594-1888
FAX (808) 594-1865

April 02, 1998

Mr. Glen T. Koyama
Belt Collins Hawaii Ltd.
680 Ala Moana Boulevard, First Floor
Honolulu, HI 96813-8400

Doc. EIS 164

Subject: Draft Environmental Assessment (DEA) for Sunset Beach Improvements, Koolauloa, Island of Oahu

Dear Mr. Koyama:

Thank you for the opportunity to review the Draft Environmental Assessment (DEA) for Sunset Beach Improvements, Koolauloa, Island of Oahu. The City & County of Honolulu is proposing to restore the vegetation on the mauka slope of Sunset beach to stabilize the beach storm berm and minimize beach loss.

The Office of Hawaiian Affairs (OHA) has no concerns at this time to proposed improvements on Sunset Beach. The DEA states that the City & County of Honolulu is fully aware of the high density of archaeological remains in Sunset Beach and is closely working with DLNR's Historic Preservation Division on a monitoring program for areas where ground is expected to be disturbed. OHA concurs with these efforts and urges the City & County of Honolulu to include Native Hawaiian organizations such as Hui Malama, Au'i Pauahi Hawaiian Civic Club, Oahu Island Burial Council, as well as OHA in the monitoring process.

Please contact Colin Kippen (594-1938), Officer of the Land and Natural Resources Division, or Luis A. Manrique (594-1758), should you have any questions on this matter.

Sincerely yours,

Randall Ogata
Administrator

Colin Kippen
Officer, LNR

cc Board of Trustees

BELT COLLINS

September 4, 1998
98P-253/341.1501

Mr. Randall Ogata
Office of Hawaiian Affairs
State of Hawaii
711 Kapiolani Boulevard, Suite 500
Honolulu, Hawaii 96813-5249

Dear Mr. Ogata:

Draft Environmental Assessment
Proposed Sunset Beach Improvements
Kooloulooa, Oahu, Hawaii

Thank you for your letter of April 2, 1998 regarding the Draft Environmental Assessment for the proposed Sunset Beach improvements. The State Historic Preservation Division (SHPD) of the Department of Land and Natural Resources has reviewed the draft archaeological study prepared by International Archaeological Research Institute, Inc. for the project site and has indicated that the survey appears to be adequate. SHPD commented, however, that two sites were found to contain subsurface cultural deposits and are significant for their information content. They also made suggestions on the technical aspects of the report. IARII has since revised its report and a copy has been transmitted to SHPD for review and approval.

Appropriate mitigation measures are being proposed for the two sites which would be implemented before construction on the proposed beach improvements occur. If SHPD determines that a monitoring program is also required, the City Department of Design and Construction will submit a monitoring plan to SHPD for approval, and the organizations, mentioned in your letter, will be welcomed to observe the program's implementation. If any burials are uncovered during construction, the City will comply with applicable requirements as administered by the Oahu Island Burial Council.

We appreciate your comments on the proposed project.

Sincerely yours,

BELT COLLINS HAWAII LTD.

Glen T. Koyama

GTK:lf

cc: Donald E. Griffin, C&C Dept. of Design and Construction

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University of Hawai'i at Mānoa

Environmental Center
A Unit of Water Resources Research Center
Crawford 317 • 2550 Campus Road • Honolulu, Hawai'i 96822
Telephone: (808) 956-7361 • Facsimile: (808) 956-3980

April 22, 1998
FA:00171

Glenn T. Koyama
Belt Collins Hawaii LTD
680 Ala Moana Blvd.
First Floor
Honolulu, HI 96813-5406

Dear Mr. Koyama:

Draft Environmental Assessment
Sunset Beach Improvements
Kooklulos, Oahu

The Department of Parks and Recreation proposes to restore shoreline vegetation to the berm on Sunset Beach to prevent further beach loss and provide stabilization. A proposed supplemental beach maintenance program will provide occasional but continued beach restoration. Other improvements include, relocation of the bikeway nearer to the roadway, installation of a viewing deck at the north end bluff, the construction of bus pull-over areas adjacent to highway, and construction of a pullover parking area for lifeguards.

We reviewed this draft Environmental Assessment (EA) with the assistance of Rob Mullane, Sea-Grant Extension; and Tori Cullins of the Environmental Center.

In general, while our reviewers strongly support the proposed beach improvements, they take issue with the contention in the Draft Environmental Assessment that the project will not have significant impacts. Many of the comments below refer to and are consistent with the recommendations in the Beach Management Plan for Maui. Although portions of that plan focus on the island of Maui, most of the recommendations are applicable to other Hawaiian Islands. A copy is available form Priscilla Billing at Hawaii Sea Grant Communications (956-8191). The document is also available on the web at http://www.soest.hawaii.edu/SEAGRANT/bmpm.html.

Shoreline

Most, if not all of the proposed activities are to be placed landward of the certified shoreline (pg.5). However, the date of the shoreline's certification is not specified in the Draft EA.

Parking

The proposed method for restricting vehicles from parking along the makai side of the highway needs to be addressed. If vehicles are not physically prevented from parking on the makai side, the odds are great that they will continue to do so, causing further erosion to the berm area, or to the bike path. If physical barriers are used, they would have to be of a type that would not impede the flow of waves during storm events. Choice of barriers should also be made in an aesthetic manner.

Bike Path

The bike path along Sunset Beach receives heavy usage, not only from bikers, but also from pedestrians, joggers, parents with strollers, etc., which brings up several concerns. The DEA does not address where exactly the bike path will be placed. Furthermore, if the path is placed near the highway, vehicles will need to be prohibited from accessing the bike path.. Any barriers will need to meet the same criteria as stated in the paragraph above. If barriers should at some point run in close proximity to the bike path, they should not be of a form that would encourage people to sit on the barriers or use them as places for congregation, thereby restricting use of the bike path.

Proposed Landscaping

The EA proposes only two species to be used for beach planting. It has been found that when native plants are observed in their natural habitats, they are rarely growing alone. There are usually three or more species growing together and perhaps supporting each other. This is termed by some the "Tapestry Effect." The advantage to this type of planting is that if one species is not thriving, the others may be faring better. Also certain species may be better adapted to the particular planting site. Pohuehue, *Ipomoea pes-caprae*, (Beach Morning Glory) an indigenous plant, is currently found in greatly reduced numbers at Sunset Beach. This groundcover is not only excellent for promoting the natural accretion of sand dunes, but it can also withstand light foot traffic. Ideally the ground cover would consist of a combination of naupaka and pohuehue.

On page 19 of the DEA under "Views," it is suggested that the naupaka planted at the site may grow to heights of 8 to 10 feet. It is further stated that this growth may block the view plane, one worthy enough to have been cited in the 1987 Coastal View Study prepared for the City and County of Honolulu. In order to preserve this view plan, and keep the spirit of "what makes Hawaii, Hawaii," we would suggest that the naupaka planting be started with low growing plants and any supplemental watering or fertilizing ceased after they have become established. This makes for more compact and attractive plants and preserves the view plane.

In the plan, coconut trees are preferred over other indigenous alternatives, including but not limited to milo, hau, and heliotrope. Coconut trees have a very shallow root system and therefore are not effective buffers of coastal erosion. They are also an introduced species. The native trees mentioned above are more suitable.

Dune walkovers (lightweight, moveable wooden or recycled boardwalks that provide access to the beach over vegetation--see the Beach Management Plan for Maui objective #4.1d) should be incorporated into the plan. These prevent trampling of existing or planned vegetation but still provide perpendicular access to the beach. Furthermore, dune walkovers can be easily relocated (or temporarily removed during an episode of coastal erosion) to minimize potential interference with shoreline processes

The supplemental beach maintenance program should include inspections of beach vegetation for the beginnings of new foot paths, to prevent further use and widening of these.

Archaeological Sites

Please be aware that Section 106 of the Natural Historic Preservation Act includes protection for Traditional Cultural Properties. The plan only identifies the possibilities of physical artifacts.

Infrastructure and Facilities

Infrastructure and facilities in the shoreline area should be kept to a minimum. The plans for and locations of showers are not fully discussed in the DEA. Showers should have small footprints (square footage) and should be located as close to the road as possible. Runoff should be contained within the vegetated area, rather than allowed to run down the sandy beach. The need for four showers should be rethought. Is there really a need for four different showers? Drinking faucets do not need to be located in the shoreline setback area; they can be located landward of the road in the parking area.

The need for a viewing platform and ramp access should be reassessed. This is proposed for an area within the shoreline setback area that is subject to wave action and other coastal hazards. We recommend that structures the shoreline setback area should be limited to those that are portable or expendable (Beach Management Plan for Maui recommendation #9.1a). If this platform is absolutely necessary, it should not be cement slab on, but rather built on posts, and should be removed should it pose a public safety hazard or interfere with shoreline processes of erosion and accretion.

The tour bus stop area will be a major structure in the shoreline area. It should be relocated to the landward side of the road, or perhaps to the parking area across the street.

Conclusion

In short, although we support the project, we suggest that it would be substantially improved by incorporation of the comments that our reviewers have provided.

Thank you for the opportunity to comment on this draft EA.

Sincerely,

John T. Harrison
Environmental Coordinator

cc: OEQC
City and County Department of Parks and Recreation
Roger Fujioka
Rob Mullane
Tori Cullins

BELT COLLINS

September 4, 1998
98P-272/341.1501

John T. Harrison, Ph.D., Coordinator
Environmental Center, WRRC
University of Hawaii at Manoa
2550 Campus Road, Crawford Hall 317A
Honolulu, Hawaii 96822

Dear Dr. Harrison:

Draft Environmental Assessment
Proposed Sunset Beach Improvements
Koolauloa, Oahu, Hawaii

Thank you for your letter of April 22, 1998 regarding the Draft Environmental Assessment for the proposed Sunset Beach improvements. Below is our response to your comments.

SHORELINE

The actual shoreline survey will occur after the completion of the Final EA and prior to the submittal of a Special Management Area Use Permit Petition and Shoreline Setback Variance Application. These applications will trigger the requirement for a certified shoreline survey.

PARKING

After meeting with community organizations, we have revised our concept plan for the project. We will not stripe the road shoulders nor place signs that will prohibit parking in front of Sunset Beach. On the other hand, we cannot encourage parking within the State right-of-way due to safety and liability concerns. Parking in front of the beach, thus, will be at the option and risk of the individual motorists.

The revised plan also shows the bike path largely intact in its original alignment except for a short segment where it is highly susceptible to damage from high surf. That segment will be shifted mauka where it will be partially within the State highway right-of-way.

Under the revised plan, vegetation will be placed on the mauka side of the bike path to serve as a buffer against the highway. We are also proposing wood poles laid horizontal on short concrete pedestal between the vegetation and highway shoulder. These vehicle barriers are common in City parks. We will also install these barriers between the highway and realigned bike path for safety purposes. This segment of the bike path, of course, will require review and approval by the State Department of Transportation.

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BIKE PATH

As described above, a short segment of the existing bike path will be realigned to avoid potential damage from high surf. The Final EA will reflect the proposed realignment.

As earlier noted, the vehicle barriers will be located adjacent to the bike path only where the path is realigned mauka of the beach and near the highway. We do not anticipate the barriers being used by people for sitting or for congregation due to its location away from the sand area.

PROPOSED LANDSCAPING

The concept plan in the Draft EA has been revised and will show in the Final EA more plant varieties. In addition to new coconut palm trees and beach naupaka, the plan will include beach morning glory, pohinahina (beach vitex), hala tree, milo, and kou. A balance will have to be made between having the naupaka screen activities on the beach, which could be a distraction to motorists on Kamehameha Highway, and allowing views of the ocean, which is a part of the natural scenic resources of the area. This is an ongoing consideration of the Department of Design and Construction.

As suggested, the new concept plan will show dune walkovers between the vegetation clusters as a means to reduce the wear over the sand path. Regular maintenance will assure that the restored planting is maintained and will not deteriorate from long-term pedestrian use through the area.

ARCHAEOLOGICAL SITES

An archaeological inventory survey was conducted by International Archaeological Research Institute, Inc., and a summary of the archaeological and historical background with a description of the cultural geography of the area was provided. The study was recently reviewed by the State Historic Preservation Division, and mitigation measures were subsequently recommended. We are presently working with SHPD to prepare an acceptable mitigation plan for the significant sites.

INFRASTRUCTURE AND FACILITIES

For a long time, there have been requests by beachgoers for outdoor showers. Four showers would be provided for convenience, but two or three may be the minimum necessary. Each shower will be designed to direct runoff or drainage into the adjacent planted areas. Runoff into the open sand area and down the beach slope is not anticipated. Drainage from the drinking fountains will flow into sumps or drainage pits. These fixtures will not be obtrusive within the planned landscape. Placement of these fountains at a different location from the original plan will increase cost to the project.

As suggested, we will be proposing a wood or concrete platform on posts for the viewing deck. This appears to be the most suitable type of construction on the knoll.

The proposed tour bus stop will provide only a better accommodation for an existing operation in the area. It is not intended to draw more visitors to the site but only to provide facilities that would reduce the wear and tear of the knoll caused by large numbers of visitors traversing the north end to observe and photograph the offshore surf.

We appreciate your comments and suggestions on the proposed project.

Sincerely yours,

BELT COLLINS HAWAII LTD.

Glen T. Koyama

GTK:lf

cc: Donald E. Griffin, C&C Dept. of Design and Construction

BOARD OF WATER SUPPLY

CITY AND COUNTY OF HONOLULU
630 SOUTH BERETANIA STREET
HONOLULU, HAWAII 96843
PHONE (808) 527-6180
FAX (808) 533-2714

April 28, 1998

Mr. Glen T. Koyama
Belt Collins Hawaii, Ltd.
680 Ala Moana Boulevard, First Floor
Honolulu, Hawaii 96813-5406

Dear Mr. Koyama:

Subject: Your Transmittal of March 20, 1998 of the Draft Environmental Assessment for the Sunset Beach Improvements Project, Pupukea, Oahu, TMK: 5-9-01: Portion 38

Thank you for the opportunity to review the Draft Environmental Assessment for the proposed project.

We have the following comments to offer:

1. The existing off-site water system is presently adequate to accommodate the proposed Sunset Beach improvements.

2. The availability of water will be determined when the Building Permit Applications are submitted for our review and approval.

   If water is made available, the applicant will be required to pay our Water System Facilities Charges for resource development, transmission and daily storage.

3. There are no existing water services to the project site.

4. If a three-inch or larger water meter is required, the construction drawings showing the installation of the meter should be submitted for our review and approval.

5. The on-site fire protection requirements should be coordinated with the Fire Prevention Bureau of the Honolulu Fire Department.

6. A Board of Water Supply approved backflow prevention assembly is required to be installed immediately after each water meter serving the site.

7. The TMK for the project site should be verified. Our records indicate the property is listed at TMK: 5-9-01: Portion 38.

If you have any questions, please contact Barry Usagawa at 527-5235.

Very truly yours,

BROOKS H. M. YUEN
Acting Manager and Chief Engineer

cc: Don Griffin, Department of Parks and Recreation

Pure Water

BELT COLLINS

September 4, 1998
98P-261/341.1501

Mr. Brooks H. M. Yuen
Board of Water Supply
City & County of Honolulu
630 South Beretania Street
Honolulu, Hawaii 96843

Dear Mr. Yuen:

Draft Environmental Assessment
Proposed Sunset Beach Improvements
Koolauloa, Oahu, Hawaii

Thank you for your letter of April 28, 1998 regarding the Draft Environmental Assessment for the proposed Sunset Beach improvements. When the proposed project proceeds into the design and implementation stage, the Department of Design and Construction will seek necessary approvals and meet design, facilities and fire requirements to comply with the standards and fees of your department. The Tax Map Key for the property is 5-9-01: portions of 37 & 38, 5-9-02: portion of 72, and Ke-Nui Road/Hoalua Street right-of-way remnant. These identifications will be reflected in the Final EA.

We appreciate your comments on the proposed project.

Sincerely yours,

BELT COLLINS HAWAII LTD.

Glen T. Koyama

GTK:lf

cc: Donald E. Griffin, C&C Dept. of Design and Construction

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DEPARTMENT OF LAND UTILIZATION

CITY AND COUNTY OF HONOLULU

650 SOUTH KING STREET, 7TH FLOOR • HONOLULU, HAWAII 96813
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98 APR 16 P 1:56

JEREMY HARRIS
MAYOR

JAN NAOE SULLIVAN
DIRECTOR

LORETTA K.C. CHEE
DEPUTY DIRECTOR

98-02046(DT)

April 15, 1998

Mr. Glen T. Koyama
Belt Collins Hawaii
680 Ala Moana Blvd., First Floor
Honolulu, Hawaii 96813-5406

Dear Mr. Koyama:

Comments to Draft Environmental Assessment (EA)
Sunset Beach Improvements
Tax Map Key (TMK): 5-9-1 or 5-9-2

Thank you for the opportunity to comment on the above Draft EA. We have the following comments:

1. The Draft EA contains an incorrect TMK (5-9-15) for the project site. The TMK should be corrected in the Final EA. We have determined that the project site may encompass one or both of the above TMKs. However, since the site plan is reduced and "not-to-scale," we cannot ascertain the correct TMK. Furthermore, the TMK should include the parcel numbers.

2. The Draft EA states that pits will be excavated and backfilled for the plants. Also, trenches will be dug and backfilled for the water lines. What type(s) of mitigative measures will be implemented to prevent runoff from entering the beach or ocean?

3. The EA states that there will be four outdoor showers. Only one shower is shown on Figure 3. The other three showers should also be depicted on the site plan.

4. The Final EA should include the dimensions and elevation drawings of the proposed observation deck.

5. A major Special Management Area Use Permit (SMP) and a Shoreline Setback Variance (SV) will be required. Enclosed is a DLU Master Application Form and instruction forms for filing an SMP and SV. A copy of a current certified shoreline survey shall be included with the SMP/SV application. The SMP and SV will be processed concurrently.

6. Will a shore protection structure be constructed to protect Kamehameha Highway and the observation deck from high seasonal surf? If so, the plans should be included in the Final EA for the structure. If no shore protection is proposed, the EA should elaborate on methods to protect the project and highway from periodic wave overwash.

7. The Final EA should explain how the proposed landscaping, sand dunes, and observation deck will not adversely affect beach processes and not artificially fix the shoreline.

8. Will the observation deck be elevated in a manner that may have adverse impacts on public views to, from and along the shoreline. How would such impacts be minimized?

9. Approximately how many cubic yards of sand will be needed to re-establish the upper slopes of the beach?

10. A Conservation District Use Application (CDUA) may be required if any of the proposals are makai of the certified shoreline. The CDUA should be mentioned in "Public Land Use Policies" of the EA.

11. The use of fill for structural support of buildings is prohibited by Section 7.10 of the Land Use Ordinance (LUO). If fill is used for landscaping or site grading, a design professional must make sure that the fill does not cause changes in flow direction during coastal storms such that flood waters will cause additional damage to buildings on the site or to any adjacent buildings.

12. According to Section 7.10 of the LUO, a licensed professional engineer or architect shall develop or review the design, specifications, and plans and certify that the design and methods of construction are in accordance with accepted standards of practice and would not affect the regulatory flood nor aggravate existing flood-related erosion hazards.

Please be aware that flood concerns are reviewed under the SMP/SV application.

If you have any questions regarding comments 1 through 10, please call Ms. Dana Teramoto of our Environmental Review Branch at 523-4648. Questions pertaining to comments 11 and 12 should be directed to Mr. Mario Siu-Li of our Subdivision Branch at 523-4247.

Very truly yours,

JAN NAOE SULLIVAN
Director of Land Utilization

JNS:dt
encls.

9803046 dt

BELT COLLINS

September 4, 1998
98P-269/341.1501

Ms. Jan Naoe Sullivan
Department of Planning and Permitting
City & County of Honolulu
650 South King Street, 7th Floor
Honolulu, Hawaii 96813

Dear Ms. Sullivan:

Draft Environmental Assessment
Proposed Sunset Beach Improvements
Kooalulua, Oahu, Hawaii

Thank you for your letter of April 15, 1998 regarding the Draft Environmental Assessment for the proposed Sunset Beach improvements. We will address your comments in the order they were presented in your letter.

1. The Tax Map Key for the project site is 5-9-01: portions of 37 & 38; 5-9-02: portion of 72; and Ke-Nui Road/Hoalua Street right-of-way remnant. We will show these TMKs in the Final EA.

2. We do not anticipate runoffs occurring on the site even during normal rainfall. The sand on the beach is porous and drains extremely well. Excessive runoff will be directed into the adjacent vegetation clusters.

3. Two to four showers and drinking fountains are planned for the beach although not all are labeled. They are indicated by a typical symbol and are located generally at the pedestrian pathways' mauka entrance through the vegetation clusters.

4. The design and construction plans for the viewing platform have not yet been prepared, but our preliminary concept plan calls for the deck to be approximately 1,390 sq. ft. in area and placed on the knoll at the approximate 22-foot elevation. It would sit above the estimated 100-year base flood elevation, as identified by the Flood Insurance Rate Maps (FIRM).

   The deck will consist of a wood or concrete platform on wood or concrete posts. At the proposed elevation, we do not anticipate the deck to significantly interfere with the natural shoreline processes. Planned groundcover on the slope around the deck will also help to stabilize the knoll. The surrounding slope is part of the project's proposed plant restoration area that was once heavily vegetated.

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5. Preparation of a SMA Use Permit Application and Shoreline Setback Variance Application was anticipated and will be filed after the project completes its environmental assessment review process.

6. No shoreline protection structure is planned for the project. The City Department of Design and Construction is resorting to a soft solution which will be environmentally sensitive to the shoreline process. Natural vegetation that is indigenous to the area will be used, as much as possible, to stabilize the sand slope.

   Additionally, a regular beach maintenance program involving periodic pushing of sand up the beach slope with a bulldozer will be implemented to supplement the vegetation restoration. In time, the vegetation will result in large deposits of sand at its makai edge thus rebuilding the beach so severe wave actions on the sandy slope will be moved further away from the highway. Once matured, the vegetation will act as a buffer against extreme surges on the highway and mauka properties. Although it will not completely stop these surges, it will slow the force and reduce its full erosive effect.

   The viewing platform will be located above the 100-year base flood elevation, as identified by the FIRM, and will be surrounded by groundcover or low vegetation that will stabilize the slope below the proposed deck.

7. The proposed project is intended to restore the vegetation that was once a major presence on the property. In the "Beach and Surf Characteristics" section of the EA, it is described how vegetation was lost after the 1969 storm, and that this vegetation, due to a number of factors, was slow to return to its original dense form. The current improvement program is intended to reestablish the vegetation on the beach. As described above, it will help stabilize the mauka beach slope as well as the slope around the proposed viewing platform.

8. The viewing platform will be constructed at the very north end of Sunset Beach fronting Kamehameha Highway. It will occupy less than 6 percent of the beach frontage and will be located away from the main mauka-makai view corridors. The platform will not obstruct lateral shoreline views.

9. The volume of sand that would be moved is difficult to estimate since it will depend on the pre-maintenance and desired post-maintenance condition of the beach. Also, the amount of sand to be moved will not be placed in hauling trucks or containers that can easily be measured. The sand will be merely shifted from one location to another on the beach. The area of anticipated activity, however, is estimated to be approximately 2.2 acres and is expected to occur between the Paumalu Stream opening at the shoreline and the residential area at the northern end of the site. Beach maintenance may take place as often as once or twice a year.

10. The proposed project is designed to occur above the certified shoreline. Some of the new vegetation, however, may be planted makai of this line. If that does occur, a Conservation District Use Application will be filed first with the State Department of Land and Natural Resources.

11. The proposed project will be in compliance with Section 7.10 of the Land Use Ordinance.

12. As in Item 11, the proposed project will be in compliance with Section 7.10 of the Land Use Ordinance.

We appreciate your comments on the proposed project.

Sincerely yours,

BELT COLLINS HAWAII LTD.

Glen T. Koyama

GTK:lf

cc: Donald E. Griffin, C&C Dept. of Design and Construction

DEPARTMENT OF WASTEWATER MANAGEMENT
CITY AND COUNTY OF HONOLULU
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JEREMY HARRIS
MAYOR

KENNETH E. SPRAGUE P.E., Ph.D.
DIRECTOR

CHERYL K. OKUMA-SEPE, ESQ.
DEPUTY DIRECTOR

In reply refer to:
WCC 98-64

March 24, 1998

Mr. Glen T. Koyama
Belt Collins Hawaii Ltd.
680 Ala Moana Boulevard, First Floor
Honolulu, Hawaii 96813-5406

Dear Mr. Koyama:

Subject: **Draft Environmental Assessment**
Sunset Beach Improvements
Koolauloa, Oahu, Hawaii
TMK: 5-9-15

The municipal sewer system is not available in the project area. The City Department of Parks and Recreation will construct a public comfort station across Kamehameha Highway from Sunset Beach. The comfort station will be serviced by a private septic tank and absorption field system.

If you have any questions, please contact Ms. Tessa Ching of the Service Control Branch at 523-4956.

Sincerely,

KENNETH E. SPRAGUE
Director

BELT COLLINS

September 4, 1998
98P-258/341.1501

Mr. Kenneth E. Sprague, Director
Department of Environmental Services
City & County of Honolulu
650 South King Street, 3rd Floor
Honolulu, Hawaii 96813

Dear Mr. Sprague:

Draft Environmental Assessment
Proposed Sunset Beach Improvements
Koolauloa, Oahu, Hawaii

Thank you for your letter of March 24, 1998 regarding the Draft Environmental Assessment for the proposed Sunset Beach improvements. We appreciate your comments on the proposed project.

Sincerely yours,

BELT COLLINS HAWAII LTD.

Glen T. Koyama

GTK:lf

cc: Donald E. Griffin, C&C Dept. of Design and Construction

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FIRE DEPARTMENT

CITY AND COUNTY OF HONOLULU

3375 KOAPAKA STREET, SUITE H425
HONOLULU, HAWAII 96819-1869

1998 MAR 25 A 9:48

JEREMY HARRIS
MAYOR

ANTHONY J. LOPEZ, JR.
FIRE CHIEF

ATTILIO R. LEONARDI
FIRE DEPUTY CHIEF

March 23, 1998

Mr. Glen T. Koyama
Belt Collins Hawaii
680 Ala Moana Boulevard, First Floor
Honolulu, Hawaii 96813-5406

Dear Mr. Koyama:

Subject: Draft Environmental Assessment
Sunset Beach Improvements
Koolaulos, Oahu, Hawaii, TMK: 5-9-15
HFD Internal No. OL 98-141

We received your letter dated March 20, 1998 relating to the the Draft Environmental Assessment for the subject property. We appreciate the opportunity to review the document and have no objections or additional requirements for the subject project.

If you need additional information, please contact Battalion Chief Charles Wassman of our Fire Prevention Bureau at 831-7778.

Very truly yours,

ANTHONY J. LOPEZ, JR.
Fire Chief

AJL/CW:bh

BELT COLLINS

September 4, 1998
98P-257/341.1501

Mr. Attilio Leonardi, Chief
Fire Department
City & County of Honolulu
3375 Koapaka Street, Suite H425
Honolulu, Hawaii 96819-1869

Dear Mr. Leonardi:

Draft Environmental Assessment
Proposed Sunset Beach Improvements
Koolauloa, Oahu, Hawaii

Thank you for your department's letter of March 23, 1998 regarding the Draft Environmental Assessment for the proposed Sunset Beach Improvements. We appreciate your comment on the proposed project.

Sincerely yours,

BELT COLLINS HAWAII LTD.

Glen T. Koyama

GTK:lf

cc: Donald E. Griffin, C&C Dept. of Design and Construction

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CITY AND COUNTY OF HONOLULU
650 SOUTH KING STREET, 8TH FLOOR • HONOLULU, HAWAII 96813-3017
PHONE: (808) 523-4533 • FAX: (808) 523-4950

98 APR 28 A 8:56

JEREMY HARRIS
MAYOR

PATRICK T. ONISHI
CHIEF PLANNING OFFICER

DORA L. HANAIKE
DEPUTY CHIEF PLANNING OFFICER

LW 3/98-0684

April 24, 1998

Mr. Glen Koyama
Belt Collins Hawaii Ltd.
680 Ala Moana Boulevard, First Floor
Honolulu, Hawaii 96813-5406

Dear Mr. Koyama:

Draft Environmental Assessment for
Sunset Beach Improvements, North Shore, TMK 5-9-15

We have reviewed the subject Draft Environmental Assessment and have no comments to offer at this time.

If you have any questions, please contact Lin Wong of our staff at 523-4485.

Yours very truly,

PATRICK T. ONISHI
Chief Planning Officer

PTO:ft

cc: Department of Parks and Recreation
OEQC

BELT COLLINS

September 4, 1998
98P-260/341.1501

Mr. Patrick T. Onishi, Chief Planning Officer
Planning Department
City & County of Honolulu
650 South King Street, 8th Floor
Honolulu, Hawaii 96813

Dear Mr. Onishi:

Draft Environmental Assessment
Proposed Sunset Beach Improvements
Koolauloa, Oahu, Hawaii

Thank you for your letter of April 24, 1998 regarding the Draft Environmental Assessment for the proposed Sunset Beach Improvements. Although you had no comments on the proposed project, we thank you for your time and effort in reviewing the Draft EA document.

Sincerely yours,

BELT COLLINS HAWAII LTD.

Glen T. Koyama

GTK:lf

cc: Donald E. Griffin, C&C Dept. of Design and Construction

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POLICE DEPARTMENT
CITY AND COUNTY OF HONOLULU
801 SOUTH BERETANIA STREET
HONOLULU, HAWAII 96813 - AREA CODE (808) 529-3111

98 APR 17 A 10:06

JEREMY HARRIS
MAYOR

LEE D. DONOHUE
ACTING CHIEF

WILLIAM B. CLARK
DEPUTY CHIEF

OUR REFERENCE CS-DL

April 14, 1998

Mr. Glen T. Koyama
Belt Collins Hawaii Ltd.
680 Ala Moana Boulevard, First Floor
Honolulu, Hawaii 96813-5406

Dear Mr. Koyama:

Thank you for the opportunity to review the Draft Environmental Statement for the Sunset Beach Improvements, TMK: 5-9-15.

This project should have no significant impact on the operations of the Honolulu Police Department.

Thank you for the opportunity to comment.

Sincerely,

LEE D. DONOHUE
Acting Chief of Police

By JAMES FEMIA
Assistant Chief
Administrative Bureau

BELT COLLINS

September 4, 1998
98P-259/341.1501

Mr. James Femia, Assistant Chief
Honolulu Police Department
City & County of Honolulu
801 South Beretania Street
Honolulu, Hawaii 96813

Dear Mr. Femia:

Draft Environmental Assessment
Proposed Sunset Beach Improvements
Kaolauloa, Oahu, Hawaii

Thank you for your letter of April 14, 1998 regarding the Draft Environmental Assessment for the proposed Sunset Beach Improvements. We appreciate your comment on the proposed project.

Sincerely yours,

BELT COLLINS HAWAII LTD.

Glen T. Koyama

GTK:lf

cc: Donald E. Griffin, C&C Dept. of Design and Construction

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Sunset Beach Community Association
P.O. Box 471 · Haleiwa, Hawaii 96712

'98 APR 24 P 2:02

Mr. Glen T. Koyama,
Belt Collins Hawaii
680 Ala Moana Blvd.
Honolulu Hawaii 96813-5406

April 21, 1998

Aloha Mr. Koyama.

Mahalo for giving our community the opportunity to review and comment on the draft for the Sunset Beach Park improvements. As president of the Sunset Beach Community Association, I have gathered most of the following comments from various people in the community but some of the landscaping comments are my own. The drawing on page 6 of the DEA is not very detailed. We would like to have a large detailed drawing to look at and comment on before this project is finalized and put out to bid. A detailed landscape, irrigation and maintenance plan would also be appreciated.

Everyone agrees that Sunset Beach is a world class beach for surfing in the winter and swimming in the summer. As such it gets lots of use/abuse and needs a plan such as the one you are working on. From what I have heard the only sore point is the removal of all makai parking. There is a group of residents who do not want to see the parking removed and there are those who feel it should be eliminated completely. On page 7 of the DEA under the parking section it say 'restrict or remove' the street parking. We understand the traffic hazards caused by the present parking conditions and we understand that the State DOT wants a safer situation to result from these improvement plans. After listening to both sides of this issue I am going to propose some ideas for a compromise. One suggestion is to keep some makai parking but let it be parallel parking. Where would the parallel parking fit and how many cars could be accommodated? There are 80 cars parked along there now. Another suggestion is to have a pull over place for surfers to check the surf before either leaving or parking in the parking lot to go surf. How would this pull over area be restricted to short term parking (10 minutes) and how could it be enforced? Please keep all sign usage to a minimum for this whole project.

The plan shows the bike path being moved nearer the highway along part of its route. Since it will be adjacent to or very near the shoulder of the highway how will cars be restricted from parking on part or all of the bike path? We presently have this problem at Sunset Beach and along a few other segments of the bike path.

The drawing on page 6 shows undisturbed vegetation next to the private lot on the Kahuku end. This is hau bush and it has been brought to my attention that it should stay and act as a visual buffer. Someone is worried that once the clearing starts there might be alot less than 25 feet of hau bush left, as indicated on your drawing.

Since Sunset Beach is the site of several major surfing events each year, I decided to speak with Randy Rarick, the promoter for the Triple Crown. He feels that there will always be events held at this beach and he therefore made a few suggestions. Contest personnel need trailers to house their computers and other electronic items. It would be helpful to have a level area where one or more trailers could be staged. He also expressed the need for electricity and telephone connections on the makai side of the highway. Perhaps the appropriate conduit pipes could be installed at the same time the water line is put in. The city could lock up these connection points and rent the use when necessary. As the Triple Crown promoter Randy looks forward to a much improved beach park. For more specific details from his perspective please feel free to call him at 638-7266.

The drawing on page 6 shows six access paths onto the beach and you labeled one (1) shower / drinking fountain. The drawing seems to indicate that there will be 4 shower facilities. Four would be adequate but one is not enough. What do the plans call for?

Foot traffic has been and will continue to be the biggest erosion problem in and around the vegetation. What plan or design is in place to maintain these 6 access paths and the plantings along side them? Having observed footpaths at other parks and beach areas it is a given that these paths will erode quickly in a U or V shape causing the roots and plants to fall into the path.

Revegetating this section of beach will add much to its beauty and durability. But a few things come to mind. When presenting the landscape plans we would like to know what specific plants / trees are to be used and where will they go. I feel that to properly landscape and maintain this stretch of beach will be a bigger challenge than you are anticipating. The DEA says that the landscape maintenance is slated to last 90 days after completion. A more realistic time would be 12 to 24 months to assure plant and tree survival and proper care of the irrigation system. Who will be responsible for the initial maintenance and who will get the long-term pruning, weeding, watering and general landscape maintenance?

The only two plants mentioned in the DEA are naupaka and coconut trees. I counted 35 coconut trees in the proposed plan and although they are very tropical in appearance they have several drawbacks. They are expensive to plant and then need to be trimmed every 6 months. When they get trimmed the rubbish usually falls on all of the other plantings causing damage twice a year. I suggest no coconut trees unless they are planted in a place that they do not present injury to anyone and therefore do not need trimming. Consider the fact that at this location they will not screen the ocean from the highway nor provide shade due to the sun's path across the sky. In the place

of coconut would you consider hala? These would do well in this area. Another beautiful seaside tree is the beach heliotrope. Milo, sea grape and silver buttonwood are three other trees that do well under the conditions at this location. Naupaka is always a winner but looks so much better when mixed with other plants. Another medium plant to use is the large white or purple spider lilly. Two great low crawling ground covers are hinahina and beach morning glory. There are several other trees, plants and ground covers that are available. Please use native grasses and plants as much as possible. I hope Belt Collins is willing to break with the usual 'tropical look' of coconut trees and help reestablish native plants at a showcase site where nature is the back-drop not a hotel / resort setting. The City should also be more demanding in landscaping terms.

Mahalo,

Chip Hartman

Chip Hartman, President

cc: Donald Griffin, Department of Parks and Recreation

BELT COLLINS

September 4, 1998
98P-271/341.1501

Mr. Chip Hartman, President
Sunset Beach Community Association
P.O. Box 471
Haleiwa, Hawaii 96712

Dear Mr. Hartman:

Draft Environmental Assessment
Proposed Sunset Beach Improvements
Koolauloa, Oahu, Hawaii

Thank you for your letter of April 21, 1998 regarding the Draft Environmental Assessment for the proposed Sunset Beach improvements. Our response to your comments is as follows.

A detailed landscape plan will be prepared in the next phase of this project when a Special Management Area Use Permit Petition and a Shoreline Setback Variance Application are submitted to the City Department of Planning and Permitting for review and processing. A public hearing will be held as part of the application review process.

After meeting with community organizations, we have revised our concept plan for the project. We will not stripe the road shoulders nor place signs that will prohibit parking in front of Sunset Beach. On the other hand, we cannot encourage parking within the State right-of-way due to safety and liability concerns. Thus, parking in front of the beach will be at the option and risk of the individual.

The revised plan also shows the bike path largely intact in its original alignment except for a short segment where it is very susceptible to damage from high surf. That segment will be shifted mauka where it will be partially within the State highway right-of-way.

Under the revised plan, vegetation will be placed on the mauka side of the bike path to serve as a buffer against the highway. We are also proposing wood poles laid horizontal on short concrete pedestals between the vegetation and highway shoulder. These vehicle barriers are common in City parks. We will also install these barriers between the highway and realigned bike path for safety purposes. This segment of the bike path will require review and approval by the State Department of Transportation.

The drawing on page 6 of the Draft EA is a concept plan that is subject to further refinement when construction plans are prepared. The concept plan currently shows a buffer of existing natural vegetation adjacent to the private property. How much vegetation will be left after construction is completed is not known at this time. The proposed concept, however, is to have enough buffer so the residence would not be visible from the beach, and visa versa, the residence would maintain some degree of privacy.

The surfing tournaments at Sunset Beach are definitely a big benefit to the community as well as to the sport. In the final plans, we will look at possible accommodations for a temporary trailer parking area near the beach. Electrical service is already being planned, but telephone connections are not being considered. Special events will need to make their own telephone arrangements.

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The concept plan calls for up to four outdoor shower fixtures/drinking fountains to be located along the pedestrian pathway in the vegetation area. It is noted that drainage from the showers will help to irrigate the newly planted vegetation clusters.

A letter received during the Draft EA public comment period suggested a lightweight, moveable board walkway over the proposed pedestrian path. This idea has merit and will be proposed in the Final EA. It is stable for pedestrian traffic and flexible and mobile to ride incoming wave surges. It would be anchored at either end to keep the walkway in place. This proposal represents a soft solution that does not involve shoreline hardening.

The adjacent vegetation area will be roped off during the initial planting period, and after the plants have matured and gained a foothold in the area, the temporary protective fencing will be removed.

Detailed landscape plans will be prepared during the project design stage which is expected to follow the environmental and land use permit approvals and project financing stage. The final plant selection and plant location will be determine during the latter design stage. As indicated above, the concept in the Draft EA has been revised. The new plan will show more plant varieties in the Final EA. In addition to new coconut palms and beach naupaka, the plan will include beach morning glory, pohinahina (beach vitex), hala tree, milo, and kou. Coconut palms are a part of the island scene in Hawaii. We will continue to show this species for Sunset Beach. As a highly used beach park, stepped-up ground maintenance will also be undertaken.

The initial 90-day maintenance period is a contractor requirement to assure that the new vegetation will survive the initial planting. Long-term maintenance will be taken care of by the regular City park maintenance crew.

We appreciate your comments and input on the proposed project.

Sincerely yours,

BELT COLLINS HAWAII LTD.

Glen T. Koyama

GTK:lf

cc: Donald E. Griffin, C&C Dept. of Design and Construction

Hawaiian Electric Company, Inc. • PO Box 2750 • Honolulu, HI 96840-0001

RECEIVED

'98 MAY -1 A 11:11

April 29, 1998

Belt Collins Hawaii
680 Ala Moana Boulevard, 1st Floor
Honolulu, HI 96813
Attention: Mr. Glen Koyama

Dear: Mr. Koyama

Subject: **Sunset Beach Improvements**

Thank you for the opportunity to comment on your March 1998 Draft EA for the **Sunset Beach Improvements**, as proposed by the Department of Parks and Recreation, City and County of Honolulu. We have reviewed the subject document and have no comments at this time.

HECO shall reserve further comments pertaining to the protection of existing powerlines bordering the project area until construction plans are finalized. Again, thank you for the opportunity to comment on this draft environmental assessment.

Sincerely,

Scott W.H. Seu
Manager, Environmental Department

WINNER OF THE EDISON AWARD
FOR DISTINGUISHED INDUSTRY LEADERSHIP

BELT COLLINS

September 4, 1998
98P-254/341.1501

Mr. Scott W. H. Seu
Environmental Department
Hawaiian Electric Company, Inc.
P.O. Box 2750
Honolulu, Hawaii 96840-0001

Dear Mr. Seu:

Draft Environmental Assessment
Proposed Sunset Beach Improvements
Kooiauloa, Oahu, Hawaii

Thank you for your letter of April 29, 1998 regarding the Draft Environmental Assessment for the proposed Sunset Beach improvements. Although you had no comments on the proposed project at this time, we thank you for your time and effort in reviewing the Draft EA document.

Sincerely yours,

BELT COLLINS HAWAII LTD.

Glen T. Koyama

GTK:lf

cc: Donald E. Griffin, C&C Dept. of Design and Construction

BELT COLLINS HAWAII LTD. • 680 ALA MOANA BOULEVARD, FIRST FLOOR, HONOLULU, HAWAII 96813-5406 U.S.A.
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GTE Hawaiian Tel
Beyond the call

GTE Hawaiian Telephone Company Incorporated
P.O. Box 2200 • Honolulu, HI 96841 • 808 546-4511

March 31, 1998

Belt Collins Hawaii
680 Ala Moana Boulevard, First Floor
Honolulu, Hawaii 96813-5406

Dear Glen Koyama:

Subject: Draft Environmental Assessment for Sunset Beach Improvements
Koolauloa, Oahu, Hawaii, TMK 5-9-15

Thank you for the opportunity to review and comment on the proposed beach improvements. Our only comments is that, if payphones are required, the telephone service will be obtained from the poleline across the street on Kamehameha Highway. Otherwise, payphones could be located with the proposed public parking project.

If you have any questions, please call Garret Hayashi at 483-8053.

Sincerely,

Garret T. Hayashi
for Wayne L. Cabral
Section Manager - Access Design & Construction

cc: G. Hayashi
File (Sunset Beach)

BELT COLLINS

September 4, 1998
98P-256/341.1501

Mr. Wayne L. Cabral
Access Design & Construction Section
GTE Hawaiian Telephone Company, Inc.
P.O. Box 2200
Honolulu, Hawaii 96841

Dear Mr. Cabral:

Draft Environmental Assessment
Proposed Sunset Beach Improvements
Koolauloa, Oahu, Hawaii

Thank you for your letter of March 31, 1998 regarding the Draft Environmental Assessment for the proposed Sunset Beach improvements. We are not planning to have any pay phones within the beach improvement area at this time.

We appreciate your comment on the proposed project.

Sincerely yours,

BELT COLLINS HAWAII LTD.

Glen T. Koyama

GTK:lf

cc: Donald E. Griffin, C&C Dept. of Design and Construction

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THE GAS COMPANY
Citizens Energy Services

April 7, 1998

Belt Collins Hawaii
680 Ala Moana Boulevard, First Floor
Honolulu, Hawaii 96813-5406

Attention: Mr. Glen T. Koyama

Gentlemen:

Subject: Draft Environmental Assessment
Sunset Beach Improvements
Plan Review and Comment

In response to your letter dated March 20, 1998, we are returning one (1) set of plans for the subject project. Based on our review of the information provided, it has been determined that the area is currently clear of utility gas facilities.

Thank you for the opportunity to review the Draft Environmental Assessment for the proposed improvements. Should there be any questions, or if additional information is desired, please call me at 594-5574.

Very truly yours,

Keith K. Yamamoto
Supervisor, Engineering

KKY:kn
98-157

Attachment: Plans

BELT COLLINS

September 4, 1998
98P-268/341.1501

Mr. Keith K. Yamamoto, Supervisor
Engineering Branch
The Gas Company
515 Kamakee Street
Honolulu, Hawaii 96814

Dear Mr. Yamamoto:

Draft Environmental Assessment
Proposed Sunset Beach Improvements
Kooiauloa, Oahu, Hawaii

Thank you for your letter of April 7, 1998 regarding the Draft Environmental Assessment for the proposed Sunset Beach Improvements. We appreciate your comment on the proposed project.

Sincerely yours,

BELT COLLINS HAWAII LTD.

Glen T. Koyama

GTK:lf

cc: Donald E. Griffin, C&C Dept. of Design and Construction

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CITY COUNCIL

CITY AND COUNTY OF HONOLULU

HONOLULU Hawaii 96813-3065 / TELEPHONE 547-7000

'98 JUN 16 P1:32

RENE MANSHO
Councilmember District 1
(808) 547-7001/ Fax 566-1164
e-mail: rmansho@gold.chem.hawaii.edu

Via Managing Director

Mr. William D. Balfour, Jr., Director
Department of Parks and Recreation
650 S. King Street, 10th Floor
Honolulu, Hawaii 96813

Aloha Mr. Balfour,

Subject: Sunset Beach Park Improvements and Draft Enviromental Assessment

Many residents have voiced their feelings about the proposed changes of the Ke Ala Pupukea Bike path, parking, shoreline shrubbery, comfort station and mauka parking. The consensus seems to feel that this Draft Enviromental Assessment has not helped to retain the community's true feeling of what should be done to make this park more user friendly. The following are items which the community would like to see incorporated into this project:

1. Retain as much parking on the makai side Kamehameha Highway.

2. Do not move the bike path.

3. Plant naupaka on both sides of the bike way.

4. Try to accomodate a pull-over area for viewing without parking.

5. A viewing deck is not high on the priority list, but a skateboard ramp has been requested and would better serve the residents. They feel that by incorporating it into this project, it would save the City and County of Honolulu a substantial amount of money. This could allow the residents of both Sunset and Haleiwa to each have a skateboard facility

Your assistance and response would be greatly appreciated. Should questions arise, please feel free to contact me or Reed Matsuura of my staff at 527-5561.

Mahalo nui loa,

Rene Mansho

Rene Mansho, Chairperson
Planning and Intergovernmental Relations

RM:rhm
cc: Cheryl D. Soon - DTS
Ken Newfield, Chair - NSNB

DEPARTMENT OF PARKS AND RECREATION
CITY AND COUNTY OF HONOLULU

650 SOUTH KING STREET 10TH FLOOR • HONOLULU, HAWAII 96813
PHONE (808) 523-4182 • FAX (808) 523-4054

98 JUL 17 A 11:02

JEREMY HARRIS
MAYOR

WILLIAM D. BALFOUR JR.
DIRECTOR

MICHAEL T. ANN
DEPUTY DIRECTOR

June 30, 1998

The Honorable Rene Mansho, Chairperson
Planning and Intergovernmental Relations Committee
City Council
City and County of Honolulu
Honolulu, Hawaii 96813

Dear Chair Mansho:

Subject: Sunset Beach Park Improvements

We have transmitted your letter to our master plan consultant, Belt Collins Hawaii. The consultant is continuing their work of finalizing the master plan for Sunset Beach Park, and we have instructed them to study how your constituents' proposals may be accommodated.

The State Department of Transportation has been requested to consider allowing parallel parking along the road shoulder of Kamehameha Highway at Sunset Beach. Belt Collins will study how we may be able to retain parking on the makai side of Kamehameha Highway.

We intend to keep most of the bike path in its present location except where it has been damaged by wave action in the past. Belt Collins will consider naupaka or other appropriate landscaping along both sides of the bike path.

We will attempt to accommodate a vehicular pull-over area for viewing without parking. However, we intend to retain the proposed viewing deck in the master plan because it helps to physically stabilize the land at this point and will satisfy accessibility requirements for physically disabled persons.

We feel that a skateboard ramp would not be appropriate at this high-use beach park. An adequate site for a skateboard ramp would require land which is not available for such use at Sunset Beach Park. This would create additional strain on the already limited parking facility. In addition, it is generally considered best practice to avoid building hard structures close to the shoreline.

However, we have identified Banzai Support Park as a potential skateboard park site. This presently undeveloped park site may be developed when funds become available.

Please have your staff contact Mr. Daniel Takamatsu, Chief of Facilities Development, at extension 6301 if there are further questions.

Sincerely,

W. D. Balfour Jr.

WILLIAM D. BALFOUR, JR.
Director

WDB:js

cc: Glen Koyama, Belt Collins Hawaii ✓

FORWARDED:

ROBERT J. FISHMAN
Managing Director

Comments on Draft EA for Sunset Beach Improvements
By S. E. "Lucky" Cole and Marilyn J. Cole prepared April 18, 1998

We enthusiastically support the City's decision to restore the natural vegetation at Sunset Beach. However, we have serious concerns regarding the plan as defined in the Draft EA. We have experience with the "Ke Ala Pupukea" Bike Path in this area and have watched foot traffic destroy the natural vegetation through the years. Your aerial photos, figures 2.2 - 2.5 show that after the 100 year surf in 1969 the beach restored itself but was never replanted by the City or the State. Nearby private properties have retained their shoreline through the same period through replanting efforts by the owners. In addition, the foot traffic has increased by an order of magnitude since 1967 contributing to the loss of land and vegetation. The City and State have made no efforts over this 30 year period to direct foot traffic or to plant the area. There is every reason to believe the beach can be restored to close to it's 1967 profile without a hardened shoreline. We believe this should be the goal of the project.

<u>There are several community requirements that this project does not address</u>:

- "Ke Ala Pupukea" should be separated by vegetation and vehicle barriers from the Highway.
- There should be makai parking to meet several valid needs:
  - Beach goers need to be able to drop off their family and equipment
  - Residents driving guests around the island need to be able to pull off and view the surf
  - Surfers need to be able to check the surf prior to deciding whether to go out in the surf.
  - People are used to a large number of makai parking spaces
- The project should be completed as soon as possible, at least cost and minimal disruption
- Handicapped access to "Ke Ala Pupukea" should be provided

We make the following suggestions in light of these community needs:

- <u>Save money, do not relocate the existing bike path!</u> Do not use the flexible bollards which have proven to be ineffective and ugly. <u>Build a vehicle barrier that can serve to protect the bikepath and provide seating for the beach goer</u> using the money saved by not relocating the bikepath. This barrier/bench could be poles on concrete cradles or a low lava rock wall similar to Shark's Cove.
- <u>Landscape both sides of "Ke Ala Pupukea", mauka and makai</u>. Be aggressive in your planting on the makai side to provide a natural buffer for the more costly bike path and vehicle barriers. Extend the vegetation to the 16 foot elevation line which seems to be about where the vegetation was in 1967. Use sand bags, sea fences or other non-hardened low cost methods to protect the makai vegetation to encourage rooting over several seasons. Minimize the width of the beach access and set them at more of an angle to reduce wave damage and foot erosion. Well defined paths to the beach and real protection of the vegetation, e.g. posts and chains, are key to the success of the project.
- <u>Use "Ke Ala Pupukea" to comply with ADA needs</u>. The existing bike path is level and eight feet wide and in use today by the handicapped. Locate handicapped parking adjacent to the bike path and provide an ADA compliant ramp from the bike path to the viewing platform. This should be more cost effective, as functional for the handicapped and free up space needed for makai parking.
- <u>Provide at least 20 parking spaces makai of the highway</u>. The viewing platform, ramps and the visitor bus parking should not be at the expense of the needs of Oahu's residents for makai parking. This plan takes too much critical makai space for the needs of the visitor and provides too little for the residents of Oahu.
- <u>Viewing platforms is a low priority</u>. The primary purpose for this project was to restore the makai vegetation and to save the beach, not to provide a viewing platform for the visitor.

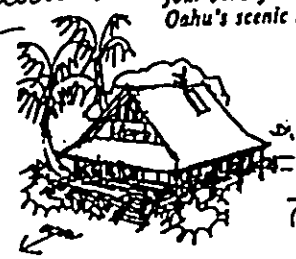
RECEIVED TIME MAY. 9. 9:02AM PRINT TIME MAY. 9. 9:05AM

Ellen K. — Please address! Thanks GP

→ CHANGE P GP
I'd like to see lucky a note
addressing these items if possible Thx

NORTH SHORE VACATION HOMES

four beachfront homes on Oahu's scenic North Shore



Marilyn and Lucky Cole
59-229C Ke Nui Road
Haleiwa, Hawaii 96712
(800) 678-5263, (808) 638-7289
facsimile (808) 638-8736

Date 5/9/98

# of Pages 2 including cover page

To: ✓Michael Terry — Phone 521-5561
Bert Collins — Fax 538-7819

From: Schuyler E. Lucky Cole — Phone (808) 638-7289, 800-678-5263 — Fax (808) 638-8736

Subject: ~~[redacted]~~ Sunset Beach Restoration

Refer to: Our conversation at the Luncheon

Mike,

I'd like to hear your thoughts on this. Obviously, there are a variety of views. It would be very desirable to achieve close to a consensus. As could include a meeting, possible on site, with a number of community members, ec Kai Kealoha, Pete Lamy (another surf lifeguard), Bike path users, Rusty Lerch ...

Mahalo,
Lucky Cole

RECEIVED TIME MAY. 9. 9:02AM PRINT TIME MAY. 9. 9:05AM

BELT COLLINS

September 4, 1998
98P-274/341.1501

Mr. Schuyler E. Cole
Mrs. Marilyn J. Cole
59-229-C Ke Nui Road
Haleiwa, Hawaii 96712

Dear Mr. and Mrs. Cole:

Draft Environmental Assessment
Proposed Sunset Beach Improvements
Koolauloa, Oahu, Hawaii

I am responding to your fax of May 9, 1998 to Mike Terry of our office concerning the Draft Environmental Assessment for the Sunset Beach improvements. You provided a number of comments on the proposed project which we will respond to below.

After years of vegetation loss on Sunset Beach, the City agrees that there is a need to restore the plants that were once a major presence in the area. This is a primary goal of the current plan for the beach park.

After meeting with community organizations, we have revised our concept plan for the project. We will not stripe the road shoulders nor place signs that will prohibit parking in front of Sunset Beach. On the other hand, we cannot encourage parking within the State right-of-way due to safety and liability concerns. Thus, parking in front of the beach will be at the option and risk of the individual.

The revised plan also shows the bike path largely intact in its original location. This will allow room to add vegetation on the mauka side of the pathway, in addition to the makai side, to serve as a buffer against the highway. We still believe, however, a short segment of approximately 180 feet of the pathway near the middle of the beach frontage will require a slight mauka shift of approximately 20 feet. This segment is the most likely segment of the bike path that will suffer significant damage from high surf and that, for safety and liability reasons, would need to be shifted slightly mauka.

We are also proposing wood poles laid horizontal on short concrete pedestals between the vegetation and highway shoulder. This is designed to prevent vehicles from parking in the vegetation area and bike path. These vehicle barriers are common in City parks.

As much vegetation will be planted to establish a good initial cluster on the mauka slope. During the early growing period, a protective barrier, possibly a rope and post fence, will be installed around the vegetation to protect the young plants. Pathways to the beach will, in fact, be at angles to the shoreline to provide a more effective line of vegetation for the upper beach slope.

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Access to the viewing deck will be designed to meet ADA standards, and the existing bike path will be made accessible from the road.

The proposed project will provide better accommodations for buses that already pull over at the north end of the beach to allow visitors to view the surf. These visitors, who are important to our tourism industry, spend only a short time at the beach and a quick access is essential for the bus operators. A short presence would also minimize their impact on the area. The proposed viewing deck and ramp will not take any parking away from the beach.

We appreciate you comments and suggestions on the proposed project.

Sincerely yours,

BELT COLLINS HAWAII LTD.

Glen T. Koyama

GTK:lf

cc: Donald E. Griffin, C&C Dept. of Design and Construction

Parks & Recreation Department
City & County of Honolulu
650 S. King St.
Honolulu, HI 96813

April 27, 1998

Subject: Comments on Belt Collins Environmental Assessment on Sunset Beach Improvements Makai of Kamehameha Highway

In the subject draft report, the proposed removal of all Makai parking at the very popular Sunset Beach surfing and beach recreational area would significantly alter the current enjoyment surfers and beach goers have had over the years. In the plan, the movement of the current bikeway to being just Makai of Kam Highway is also proposed. Both of these proposals seem to me to be ill conceived.

I have been a resident of the North Shore and active Sunset Beach surfer for the last forty years. I have witnessed the changes to the beach area over the years regarding the loss of plants extending along the beach just above the high water line. This erosion has been attributed to people walking through the vegetation rather than from the surf. The high water line has not changed that much over the years.

By moving the bikeway closer to Kam Highway, and, therefore, removing potential parking areas, all that is accomplished is the requirement to plant vegetation on sand at a position relatively no less in danger of people or surf erosion than if vegetation were planted Makai of the current bikeway. The additional footage away from the high water line would not gain that much assurance that continued erosion would not take place.

With the budget problems existing at both the State and City & County levels, it would be unwise to spend the additional dollars to move a perfectly good bikeway that currently gets maximum use. Especially, if we have not invested in the relatively inexpensive community project of planting durable vegetation just Makai of the current bikeway.

Lack of adequate parking is persistent at all our Island's surfing areas. To deliberately remove current Makai parking areas just because of a planned Mauka parking area, will extend the problem of inadequate parking past the completion of all proposed park improvements. The demand for parking at Sunset Beach exceeds the current available parking and will exceed the proposed parking. This demand will significantly increase over time. It is short sighted to remove any possible parking whether Makai or Mauka of Kam Highway.

I expect that some current Makai parking will be removed at the most narrow strip due to traffic safety problems. However there are potential parking areas south of the Paumalu Stream Bridge along Ke Nui Road and the bikeway. The current Makai parking on the North end south to the very narrow strip should remain a viable parking area with certain improvements. Makai parking just north of the lifeguard tower extending south to the bridge is certainly a viable consideration.

Surfers will pull over on the Makai side to view the surf for the time required to observe a set. The removal of Makai parking will increase the traffic safety problems rather than improve the overall safety. As a long time surfer who has continued to observe the surf from my car and to socialize with other surfers while watching the surf before going out, I am annoyed to think that I am losing such a simple, pleasurable past time because of an ill conceived plan.

I recommend that we go back to the drawing board to derive a compromise plan that would be acceptable to all concerned including those who use the beach the most.

Sincerely,

Peter V.Z. Cole
P.O. Box 356, Haleiwa, HI 96712
638-7341 or 477-1122(bus.)

98-1100
4/30/98 JHO

459
4/30

RECEIVED TIME MAY. 13. 11:13AM PRINT TIME MAY. 13. 11:13AM

BELT COLLINS

September 4, 1998
98P-273/341.1501

Mr. Peter V.Z. Cole
P.O. Box 356
Haleiwa, Hawaii 96712

Dear Mr. Cole:

Draft Environmental Assessment
Proposed Sunset Beach Improvements
Kooiauloa, Oahu, Hawaii

Thank you for your letter of April 27, 1998 regarding the Draft Environmental Assessment for the proposed Sunset Beach improvements. After meeting with community organizations, we have revised our concept plan for the project. We are now showing the bike path largely intact in its original location except for a short segment of approximately 180 feet where it is very susceptible to damage from high surf. That segment, which is located north of the lifeguard station, will be shifted slightly mauka where it will be nearer the highway.

Further, the revised plan shows that we will not stripe the road shoulders nor place signs that will prohibit parking in front of Sunset Beach. On the other hand, we cannot encourage parking within the State right-of-way due to safety and liability concerns. Thus, parking in front of the beach will be at the option and risk of the individual.

We appreciate you input on the proposed project.

Sincerely yours,

BELT COLLINS HAWAII LTD.

Glen T. Koyama

GTK:lf

cc: Donald E. Griffin, C&C Dept. of Design and Construction

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The Food Court

April 8,1998

Department of Parks and Recreation
650 S. King Street
Honolulu, Hawaii 96813

'98 APR 14 A9:13
DEPT. OF PARKS
& RECREATION
C & C OF HONOLULU

Re: Special Management Area Use Permit and
Shoreline Setback Variance for Sunset Beach Improvements

To Whom It May Concern:

I am commenting on the draft environmental assessment of improvements to Sunset Beach as planned by the Department of Parks and Recreation.

My name is Charles R. Lundy. I am a homeowner and taxpayer who resides at 58-147 Mamao Street, Haleiwa, HI. 96712. I have been a resident of the North Shore for 26 years and I have been surfing at Sunset Beach since 1961. I am a general contractor, real estate broker, developer and owner of The Food Court at Windward Mall.

I am opposed to the proposed "improvements" at Sunset Beach for the following reasons:

1. For personal reasons. I have been parking and surfing at Sunset Beach for 37 years and the proposed parking plans will prevent me from enjoy my freedom to park at the beach, watch the surf, socialize with my friends and generally use the facilities as they have existed for all these years.

2. Traffic Concerns. Those of us who know the North Shore and Sunset Beach in particular know that the parking lot on the mauka side will be difficult to get in and out, will cause traffic jams on Kam Highway, and be a great place for theives to hide and to break into cars. The use of the parking lot for overflow use in addition to makai side parking would be a compromise. The elimination of makai side parking will cause people to park up and down Kam Highway similar to surf contest times on a daily basis causing more traffic problems etc.

98-0930
4/17/98 #6.

4/17
25

BOKAL INC.
46-056 KAM HWY. KANEOHE, HAWAII 96744 (808) 235-0466

450 4/17

5. I am concerned that this proposal has been endorsed by both the Neighborhood Board and the Sunset Beach Community Association. They historically have failed to represent the true wants and desires of the general community. The Neighborhood Board has few members from the Sunset Beach area and generally the Waialua/Haleiwa faction has not cared for the Sunset Beach concerns. The Sunset Beach Community Association has been a self serving group of California transplants who have purported to represent the feelings of the community while actually advancing their own private agenda. Those who have beachfront homes near Sunset Beach and surf have the most to gain by eliminating parking at the beach. They think they can reduce the number of people using the surf spot and beach etc.

I hope that you will reconsider your actions regarding this project. I recommend that further hearings be held to hear to true feelings of the community and those who use this beach.

Yours Truly,

Charles R. Lundy

Charles R. Lundy

BELT COLLINS

September 4, 1998
98P-262/341.1501

Mr. Charles R. Lundy
Bokal, Inc.
46-056 Kamehameha Highway
Kaneohe, Hawaii 96744

Dear Mr. Lundy:

Draft Environmental Assessment
Proposed Sunset Beach Improvements
Kooloulou, Oahu, Hawaii

Thank you for your letter of April 8, 1998 regarding the Draft Environmental Assessment for the proposed Sunset Beach improvements. After meeting with community organizations, we have revised our concept plan for the project. We will not stripe the road shoulders nor place signs that will prohibit parking in front of Sunset Beach. On the other hand, we cannot encourage parking within the State right-of-way due to safety and liability concerns. Thus, parking in front of the beach will be at the option and risk of the individual.

The new off-street parking across Kamehameha Highway from Sunset Beach is scheduled for completion next year. This project has already gone through the planning process and is shown in the current EA as a related facility for reference purposes.

In addition to this Environmental Assessment, the proposed project will require a Special Management Area Use Permit and Shoreline Setback Variance. Both permits call for a public hearing which probably will be combined at one meeting. The date has not been determined, but an announcement will be made in the local newspapers. Additionally, a Conservation District Use Permit may be required if vegetation is planted makai of the certified shoreline. This permit would be reviewed and approved by the Department of Land and Natural Resources.

For your information, the last item in your two-page letter was misnumbered as 5 rather than 3. We appreciate your comments on the proposed project.

Sincerely yours,

BELT COLLINS HAWAII LTD.

Glen T. Koyama

GTK:lf

cc: Donald E. Griffin, C&C Dept. of Design and Construction

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April 2, 1998

Department of Parks and Recreation
650 S. King Street
Honolulu, HI 96813

'98 APR -3 P1:45
DEPT. OF PARKS & RECREATION
C & C OF HONOLULU

Dear Madam/Sir;

I am writing in regards to your announcement in the Monday, March 30, 1998 Honolulu Advertiser titled "Comments Sought on Sunset Beach". I am for your plans to improve the Sunset Beach area. However, my concerns are your plans to ban vehicle parking on the makai side of Kamehameha Highway. Certainly, by banning vehicle parking on the makai side it will enhance the area as far as clear unobstructive views. However, this will cause individuals to park and double park all along the mauka side, tarnishing the appearance of the mauka side. As it is now, parking on the north shore is a problem on both the makai and mauka sides. I would suggest if you ban on the makai side, you also ban on the mauka side and have City parking lots available for strictly beach parking to facilitate this ban. The City must also enforce this ban for the City beach parking lots to be successful. The City already has planned parking on the mauka side of one of its beaches on the north shore. This ban on parking should stretch from Waimea Bay to Turtle Bay rather than only one specific beach. If you ban only on the makai side, you will definately have opposition from all the mauka side residents and all your planned improvements efforts to Sunset Beach may be shot because the Sunset Beach area residents have a history of banning together from the smallest opposition and making a mountain out of a molehill. The issue usually ends up becoming one of "The City v.s. the North Shore" such as Lihilani and other development and improvement efforts.

In my opinion there is no easy solution. My father has property in Sunset Beach which the City was thinking of using as parking for the Kaunala Bay Beach and Support Park (Bill 99) back in 1995 which we supported. Since land is cheaper on the mauka side, it would be more feasible to have the parking lots on the mauka side. The Department of Parks and Recreation must be able to address questions about traffic lights and crosswalks for these parking lots. It seemed to be one of the obstacles that Bill 99 came across that the Department wasn't really prepared to answer as far as money available in the budget for these crosswalks and traffic lights. Yet it seemed necessary for safety reasons. Crosswalks would be a very good idea for this area because as it is, there are no crosswalks and pedestrians constantly jaywalk and vehicles are usually speeding on Kamehameha Highway in excess of the speed limit because drivers know that there are no traffic signals for miles.

I can be reached at 536-9395 for any questions or comments you may have. Thank you for your time and attention.

Sincerely,

98-0845
HDOT/HA

Mae Matsuura

Mae Matsuura
1314 Kinau St. #304
Honolulu, HI 96814

#44
4/2

BELT COLLINS

September 4, 1998
98P-263/341.1501

Ms. Mae Matsuura
1314 Kinau Street, #304
Honolulu, Hawaii 96814

Dear Ms. Matsuura:

Draft Environmental Assessment
Proposed Sunset Beach Improvements
Koolauloa, Oahu, Hawaii

Thank you for your letter of April 2, 1998 commenting on the proposed improvements at Sunset Beach. After meeting with community organizations, we have revised our concept plan for the project. We will not stripe the road shoulders nor place signs that will prohibit parking in front of Sunset Beach. On the other hand, we cannot encourage parking within the State right-of-way due to safety and liability concerns. Thus, parking in front of the beach will be at the option and risk of the individual.

The City has started construction on an off-street parking area across Kamehameha Highway from Sunset Beach. A crosswalk will be provided for the beachgoers' convenience, and warning signs will be posted to provide advance notice to motorists of the upcoming pedestrian crossing.

We appreciate your comments on the proposed project.

Sincerely yours,

BELT COLLINS HAWAII LTD.

Glen T. Koyama

GTK:lf

cc: Donald E. Griffin, C&C Dept. of Design and Construction

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Revd APR 20, 1998

To Parks and Recreation Department:

Response to Sunset Beach -Improvements to makai side of Kamehameha Highway

I have been a resident of the North Shore since 1968 and a consistent user of Sunset Beach parking(makai side) for surfing and beach use for that long also. Although there is planned parking on the mauka side of Kam Hwy(a new parking lot), the existing parking on the beach should remain.

The beach parking is both practical and ample and should be used as a supplement to the new parking when that is made available. The reasons being:

1. There are many more accidents in places where there is no parking on the beach side of Kam Hwy. Take both the Laniakea and Chun's Reef areas. Where there is a view plane from the highway to the ocean, the risk is much greater for the driver of the cars(and all other occupants) to watch the waves and surfers than to drive. These numerous and consistant accidents are well documented at Wahiawa Police Dept.-please research this fact! Also, Laniakea has a much higher incidence of these accidents simply because the length of the view plane is at least quadruple that at Chun's Reef. (Please note that Sunset Beach's proposed no parking strip is as long as Laniakea's strip. A dangerous and needless plan.)

2. The parking on the Makai side of Kam Hwy. can accomodate many cars. That coupled with the new parking lot should hold us a few years(hopefully). Take for example, Eukai Beach Park (Pipeline - one mile down the Hwy). Both are FAMOUS beaches that locals want to surf and people(tourists) want to watch. When they installed their parking lot some years back, within a very short while , the parking lot was and is currently maxed out. All those parking spots are filled to capacity(most if not all the time) when there is both small and large surf and just beautiful beach days for locals and tourists alike. So we have people parking up and down the highway on both sides just to use that beach park. There is NOT ENOUGH PARKING.

3. Finally, the new parking lot, bathrooms and showers are being built across the street to accomodate more people.Since more people will use the facilities than now or in the past, and the present parking is woefully inadaquate - WHY ARE WE TAKING MUCH NEEDED PARKING AWAY WHEN SUNSET BEACH PARK IS BECOMING BIGGER? THIS IS NOT A CONSISTANT OR SOUND PLAN.

So PLEASE don't remove existing parking that we NEED and HAVE and USE.

Sincerely,
William C. Sickler
59-415 Makana St.
Haleiwa, Hawaii 96712
638-8497

980091
4/20/98 #2
#52

BELT COLLINS

September 4, 1998
98P-252/341.1501

Mr. William C. Sickler
59-415 Makana Street
Haleiwa, Hawaii 96712

Dear Mr. Sickler:

Draft Environmental Assessment
Proposed Sunset Beach Improvements
Koolauloa, Oahu, Hawaii

Thank you for your letter regarding the Draft Environmental Assessment for the proposed Sunset Beach improvements. We acknowledge your concerns on the removal of parking in front of Sunset Beach. We agree that the beach is very accessible from the existing parking and that during the beach's most heavily-used days the parking is very much needed.

After meeting with community organizations, we have revised our concept plan. We will not stripe the road shoulders nor place signs that will prohibit parking in front of Sunset Beach. On the other hand, we cannot encourage parking within the State right-of-way due to safety and liability concerns. Thus, parking in front of the beach will be at the option and risk of the individual.

The new parking across Kamehameha Highway, which is currently under construction, is designed to accommodate parking demand for the regular peak periods. Special events and surfing tournaments will result in street parking along the highway beyond the beach boundaries. The new parking is intended to accommodate some of the parking demands of these events.

We appreciate your thoughts and concerns on the proposed project.

Sincerely yours,

BELT COLLINS HAWAII LTD.

Glen T. Koyama

GTK:lf

cc: Donald E. Griffin, C&C Dept. of Design and Construction

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XVI. REFERENCES

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APPENDICES

Appendix A

Sunset Beach Coastal Engineering Analysis

SUNSET BEACH
COASTAL ENGINEERING ANALYSIS

Prepared for:

Belt Collins Hawai'i
680 Ala Moana Boulevard, 2nd Floor
Honolulu, Hawai'i 96813

Prepared by:

Sea Engineering, Inc.
Makai Research Pier
41-202 Kalaniana'ole Highway, Suite 8
Waimanalo, Hawai'i 96795

August, 1997

#96-02

TABLE OF CONTENTS

LIST OF FIGURES

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1. INTRODUCTION

1.1 Project Location and General Description

Located on the North Shore of O'ahu, Sunset Beach is known for its natural beauty and large surfing waves. A site map is shown in Figure 1.1, and a recent aerial photograph of the area is shown in Figure 1.2. Although Sunset is mostly calm during the summer, the winter season brings large North Pacific swells that focus on the reef. A famous wave, it is an attraction for traveling surfers, and offers a popular spectacle for the many tourists who come to watch.

The high wave energy at Sunset Beach, and on O'ahu's North Shore in general, means that any construction undertaken near the shoreline should be done with great care and understanding of the coastal processes involved. The North Shore beaches are unusually dynamic. Large amounts of sand move onshore and offshore and up and down the beaches in response to fluctuating wave conditions. A very high beach berm has been built up over the years that offers protection from most of the extreme storm and wave events. Nevertheless, high waves occasionally overtop the berm and can cause tremendous damage. The extraordinary swell of Dec. 1-4, 1969 resulted in damage estimated at $1.51 million to the Hawaiian islands (Gerritsen, 1978), with much damage occurring in the vicinity of Sunset Beach.

The protective berm at Sunset Beach has degraded over the years. Historical aerial photographs show a tremendous reduction of vegetation covering the berm, and a loss of berm width. It is unclear what has caused the damage, but it is probably a combination of seasonal erosion from high waves, and degradation due to foot traffic and heavy use.

The crest of the berm is located at the center of Kamehameha Highway at the project site, and it slopes gently seaward to the present vegetation line. A recently constructed bicycle path along part of the North Shore was set directly on the berm at Sunset Beach. During January of 1996, large waves eroded the berm and the bike path was undercut, sustaining minor damage (photo, Figure 1.3). This event illustrates the dangers of building structures too close to the shoreline, and the need for good oceanographic design criteria.

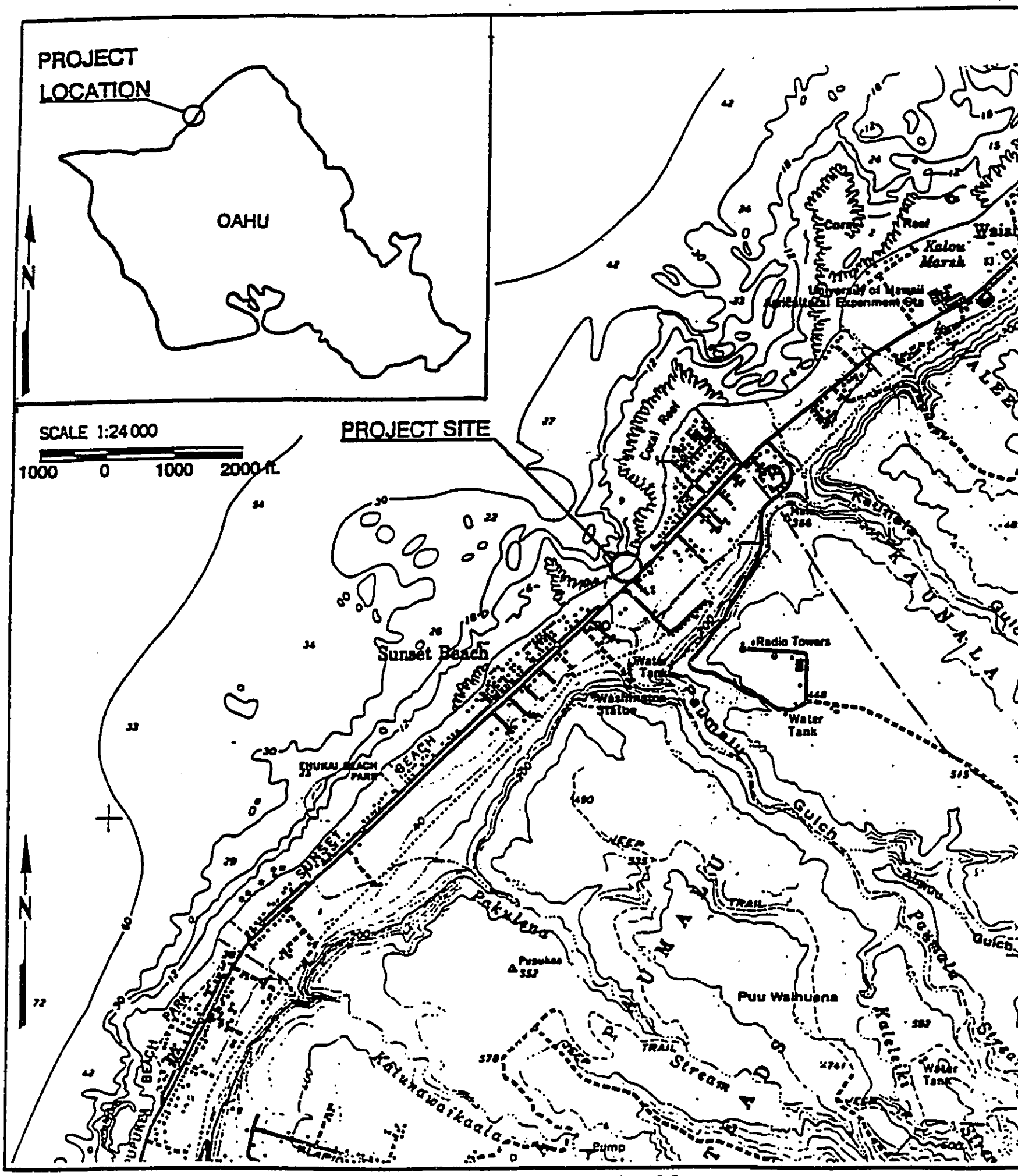

Figure 1.1: Project Location Map

Figure 1.2: Aerial photograph of the project site (September 11, 1995, R.M. Towill Corp.)

Figure 1.3: Photograph taken 1/11/96 after a large storm wave event showing undermining of the bike path on the berm crest.

1.2 Study Purpose and Scope of Work

The purpose of this study is to provide an oceanographic analysis and coastal engineering guidelines for planning and design of shoreline improvements at Sunset Beach. Work tasks include:

- estimate of winter season storm profile
- estimate of winter season wave height and wave runup elevation frequency of occurrence
- discussion of impacts and alternatives for desired shoreline improvements.

2. BEACH PROFILES

2.1 Historic Changes

Analyses of aerial photographs in the Sunset Beach area have previously been published by Hwang (1981) and Sea Engineering, Inc. (1988). In these studies, beach advance or retreat was measured by selecting common transect lines on the photos and plotting the location of the vegetation line. On a regional level there has been no systematic erosion of the shoreline, although there are a few problem areas such as the project site. Between 1949 and 1967, there was a tendency for the vegetation line to grow seaward at Sunset Point. A large retreat of the vegetation line between 1969 and 1971 is attributable to the major swell event of December 1-4, 1969 (Hwang, 1981). This event, which was comprised of some of the largest waves on record in Hawaii, was responsible for the destruction of 14 homes between Sunset Point and Waimea Bay. Table 2.1 and Figure 2.1 show transects and changes in vegetation line over the years for transects 8, 8A, and 9, as compiled by Hwang and SEI. Transect 8 is southwest of the project site, transect 9 is northeast of the project site, and transect 8A is on the northeast end of the project, on the east end of Sunset Beach where a lookout is presently planned. The studies found that Sunset Beach is relatively stable under normal conditions, with occasional severe erosion occurring during winter storm conditions. Transects 8 and 9 were severely eroded during the December 1969 storm, with the vegetation line retreating by 10 and 21 feet, respectively. By 1988, the beach showed partial restoration of the vegetation line along transect 8, and full restoration and even accretion along transect 9. Transect 8A, on the east end of Sunset Beach Park appeared to be steadily eroding.

Aerial photgraphs of the project site are shown in Figures 2.2 through 2.5 for 1967, 1969, 1971, and 1974. An aerial photograph taken in 1995 showing modern conditions is shown in Figure 1.2. The 1967 photograph shows thick vegetation between the highway and the vegetation line. Two access paths are located where the vegetation line comes closest to the road at the center of the Sunset Beach embayment, and where the beach berm is at its highest elevation. Even in this photo, sand derived from occasional overtopping is spread along the makai side of the highway.

Figure 2.3 is a photograph taken on December 5, 1969, during the 1969 storm event. Wave conditions are visibly high in the photograph, but higher wave conditions had occurred during the previous four days. Although thin, the vegetation line fronting the beach is still there, and has technically not changed its position from the previous photograph. However,

Table 1-1. Vegetation Line Changes at Sunset Beach

	Transect Number		
Observation Period	8	8A	9
1949 - 1962		-	-5
1962 - 1967	0	-	23
1967 - 1971	-10	-	-21
1971 - 1975	-10	-	7
1975 - 1979	1	-	-1
1979 - 1988	5	-43	5
Net Vegetation Line Change	-14	-43	8
Vegetation Line Range	20	43	23

Notes:

1. Net change is the total change in the position of a beach index line between the earliest and most recent observation year.
2. Range is the difference between the observed extremes in the position of a beach index line.
3. Transect locations and historical data from Hwang (1981), Table 9.

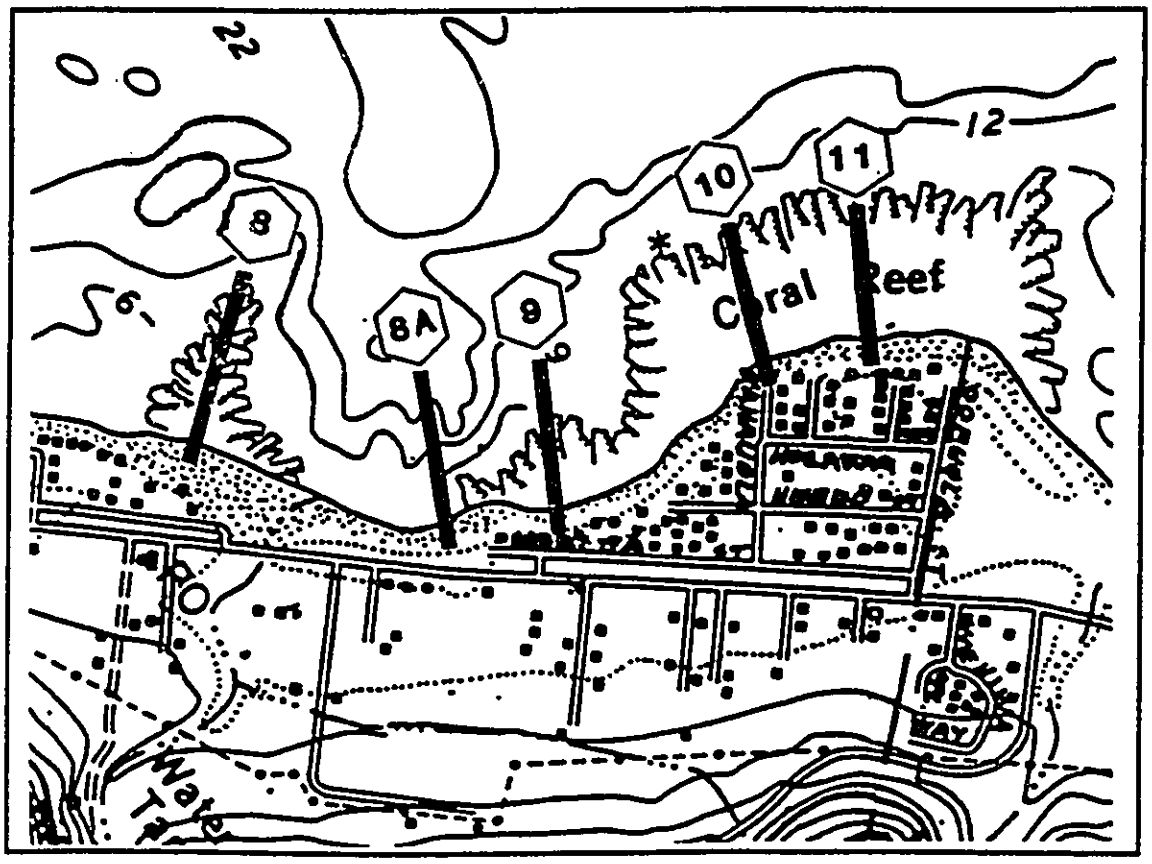

Figure 2.1: Transect locations

Figure 2.2: Aerial photograph taken April 22, 1967, (R.M. Towill Corp.).

Figure 2.3: Aerial photograph taken December 5, 1969 (R.M. Towill Corp.).

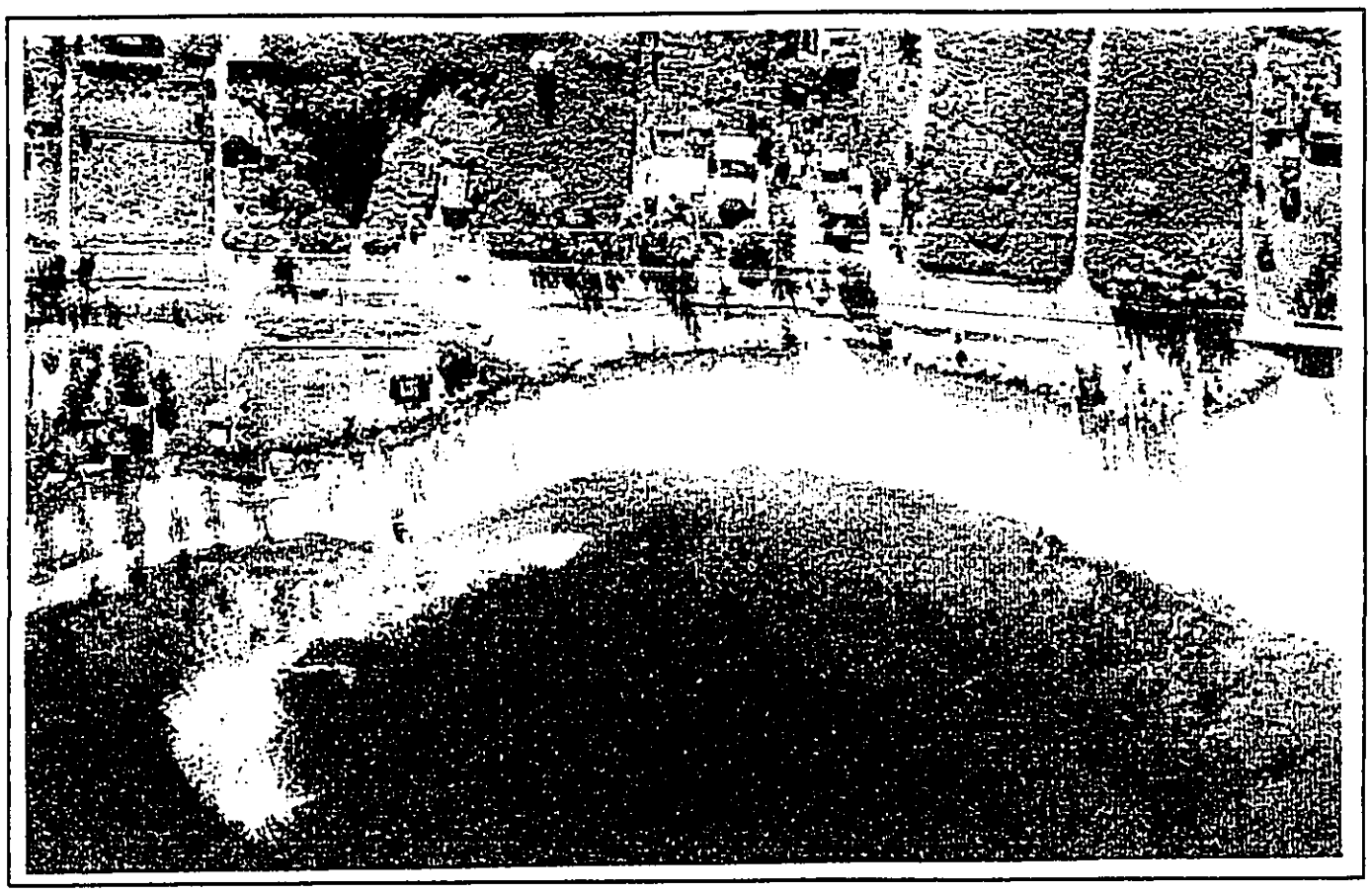

Figure 2.4: Aerial photograph taken January 23, 1971, (Air Survey Hawaii)

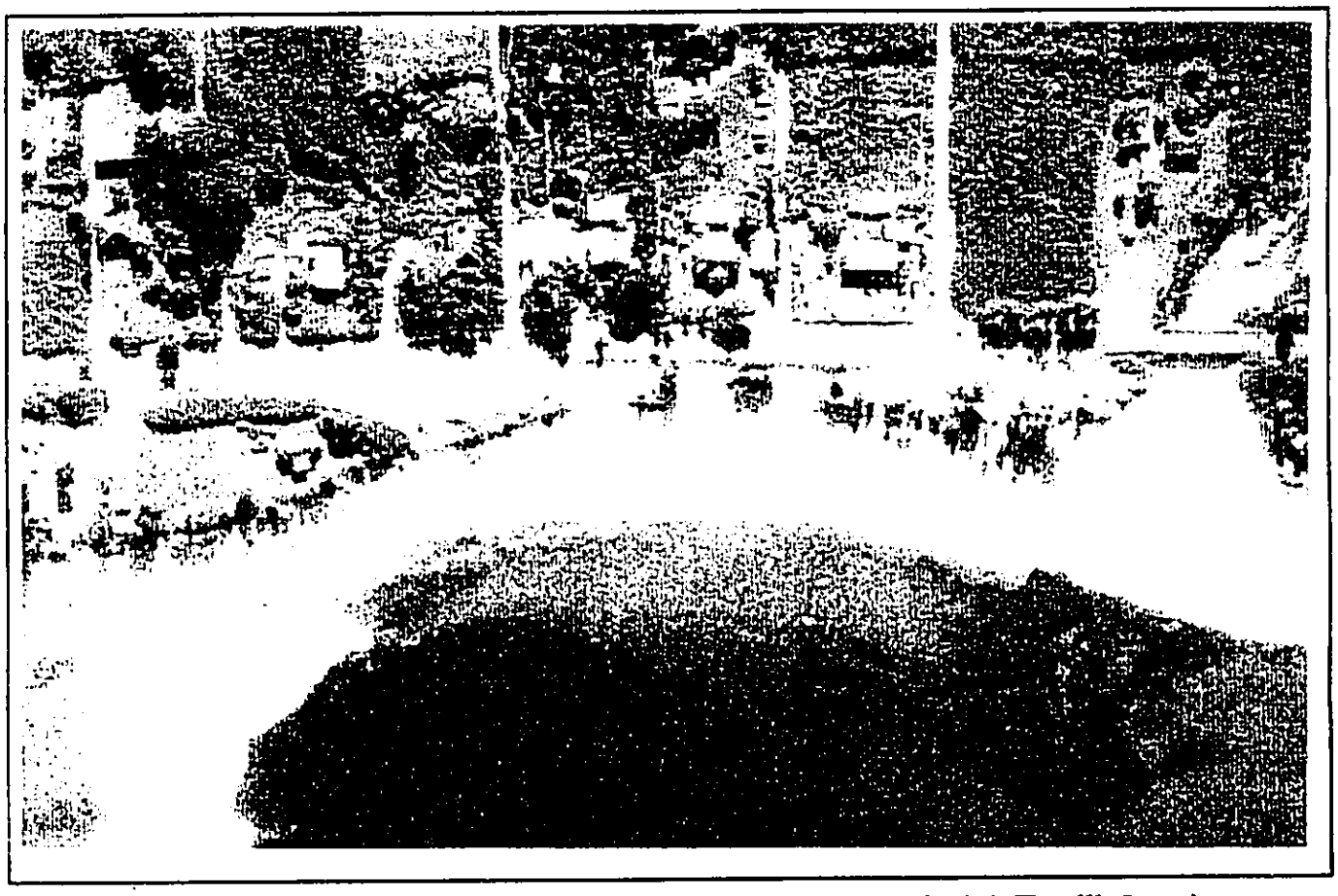

Figure 2.5: Aerial photograph taken December 3, 1974, (R.M. Towill Corp.)

the vegetation between the vegetation line and the highway has been covered with sand and is otherwise greatly reduced from the lush conditions shown in the 1967 aerial photograph.

The 1971 photograph shows an apparent partial restoration of the vegetation behind the vegetation line, but this had degraded by 1974, and continued to degrade by 1995 to where only remnants of the vegetation line are visible.

The 1970's saw an explosion in the popularity of surfing in general and on the North Shore of Oahu in particular. Although the initial destruction of vegetation may have occurred as a result of high waves during the 1969 event, heavy foot traffic probably prevented re-establishment of vegetation, which in turn enabled further destruction during high wave events. The thin front line of resistive vegetation has gradually diminished to where it is barely existent today. The 8A transect (SEI, 1988, and Figures 1.2 and 2.1) crossed a vegetated bluff, a remnant of pre-1969 conditions. It was gradually eroded laterally during high wave events due to flanking from the southwestern (Haleiwa) side.

2.2 Beach Profile Analysis

Figure 2.6 is a cross-section showing general beach features and terminology.. At Sunset Beach, and much of the North Shore, the escarpment behind the beach is not an eroded bluff, or sea cliff, but is a dune built up by overtopping and deposition of sand during very high storm wave conditions. It is the active beach berm crest during severe wave conditions, and is at an elevation equivalent to the wave runup elevation with these conditions. The crest of this storm berm at Sunset Beach is at the center of Kamehameha Highway.

The beach in front of the storm berm can vary dramatically. On the North Shore it is not unusual for wide sections of the beach to disappear practically overnight. The profile of the beach is very dependant on existing wave conditions. Wave height, wave period (the interval of time between successive waves), and the wave direction of approach all contribute to the profile shape and stability of the beach. Several beach berms may exist in front of the storm berm; the youngest one is part of the active profile of the beach. By way of further illustration, one can think of the storm berm as the high beach formed during extreme storm conditions, and the average active berm as the low beach formed during average wave conditions.

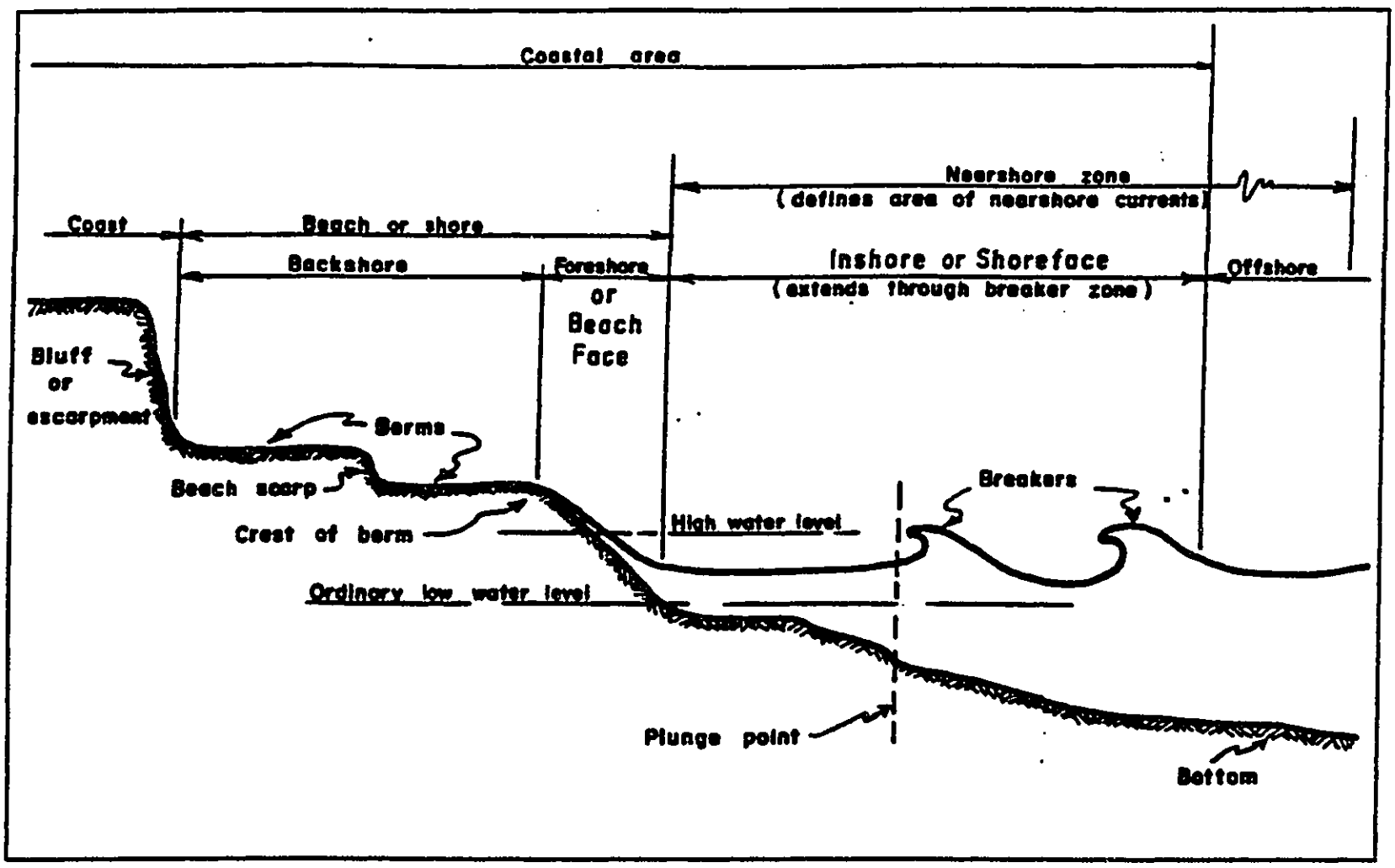

Figure 2.6: Beach profile-related terms (from Shore Protection Manual).

Four profiles were taken at the project site at Sunset Beach on February 21, 1997. Wave conditions were calm, and an erosive event had not occurred for some time, so that a wide sand beach had built up. Several generations of beach cusps were observed, giving uneven and undulating topographic expression.

The location of the profile lines are shown in Figure 2.7. The profiles are shown in Figures 2.8 - 2.11. All profiles were measured from the white line marking the makai edge of the roadway and extended approximately 400 ft. perpendicular to the shoreline. The marked difference in the four profiles shows the uneven character of the beach. This section of beach has a gentle embayed curvature that is a permanent characteristic, and is probably due to the curvature of the wave fronts as waves approach the beach. In turn, the wave geometry is governed by the interaction of the waves with the offshore bathymetry.

The beginning of Line A is at the apex of beach curvature, and represents the section of beach with the highest crest elevation and the narrowest berm crest width. It is a problem area in terms of erosion, and is the location of the eroded section of bike path in the photograph, Figure 1.3.

For further evaluation of storm conditions, it is necessary to use the beach profile that would normally exist during those conditions. This is unfortunately difficult to do. Extremely erosive events are infrequent and hard to plan for. Also, during these events it becomes difficult and dangerous to conduct profile studies due to the high wave conditions. The storm profile can be inferred, however, by constructing a smooth curve from the upper beach berm to the closure depth offshore, where the active profile and storm profile intersect. This assumes that the upper beach berm profile is constructed during erosive storm conditions, and that the offshore closure depth exhibits little profile change.

Line A is used for further study, as it represents the most critical portion of Sunset Beach. A revised drawing of Line A with the inferred storm profile drawn underneath the active profile is shown in Figure 2.12. During an erosive storm event, the tremendous amount of excess sand overlying the storm profile will be temporarily re-distributed offshore, and the MSL shoreline will migrate shoreward approximately 60 ft. Elevations of profile features are listed in Table 2.2.

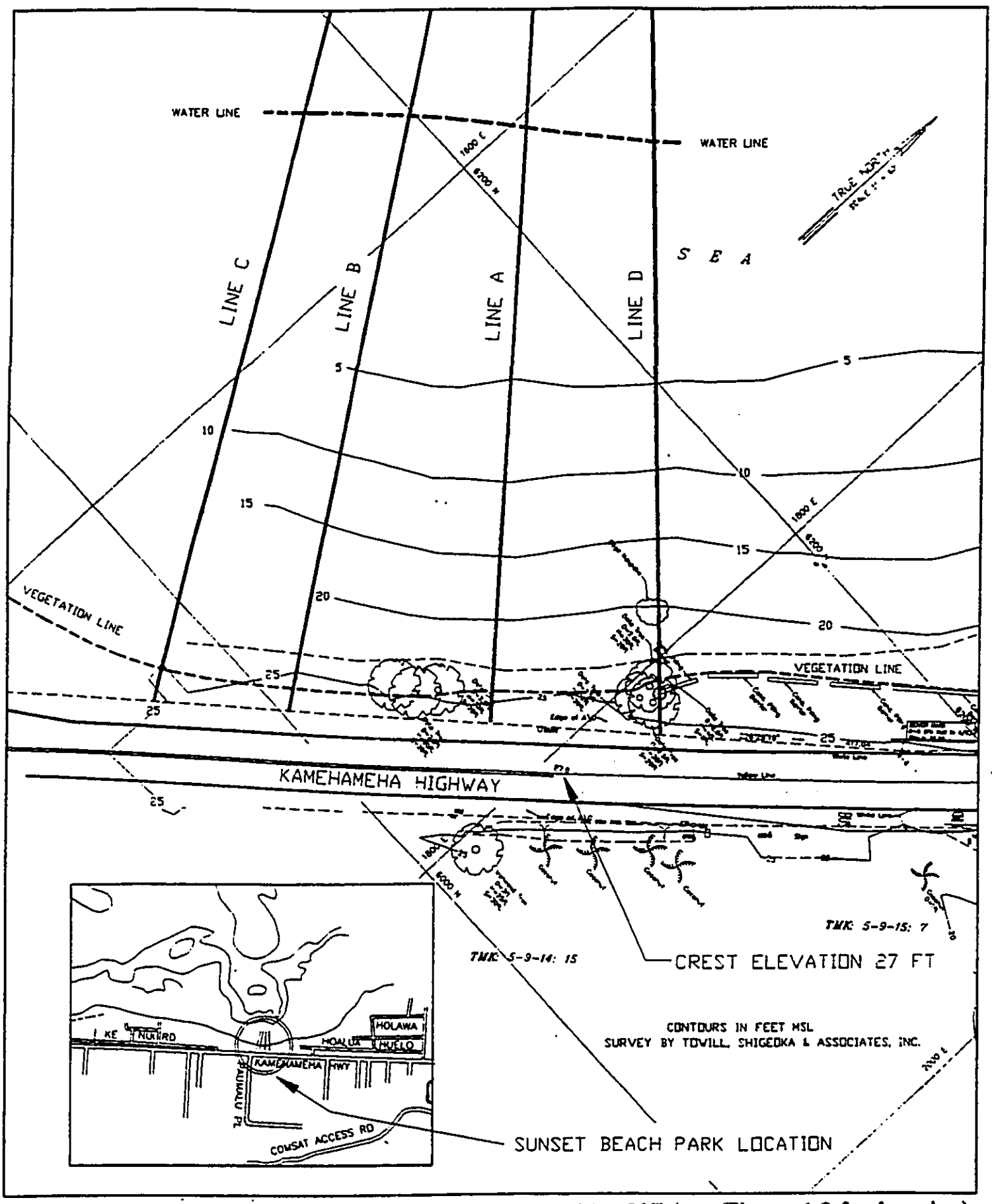

Figure 2.7: Location of profiles measured February 21, 1997 (see Figure 1.2 for location).

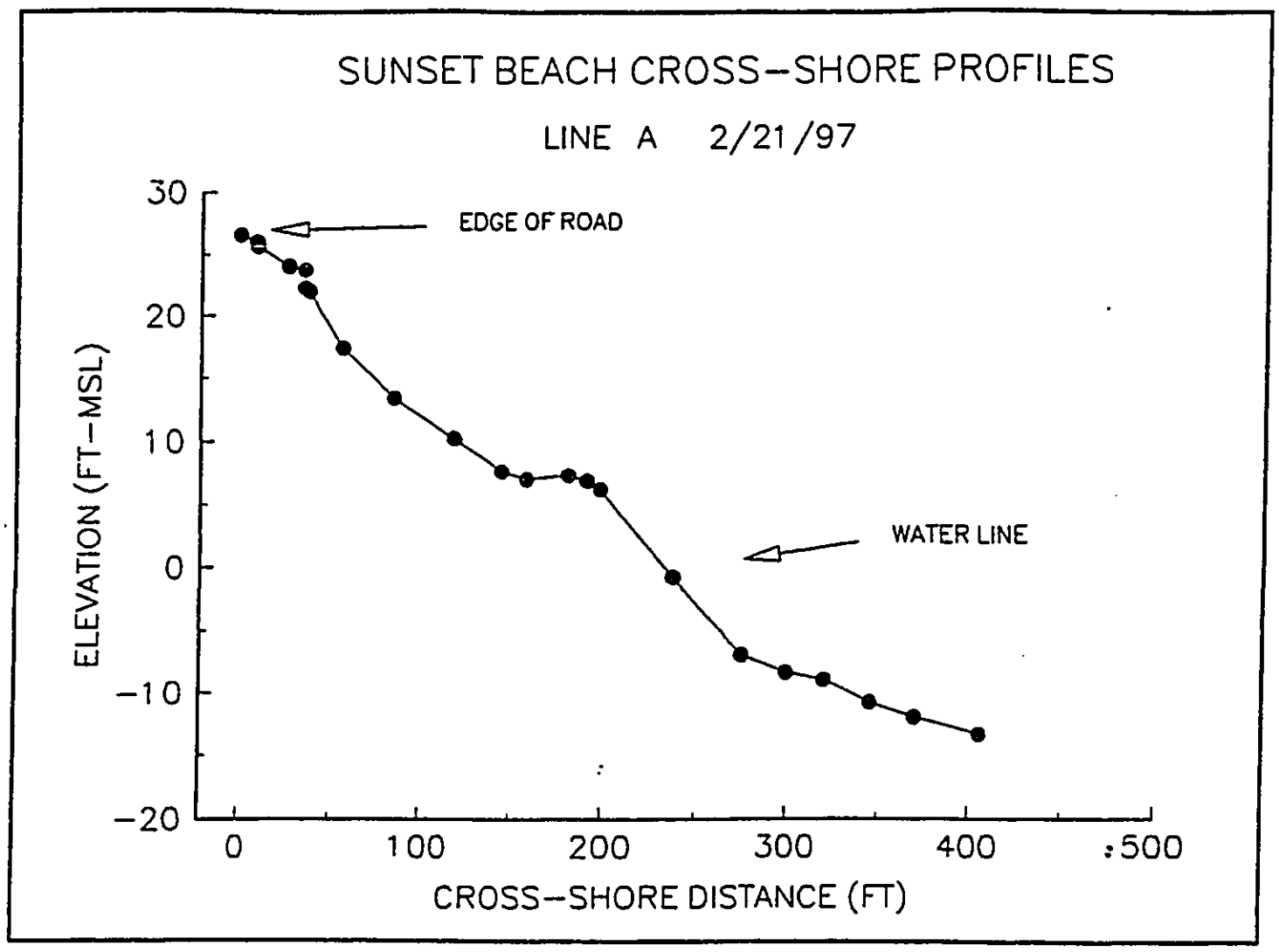

Figure 2.8: Profile of Line A.

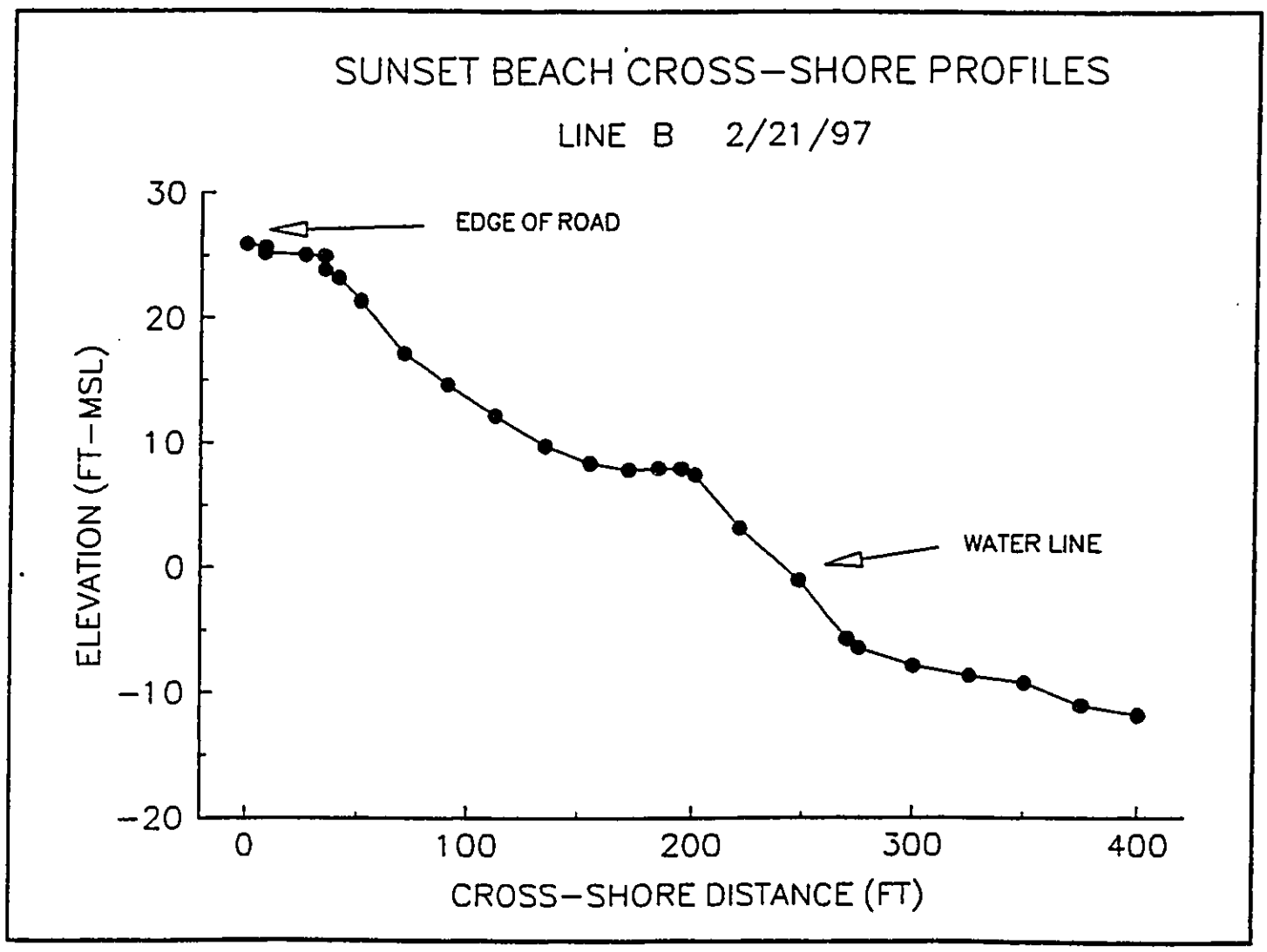

Figure 2.9: Profile of Line B.

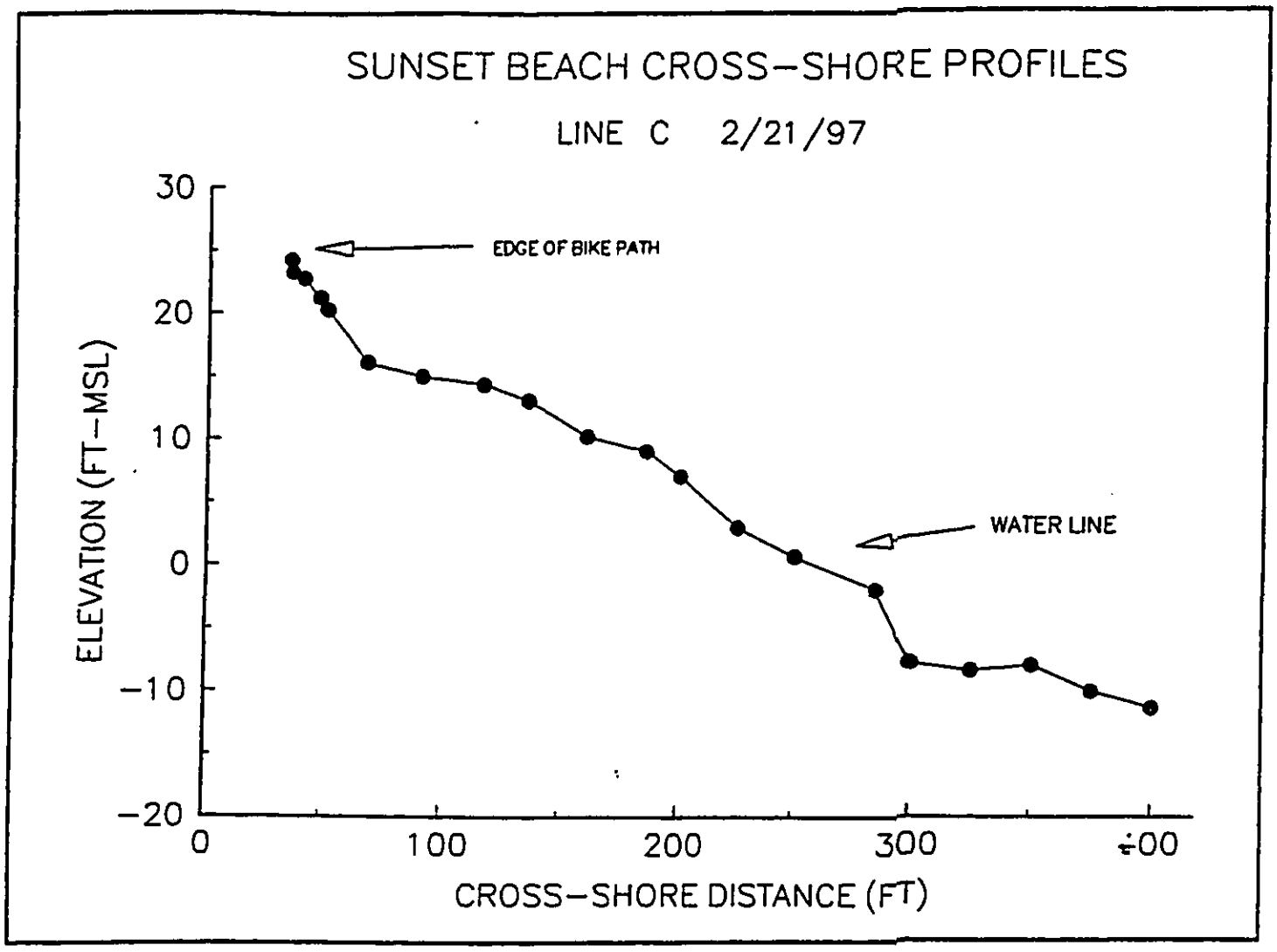

Figure 2.10: Profile of Line C.

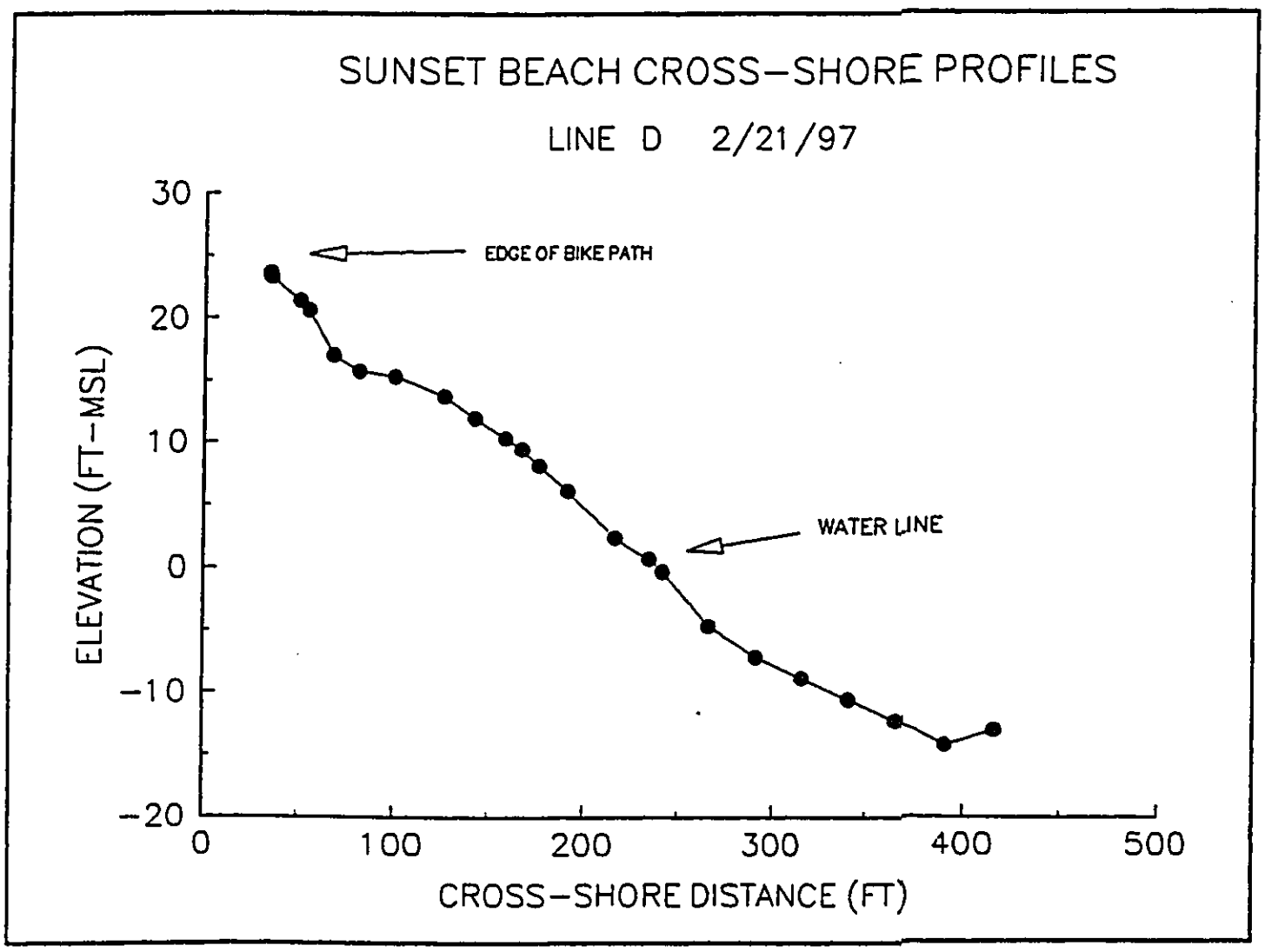

Figure 2.11: Profile of Line D.

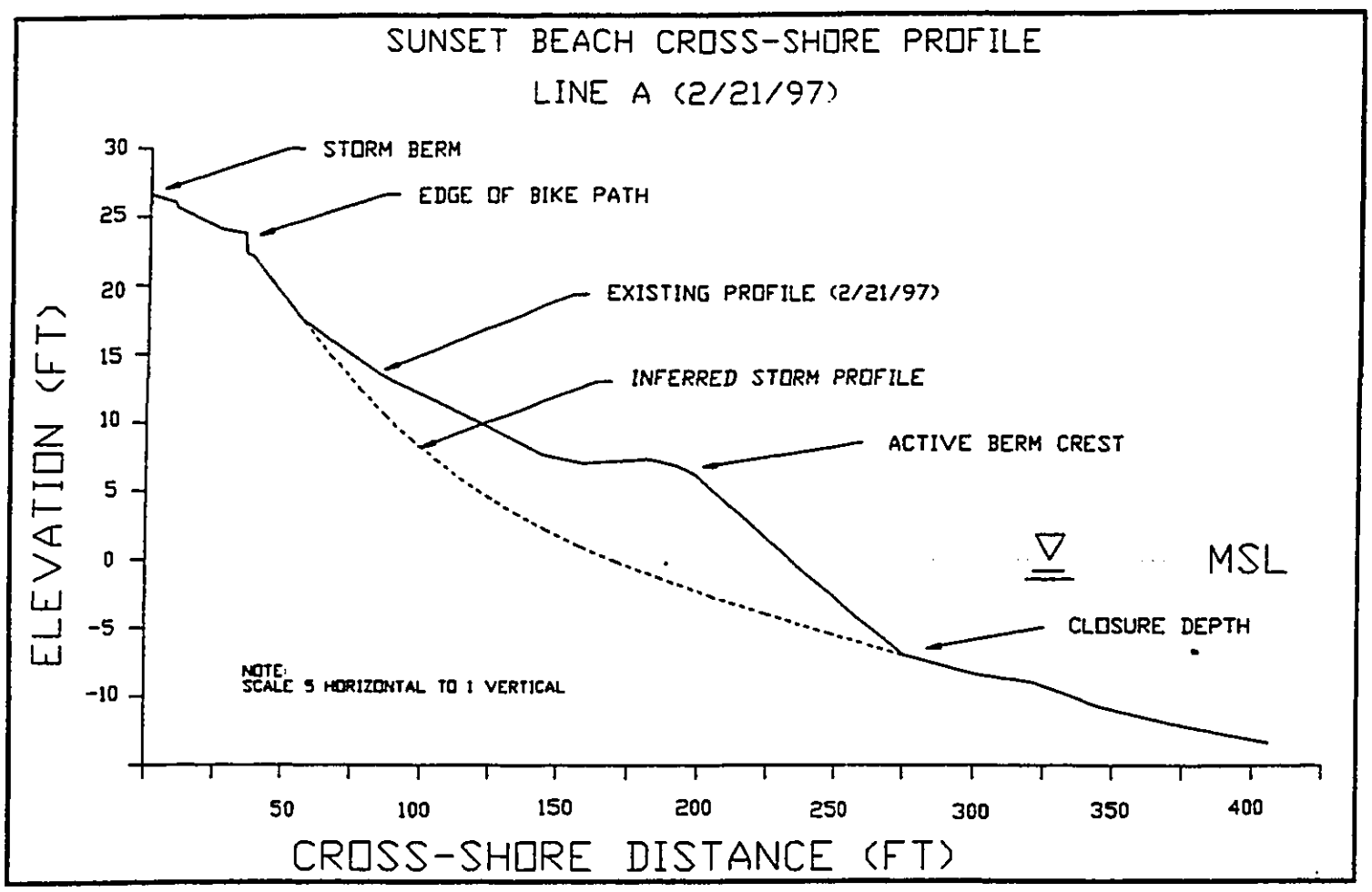

Figure 2.12: Inferred Storm Profile, Line A.

Table 2.2 Profile Elevations

Feature	Elevation (ft-MSL)
Road Crest (Crest of Storm Berm)	27.0
Bike Path (top)	24.0
Bike Path (bottom)	22.3
Active Berm Crest	7.4
Closure Depth	-7.0

3. DISTRIBUTION OF WAVE HEIGHTS AND WAVE RUNUP ELEVATION

3.1 Wave Refraction Analysis

Waves approaching the coast are altered by refraction as they pass over changing bottom contours. Wave refraction over a particular bottom depends on the direction of wave approach and the period of the wave. Waves with a long period are active deeper in the water column and "feel" the bottom at greater depths.

The speed at which a wave travels in shallow water is dependant on wave period and the water depth in which it is propagating. As waves move at an angle to bathymetric contours, the part of the wave in deep water moves faster than the section in shallower water, and the wave crest bends or refracts, and becomes more aligned with the bottom contours. This change in direction of different parts of the wave may result in convergence or divergence of wave energy, and has a major influence on the distribution of wave height and energy along a coastline. If wave energy converges, the wave heights will be larger, if the energy diverges, the wave heights will be smaller. The relation between deepwater wave heights and the wave height changes due to refraction is governed by the refraction coefficient:

$$H = K_R H_0$$

where,

K_R = Refraction Coefficient
H_0 = Deepwater Wave Height
H = Wave Height

Wave refraction analysis was accomplished using a numerical model and bathymetry from the USGS quad map (Waimea). Results are shown in Figure 3.1. The figure shows highest refraction coefficients with waves approaching from the northwest with periods greater than 20 seconds. This is indicative of convergence or focusing of large waves due to the bathymetry of the outer reefs.

3.2 Analysis of Extreme Deepwater Wave Heights

From 1982 to 1991, the Pacific Missile Range Facility at Barking Sands on the west coast

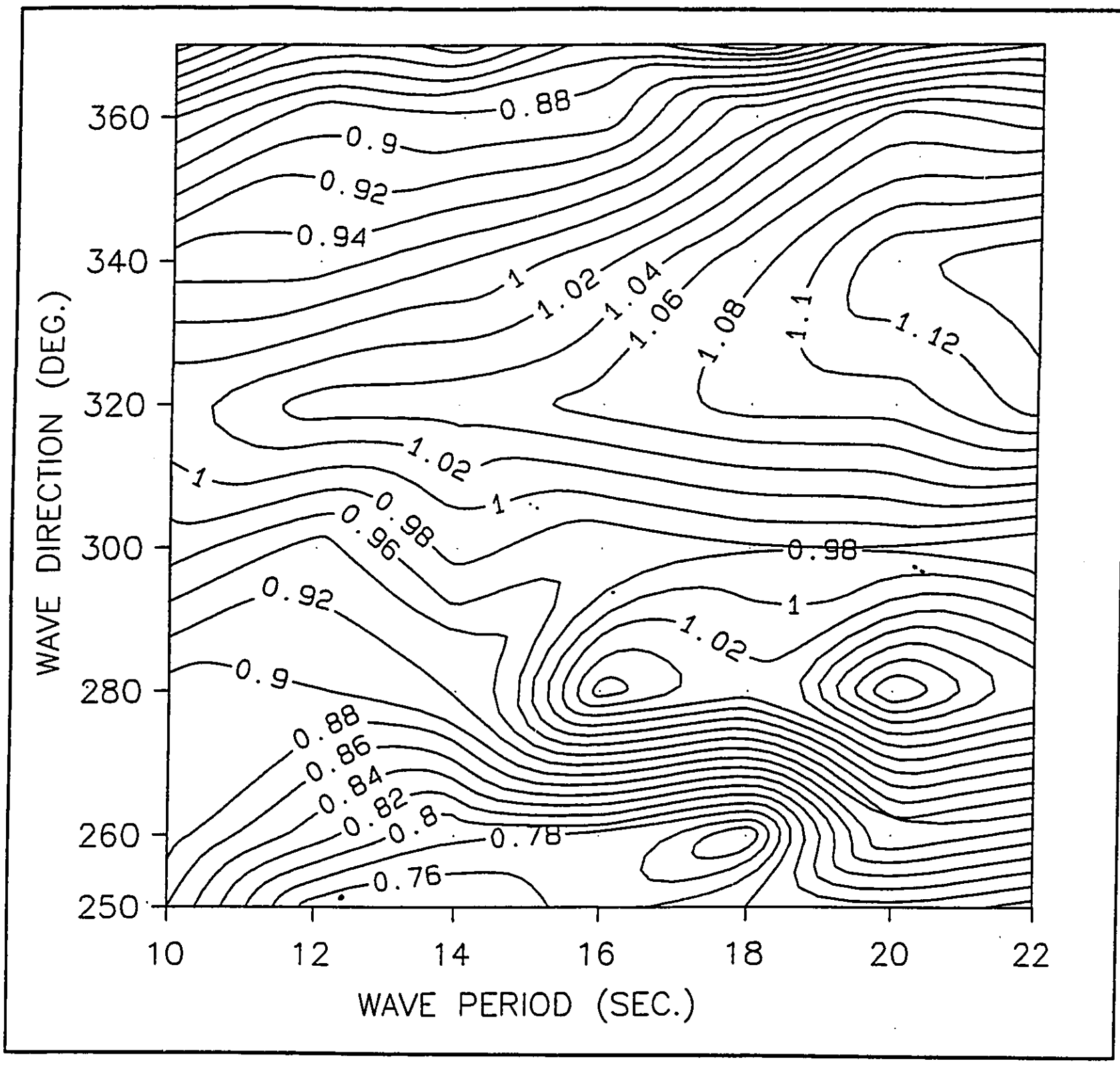

Figure 3.1: Refraction Coefficients for Sunset Beach.

of Kaua'i operated a wave measuring buoy in deep water. This buoy had an exposure similar to that of the project site, with direct exposure to North Pacific swell and partial exposure to tradewind waves refracting around Kaua'i. It is also exposed to winter Kona storm waves and to summer season south swell which adds long period energy to the record which would not occur at Sunset Beach. However the wave buoy data provides a reasonable summary of the deepwater wave climate which can be expected at Sunset Beach.

The wave heights reported by the buoy are equivalent to the significant wave height (H_S), which is the average of the highest one third of measured waves. It has been shown to roughly correspond with the value that an observer would report as a visual wave height estimation, and is widely used for engineering purposes.

The frequency of occurrence of large wave heights can be estimated using the buoy data to calibrate an appropriate probability distribution. Figure 3.2 is a graph of the return period of extreme wave heights using Gumbel's first asymptotic distribution for extreme values. The results were calculated using the highest wave height during each year of record. Some years were not available due to intermittent operation of the buoy. Table 3.1 summarizes wave heights for return periods of interest.. These results are comparable to values reported in Gerritsen (1978).

Table 3.1 Return Period Wave Heights

Return Period (Years)	Significant Wave Height (Ft.)
1	15.9
2	17.9
5	20.5
10	22.5
25	25.2
50	27.2
100	29.2

Hurricane occurrence in Hawaiian waters is infrequent, and a direct hurricane storm wave attack at Sunset Beach is unlikely. For comparison, however, deepwater wave heights and

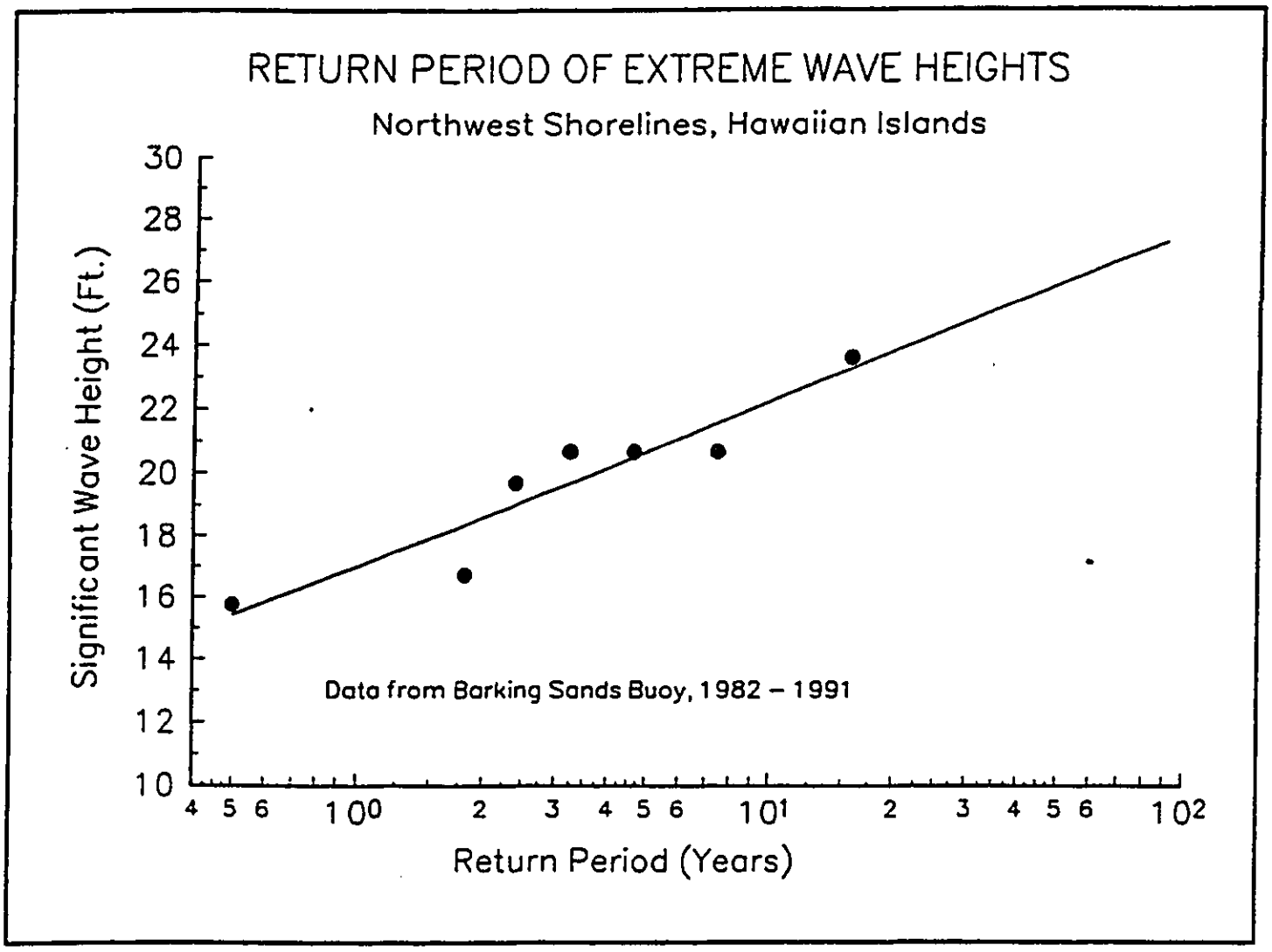

Figure 3.2: Return Period of extreme wave heights.

periods for estimated possible scenario hurricanes range from 25 to 50 feet, and 11 to 13 seconds, respectively.

3.3 Wave Runup Analysis

General

The vertical height above the stillwater level to which water from a breaking wave will run up on a foreshore slope is termed wave runup. The inundation distance on a given shoreline is a combination of stillwater level and wave runup. However, wave runup is also coupled to the stillwater level because the size of breaking waves at the shoreline is in part determined by the water depth. Wave runup calculations were done using a numerical model that integrates the stillwater level rise, depth limited wave height near the shoreline, and wave runup along the storm profile of the beach. A refraction coefficient of 1.1 was applied to the deepwater wave heights.

The stillwater level for a large swell event is a combination of the astronomical tide and the increase in water level due to the incident wave field, known as wave setup. The tide level used in this study is Mean Higher High Water (MHHW), which is the average of the highest daily tide. Hawaiian tides are mixed diurnal and semidiurnal, and there are usually two high tides of unequal magnitude per day. The higher high water is used to compute the MHHW elevation. For the MSL datum, MHHW at Sunset Beach is 0.9 ft.

Wave Setup

Wave setup is the rise in mean water level along the shore caused by wave action. The wave setup model used in this study is primarily based on the theoretical model developed by Longuet-Higgens and Stewart (1963, 1964) which balances mean water level changes against the changes in the momentum flux in a train of waves of changing amplitude. The excess momentum flux due to the waves is termed "radiation stress". Longuet-Higgins and Stewart, Bowen, Inman, and Simmons (1968), Hwang and Divoky (1970), Tait (1972), and Van Dorn (1976) suggest methods of applying the theory to predictions of wave setup, and their reports were also used as guides in the development of the numerical model used for this study.

Nakazaki (1985) reports an empirical relationship between wave height and the standard deviation of sea-surface elevations based on laboratory model studies. The relationship permits determination of changes in wave energy according to the degree of wave

nonlinearity. The non-linear theory provides a good estimate of shallow water wave characteristics and how the ratio of wave height to the standard deviation of the wave profile can vary with water depth and wave steepness. The maximum height in the breaker zone is the depth-limited breaker height, and it is assumed that the maximum possible wave height could exist at any point between the first break and the shoreline.

Wave Runup

Saville (1956) conducted laboratory tests of wave runup for monochromatic waves on gentle slopes, and this data is presented in the U.S. Army Corps of Engineers *Shore Protection Manual* (SPM) as a series of runup prediction curves. Hunt (1959) developed an empirical formula to predict wave runup using the runup slope, deepwater wave height and wavelength, which matches the experimental curves obtained by Saville in the range of equivalent runup slopes less steep than about 1V on 5H.

Saville's runup curves and Hunt's formula are based on regular (monochromatic) wave theory, which assumes that the waves have a constant height and period from one wave to the next. Recent research has shown that the effects of irregular waves on wave runup are significant. Mase and Iwagaki (1984) and Mase (1989) conducted laboratory experiments using random waves and derived experimental relationships for the random (irregular) wave runup on gentle slopes (1V on 5H to 1V on 30H) which modify Hunt's equation. The runup equation proposed by Mase is:

$$\frac{R}{H_0} = a\left[\frac{\tan\theta}{(H_0/L_0)^{0.5}}\right]^b$$

where,

H_0 = deepwater significant wave height
L_0 = deepwater significant wave length
R = runup
θ = bottom slope
a,b = empirical coefficients.

For the highest estimated runup (R_{max}), the empirical coefficients are a = 2.32, and b = 0.77. R_{max} is considered the most appropriate runup value for comparison with the actual

storm wave debris line, which is assumed to reasonably represent the maximum uprush of the waves.

The above equation is based upon experiments using simple plane slopes. Saville's method of composite slopes as presented in the SPM is used to approximate the single runup slope needed for the computations from the irregular shoreline profile which invariably exists. The method assumes that a composite slope can be replaced with a hypothetical, uniform slope running from the ocean bottom at the point where the wave breaks to the point of maximum runup. This is an iterative technique, where successive approximations are used to find the point of maximum runup. The wave runup model used in this study is a combination of the runup equation proposed by Mase, and Saville's method of composite slopes. The beach profile used was the inferred storm profile shown in Figure 2.7.

Runup is decreased by roughness on the slope, which increases turbulence and thus dissipates energy, as well as by slope permeability. A roughness factor of 0.9 representing unconsolidated sand was applied for this study.

Results

The methodology discussed above was applied to Sunset Beach along profile Line A. Wave parameters used came from the joint wave height and wave period frequency distribution table from Barking Sands buoy data for the period of 1982 through 1991 (Figure 3.3). The runup elevation return periods were calculated by applying Gumbel's extreme value distribution, and are summarized in Table 3.2

Table 3.2 Return Period of Runup Elevations

Return Period (Years)	Runup Elevation (Ft.- MSL)
1	25.3
2	25.9
5	26.5
10	26.9
25	27.3
50	27.7

0000 0027 2940

BARKING SANDS, HI BUOY

OCT. 1982 - JUL. 1991

JOINT DISTRIBUTION TABLE

TOTAL OBSERVATIONS = 4311

SIGNIFICANT WAVE HEIGHT (CM)

	22+	20	17	15	13	11	9	7	5
871-900									
841-870									
811-840									
781-810									
751-780									
721-750									
691-720		1			1				
661-690									
631-660					1				
601-630			3	2	1				
571-600			2						
541-570		1		4					
511-540			1	2	4				
481-510			4	4	3	1	1		
451-480		1	5	3	6	3			
421-450		1	3	4	4	6	1		
391-420		2	3	7	6	6	1		
361-390		2	6	12	22	10	6	1	
331-360		1	7	24	23	25	14		
301-330			10	28	37	19	15	1	
271-300		2	9	39	54	31	33	4	
241-270		2	19	44	64	54	33	22	
211-240		7	13	44	82	81	72	37	7
181-210		4	12	34	107	139	43	55	17
151-180		4	9	31	117	166	106	103	57
121-150		3	9	22	81	182	132	135	173
91 -120		3	8	35	52	121	164	242	292
61 -90		2	5	10	17	42	82	134	217
31 -60							3	10	17
1 -30									

PEAK PERIOD (SEC)

Figure 3.3: Peak Period of significant wave heights.

It is interesting to note that the estimated 50-year return period runup is only 2.4 feet higher than the estimated annual extreme runup elevation. This is true despite the estimated 50-year wave height being 70 percent larger than the annual extreme wave height (27.2 feet versus 15.9 feet, see Table 3.1). The explanation for this paradox is that larger waves break in deeper water offshore, dissipating their energy well seaward of the shore, and therefore do not actually run up on the beach. The waves that actually run up on the beach slope are much smaller waves that are breaking on or near the shoreline. However, the offshore waves do contribute to wave runup by adding to the water depth nearshore in the form of wave setup. The rise in water level due to wave setup is typically 10 percent to 20 percent of the breaking wave height offshore, for example, a 15 foot offshore breaker might raise the water level at the shoreline by 1.5 feet, while a 25 foot breaker would raise it 2.5 feet. The runup is increased because breaker heights near shore are a function of water depth. Deeper water near shore equals higher waves breaking on the shore, and moves the break point higher up on the beach slope. This means that, although a 50-year wave is significantly larger than an annual large wave event, its contribution to wave runup is only a fraction of the difference in the two breaking wave heights. At Sunset Beach, estimated annual wave heights are great enough to result in wave runup elevations that are almost as high as would be expected during much larger and less frequent wave events.

The runup results can be compared with the elevation of profile features (Table 2.1) to assess the relative impact. The bike path (elev. 24 ft) can be expected to overtop on a yearly basis. While the road crest is at 27 ft, much of the road in the vicinity of Line A is 26.9 ft or less in elevation with an overtopping return period of 10 years.

4. DISCUSSION

4.1 Overview

Every shoreline is dynamic. Seasonal and long-term changes in wave conditions, sediment supply variations, sea level changes, wind patterns - all will modify the shoreline in some way. Even hard rocky shorelines undergo slow but inevitable changes. Accretion and erosion cycles are natural, and beaches need room to change in order to maintain an equilibrium profile.

The beach berm crest at Sunset Beach was formed by deposition of sand during high wave conditions. The same conditions that erode the beach actually build and maintain the berm. An up-rushing wave carrying sand in suspension will gradually slow due to the effects of gravity, friction, and percolation, and deposit some of the suspended sand at the limit of uprush. Hard structures built close to the berm will inhibit the gradual dissipation of energy, induce more reflection and turbulence, and will tend to induce scour in front of the structure. This process will lead to the undermining of any structure built without adequate setback from the berm crest.

The berm near the profile Line A has the highest elevation at Sunset Beach, indicating it is the zone of maximum wave runup. Examination of historical aerial photographs show dramatic thinning of vegetation cover and slow but progressive erosion of the berm. Although a natural feature, the berm serves as active protection for the roadway and nearby houses.

The results of this study show that any structure built near the berm crest in the vicinity of Line A with an elevation of 25 ft or less can be expected to be overtopped on at least a yearly basis. Damage from 5-year and 10-year events can be expected to be at the level of the January 1996 event, when pile butts used to mark off parking areas were pushed across the highway, and significant undermining of the bike path occurred. Protective vegetation can be expected to be damaged or lost. Higher runups, such as a 25-year and 50-year events may cause extensive flooding on the mauka side of the highway, undermining of the highway, and extensive loss of vegetation. The small difference between the berm crest elevation and overtopping elevations means that overtopping will not be violent, but will likely occur as a surge that may spill over to the mauka side of the highway.

4.2 Shore Protection Structures

Conventional, man-made shore protection consists of armoring a shoreline with stone or concrete structures that are heavy and strongly built to withstand the impact of storm wave forces. Examples of structural solutions include vertical cemented seawalls, sloping rock rubblemound revetments, groins constructed perpendicular to the beach to trap sand, and offshore breakwaters constructed parallel to the shore to block wave energy. Such structures need a firm foundation on which to rest and a design suitable to resist the wave forces expected at the site. Consequently, any man-made shore protection structure at Sunset Beach would need to be massive: large stone size would be necessary to resist high wave forces, and a deep foundation would be necessary for stability. Halfway measures will not succeed - for example, a stone wall buried ten feet into the sand and not placed on a solid foundation will be quickly undermined during even a minor erosive event, and will fail no matter how heavy the stone.

Besides being expensive, structural solutions involve other possible consequences. Seawalls and revetments can inhibit sand deposition and permanently alter the character of the beach. Groins and breakwaters in the presence of waves can be dangerous to swimmers both from induced boundary currents and from wave impacts. In addition, groin fields are used to interrupt and slow longshore sand transport. Sand movement at Sunset Beach is primarily cross-shore, so groins would have little or no positive effect. Because of the technical design difficulties, expense, and aesthetic and safety considerations, conventional shore protection is not considered appropriate for Sunset Beach.

4.3 Recommendations

Oceanographic conditions and beach processes at Sunset Beach pose significant technical problems for the design of coastal structures. Contributing factors include:

- No solid structural foundation: based upon the absence of hard, consolidated rock outcrops, the beach berm at Sunset Beach is likely to not be underlain by a solid foundation of reef rock or beach rock until well below sea level.

- Seasonal beach accretion/erosion patterns: large amounts of sand are moved in response to a highly variable wave climate.

- Severe winter wave conditions: Oahu's North Shore experiences some of the worlds' largest waves.

The existing natural beach and storm berm is the best shore protection available for Sunset Beach. As such its health should be protected and nourished. Recommended measures are:

- Establish protective natural vegetation. From examination of aerial photographs, it is clear that vegetation loss has been accompanied by degradation of the beach. Vegetation will help to slow wave up-rush without inducing excess reflection and turbulence and will tend to enhance sand deposition, thereby offering protection during high wave conditions. In addition, the vegetation roots can help to anchor the sand and promote stability, and will therefore tend to reduce gravitational slumping and human impacts. While Sunset Beach may not return to its pre-1969 condition, slow accretion of the high beach berm should tend to occur. In this way, protective natural vegetation will promote the health of the beach.

- Change the bicycle path alignment. No structure should be built seaward of the present-day vegetation line. In the vicinity of profile Line A, the bicycle path as presently constructed on the berm promotes scour and undermining. The bike path should be set back closer to the roadway in order to be adequately protected by the berm.

- Conduct seasonal maintenance. The present degraded state of the beach is partly due to neglect. Even if vegetation becomes well established along the berm, there will be occasional events, such as a 10-year or 25-year event that will tend to cause severe erosion. A natural shoreline will tend to heal itself by accreting sand and by slowly re-establishing vegetation. Although human activity can inhibit the healing process, it can also contribute to it: vegetation can be planted and nurtured, and the high beach can be restored by nourishing it with sand from the active profile lower on the beach.

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Appendix B

State Historic Preservation Division Consultation Letter

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BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

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

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DEPARTMENT OF LAND AND NATURAL RESOURCES

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

October 30, 1997

Glen T. Koyama
Belt Collins, Hawaii
680 Ala Moana Boulevard, 1st Floor
Honolulu, Hawaii 96813-5406

LOG NO: 20393
DOC NO: 9710EJ26

Dear Mr. Koyama:

SUBJECT: **Chapter 6E-8 Historic Preservation Review -- Environmental Assessment for the Proposed Beach Improvements at Sunset Beach**
Pupukea/Kaunala, Ko'olauloa, O'ahu
TMK: 5-9-15:01, 02

Thank you for the opportunity to be a consulting party during the preparation of the project's Environmental Assessment. We commented to Belt Collins on May 1, and August 11, 1995, regarding the preliminary proposal for the Parking Lot, Comfort Station and Beach Erosion Prevention for the City and County Department of Parks and Recreation Sunset Beach Support Park (Doc Nos. 9504TD20, 9508EJ29).

At that time we believed that these projects had the potential to have an "adverse effect" on buried historic sites and recommended that archaeological inventory survey of the proposed support park area be performed to determine if any historic sites were present. We recently reviewed the final plans for the support park project and have revised our comments to include archaeological monitoring of ground disturbing activities (Doc. No. 9510ej25).

A review of our records shows that several human burials have been inadvertently discovered in the beach sands near the proposed beach improvements project area. Our records also show that cultural deposits unrelated to burials are found in the vicinity, although these have not been inventoried and described. Excavation activities at your project area have the potential to have an "adverse effect" on buried historic sites that might be located there. Therefore, in order to ensure that the proposed beach improvements will not have an "adverse effect" on significant historic sites, we request that on-site archeological monitoring be conducted in areas where ground disturbance will occur.

Prior to any ground disturbance, we recommend that an archaeological monitoring

plan be submitted to this office for review and acceptance. The monitoring plan should contain the same type of information as requested for the support park parcel monitoring plan. If an acceptable monitoring plan is implemented, then we believe that the proposed beach improvements will have "no adverse effect" on significant historic sites which may be present.

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

Aloha,

Don Hibbard, Administrator
Historic Preservation Division

EJ:jk

Appendix C

Sunset Beach Park
Archaeological Inventory Survey
O'ahu, Hawaii

SUNSET BEACH PARK
ARCHAEOLOGICAL INVENTORY SURVEY,
O'AHU, HAWAI'I

by

J. Stephen Athens, Ph.D.
Coral Magnuson, B.A.

report prepared for

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Honolulu, Hawai'i 96813

International Archaeological Research Institute, Inc.
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Honolulu, Hawai'i 96826

July 1998

ABSTRACT

An archaeological subsurface survey was undertaken within the area of proposed beach improvements at Sunset Beach Park on the north shore of O'ahu. Investigations consisted of the placement of 33 auger units and three trenches dispersed within the anticipated beach park improvement zone, situated between Kamehameha Highway and the shoreline. Two pre-contact archaeological sites consisting of subsurface midden deposits were identified as a result of these investigations.

Subsurface archaeological midden deposits were detected both near Paumalu Gulch at the south end of the project area and near Hoalua Road at the north end. The southern deposit was designated Site 50-80-01-5585, and the northern deposit Site 50-80-01-5586. The lower elevation middle section of the beach park between these sites was devoid of archaeological evidence. It is possible that high energy surf during the winter months has destroyed any archaeological deposits that once might have existed in this area.

Charcoal recovered near the base of 1.26 m of intermittent charcoal lensing at Site 50-80-01-5585 (the south end) was radiocarbon dated to 448-298 cal. B.P. (A.D. 1502-1652; one sigma range). The date indicates that the archaeological deposit pertains to the pre-contact time period, which is also suggested by the absence of historic wood taxa in the charcoal. With respect to Site 50-80-01-5586 at the north end, the lack of historic wood taxa in the charcoal also suggests a pre-contact age for this deposit.

The two archaeological sites were evaluated as significant for the information that they may contain concerning research issues in Hawaiian archaeology. The preferred mitigation alternative for these sites is preservation. However, present beach park improvement plans indicate that Site 50-80-01-5586 will be directly impacted by construction and improvement activities. Site 50-80-01-5585 will not be affected by construction and improvement activities, though such work will be undertaken in close proximity to this site.

If disturbance to Site 50-80-01-5586 is unavoidable, archaeological data recovery will be necesary. In accordance with procedures and research objectives specified in a Mitigation Plan, data recovery must be designed to collect sufficient information so that the destruction of this site (or portion thereof) will not be considered adverse. In regard to Site 50-80-01-5585, it is suggested that an archaeological monitor be present when ground disturbing activities are undertaken in its vicinity to ensure its protection and in case isolated human burials should be present. Monitoring is also appropriate in the vicinity of Site -5586 due to the possibility of isolated burials.

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I. INTRODUCTION

At the request of Belt Collins Hawaii (BCH), International Archaeological Research Institute, Inc. (IARII) has undertaken a subsurface archaeological inventory survey at Sunset Beach Park on the north shore of O'ahu (Fig. 1). The purpose of the study was to determine the presence or absence of significant archaeological or historical remains in the area of beach improvements proposed by the City and County of Honolulu, as well as to document any such remains in accordance with draft rules for inventory surveys of the State Historic Preservation Division (SHPD).

Archaeological survey and testing consisted of the excavation of 33 auger borings and 3 test trenches in the beach sand of the proposed construction area. As shown in Figure 2, these have been plotted on the project area archaeological base map, which itself derives from a recent topographic survey of Sunset Beach Park.

Fieldwork was conducted over a three day period between 15 and 17 September 1997 by a team of four archaeologists under the direction of Coral Magnuson, B.A. Field assistants included Tina Mangieri, M.A., J. Ephraim McDowell, B.A., Joan Clarke, B.A., Leona Hamano, B.A., and volunteer Kevin Magnuson, B.A. J. Stephen Athens, Ph.D., served as the principal investigator for this project and was on-site for the last day of fieldwork. In all, 12 person days of effort were expended on the fieldwork.

The basic field strategy of the project was to place auger borings evenly throughout the area of proposed construction in order to systematically sample the subsurface sediments. Three test trenches were also excavated to examine subsurface materials. Trenches 1 and 3 (located in the south and north ends of the project area) were placed to further investigate cultural deposits disclosed by the auger borings. Trench 2, however, was excavated to better define the natural stratigraphy in the central part of the project area, though slumping sand prevented close inspection of the profile.

PROJECT AREA

The project area is located in the traditional *ahupua'a* of Paumalu, Koolauloa District, on the north shore of the island of O'ahu. It consists of a narrow alignment approximately 290 m (950 ft) long on the *makai* (seaward) side of Kamehameha Highway; from Paumalu Gulch on the southwest to the vegetation near Hoalua Street on the northeast. The project area, located at an elevation between sea level and ca. 3 m (10 ft) asl (above mean sea level), is comprised of a low, sandy beach with clean, well sorted and abraded coralline beach sands and some bits of shells and other marine debris. The shoreline is

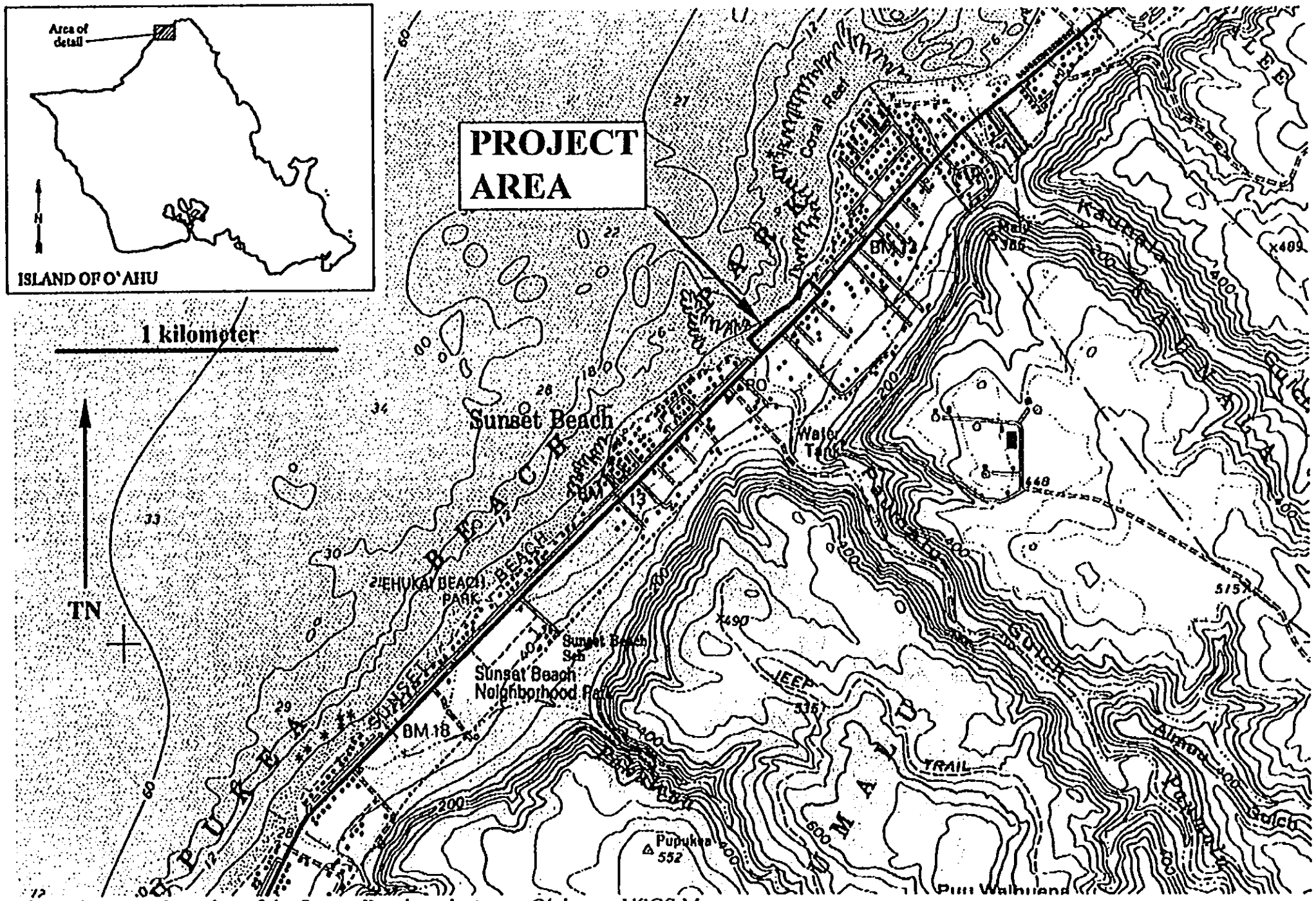

Figure 1. Location of the Sunset Beach project area, O'ahu, on USGS Map.

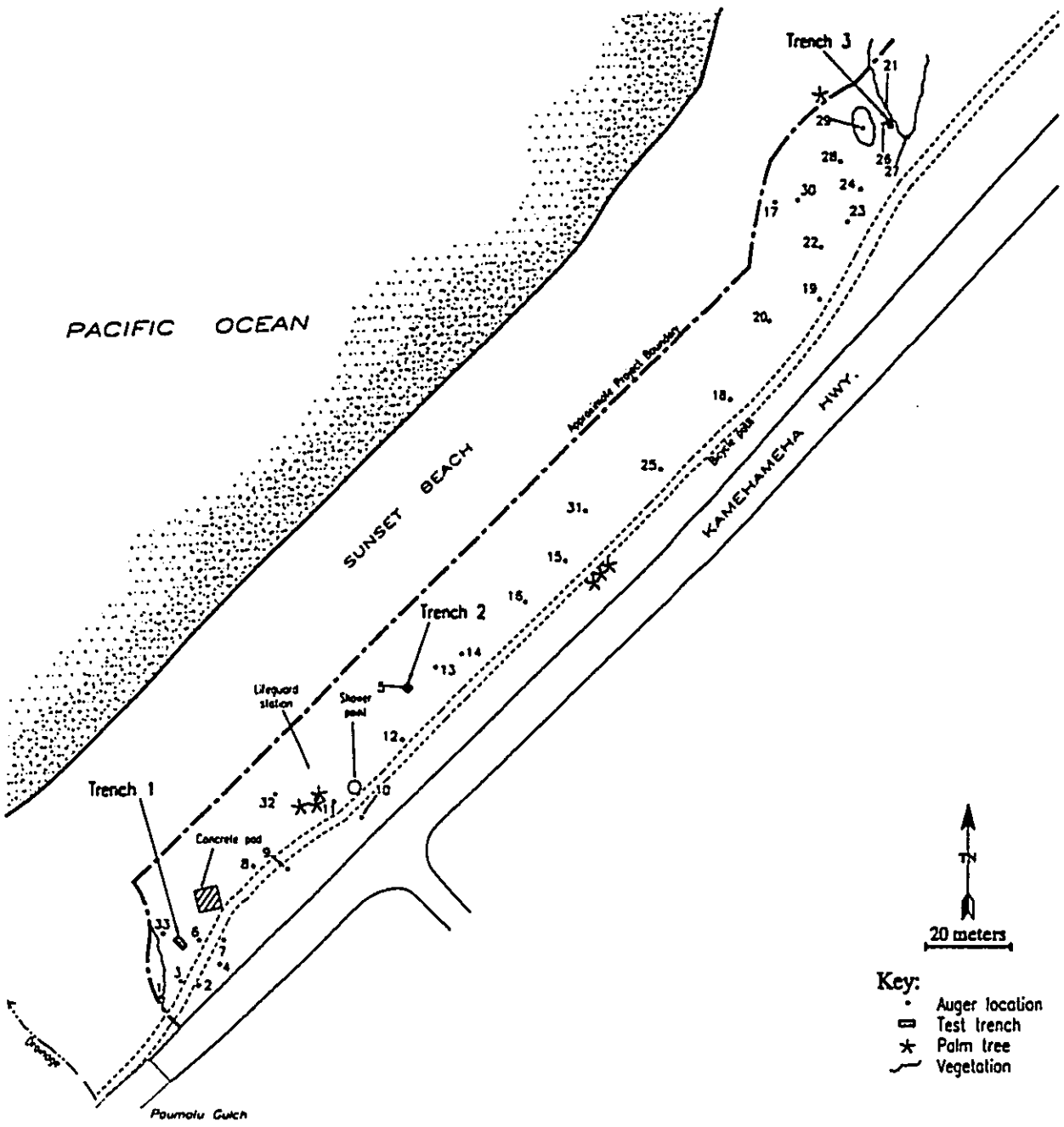

Figure 2. Archaeological base map of project area with trench and auger locations. The base map was prepared from a recent topographic survey map of Sunset Beach Park.

heavily affected by ocean conditions. In particular, high energy winter waves and storm surges continually modify the shoreline, eroding the sand in some places and redepositing it in others. Hwang (1981:24), for example, notes:

> Sunset Beach is characterized by large seasonal changes in the water line and relatively small long-term changes in the vegetation line. Over a 30-year period, there has been a slight tendency for the vegetation to grow seaward. This trend was offset during the 1967 to 1971 period by losses of up to 21 feet caused by the storm of December 1-4, 1969.

Descriptions of the general environmental conditions of Hawai'i can be found in numerous sources and need not be presented here (e.g., introductory chapters of Wagner et al. 1990:1-14; Carlquist 1980; Sanderson 1993).

Since most of the project area consists of wave impacted beach sand, there is little vegetation present. Vegetation is characterized by coastal shrubs, most noticeably *naupaka* (*Scaevola* sp.) on the higher sand dunes along the north and south ends of the project area. Introduced palms have been used to landscape the central portion of Sunset Beach Park near the road. Also, tall grasses grow near Paumalu Stream in the southwest, and a *hau* (*Hibiscus tiliaceus*) thicket grows near the northeast project area boundary.

The mean average annual rainfall for the region is about 1,000 mm. Peak rainfall occurs during the months of November and December during which approximately 100 mm of rain falls each month. July and August are the drier months and usually receive about 50 mm of rain a month (Giambelluca et al. 1986).

II. ARCHAEOLOGICAL AND HISTORICAL BACKGROUND

This brief section summarizes archaeological and historical background information for the Sunset Beach project archaeological investigations. It presents a review of the cultural geography and history of the general area, and also discusses previous archaeological studies in Paumalu *ahupua'a*.

BACKGROUND

The inhabitants of Sunset Beach utilized marine resources such as fish, shellfish, and probably seaweed (Titcomb et al. 1979:327). The *alalaua* fish (young Big-Eye or *Priacanthidae* sp.), however, were tabooed, or prohibited from use in the region (Peleula n.d.). Use of the beach was probably seasonal because high winter waves often pound the beaches, restricting use of the area. The main fishing villages were likely located on high ground removed from the danger of wave impact and erosion. Small garden areas rather than large fields systems may have been associated with the fishing villages. Handy et al. (1995:463) noted the *ahupua'a* of Paumalu is "not of the topography to support wet-taro culture of the ancient type. . . The narrow seaward plain had no water. According to *kama'aina* informants, the gulches or streams in these localities never were terraced or planted [with taro]." Other food plants, like those recorded in the mid-19th century (see below), may have been grown prehistorically in the area.

Kirch et al. (1992:14-15) suggest people began moving into agriculturally marginal areas between AD 1100-1650, and "by the mid-seventeenth century, virtually all of O'ahu was occupied or at least territorially claimed." Most people on the North Shore probably lived in or near fertile valleys that radiated from bays such as Waimea and Wailua. Kirch et al. (1992:19) likened these valleys "to the spokes of an incomplete wheel, with the prime irrigation lands at the hub. They formed the periphery of the . . . settlement system, a series of rural hinterlands, distant but not removed from actions at the center." The people in the coastal zone grew tropophytic (drought-tolerant) crops such as sweet potatoes, gourds, and yams. As the agriculture expanded up the valley, different micro-climates were encountered which allowed a considerable specialization of agriculture in each zone (Kirch et al.1992:22).

Although the Sunset Beach project area is located east of the previously mentioned valleys, Kirch's model may provide clues as to land use. Paumalu Gulch can be seen as a smaller version of a large valley. The coastal zone seems similar since the crops also consisted of tropophytic plants. Although Kirch's model suggests the valley floor would be the prime irrigation land, this is not be the case in Paumalu Gulch: Handy et al.'s (1995:463) informants indicate that the gulches and streams were not terraced or planted with taro. The reason is the streams have cut steep, narrow gulches into the bedrock with room only for the streams. Instead of the valley floor, the agricultural land was probably located at the base of the cliffs fronting the beach and the plateaus above the gulches (Mayberry and Haun 1988).

Mayberry and Haun surveyed a 1,130 acre parcel around Paumalu and Kalunawaikaala Streams, locating 25 prehistoric sites, 6 of which appear agricultural. More prehistoric agricultural sites may have been present, however bulldozing has removed any indication of their presence. Agriculture in this upland zone was not as extensive as that in the large valleys described by Kirch et al. (1992).

Europeans made contact with the Hawaiians in 1778, when Captain Cook and his sailors arrived in Hawai'i. This event marked the beginning of extensive changes in Hawai'i. Not only were diseases introduced that greatly devastated the population, but the foreigners brought new ideas concerning land use and ownership. Near Sunset Beach project area, manifestations of these changes probably included fewer people living in these more marginal areas. The reduced population likely made it possible for King Kamehameha IV to mortgage his lands at Paumalu and Pupukea on 22 October 1855, to a man named William Webster. A clause in the agreement, however stated that Webster could not claim beneficial interest in the lands. Thirty-two years later, records show that J. Richardson had leased 2,010 acres in the *ahupua'a* (Interior Department Document 1887).

The system of land ownership was radically altered in the mid-1800s. For the first time native Hawaiians were given the opportunity to claim in fee-simple those lands which they utilized. The testimonies and claims for these Land Commission Awards (LCAs) offer valuable information on land use for this time period. As indicated on historic maps, there are two LCA claims that appear to be either within or adjacent to the Sunset Beach project area (Fig. 3). These are LCA 3777, claimed by Apaa, which is near the southern part of the project area, and LCA 4013, claimed by Holoakea, which is located in the northern part of the project area. Overlaying the historic map with the project area map using identifiable reference points on both maps and the same scale, it is possible to see that the western boundary of Apaa's LCA abuts the eastern boundary of the project area (Fig. 4). As for Holoakea's LCA, the western portion clearly intrudes into the project area (Fig. 4).

Historic records indicated that Apaa grew sweet potatoes in scattered locations. Holoakea "planted sweet potato, *wauke*, breadfruit, banana, and similar things" (Frazier 1973:210).

Although the LCA's provide helpful data, they are not complete. The Native Testimonies suggest that other individuals were using surrounding areas (see Table 1, last column) but did not make claims.

The LCA documents are fairly clear in their identification of the area below the rugged foothills of the Koolau Mountain Range as the prime location of settlement. This implies that the focus of Hawaiians at this time was primarily on arable land. The lack of LCAs further inland suggests that the eroded mountain slopes were not easily cultivated and were left abandoned. Although much of the actual beach area may not have been permanently occupied, the inhabitants probably utilized the beaches seasonally.

By the beginning of 1899 the Oahu Railway & Land Co. (O R & L) had extended its rail service from Honolulu to Kahuku, passing through the North Shore. It was located on the seaward side (*makai*) of the New Government Road, now called Kamehameha Highway,

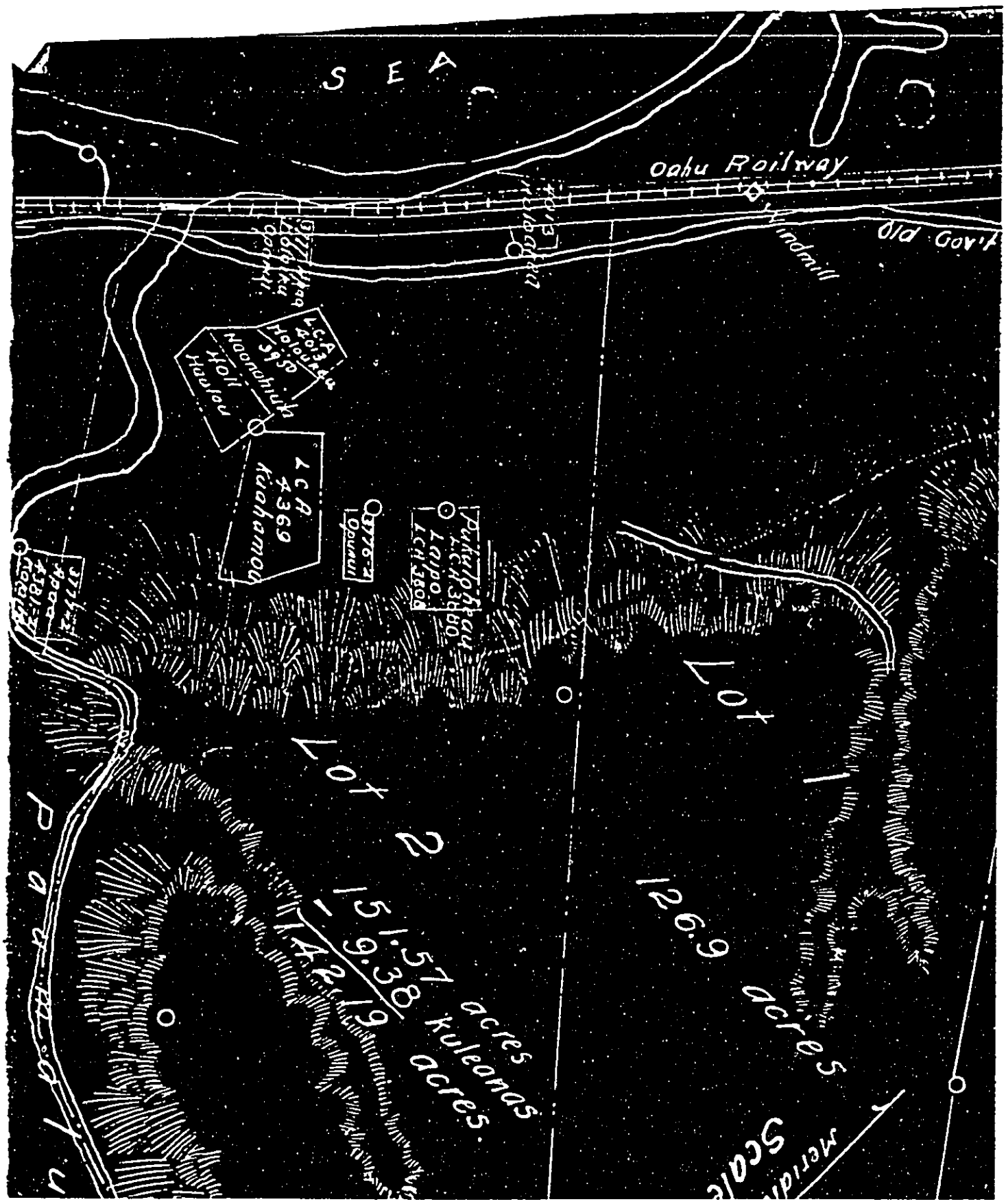

Figure 3. Land Commission Award boundaries pictured on May 23, 1908 map (Hawai'i State Archives 1908).

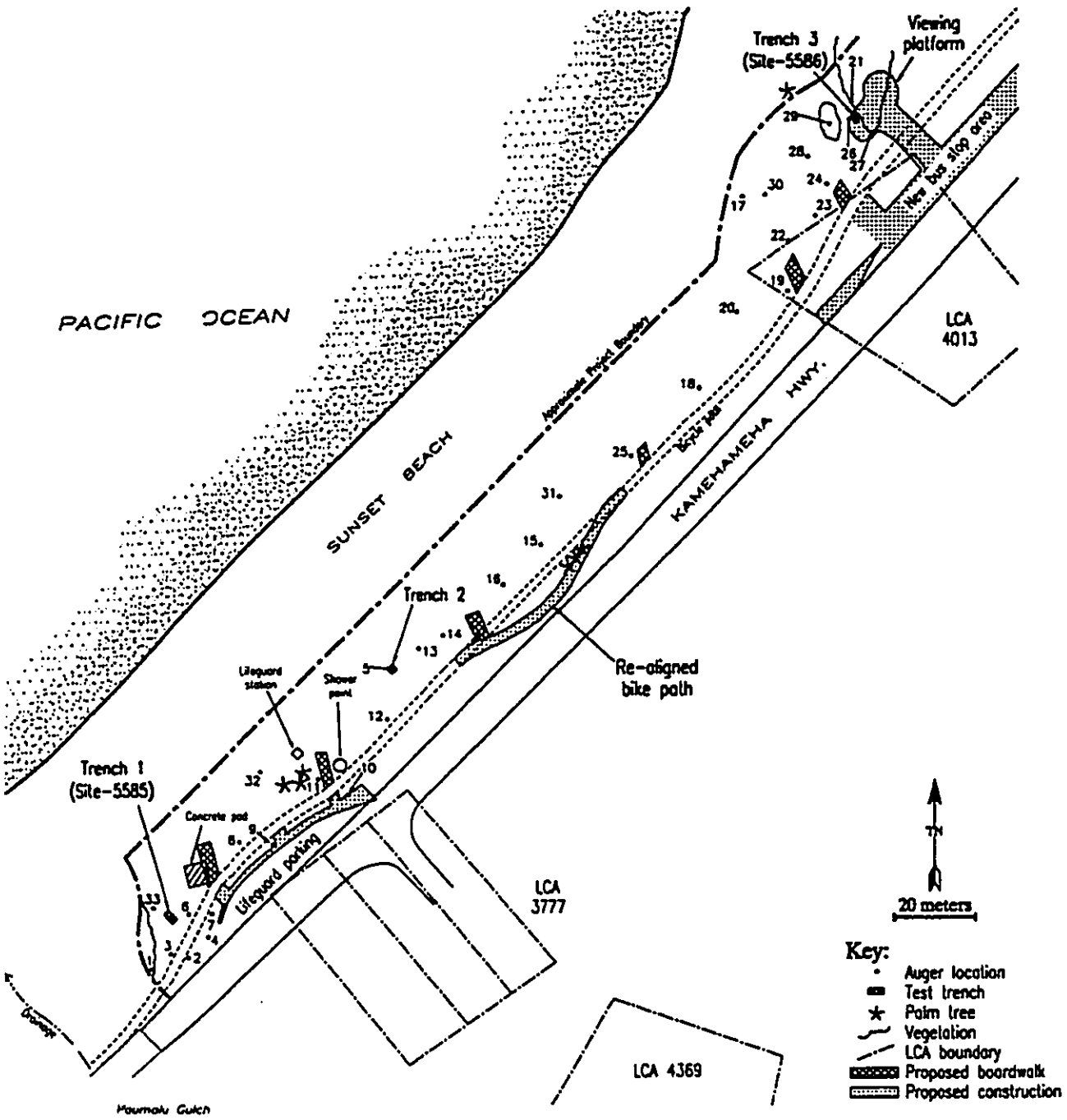

Figure 4. Land Commission Awards shown in relation to the Sunset Beach Park project area.

which forms the southeastern boundary of the project area. Traces of the rail bed are no longer extant in the Sunset Beach project area. The O R & L began facing difficult times with the common use of privately owned automobiles in the 1930s, although it experienced a brief resurgence of popularity during World War II. A tidal wave in 1946 damaged the tracks on the North Shore, reducing revenues and ultimately causing the railway to shut down in 1947 (Hungerford 1963).

Table 1. Land Commission Awards in Paumalu (Based on Native Testimonies).

LCA	Claimant	Lot	Description*	Boundaries*
3777	Apaa	2	cultivated *kula* land	*mauka*- Konohiki Hauula side- Mauniui's land Waialua side- Konohiki *makai*- Kulaiku's land
4013	Holoakea	2	cultivated *kula* land	*mauka*- Wailua's land Hauula side- Pukaloheau's land Waialua side- Laipool's land *makai*- Opunui's land

* from Foreign Testimonies (Frazier 1973:210)

Beachfront properties became desirable at the beginning of the 20th century and people new to the area began purchasing them. F. S. Lyman Jr. petitioned the Governor in 1912 to divide the beach front into lots which could be offered for sale. By 1919, lot owners begin to show up in the records. The area of what is now Sunset Beach Park, however, was not included in the salable lots.

PREVIOUS ARCHAEOLOGY

Although a few archaeological investigations have been conducted in Paumalu *ahupua'a* and neighboring Pupukea *ahupua'a* (see Fig. 5), most studies in the north shore region of O'ahu have concentrated in the Waimea and Anahulu valley areas to the south (see especially Kirch et al. 1992). The archaeological investigations that have been conducted within Pupukea and Paumalu *ahupua'a* focused on areas of development or inadvertent burial discovery. In regard to Sunset Beach Park, there have been no previous archaeological investigations specifically at this location. Figure 5 shows the locations of previous archaeological investigations in Pupukea and Paumalu *ahupua'a*.

Mayberry and Haun (1988) performed archaeological work for the Pupukea-Paumalu Development located on the inland (*mauka*) side of Kamehameha Highway (opposite the project area). It consisted of a 1,130 acre parcel varying in elevation from 15 to 775 ft asl. Sixty sites were recorded; however only eight were in the *ahupua'a* of Paumalu. They appear to range in date from pre-contact/early historic to circa 1970. Many of the features

were damaged by cattle grazing, agricultural clearing, or erosion. The sites and cultural materials examined consisted of pre-contact or early historic rockshelters and caves, some containing human burials and petroglyphs; agricultural features such as terraces, irrigation ditches, and clearing mounds; habitation complexes; a wagon road and railroad bed; and World War II coastal defenses. The variety of sites indicates an extensive use of the *ahupua'a* over time. Any number of people utilizing the region could have used the area now designated as Sunset Beach Park for marine resources and recreation. A *heiau* or small shrine(Site Number 50-80-01-3868), as indicated by the presence of massive walls and coral, was observed outside the project area at an elevation of 22 ft asl.

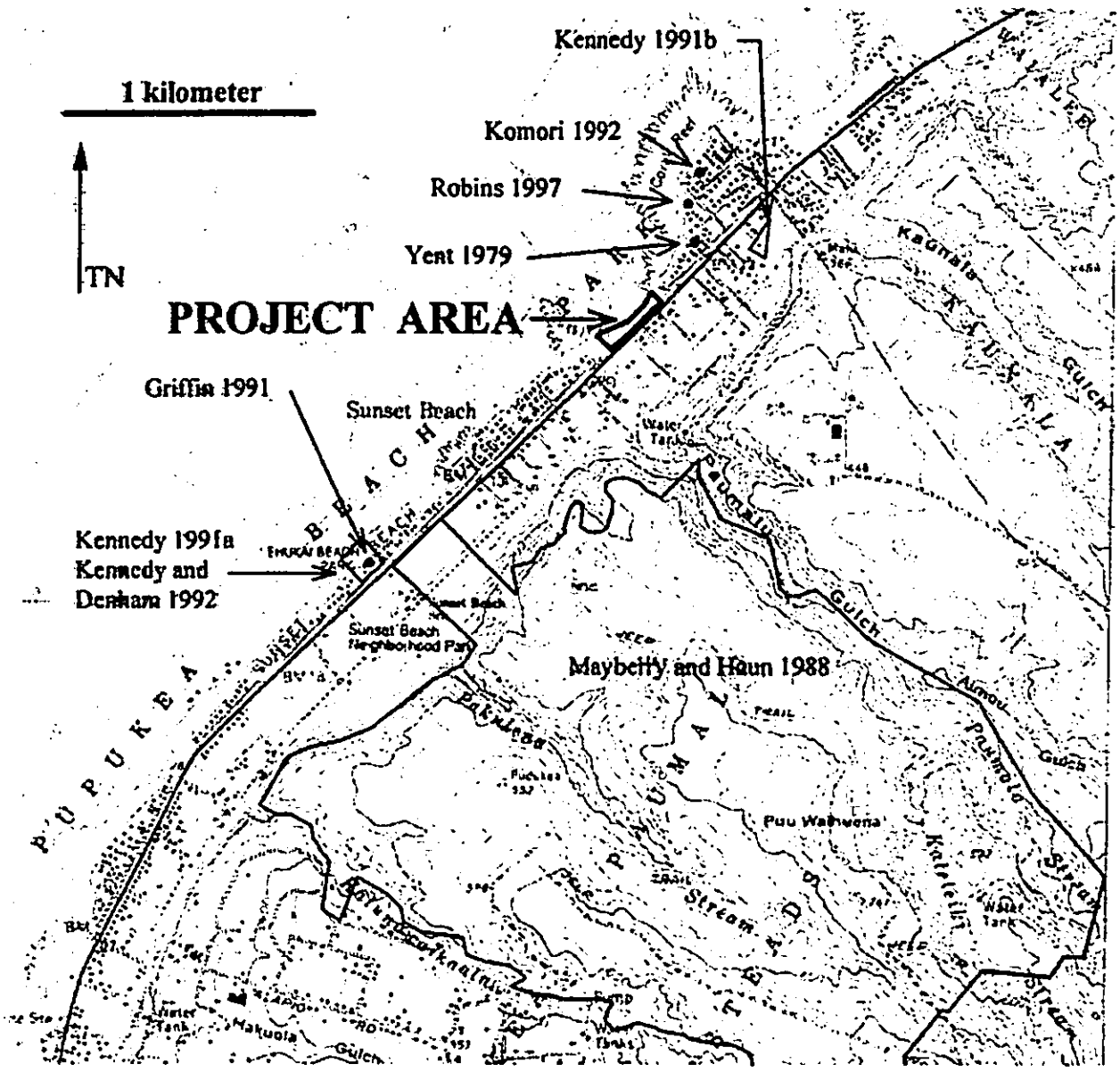

Figure 5. Locations of previous archaeological investigations in Pupukea and Paumalu *ahupua'a*.

Additional archaeological investigations near the project area include that of Dennison (1979), Griffin (1991), Kennedy (1991a, 1991b), Kennedy and Denham (1992), Komori (1992), Robins (1997), and Yent (1979). An historic walled enclosure, probably for animals, was recorded by Dennison (1979). Although it is now destroyed, it was located about 0.2 km from the coast and 3 km southwest of the Sunset Beach project area. Kennedy (1991) surveyed two 1.4 acre parcels about 610 m from the ocean and about 0.2 km from the current project area. The results of the survey indicate that the area was disturbed by bulldozer clearing and road modification. No archaeological remains were observed.

Other archaeological investigations primarily concern human remains inadvertently discovered during construction activities. A burial was uncovered during construction of a rock wall at Ehukai Beach (Griffin 1991; Kennedy and Denham 1992). It was located about 0.8 km from the beach and 1.2 km southwest of the current project location. The burial pit apparently originated from a layer of very dark gray silty sand, about 20 cm thick. Several pit and depression features were recorded nearby. Additional skeletal materials from another individual were recovered from the backdirt pile. Yent (1979) recorded two burials (male and female) observed eroding out of the sand dune face on the makai side of a Pupukea-Paumalu Beach lot, which was located about 0.25 km northeast of the Sunset Beach project area. The sediment surrounding the burials consisted of a very dark grayish brown sand with abundant charcoal. The burials were reinterred elsewhere to protect them from further damage. Komori (1992) recorded a burial at the Sunset Beach lots, located about 0.6 km northeast of the Sunset Beach project area. Another burial discovered during construction activities was located near the coastline, about 0.4 km to the northeast of the current project area. It was probably a secondary interment associated with earlier cesspool construction (Robins 1997).

The previous archaeological investigations conducted within Paumalu *ahupua'a,* although limited in scope, indicate that pre-contact Hawaiian people in the region planted crops in upland terraces and utilized the marine resources along Sunset Beach. The powerful winter waves may have restricted use of Sunset Beach during the winter, but calm summer water and the importance of seafood in the diet assured the utilization, even if seasonal, of the beach. A nearby *heiau* or shrine attests to the performance of religious activities. The Hawaiians in the region appear to have buried their dead in beach sand deposits near the shoreline and in caves. It is probable that families tended to bury the dead in ancestral locations, which suggests a possibility for additional burials near Sunset Beach project area.

The limited archaeological research suggests that additional research in the area may provide more information into the past lifeways. However, prior development and ranching activities have likely destroyed many archaeological sites and features.

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III. FIELD INVESTIGATIONS

Field investigations in the Sunset Beach project area were begun on 15 September 1997, to determine the presence or absence of significant archaeological remains within the area proposed by the City and County of Honolulu for beach improvements. The strategy for discovering such remains initially consisted of placing auger borings (3 1/2 inch diameter) at 5 m intervals throughout the project area, and screening the extracted sediment through 1/8 inch screens. It was expected that the auger tests would extend 0.80 to 1.0 m below the surface. The beach sand, however, extended to a depth greater than 3 m. A different strategy was then employed, which consisted of excavating auger tests 10 m apart, alternating between a depth of 1.5 to 3 m. This still allowed a systematic sampling of the project area, though it sacrificed a closer sampling interval for increased depth of the sampling.

Three trenches were excavated to further examine the deposits in more detail than auger borings allowed. The presence of cultural materials in the auger borings dictated the locations of the test trenches. All sediment from Test Trenches 1 and 3, located at Site 50-80-01-5585 and 50-80-01-5586 respectively, were screened through 1/4 inch screens, and the undisturbed cultural deposit was screened through 1/8 inch screens. The midden was bulk bagged and taken to the lab for sorting and analysis. Sediment from Test Trench 2 was screened through a 1/4 inch in order to ascertain the presence or absence of cultural material that may not have shown up in an auger test.

The presence of human burials, either isolated or in groups, was regarded as a possibility prior to the start of the fieldwork since burials have been documented from adjacent areas. While the sampling strategy cannot not preclude the possibility of burials being present, the intensity of the sampling was considered appropriate to 1) determine the stratigraphic integrity of the beach sands over a broad area, and thus the probability that burials would be present or preserved at all, and 2) to provide some qualitative indication of the probability that such remains might exist (i.e., no evidence for burials would indicate that burials, if present, are likely isolated occurrences and present only in low density).

AUGER TESTS

A total of 32 auger tests were excavated throughout Sunset Beach project area. The particulars of each boring are described below (Table 2). These tests disclosed archaeological deposits at both the north and south ends of the project area. These were further investigated with the excavation of Trenches 1 and 3 (see Fig. 2).

Archaeological materials consisting of midden was first discovered in Auger Test 6. The deposit appeared very localized since it was not apparent in neighboring auger tests (a radius of approximately 5 m). The deposit was examined more carefully by excavating a

Trench 1 near Auger Test 6. As can be seen from the Figure 4 map, these deposits are only a short distance beyond the northwestern corner of LCA 3777 belonging to Apaa.

Archaeological remains near Trench 3 were more extensive than those around Trench 1. Although these remains did not continue southwest towards the central portion of the project area, they were evident in the region to the west and north (Augers 21 and 26). These deposits are only a short distance beyond the northwestern corner of LCA 4013, which belongs to Holoakea.

The auger tests in the central portion of the project area (Auger Tests 6-20, 22-26, and 28-32) (Photo 1), revealed mostly beach sand with some recent trash, usually between 0 and 75 cm below surface, however Auger Test 17 contained a glass sherd between 90 and 110 cm below surface. A third trench (Trench 2) was excavated in the central portion of the project area to better define the natural stratigraphy, though slumping sand prevented careful inspection of the profile. Nevertheless, it was clear that no significant archaeological deposits were present at this location or anywhere in the central portion of the project area.

Photo 1. Auger Test 27 at Sunset Beach, excavated by Leona Hamano.

Table 2. Sediment Description, Auger Tests 1 through 33.

Auger Test	Layer	Depth (cm)	Munsell Color (dry)	Description
1	I	0-35	10YR3/3	Dark brown; sandy loam with subrounded, coarse to very coarse, calcareous sand apparent in matrix; medium to fine rootlets; apparently stream deposit.
	II	35-45	10YR3/3	Dark brown; sandy loam with subrounded, coarse, calcareous sand apparent in matrix, slightly sticky, slightly plastic; apparently stream deposit.
	III	45-100	10YR3/3	Dark brown; subrounded, course calcareous sand with slight loam; apparently stream deposit.
	IV	100-160	10YR3/3	Dark brown; subrounded, course calcareous sand with very slight loam; apparently stream deposit.
	IVa	~115	10YR3/2	Very dark grayish brown; loam with slight subrounded, coarse calcareous sand; slightly sticky, slightly plastic; apparently stream deposit.
	V	160-210	7.5YR3/2	Dark brown; subrounded to rounded, coarse, calcareous, sand with slight loam; apparently stream deposit.
	VI	210-235	10YR4/3	Dark brown; rounded, coarse, calcareous sand; a apparently stream deposit.
	VII	235+	10YR3/3	Dark brown; subrounded, course, calcareous sand; apparently stream deposit.
2	I	0	—	Asphalt buried under thin calcareous sand layer.
3	I	0-46	10YR3/3	Dark brown; subrounded, coarse, calcareous sand; associated with road construction.
	II	46-50	10YR3/3	Dark brown; subrounded to rounded, coarse, calcareous sand; associated with road construction.
4	I	0-10	10YR5/3	Brown; rounded, coarse, calcareous sand; associated with road construction.
	II	10-37	10YR5/3	Brown; rounded to subrounded, coarse, calcareous sand with slight gravel and pebble sized basalt and coralline rocks; associated with road construction.
	III	37-47	10YR3/3	Dark brown; rounded to subrounded, coarse, calcareous sand with slight to moderate gravel and pebbles sized basalt and coralline rocks; may be associated with road construction.
	IV	47-75	10YR4/3	Dark brown; subrounded to rounded, coarse, calcareous sand with slight gravel sized basalt and coralline rocks; unknown origin.
	V	75-113	10YR3/3	Dark brown; rounded to subrounded, coarse, calcareous sand with slight to moderate gravel and pebbles sized basalt and coralline rocks; unknown origin.
5	I	0-150	10YR6/4	Light yellowish brown; subrounded to rounded, coarse to very coarse, calcareous sand.
	II	150-165	10YR6/3	Pale brown; subrounded, coarse, calcareous sand.
	III	165-175	10YR6/4	Light yellowish brown; subrounded to rounded, coarse to very coarse, calcareous sand.
6	I	0-60	10YR3/3	Dark brown; subrounded to rounded, coarse, calcareous sand.
	II	60-62	10YR3/1	Very dark gray; rounded, coarse, calcareous sand with slight loam; charcoal flecks and marine shell.
	III	62-326	10YR6/4	Light yellowish brown; subrounded, coarse, calcareous sand with dark (10YR4/2) mottles containing slight charcoal to 300 cm bs.
7	I	0-100	10YR3/3	Dark brown; subrounded to rounded, coarse, calcareous sand with slight loam; associated with road construction.
	II	100-180	10YR4/3	Dark brown; subrounded to rounded, coarse, calcareous sand; unknown origin.
	III	180-260	10YR6/4	Light yellowish brown; subrounded, coarse, calcareous sand.
8	I	0-58	10YR6/4	Light yellowish brown; subrounded to rounded, coarse, calcareous sand.
	II	58-68	10YR3/3	Dark grayish brown; rounded coarse, calcareous sandy loam; apparently potting soil associated with landscaped plants.

Table 2. Sediment Description, Auger Tests 1 through 33 (continued).

Auger Test	Layer	Depth (cm)	Munsell Color (dry)	Description
9	I	0-40	10YR3/3	Dark brown; subrounded to rounded, coarse, calcareous sand with slight loam; associated with road construction.
10	I	0-30	10YR3/2	Very dark grayish brown; subrounded to rounded, medium to loam with coarse, calcareous sand; associated with road construction.
	II	30-35	10YR2/1	Black; rounded, loam with coarse, calcareous sand; appears modified by road construction.
11	I	0-120	10YR4/2	Dark grayish brown; subrounded to rounded, coarse calcareous sand with slight loam.
	II	120-170	10YR6/3	Pale brown; subrounded to rounded, coarse, calcareous sand with slight subrounded to rounded gravel and pebbles sized basalt and coralline rocks.
12	I	0-70	10YR6/4	Light yellowish brown; subrounded to rounded, coarse, calcareous sand.
	II	70-75	10YR4/3	Dark brown; subrounded to rounded, coarse, calcareous sand with very few angular basalt gravel and rounded coralline gravels.
	III	75-275	10YR6/4	Light yellowish brown; subrounded to rounded, coarse, calcareous sand.
13	I	0-107	10YR6/4	Light yellowish brown; subrounded to rounded, coarse, calcareous sand.
	II	107-109	10YR4/3	Dark brown; subrounded to rounded, coarse, calcareous sand with very few angular basalt gravel and rounded coralline gravels.
	III	109-160	10YR6/4	Light yellowish brown; subrounded to rounded, coarse, calcareous sand.
14	I	0-106	10YR6/4	Light yellowish brown; subrounded to rounded, coarse, calcareous sand.
	II	106-120	10YR7/4	Very pale brown; rounded, coarse, calcareous sand.
	III	120-123	10YR4/3	Dark brown; rounded, coarse, calcareous sand.
	IV	123-195	10YR5/6	Yellowish brown; rounded to subrounded, coarse, calcareous sand.
	V	195-220	10YR6/4	Light yellowish brown; subrounded to rounded, coarse, calcareous sand.
15	I	0-93	10YR6/4	Light yellowish brown; subrounded to rounded, coarse, calcareous sand.
	II	93-103	10YR5/4	Yellowish brown; subrounded to rounded, coarse, calcareous sand.
	III	103-145	10YR6/4	Light yellowish brown; subrounded to rounded, coarse, calcareous sand.
16	I	0-127	10YR6/4	Light yellowish brown; subrounded to rounded, coarse, calcareous sand.
	II	127-140	10YR5/3	Brown; subrounded to rounded, course, calcareous sand.
	III	140-155	10YR6/4	Light yellowish brown; subrounded to rounded, coarse, calcareous sand.
17	I	0-42	10YR7/3	Very pale brown; rounded, very coarse, calcareous sand.
	II	42-70	10YR5/4	Yellowish brown; subrounded to rounded, very coarse, calcareous sand.
	III	70-90	10YR6/4	Light yellowish brown; subrounded to rounded, coarse, calcareous sand.
	IV	90-110	10YR4/2	Dark grayish brown; rounded, coarse, calcareous sand.
	V	110-160	10YR6/4	Light yellowish brown; subrounded to rounded, coarse, calcareous sand.
18	I	0-30	10YR7/2	Light gray; rounded, coarse to very coarse, calcareous sand.
	II	30-50	10YR5/4	Yellowish brown; subrounded to rounded, very coarse, calcareous sand.
	III	50-75	10YR5/3	Brown; subrounded to rounded, coarse, calcareous sand.
	IV	75-96	10YR4/2	Dark grayish brown; rounded, coarse, calcareous sand.
	V	96-160	10YR5/3	Brown; subrounded, coarse, calcareous sand with very slight loam.
19	I	0-59	10YR7/3	Very pale brown; rounded, very coarse, calcareous sand.
	II	59-85	10YR3/1	very dark gray; rounded, coarse, calcareous sand.
	III	85-150	10YR6/3	Pale brown; subrounded to rounded, coarse, calcareous sand.
20	I	0-60	10YR6/4	Light yellowish brown; subrounded to rounded, coarse, calcareous sand.
	II	60-80	10YR4/3	Brown; subrounded to rounded, very coarse, calcareous sand.
	III	80-150	10YR6/3	Pale brown; subrounded to rounded, coarse to very coarse, calcareous sand.

Table 2. Sediment Description, Auger Tests 1 through 33 (continued).

Auger Test	Layer	Depth (cm)	Munsell Color (dry)	Description
21	I	0-8	10YR3/2	Very dark grayish brown; subrounded coarse sandy loam, with abundant medium to fine roots; slight midden.
	II	8-17	10YR6/3	Pale brown; rounded, coarse, calcareous sand.
	III	17-60	10YR2/1	Black; rounded, coarse, sandy loam with slight, angular, basalt pebbles; midden.
	IV	60-121	10YR5/3	Brown; subrounded to rounded, coarse, calcareous sand.
	V	121-140	10YR5/4	Yellowish brown; subrounded to rounded, coarse, calcareous sand.
22	I	0-60	10YR6/4	Light yellowish brown; subrounded to rounded, coarse, calcareous sand.
	II	60-65	10YR4/3	Brown; subrounded to rounded, very coarse, calcareous sand.
	III	65-160	10YR6/3	Pale brown; subrounded to rounded, coarse to very coarse, calcareous sand.
23	I	0-60	10YR6/4	Light yellowish brown; subrounded to rounded, coarse, calcareous sand.
	II	60-75	10YR3/3	Dark brown; subrounded to rounded, coarse, calcareous sand.
	III	75-200	10YR6/4	Light yellowish brown; subrounded to rounded, coarse to coarse, calcareous sand.
24	I	0-30	10YR6/4	Light yellowish brown; subrounded to rounded, coarse, calcareous sand.
	II	30-64	10YR5/3	Brown; subrounded to rounded, coarse, calcareous sand.
	III	64-200	10YR7/3	Very pale brown; subrounded to rounded, coarse calcareous sand.
25	I	0-34	10YR6/4	Light yellowish brown; subrounded to rounded, coarse to very coarse, calcareous sand.
	II	34-74	10YR3/2	Very dark grayish brown; rounded, coarse, calcareous sand.
	III	74-119	10YR6/3	Pale brown; subrounded to rounded, coarse, calcareous sand.
	IV	119-140	10YR6/4	Light yellowish brown; subrounded to rounded, coarse, calcareous sand.
26	I	0-29	10YR6/4	Light yellowish brown; subrounded to rounded, coarse to very coarse, calcareous sand.
	Fe I I	29-35	10YR3/1	Very dark grayish brown; rounded, coarse, calcareous sand.
	Fe I II	55-95	10YR4/2	Dark grayish brown; rounded, coarse, calcareous sand.
	II	60-80	10YR3/2	Very dark grayish brown; rounded, coarse, calcareous sand.
	III	80-150	10YR6/3	Pale brown; subrounded to rounded, coarse to very coarse, calcareous sand.
27	I	0-14	10YR3/1	Very dark gray; rounded to subrounded, coarse sandy loam.
	II	14-42	10YR5/3	Brown; subrounded to rounded, coarse, calcareous sand with very slight angular basalt gravels and subangular coral gravels.
	III	43-90	10YR5/3	Brown; subrounded, coarse, calcareous sand.
28	I	0-41	10YR6/4	Light yellowish brown; subrounded to rounded, coarse, calcareous sand.
	II	41-60	10YR5/3	Brown; subrounded to rounded, coarse, calcareous sand.
	III	60-112	10YR6/3	Light yellowish brown; subrounded to rounded, coarse calcareous sand.
29	I	0-50	10YR2/2	Very dark brown; rounded, coarse, calcareous sand.
	II	50-140	10YR5/2	Grayish brown; subrounded to rounded, coarse, calcareous sand.
30	I	0-69	10YR6/4	Light yellowish brown; subrounded to rounded, coarse, calcareous sand.
	II	69-152	10YR5/3	Brown; subrounded to rounded, coarse, calcareous sand.
	III	64-200	10YR6/4	Light yellowish brown; subrounded to rounded, very coarse calcareous sand.
31	I	0-152	10YR6/4	Light yellowish brown; subrounded to rounded, coarse, calcareous sand.
32	I	0-160	10YR6/4	Light yellowish brown; subrounded to rounded, coarse, calcareous sand.
33	I	0-150	10YR6/4	Light yellowish brown; subrounded to rounded, coarse, calcareous sand.
	II	150-160	10YR5/3	Brown; subrounded to rounded, coarse, calcareous sand.

TRENCH 1

Trench 1 was excavated in order to better observe the nature of the archaeological deposits disclosed in Auger Test 6. It was placed about 2 m northwest of Auger Test 6 and 2.5 m north of the bike path (Photo 2). It extended 1.25 m at an angle of 304 degrees magnetic north and 0.60 m at 34 degrees magnetic north. It was excavated to a depth of 126 cm below surface (Photo 3; Fig. 6). Four layers were observed (Table 3). Layer I consisted of loose beach sand, Layer II was a hard, compact layer associated with road construction, and Layers III and IV were cultural layers with thin bands of beach sand and dark charcoal-stained sediment throughout. See *Data Summaries and Analysis* for the analysis of the recovered midden.

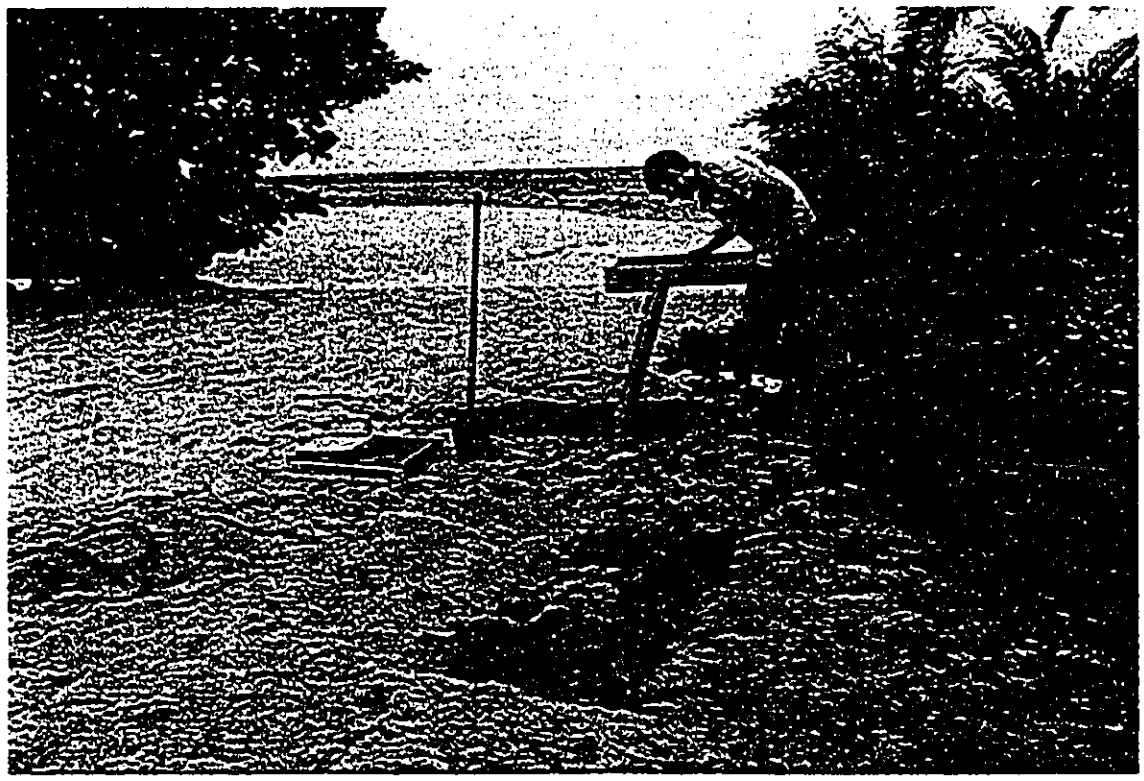

Photo 2. Beginning of excavation at Trench 1 with Kevin Magnuson.

Photo 3. Trench 1 northeast profile showing numerous lenses.

Table 3. Sediment Description, Test Trench 1.

Layer	Depth (cm)	Munsell Color (dry)	Description
I	0-8	10YR6/4	Wind deposited beach sand; light yellowish brown; subrounded to rounded, coarse, calcareous sand.
II	8-13	10YR5/4	Yellowish brown; clay loam with coarse, calcareous sand; hard and compact; abundant rounded pebbles and small cobbles of coral and basalt; clear boundary.
III	13-97	10YR6/3 to 10YR4/3	Pale brown to brown; subrounded to rounded, coarse, calcareous sand with abundant lenses of clean beach sand (10YR6/3 pale brown) and dark sediment. The lenses of dark sediment all consist of subrounded to rounded, coarse, calcareous sand. Their colors vary: 10YR3/3 (dark brown), 10YR3/2 (very dark grayish brown), 10YR3/1 (very dark gray), and 10YR4/2 (dark grayish brown); few medium sized roots located to a depth of 1 m bs; few to moderate angular basalt rocks, most of which appear fire cracked. They gradually increase in size with depth, from gravels and pebbles to large cobbles.
IV	97-126	10YR6/3 to 10YR4/3	Layer IV looked very similar to Layer III, however there was more charcoal and artifacts present.

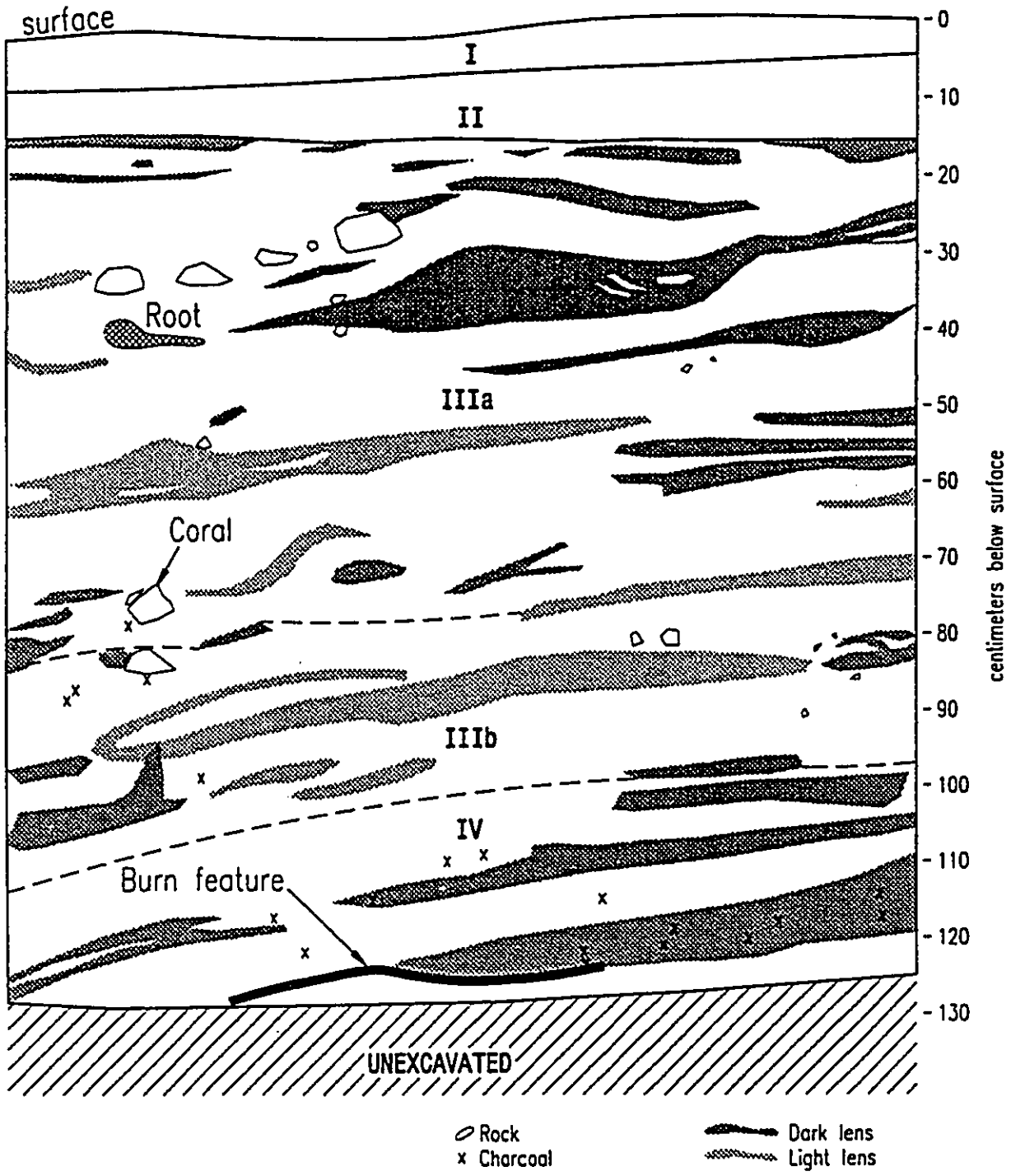

Figure 6. Profile of north face of Trench 1.

TRENCH 2

Trench 2 was excavated in the central portion of the project area in order to better define the natural stratigraphy appearing in the auger tests (Table 4). Although the size of the trench was originally 3 m by 1 m, it was extended to a 3 m square because the sand was loose and continually slumped (Photo 4). The trench was oriented parallel to the beach at 304 degrees magnetic north. During excavation, a thin layer of darker sand was observed at 150 to 165 cm bs. This appears to indicate a period of sediment stability when the A horizon was forming. At this time, plants were probably growing on the beach, leaving a layer of organic matter which appears slightly darker than that above and below. Sunset Beach is a highly dynamic depositional zone, where sand is eroded and redeposited; especially during storms and high winter waves.

Table 4. Sediment Description, Test Trench 2.

Layer	Depth (cm)	Munsell Color (dry)	Description
I	0-160	10YR6/4	Light yellowish brown; subrounded to rounded, coarse, calcareous sand; loose.
II	160-165	10YR4/3	Dark brown; subrounded to rounded, coarse, calcareous sand with very few angular basalt gravel and rounded coralline gravels.

Photo 4. Trench 2 during excavation. Note extensive slumping. Archaeologists Tina Mangieri and Ephraim McDowell.

TRENCH 3

Trench 3 was located in the northeast portion of the project area (Photo 5). It was excavated into the side of an embankment which at the time was undergoing erosion by heavy storm waves and pedestrian traffic. The embankment rises 1.20 m above the lower, eroded sand. The test trench is 2.30 m long on an east west axis, and about 0.30 m wide. It was excavated to a depth of 1.32 m below surface (Photo 6; Fig. 7). Two thin lenses (A and B) were encountered 0.06 to 0.07 m and 0.13 to 0.15 m below the surface. They are characterized by a darker color. Two features were encountered during excavation. *Feature 1, located in the mid-section of* Layer IIa, consisted of a burn feature 0.48 m wide extending from 0.17 to 0.35 m below surface. A concentrated layer of charcoal and ash was noted at the base of the feature. Scattered charcoal and ash were dispersed throughout the rest of the feature. A thin concentration of ash and charcoal was also observed at 0.24 to 0.26 m below surface and 0.27 to 0.28 m below surface. These lenses may indicate multiple uses of the burn feature. Charcoal was moderately dispersed through much of Layer IIa surrounding the burn feature, apparently originating from the burn feature. See *Data Summaries and Analysis* for the analysis of the recovered midden.

Feature 2 consisted of a postmold originating at the base of Layer IIc. It was located immediately below Feature 1, and extended from 0.50 to 0.88 m below surface. It was 0.12 m wide near the top, 0.16 m wide at 0.25 m below surface, and constricted to a point at its base. Slight charcoal flecking was observed throughout Feature 2. See *Data Summaries and Analysis* for the analysis of the recovered midden.

Table 5. Sediment Description, Test Trench 3.

Layer	Depth (cm)	Munsell Color (dry)	Description
I	0-13	10YR6/4	Light yellowish brown; subrounded to rounded, coarse, calcareous sand; loose.
Lens A	6-7	10YR3/2	Very dark grayish brown; subrounded, coarse calcareous sand.
Lens B	13-15	10YR3/2	Very dark grayish brown; subrounded, coarse calcareous sand.
Fe 1	17-35	10YR3/1	Very dark gray; subrounded to rounded, coarse calcareous sand with slight loam.
Fe 2	50-88	10YR4/2	Dark grayish brown; rounded, coarse, calcareous sand.
II	15-55	10YR3/2	Very dark grayish brown; rounded, coarse, calcareous sand.
III	55-132	10YR7/2	Light gray; subrounded to rounded, coarse, calcareous sand; loose.

Photo 5. Overview of Trench 3 excavation with Tina Mangieri and Ephraim McDowell.

Photo 6. East profile of Trench 3 showing postmold.

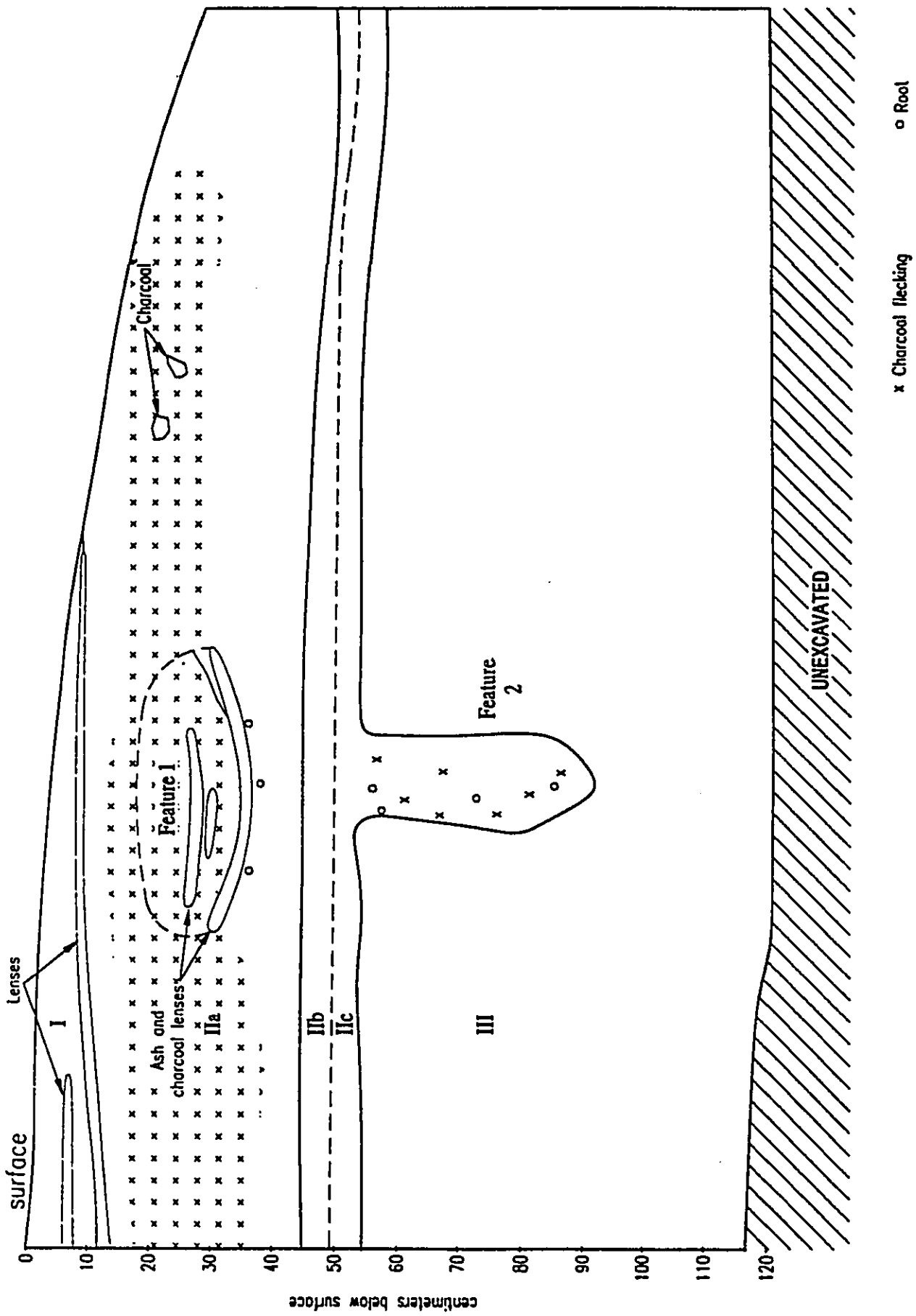

Figure 7. Profile of east face of Trench 3.

IV. DATA SUMMARIES AND ANALYSIS

Artifacts, midden analysis and radiocarbon dates are discussed in this section. The recovered cultural materials indicate that Layers I and II are historic in origin, Layer IIIa is probably a result of deposition during both the historic and pre-contact periods, and Layers IIIb and IV are pre-contact deposits.

ARTIFACTS

Artifacts recovered from Trench 1 are summarized in Table 6 (no artifacts were recovered from Trench 3). Layers I and II contained historic materials such as ceramics, glass, and rubber, indicating a recent age for the deposit. Although Layer IIIa contained one non-diagnostic glass fragment, a basalt flake was also recovered. This layer may indicate an early contact period or perhaps post depositional turbations in the soft sand which caused materials from above layers to be forced down into the deeper sediments. Layer IIIb did not contain historic materials, but rather two basalt flakes. Layer IV contained pre-contact cultural materials, including two coral abrader fragments, one volcanic glass flake, and nine basalt flakes. These tools suggest the area was once used as a manufacturing location where tools may have been made or repaired.

Two coral abrader fragments were recovered from Layer IV, at a depth between 97 and 126 cm bs. The fragments weighed 22.0 g. Their similar shapes suggest they may have once been part of the same tool. Grinding is visible as a 'V' shape on the dorsal side of the artifact (Fig. 8).

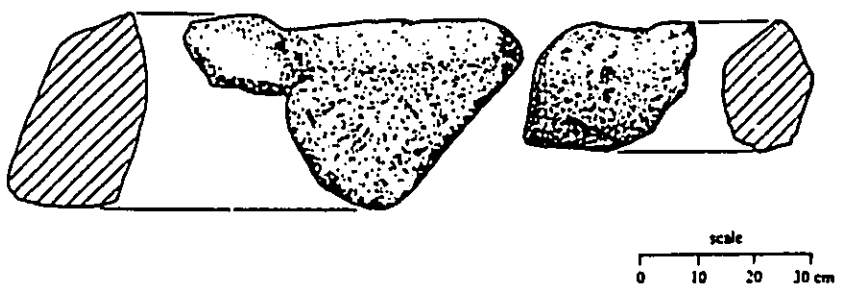

Figure 8. Coral abrader fragments recovered from Layer IV.

Table 6. Artifact Identification from Trench 1.

Age	Material Type	Artifact Type	Artifact Variety	I MNI	I weight, g	II MNI	II weight, g	IIIa MNI	IIIa weight, g	IIIb MNI	IIIb weight, g	IV MNI	IV weight, g	Total Count	Total Weight, g
PRE-CONTACT	basalt	flake						1	0.16	2	2.01	9	32.08	12	34.25
	volcanic glass	flake										1	0.21	1	0.21
	coral	abrader fragments										2	22.00	2	0.34
HISTORIC	earthen-ware	sherd		2	0.34									2	0.34
	glass	fragment		16	19.17	3	1.15	1	0.51					20	20.83
	rubber	fragment	tire?			1	3.69							1	3.69
TOTAL				18	19.51	4	4.84	2	0.67	2	2.01	12	54.29	38	81.32

MNI = Minimum number of individuals.

MIDDEN

SHELL

Results of the shell analysis are summarized in Table 7. Both marine and land snail shells were recovered from the midden. The presence of land snails seems to indicate a surface free from salt spray and beach waves during occupation. The variety of marine shells reflects the diverse marine life in the area. However, the large amounts of mytilid, turban, and echinoid shell, all edible, suggest these types were sought out by the ancient Hawaiians as food resources. Other shellfish may also have been eaten at the site, however their numbers do not appear significantly different from what would naturally occur in beach deposits. The different number of shellfish in each layer is probably the result of disposal patterns rather than a change in diet over time. However, a much larger sample of remains is needed before patterns of pre-contact shellfish use and discard can be reliably determined.

The variety of shells recovered from the midden reflect the marine environment present along the shore of Sunset Beach. Mytilids or mussels are commonly found along rocky shores where they cling to substrate by a strong byssus (Kay 1979:511). Most turbinids, from which numerous operculum and a few-whirled globose turban shells derive, live in the shallow waters of the littoral zone. They are common under rocks in shallow water shoreward of fringing reefs (Kay 1979:59). Sea urchins, on the other hand, live in holes in the reefs. The Hawaiians at Sunset Beach appear to have preferred *Echinothrix* spp. (*wana* in Hawaiian). Titcomb notes, "*Wana* were evidently the most delicious eating of the urchins. Kepelino says all kinds of *wana* are good to eat raw, and are also good cooked or dried in the sun" (Titcomb et al.1979:371). The drawback in collecting this type of urchin is their sharp spines with poison sacks that can give deep, painful puncture wounds. Thus, they were usually removed with a rock.

The shellfish recovered at Sunset Beach appears to suggest a gender-based recovery because "It was chiefly women's work to gather shellfish and seaweeds (*limu*). Every day they went out on the reefs and shores in numbers, with children searching right along with them for everything edible" (Titcomb et al. 1979:327). Although women and children were collecting shellfish in the 19th century, it is not know how far back in time such a pattern may extend. In terms of preparation, shellfish was often eaten raw, though it was also cooked by boiling in water or baking over coals. The high concentration of shellfish in various lenses or pockets of similar sediment may indicate the location where the remains of a meal was discarded.

Table 7. Marine Shell Identification from Trench 1, Including Minimum Number of Individuals and Weights.

CLASS	TAXON	IIIa MNI[1]	IIIa weight, g	IIIb MNI	IIIb weight, g	IV MNI	IV weight, g	Total Count of MNI	Percent MNI	Total weight	Percent weight/ g
Bivalve	Archidae spp.	3	0.06					3	0.09%	0.06	0.00%
	Cardita thaanumi			1	0.08			1	0.03%	0.08	0.01%
	Ctena bella	9	1.44	9	1.27			18	0.54%	2.71	0.18%
	Dimydae spp.	1	0.42					1	0.03%	0.42	0.03%
	Fragum mundum	3	0.05					3	0.09%	0.05	0.00%
	Lasaeidae spp.	1	0.44	1	0.04			2	0.06%	0.48	0.03%
	Mytilidae spp.			1	22.21			1	0.03%	22.21	1.49%
	Brachidontes crebristriatus	38	42.07	84	30.13	102	44.49	224	6.69%	116.69	7.82%
	Pectinidae spp.	1	0.02	2	0.18			3	0.09%	0.20	0.01%
	Periglypta reticulata	1	4.39	1	11.95			2	0.06%	16.34	1.09%
	Pteridae spp.			1	0.36			1	0.03%	0.36	0.02%
	Veneridae spp.			1	0.01			1	0.03%	0.01	0.00%
Gastropod	Archidae spp.	3	0.06					3	0.09%	0.06	0.00%
	Architectonicidae spp.			1	0.01			1	0.03%	0.01	0.00%
	Cerithiidae spp.			1	0.10			1	0.03%	0.10	0.01%
	Conidae spp.	2	3.64	1	7.82	1	5.42	4	0.12%	16.88	1.13%
	Costellariidae spp.	2	0.11					2	0.06%	0.11	0.01%
	Ctena bella					2	0.31	2	0.06%	0.31	0.02%
	Cymatiidae spp.	1	0.29					1	0.03%	0.29	0.02%
	Cypraeidae spp.	1	4.29	2	6.07	1	1.02	4	0.12%	11.38	0.76%
	Daphnellinae spp.			1	0.14			1	0.03%	0.14	0.01%
	Dialidae spp.	1	0.05					1	0.03%	0.05	0.00%
	Hipponix foliaceus	5	0.47	19	1.24			24	0.72%	1.71	0.11%
	Hipponix imbricatus	14	2.09	42	5.15	5	1.94	61	1.82%	9.18	0.61%
	Laemodonta octanfracia			1	0.03			1	0.03%	0.03	0.00%
	Nassariidae spp.					1	0.24	1	0.03%	0.24	0.02%

Table 7. Marine Shell Identification from Trench 1, Including Minimum Number of Individuals and Weights (continued).

CLASS	TAXON	IIIa MNI[1]	IIIa weight, g	IIIb MNI	IIIb weight, g	IV MNI	IV weight, g	Total Count of MNI	Percent MNI	Total weight	Percent weight/g
Gastropod (cont'd.)	operculum	865	113.74	1,841	232.50	35	16.07	2,741	81.92%	362.31	24.27%
	Periglypta reticulata					1	3.71	1	0.03%	3.71	0.25%
	Pyramidellidae spp.	4	0.58					4	0.12%	0.58	0.04%
	Sabia conica			8	0.13			8	0.24%	0.13	0.01%
	Strombidae spp.	2	2.51	1	4.03	1	2.62	4	0.12%	9.16	0.61%
	Tellina palatam			1	0.07	1	1.57	2	0.06%	1.64	0.11%
	Tellinidae spp.			1	0.01			1	0.03%	0.01	0.00%
	Thaididae spp.	2	0.54	2	1.11			4	0.12%	1.65	0.11%
	Theodoxus neglectus	1	0.07	1	0.13			2	0.06%	0.20	0.01%
	Trochidae spp.	2	1.02	2	5.88	1	0.73	5	0.15%	7.63	0.51%
	Turbinidae spp.	1	0.14	2	2.09			3	0.09%	2.23	0.15%
	Turbo sandwicensis	2	34.04	2	56.26	1	38.59	5	0.15%	128.89	8.63%
	Vanikoridae spp.			1	0.01			1	0.03%	0.01	0.00%
	Vermetidae spp.	2	0.17	14	0.64			16	0.48%	0.81	0.05%
	Williamia radiata			1	0.01			1	0.03%	0.01	0.00%
Echinoderm	Echinoderm	4	94.84	4	84.84	2	22.44	10	0.30%	202.12	13.54%
Crustacean	Crustacean			2	0.55			2	0.06%	0.55	0.04%
Land snail	land snail, large			1	0.13			1	0.03%	0.13	0.01%
	land snail, small	18	0.53	69	1.20			87	2.60%	1.73	0.12%
	land snail, very small	30	0.39	45	0.52			75	2.24%	0.91	0.06%
Shell	unidentified	2	214.87	3	353.40	1	0.06	6	0.18%	568.33	38.07%
Total No.		1,021		2,170		155		3,346	100.00%		
Percent of Total No.		30.51%		64.85%		4.63 %		100%			
Total Weight			523.33		830.30		139.21			1,492.84	100.00%
Percent of Weight			35.06%		55.62%		9.33%			100.00%	

1 MNI = Minimum number of individuals.

Table 8. Shell Weights and Counts for Trench 3.

CLASS	TAXON	I MNI[1]	I Shell weight, g	IIa MNI	IIa weight, g	IIb MNI	IIb weight, g	Total Count of MNI	Percent MNI	Total weight	Percent weight/g
Bivalve	Ctena bella	1	0.34					1	0.34	6%	1%
	Isognomon californicum	1	0.21					1	0.21	6%	1%
	Modiolus matris	1	0.60					1	0.60	6%	2%
	Periglypta reticulata	1	0.36	1	0.52			2	0.88	13%	3%
Echinoderm	Echinoderm	2	2.97	1	0.86	1	0.19	4	4.02	25%	15%
Gastropod	Conus sandwicensis			2	10.93			2	10.93	13%	42%
	Cypraeidae spp.	1	1.08					1	1.08	6%	4%
	Hipponix imbricatus	1	0.44					1	0.44	6%	2%
	Turbo sandwicensis	1	5.11					1	5.11	6%	20%
Shell	unidentified	2	2.47					2	2.47	13%	9%
Total No.		11		4		1		16		100%	
Percent of Total No.		69%		25%		6%		100%			
Total weight			13.58		12.31		0.19		26.08		100%
Percent of Weight			52%		47%		1%		100%		

1 MNI = Minimum number of individuals.

ANIMAL BONE

Few animal bones were recovered during excavation. The majority (10.93 g) were from Trench 1; Trench 3 only had 0.46 g. Mammal bones formed the largest portion of identified bone and fish bone the least. Bird bone was not observed, however some fragments may be included in the unidentified category. Most of the bones, except for small rodent, may represent remains of food.

Table 9. Bone Identified from Trench 1, Including Minimum Number of Individuals and Weights.

CLASS	TAXON	IIIa MNI	IIIa Shell weight, g	IIIb MNI	IIIb Shell weight, g	Total Count of MNI	Percent MNI	Total weight	Percent weight/g
Bone	unidentified	1	0.49	2	0.27	3	5%	0.76	7%
Fish	fish	1	1.25	53	1.95	54	83%	3.20	29%
Mammal	*Canis familiaris*			1	0.89	1	2%	0.89	8%
	unidentified mammal	1	1.28	6	4.80	7	11%	6.08	56%
Total No.		3		62		65	100%		
Percent of Total No.		5%		95%		100%			
Total Weight			3.02		7.91			10.93	100%
Percent of Weight			28%		72%			100%	

MNI = Minimum number of individuals.

Table 10. Bone Identified from Trench 3, Including Minimum Number of Individuals and Weights.

CLASS	TAXON	IIb MNI	IIb weight, g	Total Count of MNI	Percent of MNI	Total weight	Percent weight/g
Fish	fish	1	0.22	1	50%	0.22	48%
Mammal	small rodent	1	0.24	1	50%	0.24	52%
Total No.		2		2			
Percent of Total No.		100%		100%	100%		
Total Weight						0.46	100%
Percent of Weight			100%			100%	

MNI = Minimum number of individuals.

PLANT REMAINS

Carbonized plant remains were selectively submitted for species identification (Appendix A) including all samples submitted for radiocarbon dating. Results are summarized in Table 11. No post-contact introductions were noted in any of the samples.

RADIOCARBON DATING

The single charcoal sample, submitted to the University of Waikato Radiocarbon Dating Laboratory, was collected from the burn feature (Fe 1) near the base of Trench 1 (97-115 cm bs--see Fig. 4). The charcoal therefore has a high probability of having been associated with use of the feature, which appears mostly undisturbed (only the northwest portion showing signs of slumping downslope). The charcoal[1] was identified as *Diospyros sandwicensis*, cf. *Rauvolfia sandwicensis*, *Aleurites moluccana*, *Chenopodium oahuense*, and cf. *Osteomeles anthyllidifolia*, and their relative contributions are indicated by the following weight percentages (in the same order as the taxa are listed): 44, 24, 2, 0.4, and 2 percent. Twenty-three percent of the charcoal was not identified. *Aleurites moluccana* was the only charcoal identified as a Polynesian introduction; the remaining types are native. These taxa would have been common in the general area prior to the early 19th century. Details of the age determination for the sample are presented in Table 11. As may be seen, the sample clearly pertains to the late prehistoric period, dating to about A.D. 1500-1650 (1 sigma).

Table 11. Radiocarbon Dating Results, Trench 1.

Cat. No.	Lab. No.	Provenience	Weight g/Material	$\delta^{13}C$ (‰)	Conventional ^{14}C Age BP	Calibrated Age BP/AD (1 sigma)*	Calibrated Age BP/AD (2 sigma)*
SBtr1, 97-115**	Wk-5798	Trench 1, IV, 97-115 cm bs	4.49 charcoal	-25.6±0.2	310 ± 45	437-298 1513-1652	477-285 1473-1665

* Calibrated with the bidecadel atmospheric curve of Stuiver and Pearson (1993) using CALIB 3.0.3 (Stuiver and Reimer (1993). The reported two sigma range encompasses all of the area under the probability distribution.

1 The charcoal was identified by Gail Murakami, IARII Wood Identification Laboratory.

V. SUMMARY AND SIGNIFICANCE EVALUATIONS

Archaeological subsurface testing was conducted at Sunset Beach Park to evaluate the presence or absence of significant archaeological remains. A total of 33 auger borings and three test trenches were excavated. Archaeological remains were uncovered at the north and south ends of the beach park project area beneath beach sand. These intact deposits are located on higher ground away from the strong impact of winter waves. The cultural deposit may have once spread over all of Sunset Beach. If so, however, wave erosion would have removed the midden and other signs of human activities from the central portion of the beach. The archaeological remains have been designated as Sites 50-80-01-5585 (south) and 50-80-01-5586 (north).

Both archaeological sites were investigated in more detail by the excavation of Trenches 1 and 3 in Sites 50-80-01-5585 and -5586, respectively. At Site 50-80-01-5585, the archaeological remains extend to a depth of more than 130 cm bs. The deposit has discontinuous dark gray and light gray lenses separated by tan beach sand. A radiocarbon determination from a burn feature in Layer IV near the base of Trench 1 indicates that this archaeological site dates to the late prehistoric period sometime around A.D. 1500-1650 (1 sigma range). It is possible that deeper and hence earlier deposits could be present, though deeper excavation was not possible in the time that was available. Recovered cultural materials include historic material in Layers I and II, such as ceramic and glass fragments, and precontact material in Layers III and IV. The precontact remains consist of 12 basalt flakes, 1 volcanic glass flake, 2 coral abraders, and more than 1,493 g of midden consisting of animal bone, charcoal, and marine shells. One glass sherd was recovered from Layer III, which may indicate an early contact date for the layer or post-depositional alterations in the soft sand. The cultural deposit appeared to be localized since it was not found in neighboring auger tests (a radius if approximately 5 m). It is possible that the historic remains could derive from LCA 3777 due to its proximity.

The Trench 3 excavation was placed in archaeological deposits found at the north end of the beach park in Site 50-80-01-5586. These deposits extend to 95 cm bs. The spatial extent of the archaeological materials also appears to be very localized, not extending to the southwest towards the central portion of the project area. However, as indicated by auger borings 21 and 26, this deposit extends to the west and north of the trench. The midden contains similar materials as found in Trench 1, including marine shell, animal bone, and charcoal. No artifacts, however, were recovered. Identification of the charcoal taxa indicates the deposits are likely pre-contact in age since no historically introduced taxa was identified.

The auger tests in the central portion of the project area disclosed mostly beach sand with some recent trash and water worn marine shell. No archaeological remains were observed. Waves have probably eroded this portion of the beach extensively. A third trench (Trench 2) was excavated in this area to define the natural stratigraphy, though slumping sand prevented careful inspection of the profile. Nevertheless, it was clear that no significant archaeological deposits are present at this location or anywhere in the central portion of the project area.

There is the possibility that isolated human burials could be present anywhere within the project area since these have been documented in adjacent areas. However, it appears that this possibility is minimal in the central portion of the project area because of wave scour and constant sand erosion and redeposition with winter surf and storms, though it may increase in the vicinity of the identified cultural deposits at the far ends.

SIGNIFICANCE EVALUATIONS

Significance is defined by National Register of Historic Places (NRHP) criteria, as well as the criteria of the Division of Historic Preservation, DLNR (Draft Rules and Regulations, May 1989). These criteria are similar:

> A site meets the criteria of integrity of location, design, setting, materials, workmanship, feeling, and association, as well as one or more of the following criteria:
>
> A. Site is associated with events that have made an important contribution to the broad patterns of our history.
>
> B. Site is associated with the lives of persons important in our past.
>
> C. Site embodies the distinctive characteristics of a type, period, or method of construction; it represents the work of a master; or it possesses high artistic value. The NRHP criteria add that it represents a significant and distinguishable entity whose components may lack individual distinction.
>
> D. Site has yielded, or may be likely to yield, information important for research on prehistory or history.
>
> E. Site has important historical cultural value to an ethnic group of the State (this is a State of Hawai'i criterion).

The evaluation of significance is made for each of the "sites" identified during the inventory survey which lie within the parcel boundaries. These sites constitute discrete locations with evidence of past human activity.

The archaeological deposits of Sites 50-80-01-5585 and 50-80-01-5586 at the north and south ends of the Sunset Beach project area are eligible for listing on the State and National Register of Historic Places under criterion "D." This means that these archaeological sites are significant because they are likely to yield information important to Hawaiian prehistory. In this regard, not only can the two sites be expected to yield information on the antiquity of coastal settlement and subsistence for this part of O'ahu, but they may be informative as to broader patterns of land use and settlement systems (cf. Kirch 1992). Furthermore, Site -5585 appears to have the potential to yield information concerning land use and subsistence activities during the historic period, which may provide a useful contrast with prehistoric patterns at this site.

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VI. RECOMMENDATIONS

Construction of the Sunset Beach Park improvements has the potential to result in adverse impacts on the archaeological sites located during the subsurface survey. Each of these sites has been evaluated as significant. Avoidance of cultural properties by construction activities is the preferred mitigation strategy.

Present plans suggest that Site -5585 will not be directly impacted by construction and other improvement activities (i.e., the boundaries of this site have been determined to be outside the construction zone). However, archaeological monitoring is recommended for Site -5585 due to the expected proximity of construction activities, and also because of the increased possibility of isolated human burials occurring in this area.

In regard to Site -5586, the proposed plans for construction and improvement activities indicate that it will be adversely impacted both by construction of the viewing platform and the associated landscaping. Therefore, archaeological data recovery will be required for at least the portion of this site that is within the construction/impact zone. In accordance with procedures of the State Historic Preservation Division (SHPD), a Mitigation Plan for the data recovery investigations must first be prepared and submitted for approval. Following procedures and research objectives specified in the Mitigation Plan, data recovery will be designed to collect sufficient information so that the destruction of all or a portion of Site -5586 will not be considered adverse.

The Mitigation Plan will also specify appropriate preservation and short and long term protective measures for Site -5585 and any remaining portion of Site -5586 (following data recovery), including monitoring during construction. As with Site -5585, there is an increased possibility of isolated burials occurring in the vicinity of the Site -5586 deposits.

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APPENDIX A.

SUNSET BEACH CHARCOAL SCANNING RESULTS

by

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The transverse and tangential faces of each charcoal piece from six samples collected during the Sunset Beach project were examined under a dissecting microscope at up to 60X magnification for taxa identification. Only easily recognizable taxa were noted. Working laboratory numbers were assigned to each taxon. The counts and weights are reported below. The identified taxa are listed in Table A-1 and results are summarized in Table A-2.

Site 50-80-01-5585

Tr 1, 115 cm BS

(1) cf. *Rauvolfia sandwicensis*		1 pcs = 0.90 g
(2) *Diospyros sandwicensis*		3 pcs = 1.56 g
Total sorted	4 pcs = 2.46 g	
Not sorted	0	

Tr 1, 105 cm BS

(3) *Aleurites moluccana* nutshell		4 pcs = 0.07 g
(4) Bark		2 pcs = 0.24 g
Total sorted	6 pcs = 0.31 g	
Not sorted	10.64 g (sandy)	

Tr 1, 115 cm BS in situ

(5) cf. *Rauvolfia sandwicensis*		1 pcs = 0.13 g
(6) unidentified taxon		1 pcs = 1.02 g
Total sorted	2 pcs = 1.15 g	
Not sorted	0	

Tr 1, 97 cm BS

(7) *Diospyros sandwicensis*		6 pcs = 0.41 g
(8) cf. *Osteomeles anthyllidifolia*		1 pcs = 0.07 g
(9) unidentified taxon		2 pcs = 0.05 g
(10) *Chenopodium oahuense*		1 pcs = 0.02 g
(11) cf. *Rauvolfia sandwicensis*		2 pcs = 0.04 g
Total sorted	12 pcs = 0.59 g	
Not sorted	0.70 g (sandy)	

Site 50-80-01-5586
TU 3, 50-55 cm BS

(12) possible *Bobea* sp.	3 pcs = 0.13 g
(13) *Diospyros sandwicensis*	18 pcs = 0.77 g
(14) cf. *Aleurites moluccana*	4 pcs = 0.16 g
(15) cf. *Chamaesyce* spp.	2 pcs = 0.08 g
(16) unidentified taxon	4 pcs = 0.30 g
(17) *Chenopodium oahuense*	4 pcs = 0.17 g
(18) cf. *Rauvolfia sandwicensis*	3 pcs = 0.09 g
(19) *Sida* cf. *fallax*	2 pcs = 0.09 g
(20) *Aleurites moluccana* nutshell	5 pcs = 0.39 g
(21) cf. *Senna* sp.	3 pcs = 0.14 g
(22) Bark	2 pcs = 0.13 g
(23) possible *Pandanus*	2 pcs = 0.04 g
Total sorted 52 pcs = 2.49 g	
Not sorted 2.49 g	

Tr 1, Zone 4

(24) cf. *Rauvolfia sandwicensis*	14 pcs = 1.46 g
(25) cf. *Nestegis sandwicensis*	6 pcs = 0.52 g
(26) Bark	8 pcs = 0.79 g
(27) *Diospyros sandwicensis*	31 pcs = 2.85 g
(28) cf. *Aleurites moluccana*	5 pcs = 0.38 g
(29) *Aleurites moluccana* nutshell	34 pcs = 3.32 g
(30) cf. *Metrosideros polymorpha*	12 pcs = 1.20 g
(31) cf. *Canthium odoratum*	7 pcs = 0.51 g
(32) possible *Psychotria*	2 pcs = 0.14 g
(33) *Chamaesyce* spp.	27 pcs = 2.50 g
(34) cf. *Osteomeles anthyllidifolia*	28 pcs = 2.88 g
(35) *Sida* cf. *fallax*	4 pcs = 0.31 g
(36) *Syzygium* cf. *malaccense*	2 pcs = 0.06 g
(37) cf. *Bobea* sp.	7 pcs = 0.33 g
(38) *Acacia koa*	1 pcs = 0.04 g
(39) unidentified taxon	14 pcs = 1.20 g
(40) *Chenopodium oahuense*	3 pcs = 0.14 g
(41) *Cordyline fruticosa*	1 pcs = 0.01 g
(42) unidentified taxon	5 pcs = 0.26 g
(43) unidentified taxon	2 pcs = 0.14 g
(44) uncharred vine stem	1 pcs = 0.04 g
Total sorted 214 pcs = 19.08 g	
Not sorted 0.54 g	

Table A-1. Taxa Identified from Sunset Beach Charcoal Samples.

Scientific Name	Common/Hawaiian Name	Origin	Habit
Acacia koa	*Koa*	Endemic	Tree
Aleurites moluccana	*Kukui*, candlenut tree	Polynesian Introduction	Tree
Bobea sp.	*'Ahakea*	Endemic	Tree
Canthium odoratum	*Alahe'e*	Indigenous	Tree
Chamaesyce spp.	*'Akoko*	Endemic	Shrub-tree
Chenopodium oahuense	*'Āheahea*	Endemic	Shrub-tree
Cordyline fruticosa	Ti, *kī*	Polynesian Introduction	Shrub
Diospyros sandwicensis	*Lama*	Endemic	Shrub-tree
Metrosideros polymorpha	*'Ōhi'a lehua*	Endemic	Tree
Nestegis sandwicensis	*Olopua*	Endemic	Tree
Osteomeles anthyllidifolia	*'Ūlei*	Endemic	Shrub
Pandanus tectorius	*Hala*	Indigenous?	Tree
Psychotria sp.	*Kōpiko*	Endemic	Shrub-tree
Rauvolfia sandwicensis	*Hao*	Endemic	Tree
Senna gaudichaudii	*Kolomona*	Endemic	Tree
Sida fallax	*'Ilima*	Indigenous	Shrub
Syzygium malaccense	*'Ōhi'a 'ai*, mountain apple	Polynesian Introduction	Tree

Table A-2. Summary of Taxa Identifications in Charcoal Samples from Sunset Beach.

Unit	Depth, cm BS	Taxon	Part	Count	Weight, g
Tr. 1	115	*Diospyros sandwicensis*	Wood	3	1.56
		cf. *Rauvolfia sandwicensis*	Wood	1	0.90
		Total		4	2.46
Tr. 1	105	*Aleurites moluccana*	Nutshell	4	0.07
			Bark	2	0.24
		Total		6	0.31
Tr. 1	In situ	cf. *Rauvolfia sandwicensis*	Wood	1	0.13
		Unknown	Wood	1	1.02
		Total		2	1.15
Tr. 1	97	*Chenopodium oahuense*	Wood	1	0.02
		Diospyros sandwicensis	Wood	6	0.41
		cf. *Osteomeles anthyllidifolia*	Wood	1	0.07
		cf. *Rauvolfia sandwicensis*	Wood	2	0.04
		Unknown	Wood	2	0.05
		Total		12	0.59
TU 3	50-55	*Aleurites moluccana*	Nutshell	5	0.39
		cf. *Aleurites moluccana*	Wood	4	0.16
		cf. *Bobea* sp.	Wood	3	0.13
		cf. *Chamaesyce* spp.		2	0.08
		Chenopodium oahuense	Wood	4	0.17
		Diospyros sandwicensis	Wood	18	0.77
		cf. *Pandanus tectorius*	Wood	2	0.04
		cf. *Rauvolfia sandwicensis*	Wood	3	0.09
		Sida cf. *fallax*	Wood	2	0.09
		cf. *Senna* sp.	Wood	3	0.14
		Unknown		4	0.30
		Total		52	2.49
Tr. 1	Zone 4	*Acacia koa*	Wood	1	0.04
		Aleurites moluccana	Nutshell	34	3.32
		cf. *Aleurites moluccana*	Wood	5	0.38
		cf. *Bobea* sp.	Wood	7	0.33
		cf. *Canthium odoratum*	Wood	7	0.51
		Chamaesyce spp.	Wood	27	2.50
		Chenopodium oahuense	Wood	3	0.14
		Cordyline fruticosa	Wood	1	0.01
		Diospyros sandwicensis	Wood	31	2.85
		cf. *Metrosideros polymorpha*	Wood	12	1.20
		cf. *Nestegis sandwicensis*	Wood	6	0.52
		cf. *Osteomeles anthyllidifolia*	Wood	28	2.88
		cf. *Psychotria* sp.	Wood	2	0.14
		cf. *Rauvolfia sandwicensis*	Wood	14	1.46
		Sida cf. *fallax*	Wood	4	0.31
		Syzygium cf. *malaccense*	Wood	2	0.06
		Unknown	Wood	14	1.20
		Unknown	Wood	5	0.26
		Unknown	Wood	2	0.14
		Unknown	Vine	1	0.04
		Total		214	19.08

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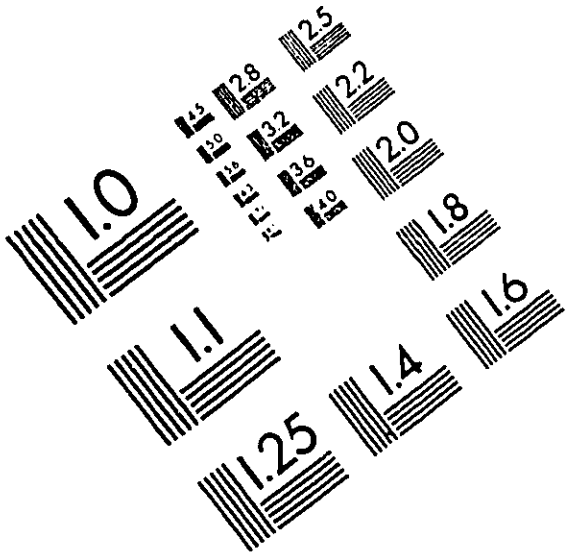

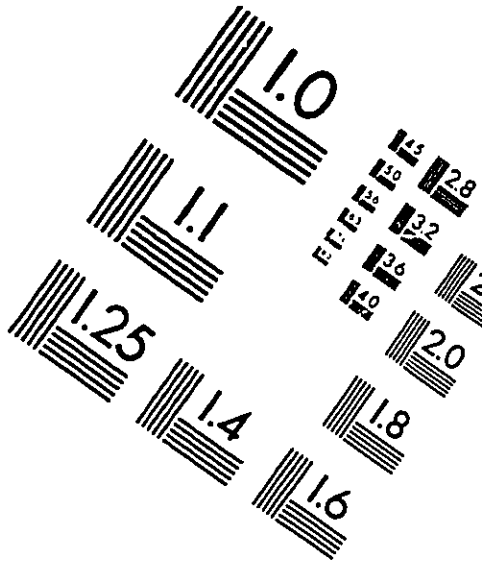

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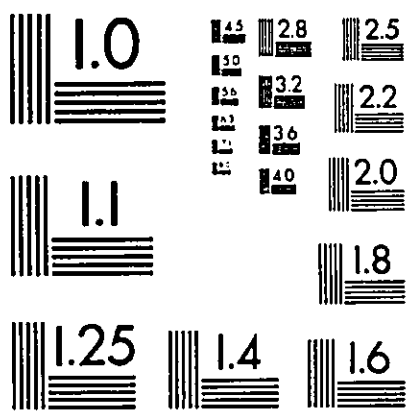

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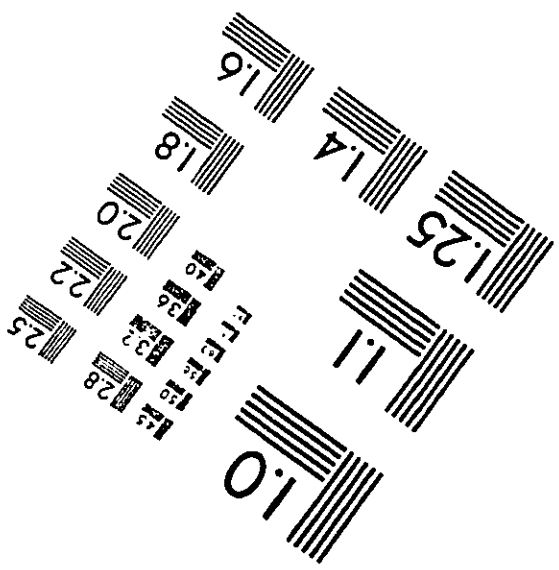

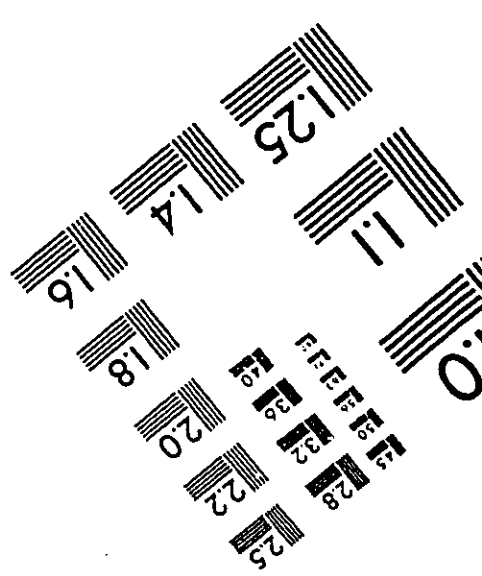

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