LINDA CROCKETT LINGLE
Mayor

RICHARD H. HAAKE
Managing Director
Telephone: 243-7855

OFFICE OF THE MANAGING DIRECTOR
COUNTY OF MAUI
WAILUKU, MAUI, HAWAII 96793

August 20, 1996

Mr. Gary Gill
Director
Office of Environmental Quality Control
220 South King Street, Suite 400
Honolulu, Hawaii 96813

Dear Mr. Gill:

Subject: Maui Central Park
Kahului, Maui, Hawaii
TMK 3-7-1:por.2 and 3-8-7:por.1, por.117

In accordance with the requirements of Chapter 343, Hawaii Revised Statutes, and Chapter 200 of Title 11, Administrative Rules of the State Department of Health, a Draft Environmental Assessment has been prepared for the proposed project.

As the proposing agency, the County of Maui, Office of the Mayor, believes that there will be no significant impact as a result of the project. Accordingly, we are anticipating the filing of a negative declaration.

Enclosed are one (1) copy of the OEQC Bulletin Publication Form and four (4) copies of the Draft Environmental Assessment. We respectfully request that notice of the Draft Environmental Assessment be published in the next edition of the The Enviornmental Notice.

Very truly yours,

Richard Haake
Managing Director

RH:to
Enclosures
woa\mcp\garyltr.oeq

1996-11-08-MA-FEA - Maui Central Park

NOV 8 1996

FILE COPY

Final Environmental Assessment

Maui Central Park

Prepared for:

County of Maui,
Office of the Mayor

October 1996

MUNEKIYO & ARAKAWA, INC.

Final Environmental Assessment

Maui Central Park

Prepared for:

County of Maui,
Office of the Mayor

October 1996

MUNEKIYO & ARAKAWA, INC.

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Chapter I

Project Overview

I. PROJECT OVERVIEW

A. PROPERTY LOCATION, EXISTING USE, AND LAND OWNERSHIP

The County of Maui, Office of the Mayor, proposes to construct Maui Central Park in Kahului, Maui, Hawaii (TMK 3-7-1:por.2 and 3-8-7:por.1, por.117). See Figure 1.

In 1985, the Maui Central Park Master Plan was created to serve as a guide for land use development within Maui Central Park, as well as provide recreational facilities and open space resources for the use and enjoyment of the community. The Maui Central Park District was subsequently established by Maui County zoning in 1986, and is generally defined by Kahului Beach Road, Maui Community College, Kaahumanu Avenue and Kanaloa Avenue.

In 1994, the Maui Central Park Advisory Committee was formed to provide recommendations for park implementation. A conceptual master plan was prepared by Chris Hart & Partners for the development of the park.

The design of the subject project is based on the recommendations of the Advisory Committee as envisioned through the Hart plan.

There are several existing uses within and along the perimeter of the park site. These include the Maui Community College dormitories at the corner of Kaahumanu Avenue and Papa Avenue; the Central Maui Youth Center; the Maui Botanical Gardens and former zoo; the Maui Family Young Men's Christian Association (YMCA); residences, two (2) churches, a pre-school and group home along Kanaloa Avenue; and the Maui Arts and Cultural Center near Kahului Beach Road.

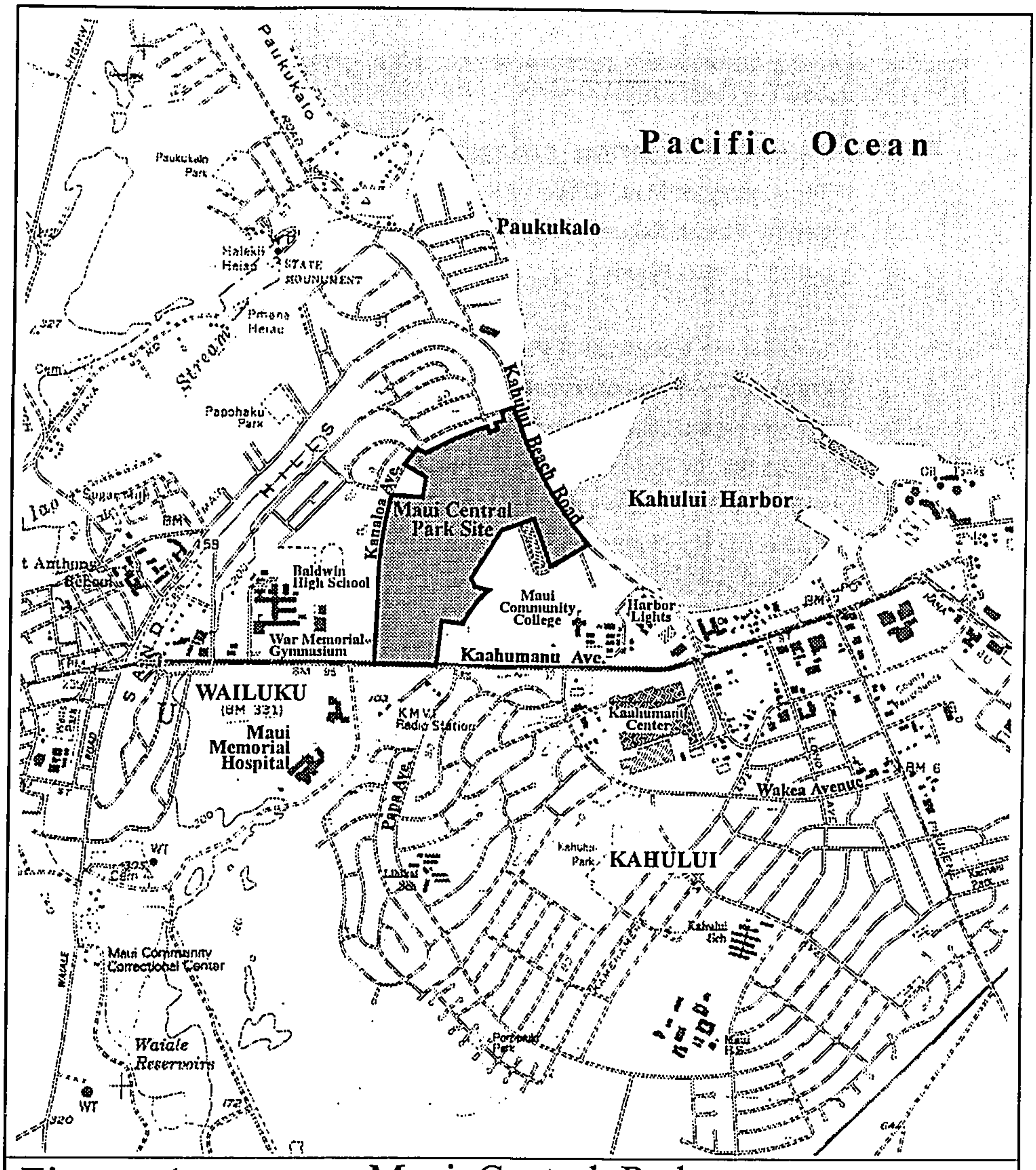

Figure 1

Maui Central Park
Regional Location Map

Prepared for: County of Maui, Office of the Mayor

Much of the park site is currently vacant. However, central portions of the site are utilized for archery purposes with the erection of a number of wilderness targets. Near the intersection of Kanaloa Avenue and Kahului Beach Road, there is an existing skateboard facility. Also located adjacent to Kahului Beach Road is a horseshoe facility.

The County of Maui is the landowner of the subject property.

B. *PROPOSED ACTION*

Maui Central Park is intended to provide a regional recreational facility which provides for a range of recreational uses for a wide variety of users. Excluding the areas of the Maui Family YMCA, Maui Arts and Cultural Center, the Maui Community College dormitories and existing Kanaloa Avenue residences and other uses, the main park site is approximately 130 acres. The undeveloped portion of the main park site is approximately 110 acres. Developed areas which are included as part of the project site are the Central Maui Youth Center and Maui Botanical Garden. See Figure 2.

Major components of the project include:

1. One multi-purpose field located near the corner of Kaahumanu and Kanaloa Avenue;
2. Relocation of the skateboarding facility from the corner of Kanaloa Avenue and Kahului Beach Road to the Central Maui Youth Center site;
3. Retention of the Maui Botanical Garden at its existing site including a reserve area for future expansion;
4. Reservation of space for a Keiki Zoo adjacent to the botanical garden;

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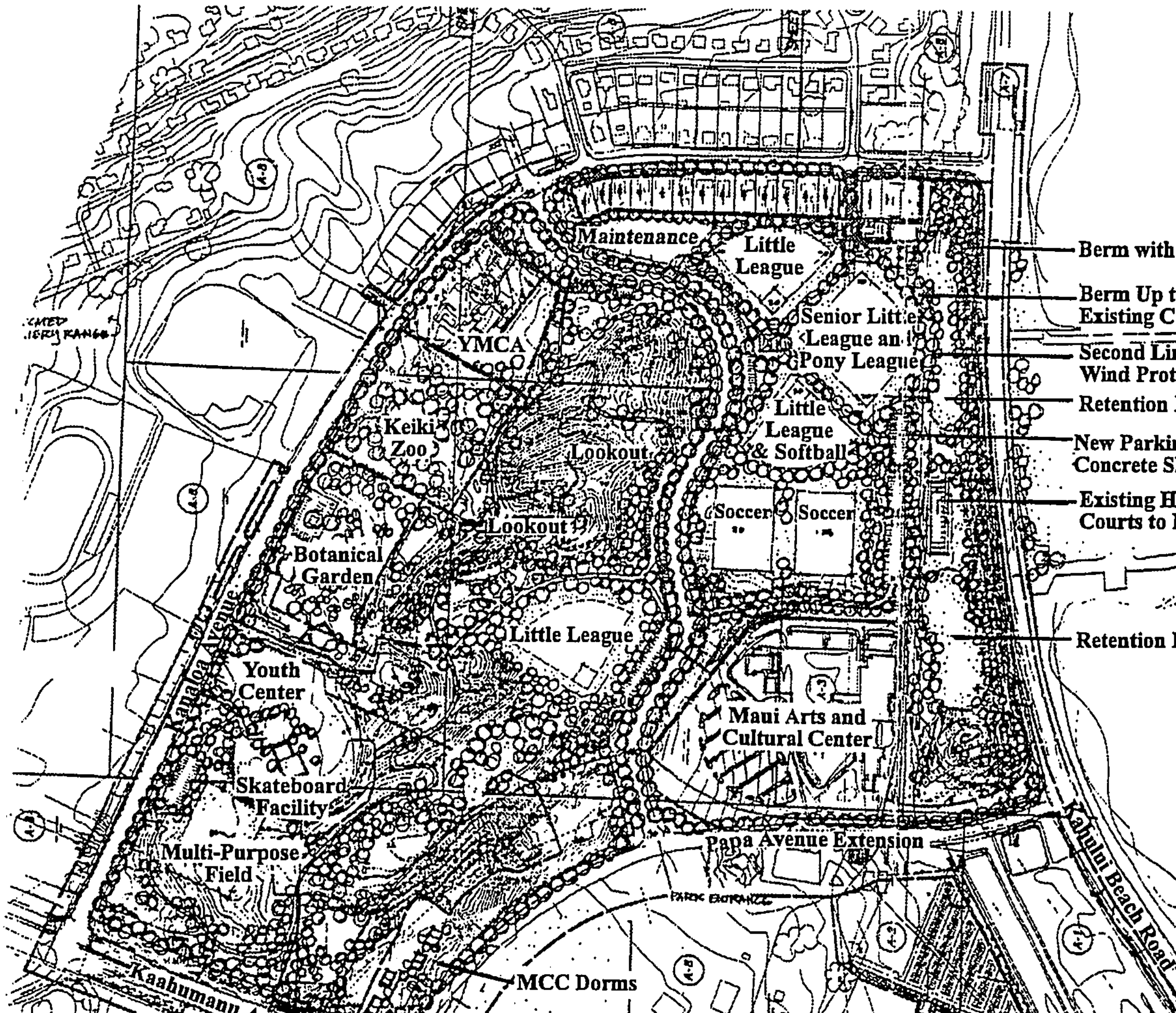

Source: Wilson Okamoto & Associates and Walters, Kimura, Motoda, Inc.

Figure 2

Maui Central Park
Schematic Master Plan

Prepared for: County of Maui, Office of the Mayor

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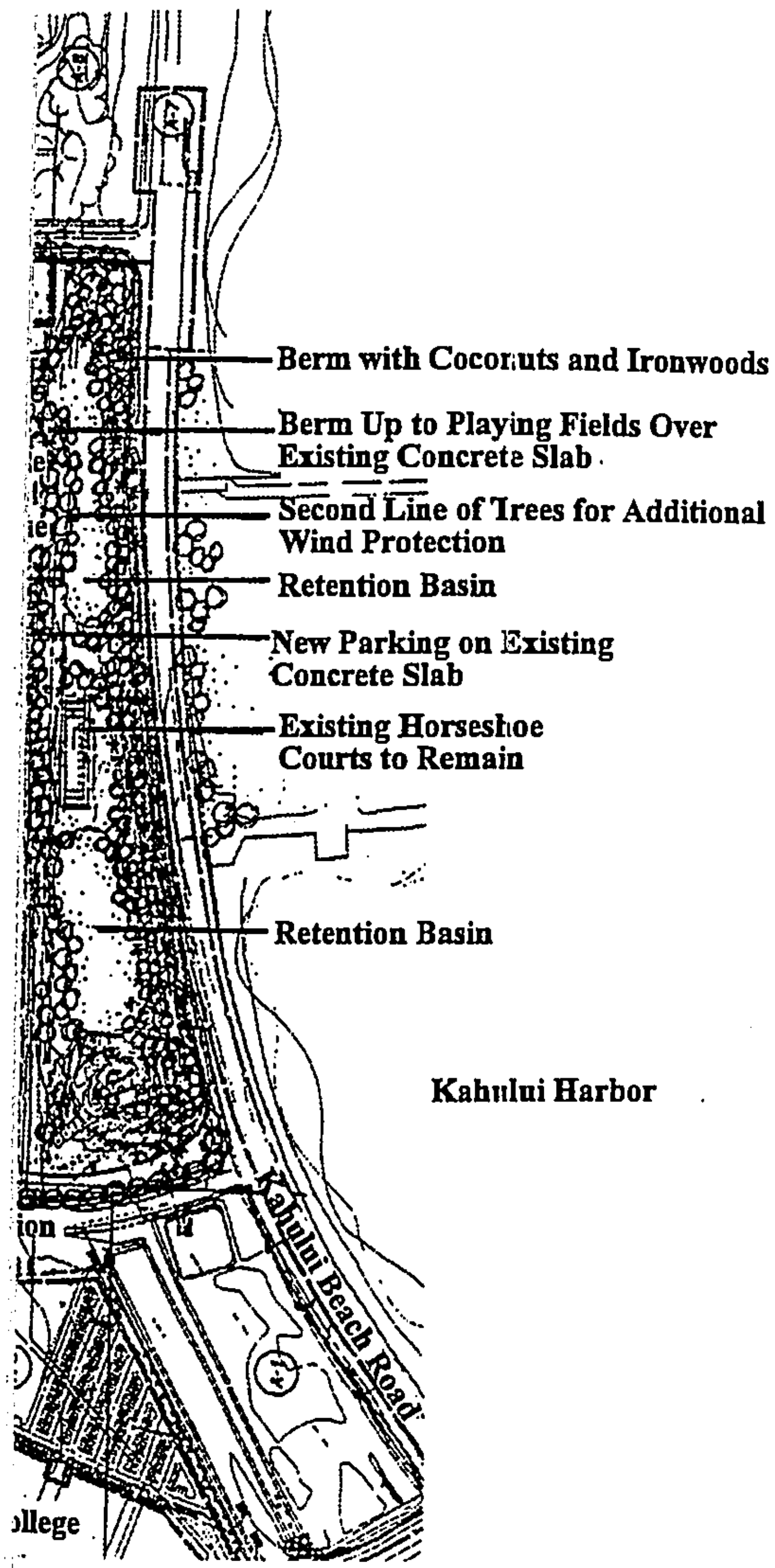


MUNEKIYO & ARAKAWA, INC.

Not To Scale

5. A landscaped green space within the central portion of the park to be utilized for picnicking, jogging, walking, bicycling and passive recreational activities;

6. One Little League ballfield located within the central portion of the park;

7. One Senior Little League/Softball ballfield, Little League/Softball field, Little League field, and two soccer fields located between the Maui Arts and Cultural Center and the Kanaloa Avenue residential area;

8. Retention of the existing horseshoe pitching facility at its existing location;

9. Two retention basins along Kahului Beach Road; and

10. County park maintenance facility located adjacent to the Little League fields intended for maintenance of Maui Central Park.

Papa Avenue is proposed to be extended from Kaahumanu Avenue to Kahului Beach Road to provide access along the park's periphery. A new Maui Central Park Drive is proposed to extend from the Papa Avenue extension in a generally northerly direction and link with Kanaloa Avenue in the area of the Maui Family YMCA.

Parking lots are proposed to be located at five (5) different areas in the park. In total, there are approximately 250 parking stalls which are proposed to service the park. Structures within the park such as restroom facilities, pavilion, dugouts, scorekeeper booth/storage room, and park equipment storage building will conform with Department of Parks and Recreation details.

The dunes and undulating topography within the central portion of the site will largely be retained. Clearing and grubbing will necessitate removal of some existing kiawe and vegetation. Native Hawaiian plants will be integrated as part of the park's landscaping. Along the Kahului Beach Road frontage, a second line of trees will be planted to complement the existing ironwood trees in order to provide additional buffer from the tradewinds.

Assuming all applicable approvals are obtained, construction is anticipated to begin in April 1997 with completion in October 1998. Estimated construction cost is approximately $15 million.

Chapter II

Description of the Existing Environment

II. DESCRIPTION OF THE EXISTING ENVIRONMENT

A. PHYSICAL ENVIRONMENT

1. Surrounding Land Uses

The project area is located in the Wailuku-Kahului area. Wailuku is the seat of government within the County. Wailuku is located on the foothills of the West Maui Mountains containing a diverse range of commercial, light industrial, and public uses, as well as older established residential areas. Kahului includes the Island's only deep water port and the second busiest airport in the State. With its proximity to Kahului Harbor and Airport, the Kahului region contains a variety of heavy industrial, light industrial, and commercial wholesale and retail activities and services. Three major shopping areas, the Kaahumanu Center, Maui Mall and the Kahului Shopping Center, are located within a mile of the project site.

To the north of the park site are the Puuone residential areas. Also located near the park's boundary are several churches, child day care facility and a group home. Kahului Beach Road traverses a portion of the park's eastern boundary. On the other side of the roadway is the breakwater for the Kahului Harbor as well as the waters of the harbor itself. The Maui Arts and Cultural Center abuts the project site near Kahului Beach Road. The Harbor Lights condominium and Maui Community College (MCC) are also located to the east of the project site. The MCC dormitories abut the project site near Kaahumanu Avenue and the Papa Avenue extension.

To the south of the project site across Kaahumanu Avenue are the Cameron Center, Maui Publishing Company offices and Maui

Memorial Hospital. Also to the south of the project site near Papa Avenue are the Ala Lani Methodist Church, the Emmanuel Lutheran Church, and the residences of Kahului's Sixth Increment. Further south is the greater Kahului residential area.

Kanaloa Avenue forms the western boundary of the park site. Abutting Kanaloa Avenue within the park site is the Central Maui Youth Center and the Maui Botanical Garden. The Maui Family YMCA also abuts Kanaloa Avenue. Across Kanaloa Avenue is the War Memorial Complex which contains a basketball gym, Olympic sized swimming pool, soccer field, five (5) Little League fields, football stadium, baseball stadium and two (2) separate parking lots.

2. *Climate*

Like most areas of Hawaii, Maui's climate is relatively uniform year round. Characteristic of Hawaii's climate, the project area experiences mild and uniform temperatures, moderate humidity and relatively consistent tradewinds. Variations in the Island's climate are largely left to local terrain.

Average temperatures in the project area (based on temperatures recorded at Kahului Airport) range from the low 60s to the high 80s. August is historically the warmest month, while January and February are the coolest. Rainfall in the project area averages approximately 20 inches per year. Winds in the Kahului region are predominantly out of the north and northeast. When the trades are blowing, portions of the project site near the shoreline experience brisk winds with velocity decreasing further inland.

3. *Topography and Soil Characteristics*

The project area is generally defined by a declining slope from Kanaloa Avenue to Kahului Beach Road. The average slope of the property from the intersection of Kaahumanu and Kanaloa Avenue to the intersection of Kahului Beach Road and Kanaloa Avenue is approximately 1.5 percent. However, sand hills and dunes also define the topography of the subject property which allow for additional variation in slopes.

Near the corner of Kaahumanu and Kanaloa Avenue, the elevation is approximately 76 feet above sea level. Moving in a northeasterly direction, the land slopes lower to a sump area approximately 25 feet above sea level. A sand dune adjacent to the Maui Community College dormitories forms the eastern boundary of the sump. The dune reaches 94 feet in height near Kaahumanu Avenue and gradually trends lower as it extends in a northerly direction.

Existing uses along Kanaloa Avenue sit on generally flat to gently sloping land which has been previously graded. Elevations gradually trend lower toward Kahului Beach Road. The Central Maui Youth Center is located on land with elevations ranging from 60 to 74 feet in height. The Botanical Gardens area ranges from 42 to 66 feet above sea level. The existing developed portion of the Maui Family YMCA is located on lands at elevations between 46 to 58 feet above sea level. The 15 parcels along Kanaloa Avenue abutting the park site containing residential uses, churches, pre-school and group home, range from 16 to 38 feet above sea level.

The central portion of the park site between the existing uses along Kanaloa Avenue and the Maui Arts and Cultural Center can be characterized as rolling sand hills and dunes. There is a sump area with a low point of 24 feet in elevation located approximately 500 feet to the east of the existing Central Maui Youth Center. The slope of the land trends higher to approximately 66 feet above sea level near the boundary of the Maui Arts and Cultural Center. The highest point within the central area of the park is 86 feet above sea level at a sand dune approximately 500 feet east of the existing YMCA site. From this point, the land generally slopes lower toward Kanaloa Avenue and Kahului Beach Road. Along Kahului Beach Road, the low point is approximately 6 feet above sea level in the area to the east or makai of the Maui Arts and Cultural Center.

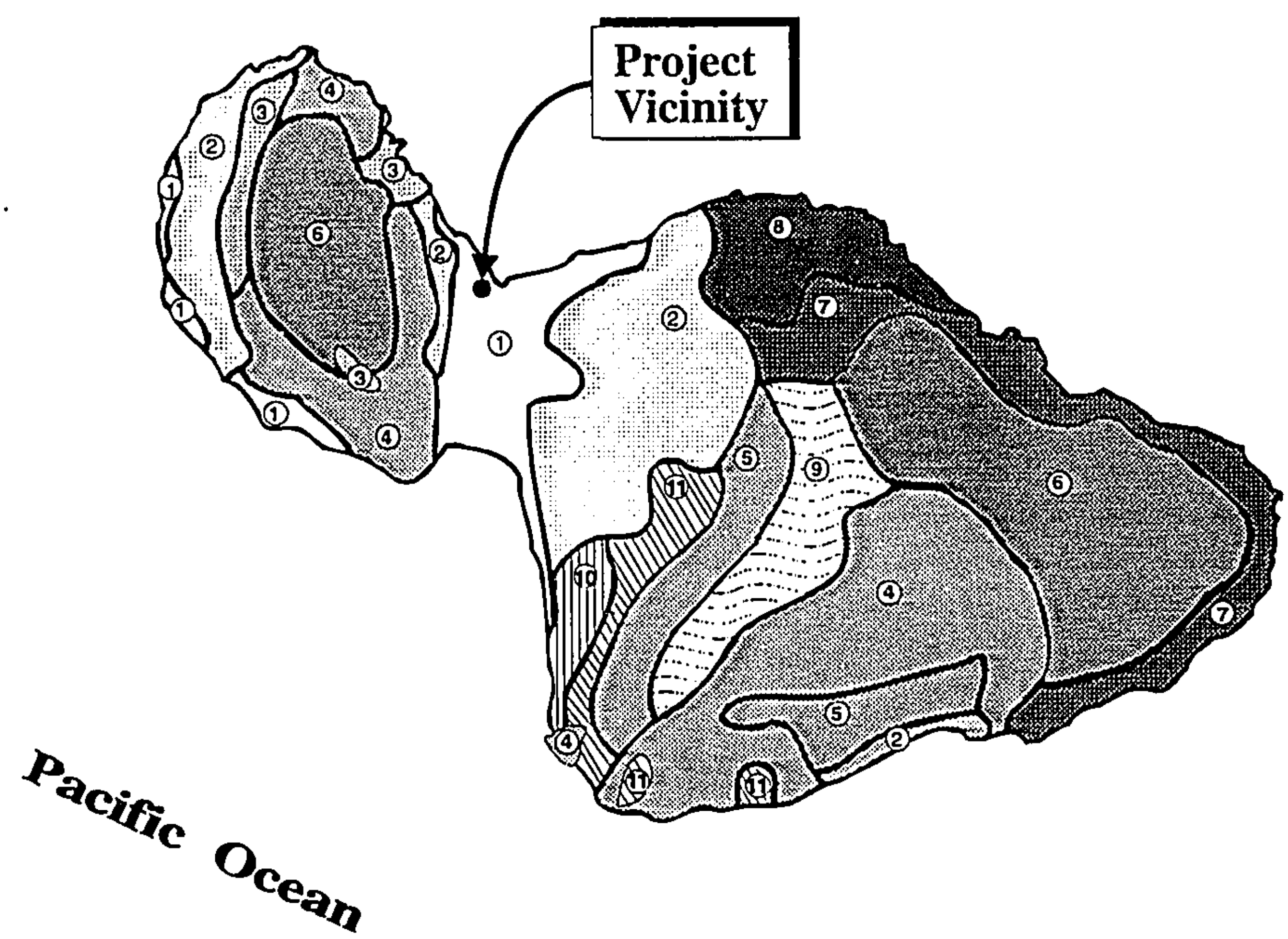
Underlying the project site and surrounding lands are soils belonging to the Pulehu-Ewa-Jaucas association. See Figure 3. This soil association is characteristically deep and well-drained and located on alluvial fans and basins. The soil type specific to the project area is of the Puuone Sand classification (PZUE). See Figure 4. PZUE soils are predominant in the Kahului region and are typified by a sandy layer and a cemented sand underlayment. Vegetation associated with this series include bermuda grass, kiawe, and lantana.

4. Flood and Tsunami Hazard

Most of the project area is situated within lands that are designated Zone "C" by the Flood Insurance Rate Map. See Figure 5. Zone "C" is an area of minimal flooding. However, portions of the project site adjacent to Kahului Beach Road are designated as Zone "A-4"

LEGEND

1. Pulehu-Ewa-Jaucas association
2. Waiakoa-Keahua-Molokai association
3. Honolua-Olelo association
4. Rock land-Rough mountainous land association
5. Puu Pa-Kula-Pane association
6. Hydrandepts-Tropaquods association
7. Hana-Makaalae-Kailua association
8. Pauwela-Haiku association
9. Laumaia-Kaipoipoi-Olinda association
10. Keawakapu-Makena association
11. Kamaole-Oanapuka association



Map Source: USDA Soil Conservation Service

Figure 3

Maui Central Park
Soil Association Map

Prepared for: County of Maui, Office of the Mayor

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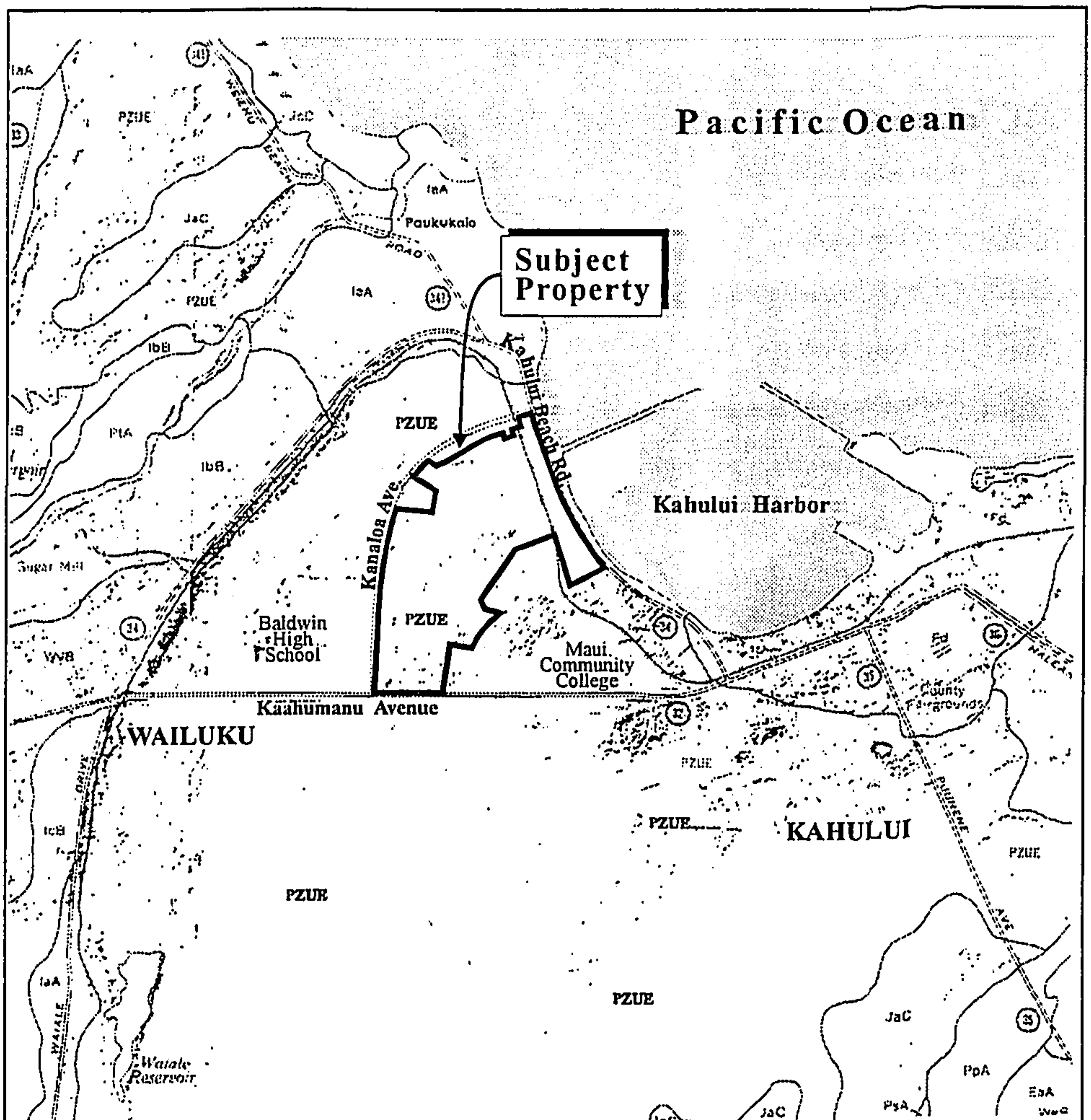

Figure 4

Maui Central Park
Soil Classifications Map

MUNEKIYO & ARAKAWA, INC.

0 1000 2000 4000 Feet

Prepared for: County of Maui, Office of the Mayor

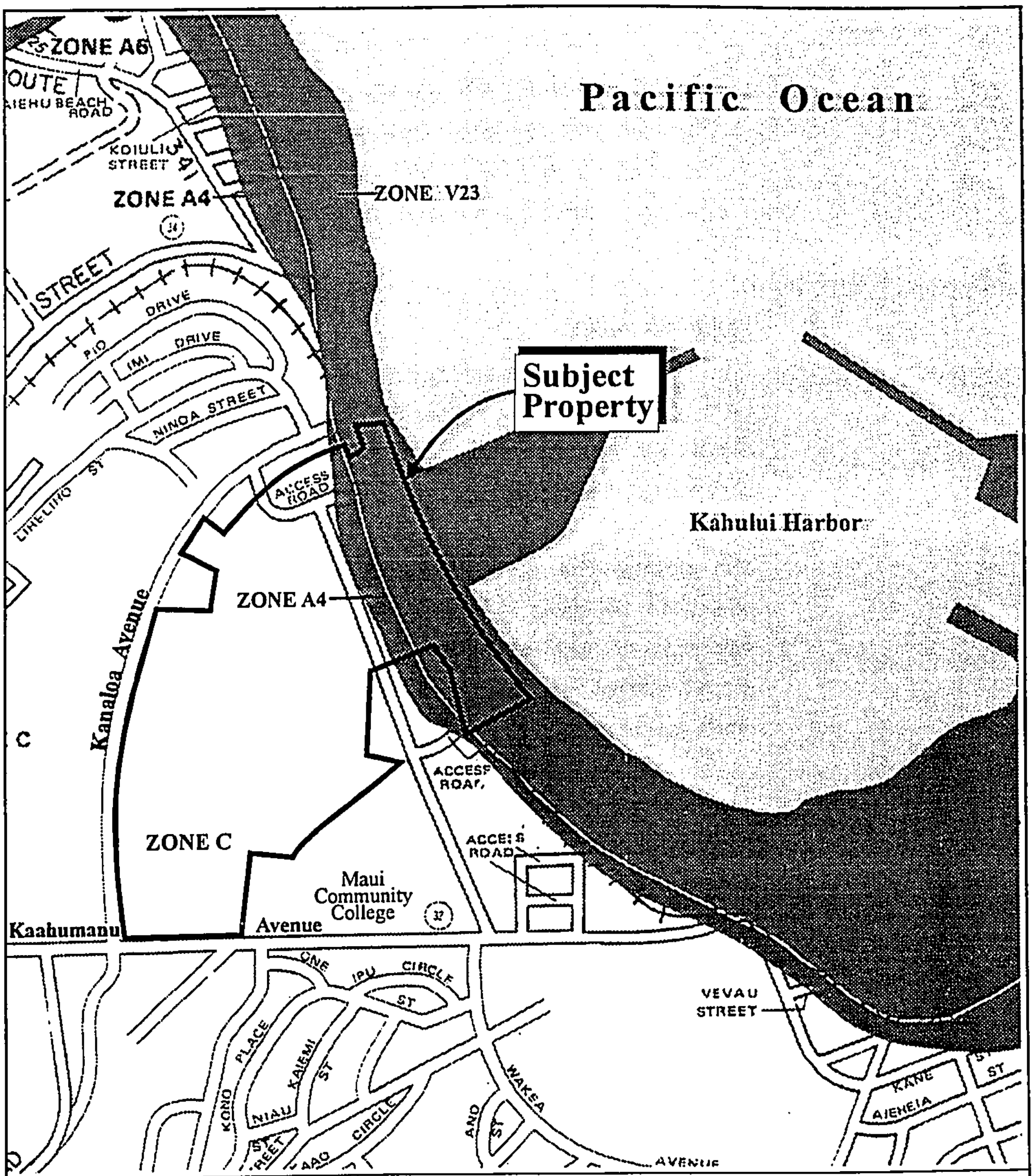

Figure 5

Maui Central Park
Flood Insurance Rate Map

MUNEKIYO & ARAKAWA, INC.

0 500 1000 2000 Feet

Prepared for: County of Maui, Office of the Mayor

(areas inundated by the 100-year flood with a base flood elevation of seventeen (17) feet above mean sea level) and "V-23" (areas inundated by the 100-year coastal flood with velocity hazards and a base flood elevation of seventeen (17) to eighteen (18) feet above mean sea level).

5. ***Flora and Fauna***

The botanical resources survey done for the project notes that two plant communities occur in the project area, a Coastal Dry Mixed Shrub & Grassland community and a Coastal Dry Shrubland Dune community. See Appendix A.

The Coastal Dry Mixed Shrub & Grassland community is dominated by kiawe (*Prosopis pallida*), koa haole (*Leucaena leucocephala*), Chinese violet (*Asystasia gangetica*), and Guinea grass (*Panicum maximum*). These four species cover more than ninety-five percent of the space that this community takes up.

African tulip (*Spathodea campanulata*), monkeypod (*Samanea saman*), and be-still trees (*Cascabela thevetia*) are growing in a drainage ditch on the southern edge of the project area along Kaahumanu Avenue. A type of tick-trefoil (*Glycine wightii*) is growing into this community where the project area meets the eastern fence of the Maui Botanical Garden, along with a single plant of silver leaved nightshade (*Solanum elaeagnifolium*).

Some cactus (CACTACEAE *spp.*), century plants (*Agave spp.*), and mother-of-millions (*Kalanchoe sp.*) have been cultivated in the archery range, and are growing from rubbish piles in the northeastern part of the project area, but do not appear to be naturalizing yet. One cactus specie, the night-blooming cereus (*Hylocereus undatus*), is growing from a rubbish pile in the northeastern part of the project area. An ornamental variety of vitex (*Vitex trifolia*) is planted at a residence north of the project area. Seeds from this plant have allowed the species to naturalize in the project area there.

Maile hohono (*Ageratum conyzoides*), koali pehu (*Merremeria aegypta*), and lion's tail (*Leonotis nepetifolia*) were found in this community, but were identified from dead plant materials.

'Ilima (*Sida fallax*) and 'uhaloa (*Waltheria indica*), are indigenous species which are occasionally found in this community. Two other indigenous plants, naupaka kahakai (*Scaevola sericea*) and pohuehue (*Ipomoea pes-caprae*), are growing amongst rubbish piles in the northeastern part of the project area.

As recently as 1990, the groundcover of this community was dominated by buffelgrass (*Cenchrus ciliaris*), but now it is covered by Guinea grass (*Panicum maximum*). The Chinese violet (*Asystasia gangetica*) which is a co-dominant of this community, was originally cultivated as a ground cover at MCC.

The Coastal Dry Shrubland Dune community is dominated by 'ilima (*Sida fallax*), 'uhaloa (*Waltheria indica*), koa haole (*Leucaena leucocephala*), blue vervain (*Stachytarpheta jamaicensis*), Spanish needles (*Bidens pilosa*), and lantana (*Lantana camara*). Guinea grass (*Panicum maximum*) and buffelgrass (*Cenchrus ciliaris*) are also common and invasive here.

This community exists on littoral sand dunes that rise above the surrounding shrub and grassland habitat, creating microhabitats, or biological islands. These perched habitats are exposed to sea winds and are drier than surrounding habitat, which limits the types of plants which may grow there. This allows native plants such as 'ilima and 'uhaloa to maintain their ground in this community against invasive alien plants.

'Aki'aki (*Sporobolus virginicus*) an uncommon indigenous beach-grass, occurs on a dune in the northeastern section of the project area. Other common to rare native species are capable of living in this habitat but are out-competed by invasive alien species.

The giant African snail (*Achatina fulica*) is found in the project area in surprisingly large numbers. The dune areas are peppered with their dead shells. With these gastropods on location, it is almost impossible for any of the succulent leaved coastal native plants, such as the rare dwarf naupaka (*Scaevola coriacea*), to survive.

Pili (*Heteropogon contortus*), an indigenous dry-land grass, used to grow, as recently as 1989, on dunes by the back gate of Maui Botanical Gardens (western side of the project area) but this was not found during the survey, and the area where it previously grew is heavily invaded by Guinea grass.

The greatest variety of species found in the project area occurs on the edges of, and within disturbances in, the above mentioned communities.

Fauna and avifauna that are found in the vicinity of the project area are typical of Kahului's urban setting. Fauna typically found in the vicinity include mongoose, cats, dogs, and rats. Avifauna typically include mynas, several types of doves, house sparrows, and francolin.

6. ***Archaeological Resources***

An archaeological reconnaissance survey with subsurface testing was conducted for the subject project. See Appendix B. The field reconnaissance involved archaeologists walking random transects across the project area spaced 40 to 50 feet apart. Ground visibility was good over approximately 75 percent of the project site because of dry climatic conditions and an extensive trail and road network which existed throughout most portions of the study area. The remaining 25 percent was covered by a dense kiawe thicket. However, during testing, some of the obscured area was penetrated with the backhoe and underwent subsurface testing.

Analysis of the subsurface deposits was accomplished by excavating 21 backhoe trenches. The trenches were a minimum of 3 meters in length and of varying depth, depending on cementation of subsurface layers. The trenches were evenly dispersed throughout the accessible portions of the project area.

During the surface reconnaissance, no cultural materials or structure were observed. The subsurface testing also resulted in no finds of buried cultural layers, features, artifacts or hidden materials.

It is noted that there were a number of previous archaeological studies in the immediate vicinity. However, most of the studies have been in areas of prior ground disturbance. A single isolated locality containing scattered human remains has recently been reported to the State Historic Preservation Division in the mauka portion of the Maui Arts and Cultural Center site.

Additionally, as a supplement to the reconnaissance survey, an inventory level survey, as recommended by the SHPD, was conducted between October 7 to 11, 1996. A complete surface survey of the project area was accomplished. Also, thirty-one (31) additional trenches were excavated for the inventory level survey. The additional subsurface work was conducted in the following specific areas:

1. Retention basins along Kahului Beach Road;
2. Little League baseball fields and maintenance facility in the northeast corner of the project area;
3. Little League field near the center of the project area;
4. Proposed connector road between Papa Avenue extension and Kanaloa Avenue;
5. Jogging/bicycle paths and lookouts on the top of the dunes; and
6. Multi-purpose field at the southwest corner of the project area.

An interview was also conducted with Mr. Charles Keau, a long time resident of the area who was involved with archaeological monitoring of the site during 1989-1990. The interview provided additional historical background information on the site (see Appendix B).

7. *Air Quality*

Air quality in the Wailuku-Kahului region is considered good as point sources (e.g., Maui Electric Power Plant, HC&S Mill) and non-point sources (e.g., automobile emissions) of emission do not generate high concentrations of pollutants. The relatively high quality of air can also be attributed to the region's constant exposure to winds which quickly disperse concentrations of emissions. This rapid dispersion is evident during sugar cane burning operations in fields southeast of Kahului's residential district.

8. *Noise*

Traffic noise generated by vehicles traveling along Kahului Beach Road and Kanaloa, Kaahumanu and Papa Avenues, is the predominant source of background noise in the vicinity of the project. To the east, Kahului Harbor operations occasionally add to the background noise level in the surrounding region.

9. *Scenic and Open Space Resources*

Scenic resources to the west of the project area include Iao Valley and the West Maui Mountains. Looking southeast, Haleakala is clearly visible. To the east, lies Kahului Harbor and the Pacific Ocean.

B. *SOCIO-ECONOMIC ENVIRONMENT*

1. *Population*

The population of the County of Maui has exhibited relatively strong growth over the past decade with the 1990 resident population of 100,374 , a 41.7 percent increase over the 1980 population of 70,847 (State of Hawaii Data Book, 1992). Growth in the County is expected to continue, with resident population projections to the years 2000 and 2010 estimated to be 112,349 and 133,459, respectively (Community Resources, Inc., January 1994).

The Wailuku-Kahului Community Plan region is anticipated to follow the Countywide pattern of population growth, with the region's 1990 population of 32,816 expected to rise to 40,452 by the year 2000 and to 48,132 by the year 2010 (Community Resources, Inc., January 1994).

2. *Economy*

The Kahului region is the Island's center of commerce. Combined with neighboring Wailuku, the region's economic character encompasses a broad range of commercial, service, and governmental activities. In addition, the region is surrounded by agricultural lands which include macadamia nut orchards and sugar cane and pineapple fields. This vast expanse of agricultural land, managed by Hawaiian Commercial & Sugar (HC&S) and Wailuku Agribusiness, is considered a key component of the local economy.

C. *PUBLIC SERVICES*

1. *Recreational Facilities*

The Wailuku-Kahului region provides a range of recreational opportunities, including shoreline and boating activities at Kahului Harbor and nearby beach parks, and individual and organized athletic activities available at numerous County parks and the War Memorial complex. The project area is in close proximity to County facilities such as Kahului Community Center and Kanaha Beach Park, as well as Iao Valley State Park.

2. *Police and Fire Protection*

Police protection for the Wailuku-Kahului region is provided by the Maui Police Department's (MPD) headquarters in Wailuku, across Kaahumanu Avenue from the project site. The region is served by the MPD's Wailuku patrol division.

Fire prevention, suppression, and protection services for the Wailuku-Kahului region are provided by the Maui Fire Department's (MFD) Wailuku Station, approximately 0.8 mile from the corner of Maui Central Park at the Kaahumanu and Kanaloa Avenue intersection. In addition, the MFD's new Kahului Station (located on Dairy Road), is approximately 2.2 miles from the project's Papa Avenue extension and Kahului Beach Road intersection.

3. *Solid Waste*

Single-family residential solid waste collection service is provided by the County of Maui on a once-a-week basis. Residential solid waste collected by County crews is transported to the County's 55-acre Central Maui Landfill, located four (4) miles southeast of the Kahului Airport. The Central Maui Landfill also accepts commercial waste from private collection companies.

4. *Health Care*

Maui Memorial Hospital, the Island's only major medical facility, also services the Wailuku-Kahului region. Acute, general and emergency care services are provided by the 185-bed facility. In addition, numerous privately operated medical/dental clinics and offices are located in the area to serve the region's residents.

5. *Schools*

The Wailuku-Kahului region is served by the State Department of Education's (DOE) public school system as well as several privately operated schools. DOE facilities in the Kahului area include Lihikai and Kahului Schools (Grades K-5), Maui Waena Intermediate School (Grades 6-8), and Maui High School (Grades 9-12). Existing facilities in the Wailuku area include Wailuku Elementary School (Grades K-5), Iao Intermediate School (Grades 6-8), and Baldwin High School (Grades 9-12). Maui Community College, a branch of the University of Hawaii, serves as the Island's only higher education facility.

D. *INFRASTRUCTURE*

1. *Roadways*

Kaahumanu Avenue and Kahului Beach Road are the major roadways linking Kahului with Wailuku. These roadways are heavily utilized during the peak commuter traffic hours. Kanaloa Avenue provides a cross link between Kaahumanu Avenue and Kahului Beach Road.

Kaahumanu Avenue is a four- to six-lane divided urban arterial roadway generally oriented in the east-west direction. The traffic signal system on Kaahumanu Avenue is coordinated between Wharf Street on the east and Mahalani Street/Kanaloa Avenue on the west by an on-street master controller. The posted speed on Kaahumanu Avenue, in the project vicinity, is 45 miles per hour.

Papa Avenue and Wakea Avenue are two-lane, two-way collector roads which begin in the industrial area of South Kahului and connect to Kaahumanu Avenue through the Kahului residential area. Papa Avenue, north of Kaahumanu Avenue, provides access to the MCC dormitories.

The intersection of Kaahumanu Avenue and Mahalani Street/Kanaloa Avenue is controlled by a traffic signal system. Kaahumanu Avenue at this intersection has exclusive left-turn lanes to southbound Mahalani Street and northbound Kanaloa Avenue. Right-turn deceleration and acceleration lanes on westbound and eastbound Kaahumanu Avenue are provided. The southbound Kanaloa Avenue approach consists of three lanes: an exclusive left-turn lane, an optional left-turn/through lane, and an exclusive right-turn lane to westbound Kaahumanu Avenue. There is an optional left-turn/through lane and an exclusive right-turn lane on the northbound Mahalani Street approach. This intersection is controlled by a six-phase traffic signal system with protected/permissive left-turn movements on Kaahumanu Avenue.

The intersection of Kaahumanu Avenue and Papa Avenue is a signalized intersection. The eastbound approach on Kaahumanu Avenue has an exclusive left-turn lane, two through lanes, and a right-turn deceleration lane to southbound Papa Avenue. The westbound approach of Kaahumanu Avenue has an exclusive left-turn lane and two through lanes. The northbound Papa Avenue approach has an exclusive left-turn and a shared left, through and right-turn lane. An acceleration lane is provided on Kaahumanu Avenue for the right-turn movement from northbound Papa Avenue to eastbound Kaahumanu Avenue. The southbound approach of Papa Avenue has one lane for the left turn, through and right turn movements. This intersection is controlled by a three phase traffic signal system with protected/permissible left-turn movements on

Kaahumanu Avenue.

The intersection of Kaahumanu Avenue and Wakea Avenue operates as a signalized intersection. Right-turn deceleration and acceleration lanes are provided on Kaahumanu Avenue for both eastbound and westbound traffic. The eastbound and westbound approaches on Kaahumanu Avenue at Wakea Avenue each have an exclusive left-turn lane, two through lanes, and a right-turn deceleration lane. The northbound approach of Wakea Avenue has an optional left-turn/through lane and an exclusive right-turn lane. The southbound approach exiting MCC has a shared left-turn, through and right-turn lane. This intersection is controlled by a five phase traffic signal system with protected/permissive left-turn movements on Kaahumanu Avenue.

2. ***Wastewater***

Domestic wastewater generated in the Wailuku-Kahului region is conveyed to the County's Wailuku-Kahului Wastewater Reclamation Facility located one-half mile south of Kahului Harbor. The design capacity of the facility is 7.9 million gallons per day (mgd). Average daily flow currently processed through the plant is approximately 6.45 mgd (telephone conversation with Dave Taylor, Wastewater Reclamation Division, July 1996).

3. ***Water***

The Wailuku-Kahului region is served by the Board of Water Supply's (BWS) domestic water system. Water drawn from the Iao Aquifer System is conveyed to this region for distribution and consumption. The Iao Aquifer, which serves the Central Maui region, has an estimated sustainable yield of 20 mgd.

4. Drainage

Currently, several culverts cross Kanaloa Avenue and outlet at the Maui Central Park site. Near the corner of Kanaloa Avenue and Kaahumanu Avenue, a 78-inch pipe culvert crosses Kanaloa Avenue, and a 42-inch pipe culvert lies under Kaahumanu Avenue, outlet onto the site. From the War Memorial Park which is to the west of the project site, one 24-inch and four 30-inch pipe culverts cross Kanaloa Avenue and outlet onto the site. Runoff from these culverts is generally ponded and pooled in low-lying areas and percolate into the ground. A 48-inch pipe culvert near the intersection of Mikohu Loop and Kanaloa Avenue also outlets at the project site. Runoff from the above-mentioned pipe culverts that enters the site empties into the existing low-lying and sump areas mauka of the beach road and percolates into the soil.

Chapter III

Potential Impacts and Mitigation Measures

III. POTENTIAL IMPACTS AND MITIGATION MEASURES

A. PHYSICAL ENVIRONMENT

1. Surrounding Land Uses

The proposed park complements a variety of recreational and cultural activities which are already in place in the general area. The site abuts the War Memorial Complex which includes a football and baseball stadium, five (5) Little League fields, Olympic swimming pool, and basketball gymnasium. The Maui Family YMCA abuts the park site and provides numerous recreational programs delving into such areas as swimming, aerobics, handball, and racquetball. The Maui Botanical Garden and Central Maui Youth Center are also existing recreational facilities. Maui Central Park complements the Maui Arts and Cultural Center which hosts a number of cultural and performing arts events. The park site also contains an existing horseshoe facility which is expected to be retained.

The proposed park also provides desired recreational space for a variety of users within the region and the island. The project would provide additional facilities within easy access of adjacent residential areas as well. With a growing population and high demand for both active and passive recreation facilities, the proposed project would serve to complement surrounding residential and community college uses.

The proposed project is not anticipated to have an adverse effect on surrounding land uses and activities.

2. Topography

The proposed project will involve the clearing, grubbing and grading of lands that are presently undeveloped. Much of the major substantial earthwork will be limited to the periphery of the park in order to establish the multi-purpose field, the ball fields, and soccer fields.

Areas within the central portion of the park will be selectively thinned, cleared and grubbed for use as a passive recreation area. It is noted that finished contours will generally follow existing grades to preserve the existing sand dune landform and minimize earthwork costs.

3. ***Flora and Fauna***

All of the plant species found in the project area are alien or indigenous and common, except for kukui (*Aleurites moluccana*) a common Polynesian plant which occurs in the Western side of the project area, and 'aki'aki (*Sporobolus virginicus*) an uncommon indigenous beach-grass which occurs on dunes in the northeastern part of the project area. There were no endemic plant species, or rare plants found in the project area. See Appendix A.

There are no species of vascular plants within the project area which require protection under Federal law. The proposed project is not anticipated to have an adverse impact upon these environmental features.

In addition, consultation with the U.S. Army Corps of Engineers indicated that there are no wetlands or other waters of the U.S. within the project area. See Chapter IX.

Fauna and avifauna found in the vicinity are typical of the Wailuku-

Kahului urban area. The proposed project is not anticipated to have an adverse impact upon these parameters as well.

4. ***Archaeological Resources***

An archaeological reconnaissance with subsurface testing was initially conducted at the project site. The study did not find any evidence of a buried cultural layer, dark organic deposits, artifacts or hidden materials and structural remains and features.

In spite of the negative findings of the present reconnaissance survey, of the subsurface testing and in previous archaeological studies, there is still likelihood of cultural materials, especially burials, occurring within the ungraded and partially graded portions of the project area. Neither the reconnaissance or the subsurface testing represent a sufficient sample of coverage to eliminate the possibility that archaeological resources occur here. Because of the shifting nature of sand dunes, it may be possible to find areas of partially buried cultural materials by locating surface scatters.

To address these concerns, an archaeological inventory survey, which included additional subsurface work and a surface survey, was conducted within the project area. No human remains or cultural materials were encountered during the additional subsurface work and surface survey. Refer to Appendix B. Also, an important component of the report was an oral interview with Mr. Charles Keau, a long time resident of the area who was involved with archaeological monitoring of the site during 1989 to 1990. The interview provided additional historical background information on the site.

In spite of the negative findings of the archaeological inventory survey, archaeological monitoring during construction is anticipated because of the potential of encountering cultural materials, especially human remains, within the project site. An archaeological monitoring plan will be submitted to SHPD for review and approval prior to the commencement of construction activities. The monitoring plan will also specify that if findings are uncovered, work will immediately be halted in that area and SHPD will be contacted to formulate an appropriate mitigation strategy.

5. ***Air Quality***

Air quality impacts attributed to the project will include dust generated by short-term, construction-related activities. Site work such as grading, grubbing, and utilities and roadway construction, for example, will generate airborne particulates. Regular watering and sprinkling will be done to minimize dust emissions. Revegetation will be implemented as soon as practicable in order to minimize the time which graded areas are left exposed. The entire project is intended to be built in one phase with a construction time frame of approximately 19 months.

In the long term, additional automobile traffic due to park activities would generate additional emissions. However, the project is anticipated to generate a relatively small portion of overall traffic activity in the Wailuku-Kahului region. The proposed project is not anticipated to be detrimental to local air quality.

6. ***Noise***

As with air quality, ambient noise conditions will be impacted by construction activities. Audible construction noise will probably be unavoidable during the construction period. To aid in the mitigation of noise impacts, construction activities will be conducted during the daylight hours only.

In general, the project will not generate adverse long-term noise conditions. County park maintenance would begin no earlier than 8:00 a.m. and be restricted to daylight hours. Activities within the park would generally be available for use during daylight hours. However, the Senior Little League and Pony League field, which is the field closest to Kahului Beach Road, and the soccer field closest to Kahului Beach Road, will be lighted. Night activities would be possible until 10:00 p.m.

The Maui Central Park Drive would be closed shortly after 10:00 p.m. to provide security. However, the Central Maui Youth Center and Botanical Garden may have special event activities at night on an intermittent basis.

A noise study done for the Papa Avenue extension in August 1995 showed existing noise levels at the MCC dormitories ranging from approximately 45 to 60 Ldn. (Day-Night Sound Level). This measurement represents the 24-hour average sound level for a typical day, with nighttime noise levels (10:00 p.m. to 7:00 a.m.) increased by 10 decibels prior to computation of the 24-hour average. Future traffic noise levels at the two student dormitory buildings closest to the Papa Avenue extension are expected to range from 58 to 60 Ldn. Although Federal provisions would not apply to the project, the future traffic noise levels are below FHA/HUD and FHWA noise abatement standards.

7. ***Scenic and Open Space Resources***

The proposed project should enhance the scenic and visual character of the surrounding area. The proposed project is located mauka of Kahului Beach Road and will not encroach into view corridors along the shoreline. In addition, the park would provide a landscaped amenity on lands which are currently undeveloped and overgrown largely with kiawe trees. Much of the landform of the dune area will be preserved in the form of passive recreation areas. The higher elevation areas of the dunes will also afford beautiful view vistas of the Central Maui isthmus.

8. ***Relocation Considerations***

The central portion of the park site is currently being utilized for archery purposes. There are a number of targets set up in a wilderness setting. A relocation archery target range site is being proposed to the west of the War Memorial Baseball Stadium.

B. *SOCIO-ECONOMIC ENVIRONMENT AND PUBLIC SERVICES*

1. ***Population and the Economy***

On a short-term basis, the project will support construction and construction-related employment. Accordingly, the project will have a beneficial impact on the local economy during the period of construction.

The proposed project is not anticipated to have an adverse impact upon population parameters. In the long term, the proposed project would provide an attractive greenspace within the Wailuku-Kahului urban core and, as such, would be an aesthetic amenity of indirect beneficial economic impact.

2. ***Police, Fire, and Medical Services***

Medical, police, and fire protection services are not expected to be adversely impacted by the proposed project. The project will not extend existing service area limits for emergency services. Night access for police patrols over closed portions of the park will be coordinated with the Police Department.

3. ***Solid Waste***

A solid waste management plan will be developed in coordination with the Solid Waste Division of the County Department of Public Works and Waste Management (DPWWM) for the disposal of clearing and grubbing material during construction. To the extent practicable, green waste will be recycled and reused.

C. *INFRASTRUCTURE*

1. ***Roadways***

A traffic assessment report was done for the subject project. See Appendix C. The highway and intersection capacity analysis performed in this study is based upon procedures presented in the "Highway Capacity Manual", Special Report 209, Transportation Research Board, 1985 and the "Highway Capacity Software", Federal Highways Administration.

Level of Service (LOS) is utilized as a quantitative and qualitative assessment of traffic operations. Levels of Service are defined by LOS "A" through "F"; LOS "A" representing the best operating condition and LOS "F" the worst operating condition.

"Volume-to-capacity" (v/c) ratio is another measure indicating the relative traffic demand to the road's carrying capacity. A v/c ratio of 1.00 indicates that the roadway is operating at 100% of its capacity. A v/c ratio greater than one (1.00) indicates that the projected traffic demand exceeds the road's traffic handling capacity.

Traffic volumes and conditions without the proposed project, were projected to the year 1998. Data provided by the State Department of Transportation was used as the basis in projecting existing 1996 AM and PM traffic volumes to the Year 1998. In addition, the County of Maui has plans to install a traffic signal system at the intersection of Kahului Beach Road and the proposed Papa Avenue extension. This intersection is assumed to be designed and implemented and therefore was excluded from the analysis. Table 1 and Table 2 show the operating LOS and v/c ratios of the critical movements at the intersections in the study area for the AM

Table 1

PROJECTED AM PEAK HOUR OPERATING CONDITIONS WITHOUT PROPOSED PROJECT		
Kaahumanu Avenue	**LOS**	**v/c**
Papa Avenue Northbound Left	D	--
Papa Avenue Southbound Left	D	--
Papa Avenue Westbound Thru	E	--
Wakea Avenue Westbound Thru	C	--
West of Papa Avenue	C	0.55

Table 2

PROJECTED PM PEAK HOUR OPERATING CONDITIONS WITHOUT PROPOSED PROJECT		
Kaahumanu Avenue	**LOS**	**v/c**
Papa Avenue Northbound Left	D	--
Wakea Avenue Southbound Left	D	--
Papa Avenue Eastbound Thru	E	--
West of Papa Avenue	C	0.63

and PM peak hours of traffic, without the proposed project.

During the projected AM peak hour of traffic, Kaahumanu Avenue, west of Papa Avenue, is expected to operate at LOS "C" with a v/c ratio of 0.55. The left-turn movement from both the southbound and northbound approaches from Papa Avenue would operate at LOS "D".

During the projected PM peak hour of traffic, Kaahumanu Avenue west of Papa Avenue, is expected to operate at LOS "C" and at a v/c ratio of 0.63. The northbound approach from Papa Avenue would operate at LOS "D".

Traffic volumes and conditions were projected to the year 1998, with the proposed project. The trip generation methodology is based upon generally accepted techniques developed by the Institute of Transportation Engineers (ITE) and published in "Trip

Generation, 5th Edition", 1991. The ITE trip rates are developed empirically, by correlating the vehicle trip generation data with various land use characteristics, such as vehicle trips per acre of development.

The traffic study assumes that the trip generation characteristics are based on a total land area of 120 acres. Of the 120 acres, vehicular trips generated by 90 acres will be attributed to the east side of the study area and 30 acres to the west side of the study area.

The proposed 30-acre portion of the park is expected to generate 46 vehicles per hour (vph) on the west side of the project site during the AM peak hour of traffic, 33 vph entering and 13 vph exiting. On the east side of the project site, the remaining 90-acre portion is expected to generate 116 vph during the AM peak hour of traffic, 84 vph entering and 32 vph exiting.

During the projected PM peak hour of traffic, the proposed 30-acre portion of the park is expected to generate 45 vph on the west side, 16 vph entering and 29 vph exiting. On the east side, the proposed 90-acre portion of the park is expected to generate 125 vph during the projected PM peak hour of traffic, 44 vph entering and 81 vph exiting.

The vehicular traffic generated by the proposed project is distributed to the street system in the vicinity of the project. The site-generated traffic is assigned to the roadway system proportionately to the volume of existing turning movements at each relevant approach. Table 3 and Table 4 show LOS for the

Table 3

PROJECTED AM PEAK HOUR OPERATING CONDITIONS WITH PROPOSED PROJECT		
Kaahumanu Avenue	**LOS**	**v/c**
Papa Avenue Northbound Left	C	--
Papa Avenue Southbound Left	D	--
Papa Avenue Westbound Thru	C	--
Wakea Avenue Westbound Thru	C	--
West of Papa Avenue	C	0.56

Table 4

PROJECTED PM PEAK HOUR OPERATING CONDITIONS WITH PROPOSED PROJECT		
Kaahumanu Avenue	**LOS**	**v/c**
Papa Avenue Northbound Left	D	--
Wakea Avenue Southbound Left	C	--
Papa Avenue Eastbound Thru	C	--
West of Papa Avenue	C	0.64

various critical movements for the projected AM and PM hours of traffic with the proposed project at the study intersections.

The traffic impact analysis for the AM peak hour shows that Kaahumanu Avenue, west of Papa Avenue, would operate at LOS "C" and at a v/c ratio of 0.56 with the proposed project. The northbound left-turn movement from Papa Avenue would improve from LOS "D" operating conditions to LOS "C" with the proposed project. Similarly, the westbound through movement along Kaahumanu Avenue at Papa Avenue would improve to LOS "C". The other traffic movements at each intersection would operate at satisfactory LOS.

For the PM peak hour, Kaahumanu Avenue, west of Papa Avenue, would operate at LOS "C" at a v/c ratio of 0.64 with the proposed project. The southbound left-turn movement from Wakea Avenue would improve from LOS "D" operating conditions to LOS "C" with the proposed project.

At the intersection of Papa Avenue and Kaahumanu Avenue, the eastbound through movement would improve from LOS "E" operating conditions to LOS "C" with the proposed project. The other traffic movements at each intersection would operate at satisfactory LOS.

Based upon the analysis of the projected traffic demands, the traffic assessment makes the following recommendations:

1. Provide an exclusive right-turn/deceleration lane on the westbound Kaahumanu Avenue approach at Papa Avenue.

2. Construct an exclusive right-turn lane, an optional left/through lane, and an exclusive left-turn lane on the northbound approach of Papa Avenue at Kaahumanu Avenue.

3. Construct an exclusive left-turn, and an optional through/right-turn lane on the southbound approach of Papa Avenue at Kaahumanu Avenue.

4. Install a traffic signal system at the intersection of Kahului Beach Road and the Papa Avenue Extension.

With the implementation of roadway improvements and new roadways, the proposed Maui Central Park should not have any significant impact on traffic in the vicinity of the project.

Issues relating to the specific alignment of the Papa Avenue extension will be addressed as design details are formulated. Ingress and egress, parking control and overflow, and safety and security accommodations will be coordinated with MCC.

2. *Water*

Domestic water for park users will be furnished by the County water system servicing the area. Projected potable water demand, excluding irrigation, is estimated at 110 gallons per minute. A water allocation will be coordinated with Board of Water Supply.

Water for irrigation purposes will be from non-potable wells which are proposed to be drilled within the project site. Approvals for the well drilling and pumping will be coordinated with the Commission on Water Resource Management.

Requirements for fire truck access and fire flow will be addressed with the Department of Fire Control as design details are formulated.

3. ***Wastewater***

The proposed project is estimated to generate an average daily flow of approximately 20.8 gallons per minute of wastewater. An allocation of capacity as well as any necessary wastewater contribution calculations would be coordinated with the Department of Public Works and Waste Management as part of the building permit process.

4. ***Drainage***

Drainage improvements for the construction of Maui Central Park will include on-site retention basins or sumps at various locations. An existing low-lying area located in the southwest corner of the site will intercept and retain runoff from off-site drainage basins conveyed through the 78-inch diameter and 42-inch diameter culverts under Kanaloa Avenue and Kaahumanu Avenue, respectively. The existing nursery site adjacent to Maui Botanical Garden will be utilized as a retention basin to accommodate runoff from the Maui Football Stadium collected via a 30-inch diameter culvert under Kanaloa Avenue and an open channel.

A depressed area east or makai of the proposed Keiki Zoo is planned to collect off-site runoff from the Maui Baseball stadium through existing culverts under Kanaloa Avenue. These retention basins and existing low-lying areas will have the capacity to retain the rainfall runoff quantities.

Two (2) retention basins or sumps fronting Kahului Beach Road will be graded to provide the required storage and retention capacities for the runoff quantities from the drainage areas east or makai of the proposed Maui Central Park Drive. The sump located near

Kanaloa Avenue and Kahului Beach Road intersection, has an existing 24-inch diameter drain pipe outletting to the harbor under Kahului Beach Road.

In addition to the proposed retention or sumps outlined above, numerous localized depressed lawn areas will become drainage retardation elements to reduce the runoff time of concentration and minimize the runoff quantities. The sandy nature of the on-site soil will allow much of the rainfall water to percolate and dissipate into the ground or sub-surface strata.

In addition, drainage pipe culverts will be implemented to relieve or avoid localized ponding.

The hydrology analysis indicates that the impact of the proposed Maui Central Park development on drainage conditions in the general vicinity will be minimal. The existing low-lying areas to the west of the proposed Maui Central Park Drive have adequate storage volume to accommodate the off-site runoff entering the project site and any on-site runoff. The runoff from the new Maui Central Park Drive, soccer fields and baseball fields will outlet at the sumps or retention basins fronting Kahului Beach Road.

Temporary erosion control measures expected to be implemented include:

1. Watering and sprinkling by means of waterwagons or by installing temporary sprinkler system;
2. Thorough watering of graded areas after construction activity has ceased for the day, weekend and holidays; and

3. Grassing of all exposed areas and slopes as soon as finished grading is completed.

5. ***Electrical and Telephone Systems***

Electrical power requirements associated with the proposed project will be supplied by Maui Electric Company, Ltd. Telephone system requirements, including the placement of emergency telephones within the park, will be coordinated with GTE Hawaiian Tel.

Chapter IV

Relationship to Governmental Plans, Policies and Controls

IV. RELATIONSHIP TO GOVERNMENTAL PLANS, POLICIES AND CONTROLS

A. STATE LAND USE DISTRICTS

Chapter 205, Hawaii Revised Statutes, relating to the Land Use Commission, establishes the four major land use districts in which all lands in the State are placed. These districts are designated "Urban", "Rural", "Agricultural", and "Conservation". The subject parcel is within the "Urban" district. See Figure 6. The proposed action involves the use of the property as a public park which is consistent with "Urban" district provisions.

B. MAUI COUNTY GENERAL PLAN

The Maui County General Plan (1990 Update) sets forth broad objectives and policies to help guide the long-range development of the County. As stated in the Maui County Charter:

> "The purpose of the General Plan is to recognize and state the major problems and opportunities concerning the needs and the development of the County and the social, economic and environmental effects of such development and set forth the desired sequence, patterns and characteristics of future development."

The proposed action is in keeping with the following General Plan objective and policies:

Objective: To provide high-quality recreational facilities to meet the present and future needs of our residents of all ages and physical ability.

Policy: Maintain and upgrade existing recreational facilities to meet community needs.

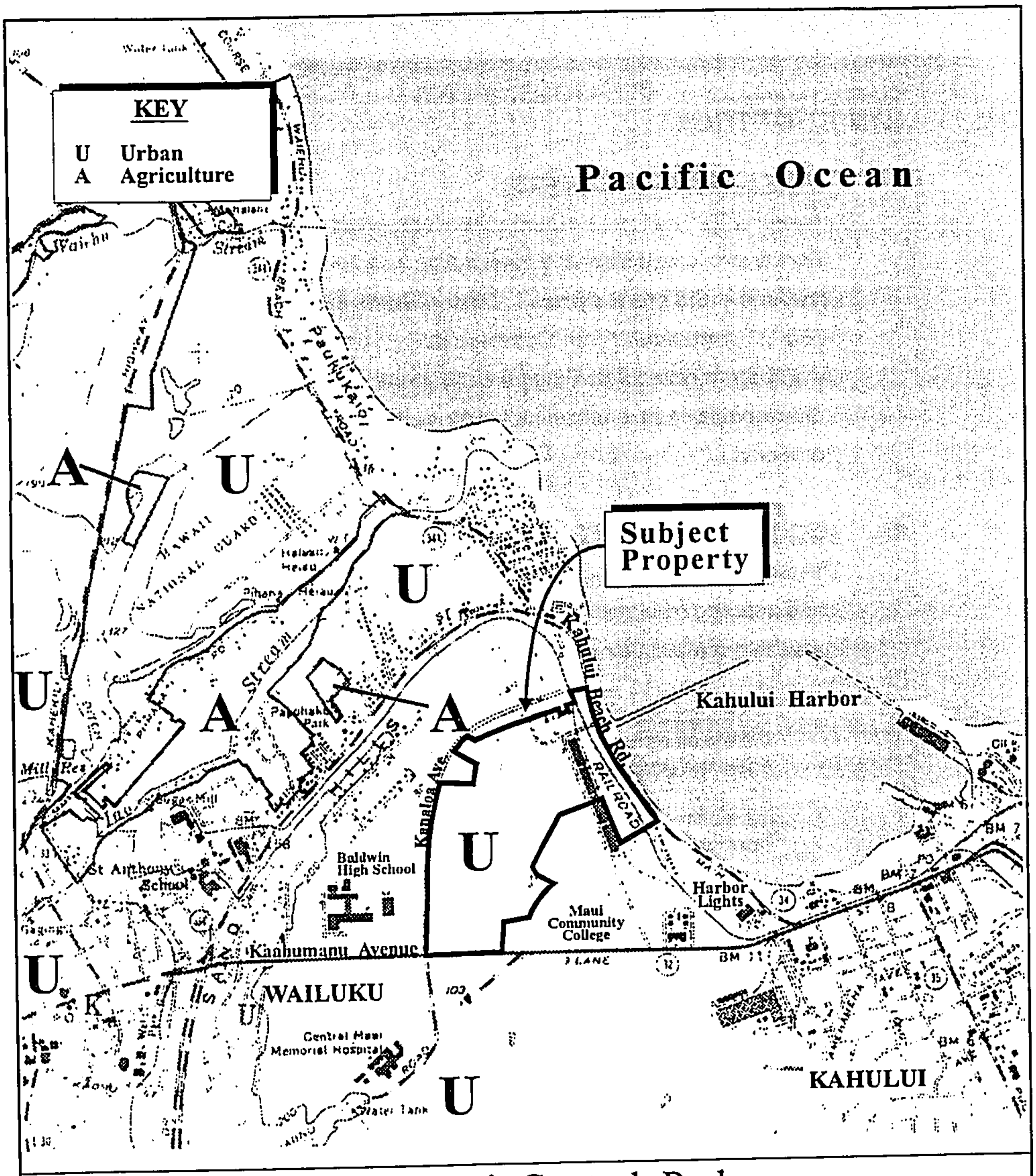

Figure 6

Maui Central Park
State Land Use District Designations

Prepared for: County of Maui, Office of the Mayor

Policy: Maintain recreational facilities for both active and passive pursuits.

Policy: Develop facilities that will meet the different recreational needs of the various communities.

Policy: Develop multi-purpose recreational facilities.

C. *WAILUKU-KAHULUI COMMUNITY PLAN*

The subject parcel is located in the Wailuku-Kahului Community Plan region which is one of nine Community Plan regions established in the County of Maui. Planning for each region is guided by the respective Community Plans, which are designed to implement the Maui County General Plan. Each Community Plan contains recommendations and standards which guide the sequencing, patterns and characteristics of future development in the region.

Land use guidelines are set forth by the Wailuku-Kahului Community Plan Land Use Map. See Figure 7. Most of the proposed Maui Central Park project site is designated "Park", while a small portion of the site located to the north of the Papa Avenue Extension is designated "Public/Quasi-Public" by the Community Plan.

The proposed project is consistent with the Wailuku-Kahului Community Plan.

The County of Maui is currently in the process of comprehensively updating each community plan. The process involves review by appointed Citizen Advisory Committees for each region, the Department of Planning, the appropriate Planning Commission, and the Maui County

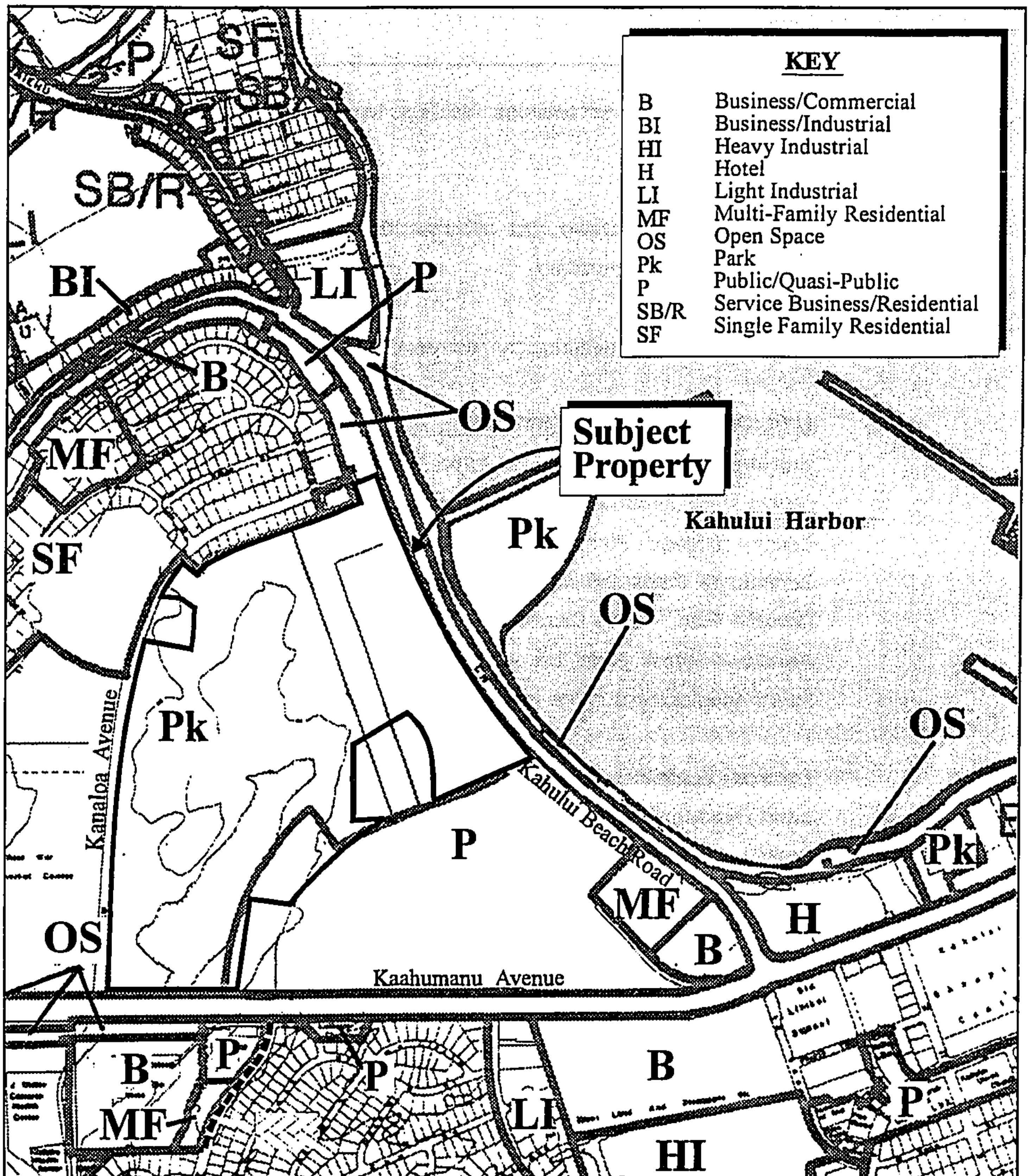

Figure 7

Maui Central Park
Wailuku-Kahului Community
Plan Land Use Designations

MUNEKIYO & ARAKAWA, INC.

0 500 1000 2000 Feet

Prepared for: County of Maui, Office of the Mayor

Council.

Comprehensive review to the Hana, Kahoolawe, Paia-Haiku, Makawao-Pukalani-Kula, and West Maui Community Plans have been completed. The Maui County Council has recently initiated review of the Kihei-Makena Community Plan. Pending review at the County Council are the Wailuku-Kahului, Lanai and Molokai Community Plans.

Land use guidelines for the subject property within the proposed Maui Planning Commission version of the Wailuku-Kahului Community Plan are the same as the existing community plan. Thus, the proposed project is also consistent with provisions of the proposed Wailuku-Kahului Community Plan.

D. *__ZONING__*

The subject property is zoned Maui Central Park District as codified in Chapter 19.27 of the Maui County Code. See Figure 8. The intent of the Maui Central Park District is to provide for the planning and development of educational, recreational and cultural facilities in a setting of a public regional park. Permitted uses within the park include zoos and botanical gardens; cultural and performing arts centers; parks and playgrounds; maintenance areas; and recreational, educational and community facilities for public or eleemosynary organizations.

The proposed project conforms with the applicable zoning provisions.

E. *__SPECIAL MANAGEMENT AREA OBJECTIVES AND POLICIES__*

Pursuant to Chapter 205A, Hawaii Revised Statutes, and the Rules and Regulations of the Planning Commission of the County of Maui, projects located within the SMA are evaluated with respect to SMA objectives,

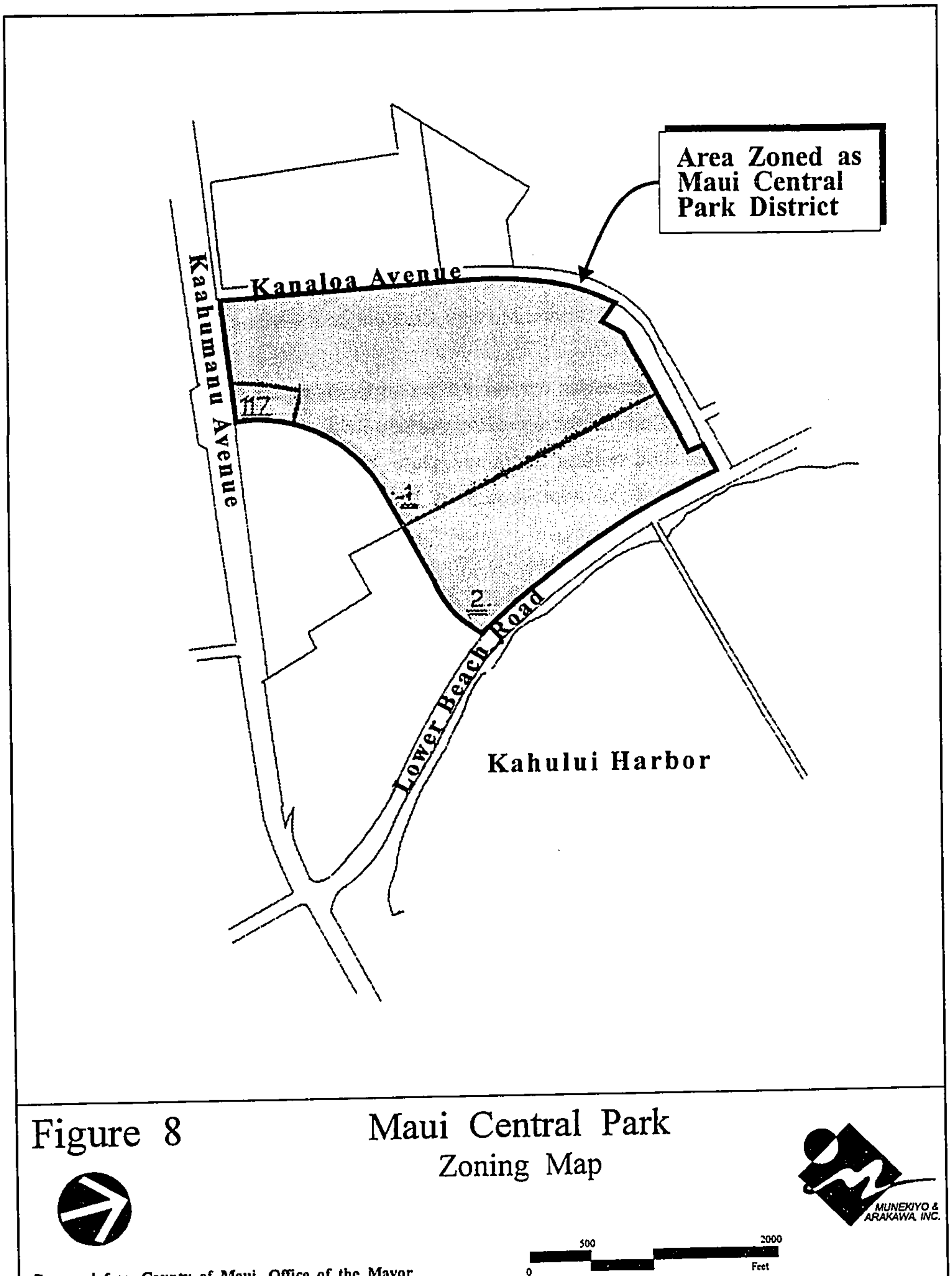

Figure 8

Maui Central Park
Zoning Map

Prepared for: County of Maui, Office of the Mayor

policies and guidelines. This section addresses the project's relationship to applicable coastal zone management considerations, as set forth in Chapter 205A and the Rules and Regulations of the Planning Commission.

1. Recreational Resources

Objective: Provide coastal recreational resources accessible to the public.

Policies:

a. Improve coordination and funding of coastal recreation planning and management; and

b. Provide adequate, accessible and diverse recreational opportunities in the coastal zone management area by:

   i. Protecting coastal resources uniquely suited for recreation activities that cannot be provided in other areas;

   ii. Requiring replacement of coastal resources having significant recreational value, including but not limited to surfing sites, fishponds, and sandy beaches, when such resources will be unavoidably damaged by development; or requiring reasonable monetary compensation to the State for recreation when replacement is not feasible or desirable;

   iii. Providing and managing adequate public access, consistent with conservation of natural resources, to and along shorelines with recreational value;

   iv. Providing an adequate supply of shoreline parks and other recreational facilities suitable for public recreation;

   v. Ensuring public recreational use of County, State, and federally owned or controlled shoreline lands and waters having recreational value consistent with public safety standards and conservation of natural resources;

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

vii. Encouraging reasonable dedication of shoreline areas with recreational value for public use as part of discretionary approvals or permits by the land use commission, board of land and natural resources, county planning commissions, and crediting such dedication against the requirements of Section 46-6 of the Hawaii Revised Statutes.

Response: The proposed project will not impact coastal recreational resources. Access to shoreline areas will remain unaffected by the proposed action.

2. Historical/Cultural Resources

Objective: Protect, preserve and where desirable, restore those natural and man-made historic and prehistoric resources in the coastal zone management areas that are significant in Hawaiian and American history and culture.

Policies:

a. Identify and analyze significant archaeological resources;

b. Maximize information retention through preservation of remains and artifacts or salvage operations; and

c. Support State goals for protection, restoration, interpretation and display of historic resources.

Response: Archaeological surveys conducted within the project area did not reflect any notable findings. Coordination with the State Historic Preservation Division is being undertaken to ensure that the proposed project will have no adverse effect on historical or cultural resources.

3. ***Scenic and Open Space Resources***

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

Policies:

a. Identify valued scenic resources in the coastal zone management area;

b. Insure that new developments are compatible with their visual environment by designing and locating such developments to minimize the alteration of natural land forms and existing public views to and along the shoreline;

c. Preserve, maintain and, where desirable, improve and restore shoreline open space and scenic resources; and

d. Encourage those developments which are not coastal dependent to locate in inland areas.

Response: The proposed project will improve coastal scenic and open space resources by minimizing alteration of natural landforms, provision of landscaping and increased accessibility.

4. ***Coastal Ecosystems***

Objective: Protect valuable coastal ecosystems, including reefs, from disruption and minimize adverse impacts on all coastal ecosystems.

Policies:

a. Improve the technical basis for natural resource management;

b. Preserve valuable coastal ecosystems of significant biological or economic importance;

c. Minimize disruption or degradation of coastal water ecosystems by effective regulation of stream diversions, channelization, and similar land and water uses, recognizing competing water needs; and

d. Promote water quantity and quality planning and management practices which reflect the tolerance of fresh water and marine ecosystems and prohibit land and water uses which violate state water quality standards.

Response: The development of the proposed improvements is not anticipated to affect coastal ecosystems. Appropriate erosion control measures will be implemented during the construction of the project to minimize the disruption of coastal water ecosystems.

5. Economic Uses

Objective: Provide public or private facilities and improvements important to the State's economy in suitable locations.

Policies:

a. Concentrate coastal dependent development in appropriate areas;

b. Ensure that coastal dependent development such as harbors and ports, and coastal related development such as visitor facilities and energy-generating facilities are located, designed, and constructed to minimize adverse social, visual and environmental impacts in the coastal zone management area; and

c. Direct the location and expansion of coastal dependent developments to areas presently designated and used for such developments and permit reasonable long-term growth at such areas, and permit coastal dependent development outside of presently designated areas when:

    i. Utilization of presently designated locations is not feasible;

    ii. Adverse environmental effects are minimized; and

iii. The development is important to the State's economy.

Response: During the short-term, construction related employment will benefit the local economy. Upon completion, the project should provide an aesthetically pleasing green space adjacent to coastal dependent development.

6. ***Coastal Hazards***

Objective: Reduce hazard to life and property from tsunami, storm waves, stream flooding, erosion, subsidence, and pollution.

Policies:

a. Develop and communicate adequate information about storm wave, tsunami, flood, erosion, subsidence, and point and nonpoint source pollution hazards;

b. Control development in areas subject to storm wave, tsunami, flood, erosion, subsidence, and point and nonpoint source pollution hazards;

c. Ensure that developments comply with requirements of the Federal Flood Insurance Program;

d. Prevent coastal flooding from inland projects; and

e. Develop a coastal point and nonpoint source and pollution control program.

Response: Most of the project area is situated within lands that are designated Zone "C", areas of minimal flooding. The project area closest to Kahului Beach Road is located in lands designated Zone "A4", areas of 100-year flooding, and Zone "V23", areas inundated by the 100-year coastal flood with velocity. The proposed drainage improvements maintain low-lying areas to accommodate on-site and off-site runoff for the area to the west of

Maui Central Park Drive and the Papa Avenue Extension. The existing sumps along the eastern boundary of the project site along Kahului Beach Road would be utilized to drain the proposed soccer and baseball fields.

7. ***Managing Development***

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

Policies:

a. Use, implement, and enforce existing law effectively to the maximum extent possible in managing present and future coastal zone development;

b. Facilitate timely processing of applications for development permits and resolve overlapping of conflicting permit requirements; and

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

Response: All aspects of development will be conducted in accordance with applicable Federal, State, and County requirements. Opportunities for reviewing the proposed action are available through the early consultation, and public notification, review, comment and public hearing processes.

8. ***Public Participation***

Objective: Stimulate public awareness, education, and participation in coastal management.

Policies:

a. Maintain a public advisory body to identify coastal management problems and to provide policy advise and assistance to the coastal zone management program;

b. Disseminate information on coastal management issues by means of educational materials, published reports, staff contact, and public workshops for persons and organizations concerned with coastal-related issues, developments, and government activities; and

c. Organize workshops, policy dialogues, and site-specific mediations to respond to coastal issues and conflicts.

Response: As previously noted, opportunities for agency and public review of the proposed action are provided through Federal and State notification, review, and comment processes, as well as the County Special Management Area permitting process.

9. Beach Protection

Objective: Protect beaches for public use and recreation.

Policies:

a. Locate new structures inland from the shoreline setback to conserve open space and to minimize loss of improvements due to erosion;

b. Prohibit construction of private erosion-protection structures seaward of the shoreline, except when they result in improved aesthetic and engineering solutions to erosion at the sites and do not interfere with existing recreational and waterline activities; and

c. Minimize the construction of public erosion-protection structures seaward of the shoreline.

Response: The proposed project does not involve any construction work seaward of the shoreline. On-site runoff is proposed to be accommodated within existing sumps on the project site. The project should have no effect on beach loss due to erosion.

Chapter V

Summary of Adverse Environmental Effects which Cannot be Avoided

V. SUMMARY OF ADVERSE ENVIRONMENTAL EFFECTS WHICH CANNOT BE AVOIDED

The proposed development of Maui Central Park will result in some construction-related impacts as described in Chapter III, Potential Impacts and Mitigation Measures.

Potential effects include noise-generated impacts occurring from site preparation and construction activities. In addition, there may be temporary air quality impacts associated with dust generated from construction activities, and exhaust emissions discharged by construction equipment.

Accordingly, the proposed project is not anticipated to create any long-term, adverse environmental effects.

Chapter VI

Alternatives to the Proposed Action

VI. ALTERNATIVES TO THE PROPOSED ACTION

A. PREFERRED ALTERNATIVE

The construction of Maui Central Park provides a significant landscaped green space within the Wailuku-Kahului region. The 130 acre property is located within the center of the region representing the last available developable property of this size within the urbanized area. Moreover, the property is already owned by the County of Maui.

The proposed regional park project includes a number of recreational activities servicing a broad segment of the community. Such activities include baseball, softball, soccer, tennis, jogging, skateboarding, horseshoe pitching, and other youth activities. Passive pursuits include picnicking, walking, and enjoying the botanical garden and keiki zoo.

There are a significant number of residents who either live, work, shop or play in close proximity to the project site who could utilize the park. Based on 1996 estimates, there are approximately 37,514 existing residents of Wailuku-Kahului which is about 36 percent of the total population of the island. In addition, Wailuku-Kahului is the governmental, commercial and industrial center of the island. There are approximately 27,028 civilian jobs within Wailuku-Kahului which represents about 48 percent of the total number of civilian jobs on the island. Moreover, there are significant shopping and entertainment centers in the region which draws additional people from other areas of the island. This represents a sizable group of potential users of the project. It should also be noted that population within the Wailuku-Kahului region as well as the island of Maui is projected to grow which will only serve to increase future demand for parks and recreational facilities.

B. NO ACTION ALTERNATIVE

Although the property could continue to be utilized in its present manner, the implementation of the master plan for the park would provide improvements for a significantly broader array of users. There are various organizations which have been allowed to utilize the land for various recreational pursuits. However, a master plan for the park has not been implemented and the park land is generally underutilized.

Planning for Maui Central Park started over a decade ago. However, implementation of the master plan has been deferred. It is noted that the no action alternative does not represent a desirable option in meeting overall parks and recreation goals.

Chapter VII

Irreversible and Irretrievable Commitments of Resources

VII. IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

The proposed development of Maui Central Park would involve the commitment of fuel, labor, funding, and material resources.

Development of the proposed project will involve the commitment of land for park improvements which may preclude other land use options for the site. This commitment of land resources is consistent with existing and future land uses in and around the project area.

Chapter VIII

Findings and Conclusions

VIII. FINDINGS AND CONCLUSIONS

The proposed project involves the implementation of Maui Central Park, a 130 acre public regional park in Kahului, Maui, Hawaii. Since County lands and funds are proposed to be utilized for the project, an Environmental Assessment has been prepared pursuant to Chapter 343, Hawaii Revised Statutes, and Chapter 200 of Title 11, Administrative Rules of the State Department of Health. A County Special Management Area Use Permit is also being requested.

Every phase of the proposed action, expected consequences, both primary and secondary, and the cumulative as well as the short-term and long-term effects of the action have been evaluated in accordance with the Significance Criteria of Section 11-200-12 of the Administrative Rules. Based on the analysis, the proposed project will not result in any significant impacts. Discussion of project conformance to the criteria is noted as follows:

1. ***No Irrevocable Commitment to Loss or Destruction of any Natural or Cultural Resource Would Occur as a Result of the Proposed Project***

   Flora within the project area consists primarily of kiawe, buffelgrass and haole koa. No wetland parameters exist within the project site. Fauna and avifauna are typical of a developed area. There are no known, rare, endangered or threatened species of flora, fauna, or avifauna within the project site.

   An archaeological reconnaissance with subsurface testing was done for the project site by Cultural Surveys Hawaii. No significant cultural materials were found. In addition, an archaeological inventory survey, which included subsurface testing and a surface survey, also revealed negative findings. Coordination with the State Historic Preservation Office prior to start of construction will be initiated to ensure that there is no effect to cultural or historic resources.

2. ***The Proposed Action Would Not Curtail the Range of Beneficial Uses of the Environment***

The project site is largely unmaintained containing predominantly kiawe and guinea grass. The park would provide additional landscaping and vegetation while largely maintaining the existing landform. The site is located in the midst of an urban area and would be an infill development within the Wailuku-Kahului urban core. The project would not have a significant effect on the beneficial uses of the environment.

3. ***The Proposed Action Does Not Conflict With the State's Long-Term Environmental Policies or Goals or Guidelines as Expressed in Chapter 344, Hawaii Revised Statutes***

The State Environmental Policy and Guidelines are set forth in Chapter 344, Hawaii Revised Statutes. The proposed action is in consonance with the following policies and guidelines:

Environmental Policy:

Enhance the quality of life by:

* * *

(C) Establishing communities which provide a sense of identity, wise use of land, efficient transportation, and aesthetic and social satisfaction in harmony with the natural environment which is uniquely Hawaiian.

Guidelines:

* * *

Flora and fauna.

* * *

(B) Foster the planting of native as well as other trees, shrubs, and flowering plants compatible to the enhancement of our environment.

* * *

Parks, recreation, and open space.

* * *

(A) Establish, preserve and maintain scenic, historic, cultural, park and recreation areas, including the shorelines, for public recreational, educational, and scientific uses;

* * *

(C) Promote open space in view of its natural beauty not only as a natural resource but as an ennobling, living environment for its people.

* * *

Community life and housing.

* * *

(B) Develop communities which provide a sense of identity and social satisfaction in harmony with the environment and provide internal opportunities for shopping, employment, education, and recreation;

* * *

(E) Recognize community appearances as major economic and aesthetic assets of the counties and the State; encourage green belts, plantings, and landscape plans and designs in urban areas; and preserve and promote mountain-to-ocean vistas.

4. ***<u>The Economic or Social Welfare of the Community or State Would Not Be Substantially Affected</u>***

The project would directly benefit the local economy primarily during the construction phase. In the long term, however, the project should have minimal direct effect upon the local economy. Additional recreation and green space should indirectly benefit economic and social welfare in terms of a provision of an aesthetic amenity.

5. ***The Proposed Action Does Not Affect Public Health***

No impacts to the public's health and welfare are anticipated.

6. ***No Substantial Secondary Impacts, Such as Population Changes or Effects on Public Facilities, are Anticipated***

No significant population changes are anticipated as a result of the proposed project. Although the project involves the provision of additional parks and recreation amenities, it is not likely to influence the place of residence for existing residents nor is it likely to induce additional residents to live on the island.

From a land use standpoint, the proposed project is anticipated to be compatible with surrounding land uses and complements the War Memorial Recreational Complex located across Kanaloa Avenue from the project site.

The proposed project is not anticipated to have a significant effect upon the area's roadways and should improve level of service at various intersections in the vicinity of the project. The applicant will work with the Department of Water Supply in supplying the additional increment of potable water needed for the project. Non-potable wells are proposed to be drilled on-site in order to provide water for irrigation. The applicant will work with the Commission on Water Resource Management in securing the necessary approvals. The project intends to hook up with the County sewer system and will work with the Department of Public Works and Waste Management in obtaining approvals prior to building permit issuance. On-site and off-site drainage is expected to be accommodated within the project site. The project is not expected to significantly impact public services such as police, fire and medical services. Impacts upon educational and long term solid waste parameters are also minimal. To the extent practicable, green waste will be recycled and reused.

7. ***No Substantial Degradation of Environmental Quality is Anticipated***

The project site will be landscaped to complement the surrounding developed environment. Use of herbicides will be utilized in accordance with manufacturer's recommendations while fertilizers are anticipated to be utilized in accordance with prudent irrigation practices.

No substantial degradation of environmental quality resulting from the project is anticipated.

8. ***The Proposed Action Does Not Involve a Commitment to Larger Actions, Nor Would Cumulative Impacts Result in Considerable Effects On The Environment***

The proposed project would be built in one phase and would not involve a commitment to future expansion or larger actions.

9. ***No Rare, Threatened or Endangered Species or Their Habitats Would be Adversely Affected By The Proposed Action***

There are no rare, threatened or endangered species of flora, fauna, or avifauna or their habitats on the subject property.

10. ***Air Quality, Water Quality or Ambient Noise Levels Would Not Be Detrimentally Affected By The Proposed Project***

Construction activities will result in short-term air quality and noise impacts. Dust control measures, such as regular watering and sprinkling, and erection of dust screens will be implemented to minimize wind-blown emissions. Noise impacts will occur primarily from construction equipment. It is anticipated that construction will be limited to daylight working hours.

In the long term, the project is not anticipated to have a significant impact on air quality or noise parameters.

11. The Proposed Project Would Not Affect Environmentally Sensitive Areas, Such As Flood Plains, Tsunami Zones, Erosion-prone Areas, Geologically Hazardous Lands, Estuaries, Fresh Waters or Coastal Waters

Portions of the project site located near Kahului Beach Road are located within Zones A4 (areas inundated by the 100-year flood with a base flood elevation of seventeen (17) feet above mean sea level) and V-23 (areas inundated by the 100-year coastal flood with velocity hazards and a base flood elevation of seventeen (17) to eighteen (18) feet above mean sea level. However, no habitable structures are being placed in these areas. Soils of the project site are not erosion-prone. There are no geologically hazardous lands, estuaries, perennial or intermittent streams, or fresh waters within or adjacent to the project site. The coastal waters of Kahului Harbor are located across from Kahului Beach Road and would not be significantly affected.

12. The Proposed Project Does Not Substantially Affect Scenic Vistas and Viewplanes Identified In County or State Plans or Studies.

The project will not adversely affect scenic vistas and viewplanes. Maui Central Park will enhance the open space value of the site by providing a landscape amenity on lands currently undeveloped and overgrown with kiawe trees and weeds.

13. The Proposed Project Does Not Require Substantial Energy Consumption.

The proposed action involves the creation of park areas and related improvements and, therefore, does not require or involve substantial energy consumption activities.

Based on the foregoing findings, it is concluded that the proposed action will not result in any significant impacts.

Chapter IX

Agencies and Organizations Consulted During the Preparation of the Environmental Assessment and Responses Received

IX. AGENCIES AND ORGANIZATIONS CONSULTED DURING THE PREPARATION OF THE ENVIRONMENTAL ASSESSMENT AND RESPONSES RECEIVED

The following agencies and organizations were contacted during the preparation of the Environmental Assessment:[a]

1. Linda Hibara-Endo
   Department of the Army
   U.S. Army Engineer District, Hnl.
   Attn: Operations Division
   Bldg. T-1, Room 105
   Fort Shafter, HI 96858-5440

2. Reginald Kurokawa
   Department of Agriculture
   State of Hawaii
   635 Mua Street
   Kahului, HI 96732

3. Lawrence Miike, Director
   Department of Health
   State of Hawaii
   54 High Street
   Wailuku, HI 96793

4. Michael Wilson, Director
   Department of Land and Natural Resources
   State of Hawaii
   P. O. Box 621
   Honolulu, HI 96809

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

6. Robert Siarot, Maui District Engineer
   Department of Transportation
   Highways Division
   State of Hawaii
   650 Palapala Drive
   Kahului, HI 96732

7. Henry Oliva, Director
   Department of Parks and Recreation
   County of Maui
   200 South High Street
   Wailuku, HI 96793

8. David W. Blane, Director
   Department of Planning
   County of Maui
   250 South High Street
   Wailuku, HI 96793

9. Howard Tagomori, Chief
   Police Department
   County of Maui
   55 Mahalani Street
   Wailuku, HI 96793

10. Charles Jencks, Director
    Department of Public Works and Waste Management
    County of Maui
    200 South High Street
    Wailuku, HI 96793

11. David Craddick, Director
    Department of Water Supply
    County of Maui
    200 South High Street
    Wailuku, HI 96793

12. Ron Davis, Chief
    Department of Fire Control
    County of Maui
    200 Dairy Road
    Kahului, HI 96732

13. Mark Nerenhausen, Director
Maui Arts and Cultural Center
101 Kaahumanu Ave., Suite A-A
Kahului, HI 96732

14. Clyde Sakamoto, Provost
Maui Community College
310 Kaahumanu Avenue
Kahului, HI 96732

15. Gail Gnazzo, Executive Director
Central Maui Youth Center
100 Kanaloa Avenue
Wailuku, HI 96793

16. Charles Knobel, Director
Maui Family YMCA
250 Kanaloa Avenue
Wailuku, HI 96793

17. Mr. James Lawrence
Kahului Town Association
P. O. Box 156
Kahului, HI 96732

* Substantive comments raised by agencies or organizations are addressed in the body of the EA document.

AUG 06 1996

POLICE DEPARTMENT

COUNTY OF MAUI

LINDA CROCKETT LINGLE
MAYOR

55 MAHALANI STREET
WAILUKU, HAWAII 96793
AREA CODE (808) 244-6400
FAX NO. (808) 244-6411

HOWARD H. TAGOMORI
CHIEF OF POLICE

THOMAS PHILLIPS
DEPUTY CHIEF OF POLICE

OUR REFERENCE

YOUR REFERENCE

July 24, 1996

Mr. Milton Arakawa
Project Manager
Munekiyo & Arakawa, Inc.
1823 Wells Street, Suite 3
Wailuku, Hawaii 96793

Dear Mr. Arakawa:

Subject: Maui Central Park

We have received your letter of July 10, 1996, with attachments, regarding the above project.

We have reviewed the proposed project and have enclosed our comments. Thank you for the opportunity to make comments on the project summary.

Very truly yours,

HOWARD H. TAGOMORI
Chief of Police

Enclosure

TO : CHARLES HALL, ASSISTANT CHIEF, UNIFORMED SERVICES

VIA : GERALD MATSUNAGA, CAPTAIN, DISTRICT I

FROM : GLENN CUOMO, LIEUTENANT, DISTRICT I

SUBJECT : COMMENTS ON MAUI CENTRAL PARK

I have been assigned to address the concerns that Patrol has with the Central Maui Park project. Possible problems due to a park this size include traffic congestion during heavy use, illegal parking due to inadequate design , large gatherings of youths and possible violence at night, criminal property damage to the park and its structures and theft from park users or their vehicles. The following are some questions I believe our department may want to raise:

Will **adequate parking** be provided within the park?
Will any in park parking be provided for the multi- purpose field?
Will parking areas be designed to allow users to **observe** their vehicle so that **thefts** are minimized?

Will the park be opened 24 hours or will it be **closed at night**?
If the park and drive are to be closed at night, what access will be provided for police to patrol?

Will **traffic signals** or "Right Turn Only" signs be installed at the park drive exits?

Will **drinking** be limited to certain hours or will it be allowed at all?

What **lighting** will be provided at night?

Will storage sheds and other structures be designed and positioned to minimize **theft and vandalism**?

Will **emergency telephones** be available throughout the park?

I believe that some of the above issues, if addressed at this phase of the park's development, will help us to carry out our mission.

Will there be enough restrooms, and what hours will the restrooms be opened? This is due to vandalism, health concerns, etc., such has happened within other county and state parks.

Capt Gerald Matsunaga 7277
7/22/96

LT Glenn Cuomo
Glenn Cuomo E#6397
7/22/96 at 1030 hrs.

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

~~~ 00 1996

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

DEPUTY
GILBERT COLOMA-AGARAN

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

STATE OF HAWAII

DEPARTMENT OF LAND AND NATURAL RESOURCES

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

August 5, 1996

Mr. Milton Arakawa
Munekiyo & Arakawa, Inc.
305 High Street, Suite 104
Wailuku, Hawaii 96793

LOG NO: 17771
DOC NO: 9607KD19

Dear Mr. Arakawa:

SUBJECT: **Chapter 6E-8 Historic Preservation Review of the Maui Central Park Project Kahului, Wailuku District, Island of Maui**
TMK: 3-8-07: por.1 and 3-7-01: por. 2

Thank you for requesting comments regarding the proposed Maui Central Park project, which encompasses approximately 110 acres in Kahului. The project area is located between Waiehu Beach Road, Kanaloa Avenue, and Ka'ahumanu Avenue, and will affect previously disturbed as well as undisturbed sand dune lands. The entire project is within the Sand Hills geological zone, which extends from Kahului Bay west to Kuihelani Highway.

Previous archaeological work in the area includes a subsurface survey of the proposed Papa Avenue extension. No historic sites were identified during this survey. A number of archaeological surveys have been conducted of adjacent lands, in conjunction with construction at Maui Community College and the Culture and Arts Center. These surveys identified remains of military structures, associated with World War II, and found that much of the area was impacted by extensive military construction during World War II. The Central Park area includes a portion of the former military installation, as well as a large, relatively undisturbed dune formation. Based on findings of surveys in other undisturbed dune areas, it appears likely that historic sites, particularly traditional Hawaiian burial sites, will be present in this area.

We have previously reviewed the master plan for this project, and a site visit was made by Mr. Pat Matsui, County of Maui Department of Parks and Recreation Planner and Ms. Theresa Donham of our office. At that time, it was agreed that an archaeological inventory survey would be needed of the project area, with various field approaches to be implemented depending upon the extent of previous disturbance and nature of proposed uses.
~~~

It is our understanding that an inventory survey is pending for this project. We will have additional comments regarding project impacts to historic sites after we have had an opportunity to review the draft report of the survey. We recommend that the report and findings of the survey be included in the Draft Environmental Assessment for the project.

If you have any questions, please contact Ms. Theresa K. Donham at 243-5169.

Aloha,

DON HIBBARD, Administrator
State Historic Preservation Division

KD:jen

Maui Community College
UNIVERSITY OF HAWAII
OFFICE OF THE PROVOST

July 31, 1996

Mr. Milton Arakawa
Project Manager
Maui Central Park Environmental Assessment
Munekiyo and Arakawa, Inc.
305 High Street Suite 104
Wailuku, Hawaii 96793

SUBJECT: Maui Central Park Development

Dear Mr. Arakawa:

Thank you for providing Maui Community College an opportunity to comment on the proposed Central Park Concept Master Plan. We are responding to your letter dated July 10, 1996 and look forward to collaborating with your firm, Chris Hart and Partners, and representatives from the County Department of Planning and the Mayor's Office to address the following issues of concern to MCC.

Many of the issues carryover from the prior Central Park development plan, which envisioned a parkway connecting a two-lane Papa Avenue extension to Kanaloa Avenue. Based on discussions with Chris Hart and other county representatives, it seems that the Central Park concept has been rethought such that the parkway connecting the Papa Avenue extension to Kanaloa Avenue has been eliminated. The following issues, revolving around integration of the Central Park development with the MCC Masterplan, are of concern to the College:

- Scope and size of the Papa Avenue extension and Central Park development and the impact of development on the MCC land "footprint"
- Impact of a Papa Avenue extension on adjacent MCC facilities, particularly the dormitory, ball field, agriculture program facilities, and beach road parking lot (e.g., proximity to dormitory facilities, noise levels from traffic, ingress to and egress out of MCC for pedestrians and vehicles)
- Drainage accommodations given a Papa Avenue extension and further Central Park development

Mr. Arakawa
Munekiyo and Arakawa, Inc
July 31, 1996
Page 2

- Parking control, parking overflow, and potential public safety and security accommodations necessitated by Central Park development

We look forward to working with project consultants and county representatives to address the above issues and other issues which may arise at a later date. Again, thank you for the opportunity to comment. Should you have any questions or require additional information, please feel free to contact me at 984-3213.

Sincerely yours,

Karen Muraoka

for Clyde Sakamoto
Provost

JUL 24 1996

LINDA CROCKETT LINGLE
MAYOR

RONALD P. DAVIS
CHIEF

HENRY A. LINDO, SR.
DEPUTY CHIEF

COUNTY OF MAUI
DEPARTMENT OF FIRE CONTROL

200 DAIRY ROAD
KAHULUI, MAUI, HAWAII 96732
(808) 243-7561

July, 22, 1996

Milton Arakawa, Planner
Munekiyo & Arakawa, Inc.
305 High Street, Suite 104
Wailuku, Maui, Hawaii 96793

RE: Maui Central Park; TMK: 3-8-07:01 and 3-7-01:02

Dear Mr. Arakawa,

The Maui Central Park is a noble idea and should be allowed to progress in a timely manner.

The more obvious requirement for this park is to provide adequate access in accordance with the Uniform Fire Code, 1979 Edition as amended, Section 10.207(a). This section addresses the issue of access roadways. The unobstructed width shall be twenty (20) feet, provided with an all-weather surface and sufficient turning radius to accommodate a 30-ton fire apparatus. The vertical clearance shall be thirteen feet six inches (13' 6").

Secondly, sufficient water supply sources shall be provided to protect the structures associated with this park; scorer's box, concession stands, restrooms or any other type of structures.

If you have any questions, direct them in writing to the Fire Prevention Bureau, 21 Kinipopo Street, Wailuku, Hawaii 96793.

Sincerely,

Leonard F. Niemczyk
Leonard F. Niemczyk
Captain, FPB

JUL 19 1996

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

July 17, 1996

REPLY TO
ATTENTION OF
Operations Branch

Mr. Milton Arakawa
Project Manager
Munekiyo and Arakawa
305 High Street, Suite 104
Wailuku, Hawaii 96793

Dear Mr. Arakawa:

This letter is in response to your request for comments on a proposal to implement Maui Central Park (TMK 3-8-7:por.1 and 3-7-1:por.2) in Kahului, Maui, Hawaii.

Based on the information provided (i.e. plant list) and our review of the NRCS Soil Survey Maps, the proposed project will not impact waters of the U.S., including wetlands and will not require a Department of Army permit.

If you have any further questions, please contact Alan Everson of our staff at 438-9258, extension 11. Please refer to File No. 960000308.

Sincerely,

Terrell E. Kelley

Terrell E. Kelley
Ecologist

JUL 23 1996

BENJAMIN J. CAYETANO
GOVERNOR

KAZU HAYASHIDA
DIRECTOR

DEPUTY DIRECTORS
JERRY M. MATSUDA
GLENN M. OKIMOTO

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
MAUI DISTRICT
650 PALAPALA DRIVE
KAHULUI, HAWAII 96732

IN REPLY REFER TO.

HWY-M 2.207-96

July 22, 1996

Mr. Milton Arakawa
Project Manager
Munekiyo & Arakawa, Inc.
305 High Street, Suite 104
Wailuku, Hawaii 96793

Dear Mr. Arakawa:

SUBJECT: MAUI CENTRAL PARK, TMK: 3-8-7:POR.1 AND
3-7-1: POR.2, I.D. NO. ME-96-29
(X-REF: MAUI CENTRAL PARKWAY, I.D.NO. ME-95-22)

Thank you for the opportunity to comment on the draft EA. The following are our comments:

1. TIAR shall be prepared for the project. An updated of the recently completed TIAR for Maui Central Parkway is acceptable.

2. Intersections that must be improved include, but not limited to, the following:

   a. Signalization of Kahului Beach Road at Papa Avenue;
   b. Kaahumanu Avenue at Papa Avenue. Install and/or extend right/left turn deceleration lanes; improve and/or modify traffic signal system, etc.; and
   c. Kaahumanu Avenue at Kanaloa and Mahalani Street.

3. Submit construction plans for review.

Very truly yours,

ROBERT O. SIAROT
District Engineer, Maui

FC:mh

JUL 18 1996

DEPARTMENT OF
PARKS AND RECREATION
COUNTY OF MAUI

1 uf

LINDA CROCKETT LINGLE
Mayor
HENRY OLIVA
Director
ALLEN SHISHIDO
Deputy Director

1580-C Kaahumanu Avenue, Wailuku, Hawaii 96793

(808) 243-7230
FAX (808) 243-7934

July 16, 1996

Mr. Milton Arakawa, Project Manager
Munekiyo & Arakawa, Inc.
305 High Street, Suite 104
Wailuku, Hawaii 96793

Dear Mr. Arakawa:

SUBJECT: Maui Central Park

We have reviewed the summary to the above-referenced project and are in support of the proposal.

If you require additional information, please contact Patrick Matsui, Chief of Parks Planning and Development, at 243-7387.

Sincerely,

Henry Oliva

HENRY OLIVA
Director

PTM:ik

c: Patrick Matsui

AUG 22 1996

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

LAWRENCE MIIKE
DIRECTOR OF HEALTH

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

In reply, please refer to:

August 14, 1996

96-113/epo

Mr. Milton Arakawa
Project Manager
Munekiyo & Arakawa, Inc.
305 High Street, Suite 104
Wailuku, Hawaii 96793

Subject: Pre-Environmental Assessment (EA) Comments
Maui Central Park Project
Kahului, Maui
TMK: 3-8-7: por. of 1 and 3-7-1: por. of 2

Dear Mr. Arakawa:

Thank you for allowing us to review and comment on the subject project. We have the following comments to offer:

Water Pollution

A National Pollutant Discharge Elimination System (NPDES) permit is required for any discharge to waters of the State including the following:

1. Storm water discharges relating to construction activities for projects equal to or greater than five acres;
2. Storm water discharges from industrial activities;
3. Construction dewatering activities;
4. Cooling water discharges less than one million gallons;
5. Ground water remediation activities; and
6. Hydrotesting water.

Any person wishing to be covered by the NPDES general permit for any of the above activities should file a Notice of Intent with the Department's Clean Water Branch at least 90 days prior to commencement of any discharge to waters of the State.

Any questions regarding this matter should be directed to Mr. Denis Lau of the Clean Water Branch at 586-4309.

Wastewater

1. Restroom facilities must conform to the requirements of Table 1 found in Hawaii Administrative Rules, Title 11, Chapter 11, "Sanitation."

2. Restroom facilities must connect to the county sewer system.

3. Please address in the EA the possibility of using nonpotable water for park irrigation.

Questions regarding these comments should be directed to Mr. Herbert Matsubayashi, Chief Sanitarian, Maui District Health Office at 984-8230.

Sincerely,

Lawrence Miike

LAWRENCE MIIKE
Director of Health

c: Dr. Lawrence Hart
MDHO (Herb Matsubayashi)

Chapter X

Letters Received During the Public Comment Period and Agency Responses

United States Department of Agriculture

Natural Resources Conservation Service

210 Imi Kala St
Suite 209
Wailuku, Hi 96793

'96 SEP 13 P12:50

September 12, 1996

Mr. David Blane, Planning Director
County of Maui
Planning Department
250 S. High Street
Wailuku, Hawaii 96793

Dear Mr. Blane,

Subject: Central Maui Park; TMK: 3-7-01: 2 & 3-8-07: por. 1, 117

I have no comment on the subject application. Thank you for the opportunity to comment.

Sincerely,

Neal S. Fujiwara

Neal S. Fujiwara
District Conservationist

LINDA CROCKETT LINGLE
Mayor

RICHARD H. HAAKE
Managing Director
Telephone: 243-7855

OFFICE OF THE MANAGING DIRECTOR
COUNTY OF MAUI
WAILUKU, MAUI, HAWAII 96793

October 16, 1996

Mr. Neal Fujiwara
District Conservationist
Natural Resources Conservation Service
210 Imi Kala Street
Suite 209
Wailuku, Hawaii 96793

SUBJECT: Maui Central Park

Dear Mr. Fujiwara:

We have received a copy of your September 12, 1996 letter to Mr. David Blane of the County of Maui Planning Department.

As part of the Environmental Assessment process for the project, we would like to acknowledge your comments and look forward to working with you in addressing any comments which your agency may have. Thank you for your review and interest in the project.

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

Very truly yours,

Richard H. Haake
Managing Director

RH:to
wos/mcp/neal.ltr.001

BENJAMIN J. CAYETANO
GOVERNOR

'96 SEP 19 P2:30

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

SAM CALLEJO
COMPTROLLER

RESPONSE REFER TO:

FILE NO. ____________

September 17, 1996

MEMORANDUM

TO: Mr. David W. Blane, Planning Director
Maui County Planning Department

ATTN.: Ms. Colleen Suyama, Staff Planner

FROM: Randall M. Hashimoto, State Land Surveyor

SUBJECT: I.D.: 96/SM1-0017
TMK: 3-7-001:2 and 3-8-007:por. 1; por. 117
Project Name: Central Maui Park
Applicant: Richard Haake, Managing Director,
Office of the Mayor

The subject proposal has been reviewed and confirmed that no Government Survey Triangulation Stations and Benchmarks are affected. Survey has no objections to the proposed project.

Randall M. Hashimoto
RANDALL M. HASHIMOTO
State Land Surveyor

LINDA CROCKETT LINGLE
Mayor

RICHARD H. HAAKE
Managing Director
Telephone: 243-7855

Co

OFFICE OF THE MANAGING DIRECTOR
COUNTY OF MAUI
WAILUKU, MAUI, HAWAII 96793

October 16, 1996

Mr. Randall Hashimoto
State Land Surveyor
Department of Accounting and General Services
State of Hawaii
Survey Division
P.O. Box 119
Honolulu, Hawaii 96813

SUBJECT: Maui Central Park

Dear Mr. Hashimoto:

We have received a copy of your September 17, 1996 memorandum to Mr. David Blane of the County of Maui Planning Department.

As part of the Environmental Assessment process for the project, we would like to acknowledge your comments and look forward to working with you in addressing any comments which your agency may have. Thank you for your review and interest in the project.

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

Very truly yours,

Richard H. Haake
Managing Director

RH:to
woe\ncp\randall.ltr

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

STATE OF HAWAII

DEPARTMENT OF LAND AND NATURAL RESOURCES

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

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

DEPUTY
GILBERT COLOMA-AGARAN

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

'96 SEP 25 P2:12

September 19, 1996

LOG NO: 18121
DOC NO: 9609KD17

Mr. David W. Blane, Director
Maui Planning Department
250 South High Street
Wailuku, Maui, Hawaii 96793

Dear Mr. Blane:

SUBJECT: **Chapter 6E-8 Historic Preservation Review of a Special Management Area Application and Draft Environmental Assessment – Maui Central Park Project, Kahului, Wailuku District, Island of Maui**
TMK: 3-7-01: 2, 3-8-01: 1, 117 I.D. No. 96/SM1-0017

Thank you for the opportunity to review the Special Management Area application and Draft Environmental Assessment for the proposed Maui Central Park project. The c. 110 acre project area is located between Kahului Beach Road, Kanaloa Avenue, and Ka'ahumanu Avenue in Kahului. New facilities proposed for the park area include four baseball fields, two soccer fields, a multi-purpose field, a maintenance facility, a connector road between Kanaloa Avenue and the proposed Papa Avenue extension, two retention basins along Kahului Beach Road, jogging/bicycle paths, and lookout/picnic areas.

Previous archaeological work within the project area includes a subsurface survey of the proposed Papa Avenue extension and Maui Central Parkway, which were proposed between the southern boundary of the park and Maui Community College, and between Maui Community Arts and Cultural Center and Kanaloa Avenue at the Maui Youth Center (Kennedy et a. 1993). During the survey, fifty-four backhoe trenches were excavated along the corridors for these proposed roads; no evidence of historic sites was identified.

Archaeological inventory surveys have been conducted for properties adjacent to the Central Park project area. These include Maui Community College, the Maui Community Arts and Cultural Center, and the proposed Keiki Zoo Maui petting zoo. Historic sites identified on adjacent properties that extend into the Central Park area include the Kahului Railroad (SIHP Site 50-50-04-3112) and structural remains of a World War II era military installation (SIHP Site 50-50-04-4232). These two sites are not mentioned in the draft EA, or in the reconnaissance survey attached to the EA.

In a prior review of this proposed project (letter dated August 5, 1996, attached to EA), our office indicated that a large portion of the Central Park project area is comprised of undisturbed dune lands, including a relatively high, prominent sand dune. Given the location of this dune and nature of archaeological findings in other undisturbed coastal dunes in the area, it is likely that human burials are present. We recommended that an inventory survey be conducted of the project area, and that the survey report be attached to the draft EA.

Archaeological reconnaissance with subsurface testing was conducted for this project, and a draft report of this field work is attached to the draft EA (Heidel, Devereux, Pyle, and Hammatt 1996). During the reconnaissance, a random walk-through was conducted and 21 backhoe test trenches were excavated in various locations within the project area. No historic sites were identified during this field work. The reconnaissance study provides preliminary information for certain localities within the Central Park area. However, this study is not adequate to determine the location, nature and significance of historic sites within the project area. The report does not provide sufficient information to determine how the proposed facilities will impact known historic sites within the project area. Based on the nature of the fieldwork completed, it is not certain that all historic sites within the project area have been identified. A systematic pedestrian surface survey was not conducted, and many of the areas to be graded were not tested. The following areas need to be further addressed in the Final Environmental Assessment, in order to accurately reflect project impacts:

1) Retention basins along Kahului Beach Road: We assume that these basins will be excavated. No subsurface testing was conducted in these areas during the reconnaissance. Such testing is needed in order to determine whether subsurface features or cultural deposits are present. This area is in the near vicinity to a known subsurface site (50-50-04-3120) which contains a significant intact habitation site and numerous burial features. We cannot comment on the impacts of these basins until the area is tested. The Kahului Railroad berm (Site 50-50-04-3112) is also in this area and could potentially be impacted by the retention basins.

2) Little league baseball fields and maintenance facility in the northeast corner of the project area: Structural remains which are thought to represent the WWII military installation (Site 50-50-04-423) are present in this area. These include a large concrete pad which is to be used for a parking lot and additional smaller ruins to the west. These remains have not been recorded and there is no information in the reconnaissance report which provides a background on their uses. This information needs to be included in the inventory survey report so that informed decisions can be made regarding mitigation of adverse effects to this site.

3) Proposed connector road between the Papa Avenue extension and Kanaloa Avenue: This corridor follows along the lower eastern slopes of a large, relatively undisturbed sand dune. Disturbed human remains were identified on the surface during the botanical survey for this project, within the corridor for this road. During the reconnaissance field work, only one of the 21 backhoe test trenches was located within this road corridor. Given the existing topography, it appears that extensive grading will be required along sections of the large dune. Subsurface survey of this corridor is needed in order to determine if there is additional human remains in the area of the recent find, and if there are additional locations of human burials along this corridor.

4) Little league field near the center of the project area: This field is to be located in an area identified as undisturbed in the reconnaissance survey. One or two backhoe trenches were placed in this area during the reconnaissance. Additional testing is needed in this area, since it will be graded level.

5) Jogging/bicycle paths and lookouts on the top of the dune: Subsurface testing is needed in the areas to be impacted by these facilities.

6) Multipurpose field at the southwest corner of the project area: A single test trench was placed in this area during the reconnaissance field work. Additional testing is needed in this undisturbed area to determine the presence or absence of subsurface deposits or features. Testing should extend into all peripheral areas that are to be graded or extensively grubbed.

7) Overall project area: A complete pedestrian survey is needed in order to ensure that surface structures or features are identified prior to initiation of vegetation clearing. Oral interviews with community members need to be conducted as part of the inventory survey, not during construction monitoring (as proposed in the draft EA). Information provided by persons knowledgeable of the area needs to be made available before decisions affecting the area are made, not after the construction is already in progress.

In summary, we do not concur with the discussion of archaeological resources as stated on page 17 of the draft EA; and we do not concur with the mitigation measures as proposed on page 27. There is no discussion of impacts to known sites within the project area, and there is presently insufficient information regarding the cultural resources of this project area to make informed decisions regarding mitigation measures. We therefore recommend that no action be taken on this SMA application until an inventory survey has been completed and the Environmental Assessment has been revised to more accurately reflect the cultural resources of this project area and the impacts to historic sites that are present. We will provide comments regarding mitigation measures as soon as the inventory survey report is reviewed and approved by our office.

Please contact Ms. Theresa Donham at 243-5169 if you have any questions.

Aloha,

DON HIBBARD, Administrator
State Historic Preservation Division

KD:jen

LINDA CROCKETT LINGLE
Mayor

RICHARD H. HAAKE
Managing Director
Telephone: 243-7855

OFFICE OF THE MANAGING DIRECTOR
COUNTY OF MAUI
WAILUKU, MAUI, HAWAII 96793

October 23, 1996

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

SUBJECT: Maui Central Park

Dear Mr. Hibbard:

We have received a copy of your September 19, 1996 letter to the County of Maui Planning Department pertaining to the subject project and would like to offer the following response for your consideration.

In early August, 1996, a reconnaissance survey was completed at the project site, which included 21 trenches. As a supplement to the reconnaissance survey, an inventory level survey, as recommended by the SHPD, was conducted between October 7-11, 1996. A complete surface survey of the project area was accomplished. Also, thirty-one (31) additional trenches were excavated for the inventory level survey. The additional subsurface work was conducted in the following specific areas:

1. Retention basins along Kahului Beach Road;
2. Little League baseball fields and maintenance facility in the northeast corner of the project area;
3. Little League field near the center of the project area;
4. Proposed connector road between Papa Avenue extension and Kanaloa Avenue;
5. Jogging/bicycle paths and lookouts on the top of the dunes; and
6. Multi-purpose field at the southwest corner of the project area.

An interview was also conducted with Mr. Charles Keau, a long time resident of the area who was involved with archaeological monitoring of the site during 1989-1990. The interview provided additional historical background information on the site which are noted in the archaeological inventory report.

No human remains or cultural materials were encountered during the additional subsurface work and surface survey. However, because of the potential of encountering cultural materials, especially human remains within the project site, archaeological monitoring during construction is recommended. It is anticipated that a monitoring plan will be submitted to SHPD for review and approval prior to the commencement of construction activities.

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

Very truly yours,

Richard Haake
Managing Director

RH:to
woa/mcp/respltr.shp

POLICE DEPARTMENT

COUNTY OF MAUI

LINDA CROCKETT LINGLE
MAYOR

55 MAHALANI STREET
WAILUKU, HAWAII 96793
AREA CODE (808) 244-6400
FAX NO. (808) 244-6411

HOWARD H. TAGOMORI
CHIEF OF POLICE

LANNY TIHADA
DEPUTY CHIEF OF POLICE

'96 SEP 24 AM 11:19

OUR REFERENCE

YOUR REFERENCE

September 23, 1996

MEMORANDUM

TO	:	DIRECTOR, PLANNING DEPARTMENT
FROM	:	HOWARD H. TAGOMORI, CHIEF OF POLICE
SUBJECT	:	I.D. No.: 96/SM1-0017 TMK: 3-7-001: 2 and 3-8-007: por. 1, por. 117 Project Name: Central Maui Park Applicant Name: Richard Haake, Managing Director Office of the Mayor

____ No recommendation or special condition is necessary or desired.

__✓__ Refer to attachment(s).

Assistant Chief Charles Hall
for: HOWARD H. TAGOMORI
Chief of Police

TO : HOWARD TAGOMORI, CHIEF OF POLICE, MAUI POLICE DEPARTMENT

VIA : CHANNELS

FROM : CLAYTON TOM, LIEUTENANT, WAILUKU PATROL DIVISION

SUBJECT : COMMENTS FOR APPLICATION FOR SPECIAL MANAGEMENT AREA PERMIT, MAUI CENTRAL PARK

This correspondence contains comments on the Application for Special Management Area Permit for the Maui Central Park. The traffic assessment was prepared for the Parks and Recreation by Wilson Okamoto & Associates, Inc. This report is an overview of the traffic assessment.

The Maui Central Park is bounded by Kaahumanu Avenue, Kahului Beach Road, Maui Community College, and an existing residential area to the North. The construction of the park will include the extension of Papa Avenue to Kahului Beach Road which will be extended to connect with the existing road fronting the Maui Cultural and Arts Center. There will also be an access road that will connect the west Papa Avenue Extension to Kanaloa Avenue at the intersection of Mikohu Loop.

The purpose of the traffic assessment is to determine existing traffic operating conditions, projected traffic conditions, and to identify additional roadway improvements needed for the project.

Existing traffic conditions were studied at Kaahumanu Avenue at the intersections with Papa Avenue and Wakea Avenue. The study determined the peak hours of traffic in the morning between 0630 to 0815 hours and in the afternoon beginning at 1630 hours.

The recommendations based upon the analysis of the projected traffic demands are as follows:

1. Provide an exclusive right turn deceleration lane on the westbound Kaahumanu Avenue approach at Papa Avenue.

2. Construct an exclusive right turn lane, an optional left/through lane, and an exclusive left turn lane on the northbound approach of Papa Avenue at Kaahumanu Avenue.

3. Construct an exclusive left turn, and an optional through/right turn lane on the southbound approach of Papa Avenue at Kaahumanu Avenue.

4. Install a traffic signal system at the intersection of Kahului Beach Road and the Papa Avenue Extension.

Based on the recommendation of the roadway improvements, it was the conclusion that the proposed park should not have any significant impact on the traffic in the vicinity of the project. Additional inspection of the study revealed no other safety concerns for the project.

This report is submitted for your perusal.

Respectfully Submitted,

Lieutenant Clayton TOM
Wailuku Patrol Division
09/20/96 2350 Hours

PLZ. FORWARD.
CONCUR w/ LT. C. TOM.
9/23/96

LINDA CROCKETT LINGLE
Mayor

RICHARD H. HAAKE
Managing Director
Telephone: 243-7855

Cof

OFFICE OF THE MANAGING DIRECTOR
COUNTY OF MAUI
WAILUKU, MAUI, HAWAII 96793

October 16, 1996

Mr. Howard Tagomori
Chief of Police
Police Department
County of Maui
55 Mahalani Street
Wailuku, Hawaii 96793

SUBJECT: Maui Central Park

Dear Mr. Tagomori:

We have received a copy of your September 23, 1996 memorandum to Mr. David Blane of the County of Maui Planning Department.

Your review and comments are sincerely appreciated. We are apprised of your concerns and will work with you in ensuring that Maui Central Park meets applicable public safety parameters.

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

Very truly yours,

Richard H. Haake
Managing Director

RH:to
woa/mcp/howard.ltr

OCT. 2 1996

TO WHOM IT MAY CONCERN,

I am writing this letter in response to the Maui News article asking for public comment on the proposed Maui Central Park.

I would like to see a full scale roller hockey rink added to the plans. The current plan has proposed 4 baseball fields. Do we need this? Can't we use some of the land and money to promote inline hockey. This is a very popular sport and the kids do not have anyplace to practice or get more involved and off the streets.

Please consider a inline hockey rink. How about putting new concrete down over the large concrete slab that now exists across from the skateboard park? It will probably cost alot of money to remove that slab and maybe it is the perfect place for a rink.

Thank you for the opportunity.

Bruce C. Fernandes
285 Kaahumanu Ave.
Suite 220
Kahului, Hi 96732
871-8423
242-7984

CORRECTION

THE PRECEDING DOCUMENT(S) HAS BEEN REPHOTOGRAPHED TO ASSURE LEGIBILITY
SEE FRAME(S)
IMMEDIATELY FOLLOWING

DOCUMENT CAPTURED AS RECEIVED

OCT. 2 1996

TO WHOM IT MAY CONCERN,

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Please consider a inline hockey rink. How about putting new concrete down over the large concrete slab that now exists across from the skateboard park? It will probably cost alot of money to remove that slab and maybe it is the perfect place for a rink.

Thank you for the opportunity.

Bruce C. Fernandes
285 Kaahumanu Ave.
Suite 220
Kahului, Hi 96732
871-8423
242-7984

OCT 15 1996

LINDA CROCKETT LINGLE
Mayor
TELEPHONE 243-7855

OFFICE OF THE MAYOR
COUNTY OF MAUI
WAILUKU, MAUI, HAWAII 96793

October 8, 1996

Mr. Bruce C. Fernandez
285 Kaahumanu Ave., Suite 220
Kahului, Hawaii 96732

Dear Mr. Fernandez:

Re: Maui Central Park

Thank you for expressing your concern in the October 2, 1996 letter.

The full scale hockey rink which you would like added is an excellent suggestion and has come up before. Our Parks Department recognized the need for a hockey rink and designed a dual use facility composed of basketball courts which could be converted to a full-size hockey rink a year ago. This facility will be adjoining the youth center. Construction for this multi-use area should start in December 1996. While the County will be spending money on materials for this project, it will be the community and the unions which will provide the labor for this facility.

If you would like to be involved in the creation of the Central Park facility and a new Kalama Park in-line rink, please call Henry Oliva, Director of the Parks & Recreation Department at 243-7230.

Sincerely,

RICHARD H. HAAKE
Acting Mayor

RHH:ed
cc: Henry Oliva Director of Parks & Recreation
Milton Arakawa

LINDA CROCKETT LINGLE
Mayor

CHARLES JENCKS
Director

DAVID C. GOODE
Deputy Director

AARON SHINMOTO, P.E.
Chief Staff Engineer

RALPH NAGAMINE, L.S., P.E.
Land Use and Codes Administration

EASSIE MILLER, P.E.
Wastewater Reclamation Division

LLOYD P.C.W. LEE, P.E.
Engineering Division

BRIAN HASHIRO, P.E.
Highways Division

Solid Waste Division

COUNTY OF MAUI
DEPARTMENT OF PUBLIC WORKS AND WASTE MANAGEMENT
200 SOUTH HIGH STREET
WAILUKU, MAUI, HAWAII 96793

October 3, 1996

MEMO TO: DAVID W. BLANE, DIRECTOR OF PLANNING

FROM: CHARLES JENCKS, DIRECTOR OF PUBLIC WORKS AND WASTE MANAGEMENT

SUBJECT: SPECIAL MANAGEMENT AREA PERMIT
MAUI CENTRAL PARK
TMK: (2) 3-7-001:002 & 3-8-007:por. of 001 & 117
96/SM1-0017

We reviewed the subject application and have the following comments.

1. The hydrologic criteria shall be based on a 50 year storm for sumps and 100 year storm for drainage areas greater than 100 acres.

2. A 30" wastewater gravity transmission line runs through this property. No excessive backfilling or overfilling of this line will be permitted unless approved by this department.

3. Solid waste from the construction of structures within the park such as restrooms, pavilion, storage building and excess material from parking lot paving shall be included in the Solid Waste Management Plan.

4. A portion of the project site is within the special flood hazard area zones A4 and V23 with base flood elevations between 17 and 18 feet mean sea level. An analysis should be performed on the impact of the proposed grading on the above special flood hazard areas. A Conditional Letter of Map Revision from the Federal Emergency Management Agency may be required.

'96 OCT -4 P1:03

AS:ey/mt
xc: Engineering Division
Solid Waste Division
Wastewater Reclamation Division
G:\LUCA\CZM\CNTRLPRK.SMA

LINDA CROCKETT LINGLE
Mayor

RICHARD H. HAAKE
Managing Director
Telephone: 243-7855

OFFICE OF THE MANAGING DIRECTOR
COUNTY OF MAUI
WAILUKU, MAUI, HAWAII 96793

October 18, 1996

Charles Jencks, Director
Department of Public Works
and Waste Management
200 South High Street
Wailuku, Hawaii 96793

SUBJECT: Maui Central Park

Dear Mr. Jencks:

We have received a copy of your October 3, 1996 memorandum to David Blane, Director of Planning pertaining to the Special Management Area permit application for the subject project. We would like to take this opportunity to respond to your comments.

1. We have recalculated the hydrologic criteria for the project based on a 50 year storm for sumps and 100 year storm for drainage areas greater than 100 acres. The revised drainage study will be submitted to your Department under separate cover. Even with the revised calculations, only minor grading revisions are required in order to more proportionately route flows to the proposed sumps fronting Kahului Beach Road. No increases in the size of the retention basins are necessary.

2. With regard to the 30 inch wastewater gravity transmission line, we will work with the Wastewater Reclamation Division to address any concerns relating to excessive backfilling or overfilling of the line.

3. We intend to include solid waste from the construction of structures within the park such as restrooms, pavilion, storage building and excess material from parking lot paving within the Solid Waste Management Plan.

Charles Jencks, Director
Department of Public Works
October 18, 1996
Page Two

4. Although the project will involve some grading in the areas adjacent to Kahului Beach Road, we believe that the project will have no effect upon the existing flood hazard areas in this vicinity. Unlike the previous Hart conceptual plan, the current plans have not included a large berm parallel to the road. We will coordinate this issue with the Land Use and Codes Administration and the Federal Emergency Management Agency.

Thank you for your comments on this project. If you have any questions, please feel free to call me.

Very truly yours,

Richard Haake
Managing Director

RH:to
cc: Barry Toyota, Wilson Okamoto & Associates
Milton Arakawa, Munekiyo & Arakawa, Inc.
woa/mco/respltr.dcw

LINDA CROCKETT LINGLE
MAYOR

RONALD P. DAVIS
CHIEF
HENRY A. LINDO, SR.
DEPUTY CHIEF

COUNTY OF MAUI
DEPARTMENT OF FIRE CONTROL
200 DAIRY ROAD
KAHULUI, MAUI, HAWAII 96732
(808) 243-7561

October 3, 1996

Colleen Suyama, Planner
County of Maui, Planning Department
250 South High Street
Wailuku, Maui, Hawaii 96793

RE: Central Maui Park, TMK: 3-7-01:02 and 3-8-07:1 and 117
ID.: 96/SM1-0017

Dear Ms Suyama,

Fire department apparatus access is the major concern of the Department of Fire Control. In the event of an emergency, access will tend to be somewhat restricted by citizens using the park. In accordance with the Uniform Fire Code, 1979 Edition as amended, the fire department apparatus access shall be provided throughout the park and shall be 20 feet of unobstructed width, having an all-weather driving surface capable of supporting the imposed weight (30 tons) of apparatus. The entire width of the access roadway shall have a vertical clearance of 13 feet, 6 inches. The requirement remains the same in the Uniform Fire Code, 1988 Edition as amended. This requirement will allow access of the fire department apparatus and police department officers or ambulance service, if necessary.

Colleen Suyama
Page 2
October 3, 1996

Where fire hydrants are planned for the park, contact the Fire Prevention Bureau to assist in the proper location and positioning of the hydrants.

If you have any other questions, direct them in writing to the Fire Prevention Bureau, 21 Kinipopo Street, Wailuku, Maui, Hawaii 96793.

Sincerely,

Ronald P. Davis
Fire Chief

SENT BY:COUNTY OF MAUI ;10-18-96 ;12:17PM ; 8082437870→ 8082448729;# 2

LINDA CROCKETT LINGLE
Mayor

RICHARD H. HAAKE
Managing Director
Telephone: 243-7855

OFFICE OF THE MANAGING DIRECTOR
COUNTY OF MAUI
WAILUKU, MAUI, HAWAII 96793

October 18, 1996

Mr. Ronald P. Davis, Fire Chief
County of Maui
Department of Fire Control
200 Dairy Road
Kahului, Hawaii 96732

SUBJECT: Maui Central Park

Dear Mr. Davis:

We have received a copy of your October 3, 1996 letter to the County Planning Department pertaining to the subject project. We would like to take this opportunity to respond to your concerns.

All roadways and parking areas within Maui Central Park will have at least 20 feet of unobstructed lane width with an all-weather surface capable of supporting the weight of Department of Fire Control apparatus and a vertical clearance of 13 feet 6 inches. Location and positioning of fire hydrants will be coordinated with the Fire Prevention Bureau.

The coordination of specific requirements of the Department of Fire Control will be addressed through the building permit process. If you have any questions, please feel free to call me. We appreciate your interest in the project.

Very truly yours,

Richard Haake
Managing Director

RH:to
wos\mcp\respltr.mfd

OCT 09 1996

United States Department of the Interior

FISH AND WILDLIFE SERVICE
PACIFIC ISLANDS ECOREGION
300 ALA MOANA BOULEVARD, ROOM 3108
BOX 50088
HONOLULU, HAWAII 96850
PHONE: (808) 541-3441 FAX: (808) 541-3470

'96 OCT -7 P3:32

OCT 04 1996

In Reply Refer To: APM

David W. Blane, Director of Planning
County of Maui Planning Department
250 S. High Street
Wailuku, Maui, HI 96793

Re: Review of the Special Management Area Permit Application for the Proposed Maui Central Park, Kahului, Maui

Dear Mr. Blane:

The U.S. Fish and Wildlife Service (Service) has reviewed the Special Management Area Permit Application for the proposed Maui Central Park, Kahului, Maui, received on 11 September 1996. The proposed project involves one multi-purpose field; relocation of the skateboarding facility; retention of the Maui Botanical Garden at its existing site including a reserve for future expansion; space for a keiki zoo adjacent to the botanical garden; a landscaped green space in the central portion of the park to be utilized for picnicking, jogging, walking, bicycling and passive recreational activities; a Little League ballfield located in the central portion of the park; one senior Little League/Softball ballfield, Little League/Softball field, Little League field, and 2 soccer fields located between the Maui Arts and Cultural Center and the Kanaloa Avenue residential area; retention of the existing horseshoe pitching facility at its existing location; two retention basins along Kahului Beach Road; and a county park maintenance facility located adjacent to the Little League fields intended for maintenance of Maui Central Park. Papa Avenue is proposed to be extended from Kaahumanu Avenue to Kahului Beach Road to provide access along the park' periphery; a new Maui Central Park Drive is proposed to extend from the Papa Avenue extension in a northerly direction and link with Kanaloa Avenue in the area of the Maui Family YMCA. Parking lots are proposed to be located in six different locations with an additional new parking area to serve the botanical garden. Two hundred and fifty parking stalls are proposed to service the park. The dunes and undulating topography within the central portion of the site will largely be retained.

The Service is not aware of any Federal trust resources, such as migratory birds, endangered or threatened species or wetlands, that would be affected by the proposed project. Because the project will be located on a previously disturbed site, the Service does not anticipate any direct adverse impacts to native wildlife or plant resources. The Service recommends that when landscaping, the permittee makes every effort to plant native species and that, whenever practical, alien plant species be removed and replaced with natives. The Service also recommends that the project ensure that waste from the proposed keiki zoo be prevented from running directly into the harbour.

The Service appreciates the opportunity to comment on this Special Management Area Permit Application. If you have questions regarding these comments, please contact Fish and Wildlife Biologist Dr. Annie Marshall at 808\541-3441.

Sincerely,

Brooks Harper

Brooks Harper
Field Supervisor
Ecological Services

LINDA CROCKETT LINGLE
Mayor

RICHARD H. HAAKE
Managing Director
Telephone: 243-7855

OFFICE OF THE MANAGING DIRECTOR
COUNTY OF MAUI
WAILUKU, MAUI, HAWAII 96793

October 18, 1996

Mr. Brooks Harper, Field Supervisor
Ecological Services
United States Department of the Interior
Fish and Wildlife Service
Pacific Island Ecoregion
300 Ala Moana Boulevard
Room 3108
Box 50088
Honolulu, Hawaii 96850

SUBJECT: Maui Central Park

Dear Mr. Harper:

We have received a copy of your October 4, 1996 letter to David W. Blane, Director of Planning, relating to the Special Management Area Application for the subject project.

We would like to take this opportunity to note that the landscaping for the project will incorporate a mix of native and alien plant species. We would also like to note that space within the park is being reserved for the Keiki Zoo. Compliance with applicable health regulations, including prevention of runoff through the park into the ocean, will be the responsibility of the zoo operator.

If you have any questions, please feel free to call me. We appreciate your interest in the project.

Very truly yours,

Richard Haake
Managing Director

RH:to
wos/mco/resp/tr.fws

OCT 09 1996

Native Hawaiian Plant Society

P.O. Box 5021, Kahului, Maui, Hawai'i 96732

Nanea nā pua o ka 'āina aloha

Mr. Milton Arakawa
Project Manager
Maui Central Park Environmental Assessment
Munekiyo and Arakawa, Inc.
305 High Street Suite 104
Wailuku, Hawaii 96793

October7, 1996

SUBJECT: Maui Central Park Draft EA

Dear Mr. Arakawa:

In the draft Environmental Assessment for the Maui Central Park, (page 5, paragraph 2) a reference is made to " an additional new parking area serving the botanical garden." When located on the maps provided in the draft EA, it replaces the only level, open space in the Botanical Garden. This field is the picnic area of the Garden and also contains a hula pa or stage which is used during special events. It is not unusual for the Botanical Gardens to host school groups of over two hundred students at a time. This field serves as an important eating and recreational area for them.

In the twenty years of the existence of the Botanical Gardens, lack of parking has never been an issue. The location of the War Memorial Stadium parking lot directly across the street has been more than adequate for our needs. The Botanical Gardens had a visitor count of 60,000 people in 1995. The Amphitheater, located at the rear of the Gardens, has accommodated concerts with as many as 3,000 people. We do not feel that creating additional parking at the loss of open space is needed.

In fact, we would like to see the elimination of the present on-street parking, which often interferes with bike lane traffic and is hazardous. The unimproved exterior of the Botanical Gardens should also have a sidewalk and a bus drop-off for the safety of the children and pedestrians.

A request for proposals has just been released (Oct.6) by the Department of Parks and Recreation, regarding a design for the Botanical Gardens. It is premature to include this unnecessary parking lot, when final plans for the Botanical Garden are yet to be determined.

In closing, we strongly urge you to preserve this valuable high-use park space and consider our recommendations for a sidewalk and a bus drop off area.

Sincerely,

for John M. Perry

Linda Nelson, President

LINDA CROCKETT LINGLE
Mayor

RICHARD H. HAAKE
Managing Director
Telephone: 243-7855

OFFICE OF THE MANAGING DIRECTOR
COUNTY OF MAUI
WAILUKU, MAUI, HAWAII 96793

October 18, 1996

Ms. Linda Nelson, President
Native Hawaiian Plant Society
P.O. Box 5021
Kahului, Hawaii 96732

SUBJECT: Maui Central Park

Dear Ms. Nelson:

Thank you for your letter of October 7, 1996 to Milton Arakawa relating to the subject project.

As you have requested, we have decided to delete the parking lot within the Botanical Gardens site in order to preserve existing open space on the site. We appreciate your suggestions to improve our Plan.

As you have noted, the Botanical Garden site is in the process of being redesigned. We feel that suggestions relating to elimination of on-street parking, establishment of a sidewalk and bus drop-off should be discussed in terms of the overall redesign of the site plan for the botanical garden.

If you have any questions, please feel free to call me. We thank you again for your comments.

Very truly yours,

Richard Haake
Managing Director

RH:to
wcs/mcp/respn* nnp

MCP OCT 09 1996

BENJAMIN J. CAYETANO
GOVERNOR

GARY GILL
DIRECTOR

STATE OF HAWAII
OFFICE OF ENVIRONMENTAL QUALITY CONTROL
220 SOUTH KING STREET
FOURTH FLOOR
HONOLULU, HAWAII 96813
TELEPHONE (808) 586-4185
FACSIMILE (808) 586-4186

October 8, 1996

The Honorable Richard Haake
Office of the Managing Director
County of Maui
200 South High Street
Wailuku, Hawai'i 96793

Dear Mr. Haake:

We submit for your response (required by Section 343-5(b), Hawaii Revised Statutes) the following comment on a draft environmental assessment ("DEA") for the Maui Central Park. The document was submitted to our office by your August 20, 1996, letter. Notice of availability of this DEA was published in the September 8, 1996, edition of the *Environmental Notice*.

1. At your request, our Office published your negative declaration determination on the Maui Central Park Roadway, Papa Avenue Extension and Related Drainage Improvements in the October 23, 1995, edition of the *Environmental Notice*. Please discuss the status of that project in relation to the present Maui Central Park project.

Please include a copy of this letter and your response (along with copies of all timely-received comment letters and responses) in the final environmental assessment and notice of determination for this project. If there are any questions, please call Mr. Leslie Segundo, Environmental Health Specialist at 586-4185. Thank you.

Sincerely,

GARY GILL
Director

c: Milton Arakawa, Munekiyo & Arakawa, Inc.

LINDA CROCKETT LINGLE
Mayor

RICHARD H. HAAKE
Managing Director
Telephone. 243-7855

OFFICE OF THE MANAGING DIRECTOR
COUNTY OF MAUI
WAILUKU, MAUI, HAWAII 96793

October 18, 1996

Gary Gill, Director
Office of Environmental Quality Control
220 South King Street
Fourth Floor
Honolulu, Hawaii 96813

SUBJECT: Maui Central Park

Dear Mr. Gill:

Thank you for your letter of October 8, 1996 pertaining to the subject project.

We would like to note that the Maui Central Roadway, Papa Avenue Extension and Related Drainage Improvements Project, as published in the October 23, 1995 edition of the Environmental Notice, will not be implemented by the County of Maui. As stated in the Draft EA, the present Maui Central Park Project includes a different proposed roadway configuration.

If you have any questions, please feel free to call me. We appreciate your interest in the project.

Very truly yours,

Richard Haake
Managing Director

RH:to
cc: Barry Toyota, Wilson Okamoto & Associates
Milton Arakawa, Munekiyo & Arakawa, Inc.
wca/mcp/respltr.ceq

DOCUMENT CAPTURED AS RECEIVED

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

'96 OCT 10 P2 STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION
P.O. BOX 621
HONOLULU, HAWAII 96809

DEPT OF PLANNING
COUNTY OF MAUI
RECEIVED

OCT 9 1996

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

Ref.:LM-AJ

Honorable David W. Blane
Planning Director
County of Maui
Planning Department
250 S. High Street
Wailuku, Maui, Hawaii 96793

File No. A143

Dear Mr. Blane:

SUBJECT: Draft Environmental Assessment, Botanical Resources Survey, Archaeological Reconnaissance Report and Traffic Assessment Report
I.D.: 96/SM1-0017
Project Name: Central Maui Park
Tax Map Key: 3-7-01: 02 & 3-8-07: por. 01, por. 117

We have reviewed the subject application and would like to offer the following comments.

Water and Land Development, Land Division:

We recommend coordination with the county government to incorporate this project into the county's Water Use and Development Plan.

The document should quantify the additional water demand this project would impose on the existing municipal system and Iao Aquifer System pumpage.

Thank you for the opportunity to review and provide comments for the subject application. Should you have any questions, please contact Al Jodar at 587-0424 of our Land Division in Honolulu.

Aloha,

for MICHAEL D. WILSON

I:\NETDATA\DAHU\AL\LTR\COM143.RTN

cc: Mayor Lingle

LINDA CROCKETT LINGLE
Mayor

RICHARD H. HAAKE
Managing Director
Telephone: 243-7855

OFFICE OF THE MANAGING DIRECTOR
COUNTY OF MAUI
WAILUKU, MAUI, HAWAII 96793

October 18, 1996

Mr. Michael Wilson, Director
Department of Land and Natural Resources
Land Division
P.O. Box 621
Honolulu, Hawaii 96809

SUBJECT: Maui Central Park

Dear Mr. Wilson:

We have received a copy of your October 9, 1996 letter to the County of Maui Planning Department pertaining to the subject project and would like to take this opportunity to provide a response.

With regard to water usage for the project, we intend to seek approval from the Commission on Water Resource Management for the drilling of on-site brackish wells to supply the project's irrigation needs. Additional potable water demands relating to the project stem from comfort station and drinking water fixtures interspersed throughout the park. It is estimated that the additional demand is 110 gallons per minute (gpm). We will coordinate any requirements for potable water with the County Department of Water Supply.

If you have any questions, please feel free to call me. Thank you for your interest in the project.

Very truly yours,

Richard Haake
Managing Director

RH:to
wos\mcp\resphr.dln

References

References

Community Resources, Inc. Maui County Community Plan Update Program Socio-Economic Forecast Report, January 1994.

County of Maui, The General Plan of the County of Maui, September 1990 Update.

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Michael T. Munekiyo Consulting, Inc., Application for Special Management Area Permit-Maui Community College Buildings "J" and "S", January 1993.

Michael T. Munekiyo Consulting, Inc., Final Environmental Assessment - Maui Central Park Parkway and Papa Avenue Extension, July 1993.

Michael T. Munekiyo Consulting, Inc., Application for Special Management Area Permit-Maui Community College Building "J" Phase II, January 1994.

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University of Hawaii, Department of Geography, Atlas of Hawaii, Second Edition, 1983.

U.S. Department of Agriculture, Soil Conservation Service, Soil Survey of Islands of Kauai, Oahu, Maui, Molokai and Lanai, State of Hawaii, August 1972.

Appendices

Appendix A

Botanical Resources Survey

BOTANICAL RESOURCES SURVEY

FOR

ENVIRONMENTAL ASSESSMENT
MAUI CENTRAL PARK PROJECT
TMK: 3-8-07: 1 & TMK: 3-7-01: 2
KAHULUI, MAUI, HAWAI'I

SUBMITTED BY:
DAVID T. PAUL, B.A.
NATURAL SCIENCE FIELDWORK & RESEARCH
HCR 3, BOX 10070
KEA'AU, HAWAI'I 96749
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PREPARED FOR:
XAMANEK RESEARCHES
P.O. BOX 131
PUKALANI, HAWAI'I 96788

PREPARED BY:
DAVID T. PAUL
AUGUST 1996

BOTANICAL RESOURCES SURVEY

SUMMARY:

On July 20 & 21, 1996, a botanical resources survey of the area proposed for Maui Central Park (TMK: 3-8-07:1 & TMK: 3-7-01:2) in Kahului was conducted by David Paul and Erik Fredericksen.

The survey provided information necessary to describe the vegetation in the area and determine if any vascular plant species found there has legal protection under Federal or State Law and would require consideration for planning. Both Federal (USFWS) and State (DLNR) offices which enforce laws regarding protected plant species, do so with "Listed and Candidate Species, as Designated Under the U.S. Endangered Species Act." (USFWS, 1996).

Consequently, no species of vascular plant was found in the project area that has protection under Federal or State Law. Therefore, there are no botanical resources found in the proposed Maui Central Park area that require consideration for planning.

METHODS:

The survey was conducted by meandering back & forth across the project area and recording every naturalized vascular plant species which was encountered. The plant species occuring there were placed into Unique Biological Communities which they are associated with. Identifying unique communities can help to locate areas that support rare (legally protected) plant species.

Special attention was taken in searching the littoral sand dunes found in the project area, as they support a more sensitive plant community than the common low lying places in the area. Rare plants (with legal protection) such as dwarf naupaka (*Scaevola coriacea*), 'ohai (*Sesbania tomentosa*), and pamakani (*Tetramalopium conyzoides*) have been known to exist in coastal dune habitats, and dunes in the project area were searched for these types of plants.

Each plant species was identified by using keys and descriptions from the "Manual of the Flowering Plants of Hawai'i." (Wagner, W.L., et al, 1990).

Unique Biological Communities were identified using "Vegetation." (Gagne & Cuddihy, 1990).

Plants with legal protection were reviewed from "Listed and Candidate Species, as Designated Under the U.S. Endangered Species Act." (USFWS, 1996).

RESULTS:

VEGETATION

The vascular plant species which were encountered during the field survey (July 20 & 21, 1996) are members of Unique Biological Communities. These communities may contain Rare Plants that have a legal status in Federal and State governments. Therefore, all vascular plant species encountered during the field survey are placed into a List of Vascular Plants (Fig. 1.) to represent each distinct form of plant life and show if any legally protected plants occur in the project area that need consideration for planning.

The following sections describe the vegetation occuring in the project area in detail.

Unique Biological Communities:

Two communities occur in the project area, a Coastal Dry Mixed Shrub & Grassland community and a Coastal Dry Shrubland Dune community.

The Coastal Dry Mixed Shrub & Grassland community is dominated by kiawe (*Prosopis pallida*), koa haole (*Leucaena leucocephala*), Chinese violet (*Asystasia gangetica*), and Guinea grass (*Panicum maximum*). These four species cover more than ninty-five percent of the space that this community takes up.

African tulip (*Spathodea campanulata*), monkeypod (*Samanea saman*), and be-still trees (*Cascabela thevetia*) are growing in a drainage ditch on the Southern edge of the project area along Ka'ahumanu Ave. A type of tick-trefoil (*Glycine wightii*) is growing into this community where the project area meets the Eastern fence of Maui Co. Zoo, along with a single plant of silver leaved nightshade (*Solanum elaeagnifolium*)

Some cactus (CACTACEAE *spp.*), century plants (*Agave spp.*), and mother-of-millions (*Kalanchoe sp.*) have been cultivated in the archery range, and are growing from rubbish piles in the North-eastern part of the project area, but do not appear to be natualizing yet. Although one cactus species, the night-blooming cereus (*Hylocereus undatus*), which is growing from a rubbish pile in the NE part of the project area, does seem to be coming successful, and is known to naturalize easily. An ornamental variety of vitex (*Vitex trifolia*) is planted at a residence North of the project area; seeds from this plant have allowed the species to naturalize in the project area there.

Maile hohono (*Ageratum conyzoides*), koali pehu (*Merremeria aegypta*), and lion's tail (*Leonotis nepetifolia*) were found in this community, but were identified from dead plant materials.

'Ilima (*Sida fallax*) and 'uhaloa (*Waltheria indica*), are indigenous species which are occasionally found in this community. Two other indigenous plants, naupaka kahakai (*Scaevola* *sericea*) and pohuehue (*Ipomoea pes-caprae*), are growing amongst rubbish piles in the North-eastern part of the project area.

In the past (recent as 1990) the groundcover of this community was dominated by buffelgrass (*Cenchrus ciliaris*), but now it is covered by Guinea grass (*Panicum maximum*). The Chinese violet (*Asystasia gangetica*) which is a co-dominant of this community, was originally cultivated as a ground cover at Maui Community College.

The Coastal Dry Shrubland Dune community is dominated by 'ilima (*Sida fallax*), 'uhaloa (*Waltheria indica*), koa hoale (*Leucaena leucocephala*), blue vervain (*Stachytarpheta jamaicensis*), Spanish needles (*Bidens pilosa*), and lantana (*Lantana camara*). Guinea grass (*Panicum maximum*) and buffelgrass (*Cenchrus ciliaris*) are also common and invasive here.

This community exists on littoral sand dunes that rise above the surrounding shrub & grassland habitat, creating microhabitats, or biological islands. These perched habitats are exposed to sea winds and are drier than surrounding habitat, which limits the types of plants which may grow there. This allows native plants such as 'ilima and 'uhaloa to maintain their ground in this community against invasive alien plants.

'Aki'aki (*Sporobolus virginicus*) an uncommon indigenous beach-grass, occurs on a dune in the Northeastern section of the project area. Other common to rare native species are capable of living in this habitat but are out-competed by invasive alien species.

The giant Arican snail (*Achatina fulica*) is found in the project area in surprizingly large numbers. The dune areas are peppered with their dead shells. With these gastropods on location it is almost impossible for any of the succulent leaved coastal native plants, such as the rare dwarf naupaka (*Scaevola coriacea*), to survive.

Pili (*Heteropogon contortus*) an indigenous dry-land grass, used to grow (recent as 1989) on dunes by the back gate of Maui Botanical Gardens (Western side of the project area) but this was not found during the survey, and the area where it previously grew is heavily invaded by Guinea grass.

The greatest variety of species found in the project area occurs on the edges of, and within disturbances in, the above mentioned communities.

Rare Plants:

For the purpose of this report Rare Plants are those plants which have legal standing under Federal and State Law. As Rare Plants are protected, they require consideration for planning in development projects.

The Coastal Dry Shrubland Dune community found in the project area is capable of supporting Rare Plants. Dwarf naupaka (*Scaevola coriacea*), 'ohai (*Sesbania tomentosa*), and pamakani (*Tetramolopium conyzoides*) are Rare Plants known to occur in dune habitats on Maui. Dwarf naupaka and 'ohai were previously cultivated in Maui Botanical Gardens, West of the project area, but are no longer there. Dwarf naupaka still persists on a coastal dune in Waiehu at the public golf course, amidst a variety of invasive alien plants. Pamakani (*T. conyzoides*) is now considered to be extinct. The project area was searched for these plants, but none were found.

Although the project area contains habitat capable of supporting Rare Plants, none were found. Therefore, there are no botanical resources found in the proposed Maui Central Park area that require consideration for planning.

List of Vascular Plants:

The List of Vascular Plants found during the survey is displayed in Figure 1. at the end of this report.

No ferns (Pteridophytes) or coniferous plants (Gymnosperms) were found in the project area.

All of the plant species found in the project area are alien or indigenous and common, except for kukui (*Aleurites moluccana*) a common Polynesian plant which occurs in the Western side of the project area from Maui Botanical Gardens, and 'aki'aki (*Sporobolus virginicus*) an uncommon indigenous beach-grass which occurs on dunes in the Northeastern part of the project area. There were no endemic plant species, or Rare Plants found in the project area.

RECOMMENDATIONS:

No species of vascular plant was found in the project area that has protection under Federal or State Law. Therefore, there are no botanical resoures found in the proposed Maui Central Park area that require consideration for planning.

The littoral sand dunes found in the project area are capable of supporting a variety of native coastal species of plants, but only under cultivation. There are a number of native coastal plants (Fig. 2.) growing on the beach, opposite Kahului Beach Rd. from the project area, which could grow on these dunes in the absence of invasive alien species. Through cultivation Rare Plants may successfully be reintroduced to these dunes. Successful cultivation of rare coastal species was previously demonstrated at Maui Botanical Gardens. The cultivation of native plant species on these dune habitats may be an asset to the proposed project.

Figure 2. shows Native Coastal Plants occuring adjacent to the project area.

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Gagne, W.C. & Cuddihy, L.W. 1990. "Vegetation." in Wagner, W.L. et al. Eds. 1990. "Manual of the Flowering Plants of Hawai'i." University of Hawai'i Press. Honolulu, HI. 2 vol. pp.45-114.

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USFWS. 1996. "Hawaiian Islands Plants: Updated February 1, 1996. Listed and Candidate Species, as Designated Under the U.S. Endangered Species Act." USFWS, Pacific Islands Office. Honolulu, HI. 17p.

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Figure 1. **List of Vascular Plants**

Dicotyledons

FAMILY Genus/species		Common Name	Legal Status	Dist.& Abund.
ACANTHACEAE				
Asystasia gangetica (L.) T. Anderson		Chinese violet	-	A-C
AMARANTHACEAE	Amaranth Family			
Amaranthus spinosus L.		pakai kuku, spiny amaranth	-	A-C
A. viridis L.		pakai, slender amaranth	-	A-C
ANACARDIACEAE	Mango Family			
Schinus terebinthifolius		wililaiki, christmas berry	-	A-C
APOCYNACEAE	Plumeria Family			
Cascabela thevetia (L.) Lippold		be still tree	-	A-C
ASTERACEAE	Sunflower Family			
Ageratum conyzoides L.		maile hohono	-	A-C
Bidens pilosa L.		kinehe, Spanish neddles	-	A-C
Conyza bonariensis (L.) Cronq.		hairy horseweed	-	A-C
Emilia sonchifolia (L.) DC		pua lele, Flora's paintbrush	-	A-C
Heterotheca grandiflora Nutt.		telegraph weed	-	A-C
Pluchea indica (L.) Less.		Indian fleabane	-	A-C
P. symphytifolia (Mill.) Gillis		sourbush	-	A-C
Sonchus oleraceus L.		pua lele, sow thistle	-	A-C
Tridax procumbens L.		coat buttons	-	A-C
Verbesina encilioides (Cav.) Benth.& Hook.		golden crown-beard	-	A-C
Wedelia trilobata (L.) Hitchc.		wedelia	-	A-C
BIGNONIACEAE	Bignonia Family			
Spathodea campanulata P. Beauv.		African tulip	-	A-C
BORAGINACEAE	Borage Family			
Heliotropium amplexicaule Vahl		heliotrope	-	A-C
H. procumbens Mill.		nena, heliotrope	-	A-C

BRASSICACEAE	Mustard Family			
Lepidium virginicum L.		pepperwort	-	A-C
CACTACEAE	Cactus Family			
Hylocereus undatus (Haw.) Brit. & Rose		night-blooming cereus	-	A-C
CARYOPHYLLACEAE	Pink Family			
Polycarpon tetraphyllum (L.) L.		polycarpon	-	A-C
CASUARINACEAE	She-oak Family			
Casuarina equisetifolia L.		paina, ironwood	-	A-C
CHENOPODIACEAE	Goose-foot Family			
Atriplex semibaccata R. Br.		Australian saltbush	-	A-C
Chenopodium murale L.		'aheahea, goosefoot	-	A-C
CONVOLVULACEAE	Morning-glory Family			
Ipomoea pes-caprae (L.) R. Br.		pohuehue	-	I-C
Merremeria aegypta (L.) Urb.		koali kua hulu	-	I-C
EUPHORBIACEAE	Poinsettia Family			
Chamaesyce hirta (L.) Millsp.		hairy spurge	-	A-C
C. hypericifolia (L.) Millsp.		graceful spurge	-	A-C
Ricinus communis L.		koli, castor bean	-	A-C
FABACEAE	Bean Family			
Acacia farnesiana (L.) Willd.		klu	-	A-C
Chamaecriata nictitans (L.) Moench		lauki, partidge pea	-	A-C
Crotalaria pallida Aiton		rattlepod	-	A-C
Desmanthus virgatus (L.) Willd.		slender mimosa	-	A-C
Desmodium tortuosum (Sw.) DC		Florida beggarweed	-	A-C
Glycine wightii (Wig. & Arn.) Verdc.		tick trefoil	-	A-C
Indigofera spicata Forssk.		creeping indigo	-	A-C
I. suffruticosa Mill.		'iniko, indigo	-	A-C
Leucaena leucocephala (Lam.) de Wit		koa hoale	-	A-C
Macroptilium atropurpureum (DC) Urb.		cow pea vine	-	A-C
M. lathyroides (L.) Urb.		cow pea	-	A-C
Pithecellobium dulce (Roxb.) Benth.		'opiuma	-	A-C
Prosopis pallida (Hum. & Bon. ex Wil.) Kun.		kiawe	-	A-C
Samanea saman (Jacq.) Merr.		monkeypod	-	A-C

GOODENIACEAE	Half-flower Family			
Scaevola sericea Vahl		naupaka kahakai	-	I-C
LAMIACEAE	Mint Family			
Leonotis nepetifolia (L.) R. Br.		lion's tail	-	A-C
MALVACEAE	Hibiscus Family			
Abutilon grandifolium (Willd.) Sweet		false 'ilima	-	A-C
Malvastrum coromandelianum (L.) Garcke		false mallow	-	A-C
Sida fallax Walp.		'ilima	-	I-C
S. rhombifolia L.		false 'ilima	-	A-C
MORACEAE	Fig Family			
Ficus microcarpa L. fil.		banyan	-	A-C
NYCTAGINACEAE	Four-o'clock Family			
Boerhavia coccinea Mill.		alena	-	A-C
PAPAVERACEAE	Poppy Family			
Argemone mexicana L.		Mexican poppy	-	A-C
PASSIFLORACEAE	Passion-fruit Family			
Passiflora edulis Sims		lilikoi, passionfruit	-	A-C
P. foetida L.		pohapoha, running pop	-	A-C
PORTULACACEAE	Portulaca Family			
Portulaca oleracea L.		pigweed	-	A-C
P. pilosa L.		portulaca	-	A-C
SOLANACEAE	Tomato Family			
Nicandra physalodes (L.) Gaertn.		apple of Peru	-	A-C
Nicotiana glauca R.C. Graham		tree tobacco	-	A-C
Solanum americanum Mill.		popolo	-	I-C
S. elaeagnifolium Cav.		silver leaved nightshade	-	A-C
STERCULIACEAE	Chocolate Family			
Waltheria indica L.		'uhaloa	-	I-C
VERBENACEAE	Vervain Family			
Lantana camara L.		lantana	-	A-C

Stachytarpheta jamaicensis (L.) Vahl	Jamaican vervain	-	A-C
Vitex trifolia L.	vitex	-	A-C
ZYGOPHYLLACEAE Creosote bush Family			
Tribulus terrestris L.	puncture vine	-	A-C

MONOCOTYLEDONS

FAMILY Genus/species	Common Name	Legal Status	Dist.& Abund.
COMMELINACEAE Spiderwort Family			
Commelina diffusa N.L. Burm.	honohono	-	A-C
CYPERACEAE Sedge Family			
Pycreus polystacyos (Rottb.) P. Beauv.	nutgrass	-	I-C
POACEAE Grass Family			
Cenchrus ciliaris L.	buffelgrass	-	A-C
C. echinatus L.	sandbur	-	A-C
Chlorus barbata (L.) Sw.	fingergrass	-	A-C
Cynodon dactylon (L.) Pers.	manienie, Burmuda grass	-	A-C
Eleusine indica (L.) Gaertn.	wiregrass	-	A-C
Eragrostis tenella (L.) P. Beauv. ex Roem.& Schult.	lovegrass	-	A-C
Panicum maximum Jacq.	Guinea grass	-	A-C
Setaria verticillata (L.) P. Beauv.	bristly foxtail	-	A-C
Sporobolus virginicus (L.) Kunth.	'aki'aki	-	I-U

KEY

Legal Status: LE = Listed Endangered
PE = Proposed Endangered
CL = Candidate for Listing
SOC = Species of Concern

Distribution: E = Endemic
I = Indigenous
P = Polynesian
A = Alien

Abundance: C = Common
U = Uncommon
R = Rare

Figure 2. Native Coastal Plants occuring adjacent to the Project Area.

Genus/species	Common Name
Boerhavia repens L.	alena
Cuscuta sandwichiana Choisy	kauna'oa
Heliotropium currasavicum L.	nena
Ipomoea pes-caprae (L.) R. Br.	pohuehue
Jacquemontia ovalifolia subsp. *sandwicensis* (A. Gray) K. Robertson	pa'uohi'iaka
Pandanus tectoris S. Parkinson ex Z.	hala
Sesuvium portulacastrum (L.) L.	'akulikuli
Sporobolus virginicus (L.) Kunth.	'aki'aki

Appendix B

Archaeological Reconnaissance Survey and Archaeological Inventory Survey

ARCHAEOLOGICAL RECONNAISSANCE WITH SUBSURFACE TESTING FOR PROPOSED 110-ACRE MAUI CENTRAL PARK, WAILUKU, MAUI (TMK: 3-8-07:1 AND 3-7-01:2)

DRAFT

by

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Prepared for

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Cultural Surveys Hawaii
August 1996

ABSTRACT

Surface reconnaissance and subsurface backhoe testing were conducted in a 110-acre property in the *makai* portion of Wailuku planned for development of a county park. Results of the surface reconnaissance and profiles of 21 backhoe trenches, excavated throughout much of the property, showed negative findings. Previous archaeological work in the area also shows negative findings, but this work was conducted in areas of prior disturbance. An area containing scattered human remains has been recently identified in the central eastern portion of the project area bordering the *mauka* area of the Maui Community Arts and Cultural Center. However, because of the likelihood of encountering cultural materials, especially human burials, within the project area, construction monitoring is recommended. This monitoring should be done according to a plan reviewed and approved by State Historic Preservation Division (SHPD) and Maui County before construction. A component of this plan should include oral interviews to identify possible burial sites and lineal descendants. The plan should also specify that if findings are uncovered, work should immediately stop in that area for appropriate assessment. If major findings are uncovered data recovery or other mitigation may be required.

ACKNOWLEDGEMENTS

We would like to thank Mr. Milton Arakawa of Monekiya and Arakawa, Inc. for providing maps and other information about the project area. Access was arranged through Maui County Department of Public Works. Mr. Walt Frederickson kindly provided information of a recent find of human remains within the project area. Backhoe services were provided by Mr. Clarence Montalvo of CCM Clearing.

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I. INTRODUCTION

On August 1 and on August 5 through 6, 1996 personnel of Cultural Surveys Hawai'i conducted an archaeological Reconnaissance Survey of the 110-acre Maui Central Park site (TMK 3-8-07:1 and 3-7-01:2). Reconnaissance Survey of this parcel included subsurface test excavations by backhoe. The archaeological work was done for Wilson Okamaoto & Associates, Inc..

Project Area Description

The 110-acre project area lies approximately 1 kilometer westward of Kahalui Harbor and the campus of the University of Hawaii, Maui Community College. It is located with Kanaloa Avenue forming its western boundary. The Maui Zoological and Botanical Garden forms the southern boundary. The Maui YMCA complex forms the northern boundary while the Maui Arts and Cultural Center bounds the project area to the east. It consists of an area that was geologically derived from the old Kula series of lava flows and is isolated in the interface of the dominant *entisols*, volcanic ash/beach derived soils and *oxisols*, exceptionally stable lowland soils (University of Hawaii, 1983, pp. 39-41).

Soil associations are described by Donald Foote in his 1972 publication of *Soil Surveys of the Islands of Kauai, Oahu, Maui, Molokai, and Lanai. State of Hawaii.* He describes the area as Pulehu-Ewa-Jaucas, being deep, moderately sloping to nearly level, well drained and even excessively drained soils that have a moderately fine to course textured subsoil or underlying material.

The dune area in which the project area lies is classified as part of the extensive Pu'uone Sand Dune Formation. Upper layers are grayish brown, calcareous sand. underlain by grayish-brown cemented sand.

A substantial portion of the project area has been utilized by a local. Maui archery group and subsequent modifications are seen throughout the project area. These modifications consist of jeep roads, trails, target ranges and meeting areas. All of these modifications appear to be in use at the present time.

Vegetation within the project area consists of various grasses, *koa haole*, and *kiawe*.

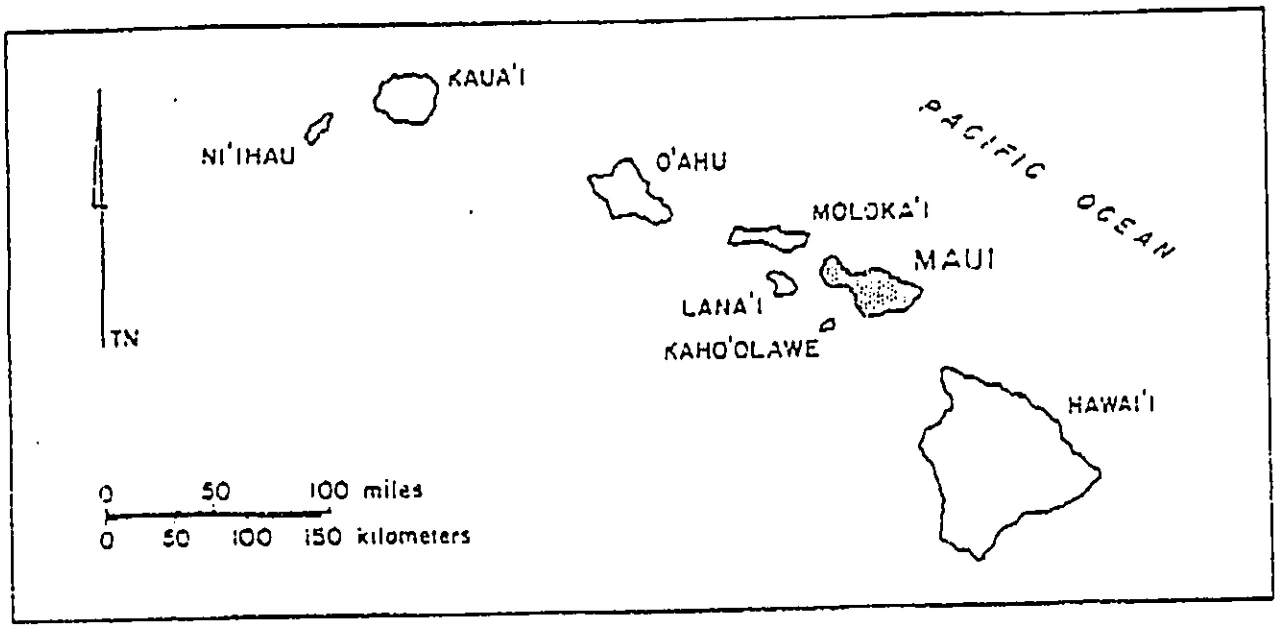

Figure 1 State of Hawai'i

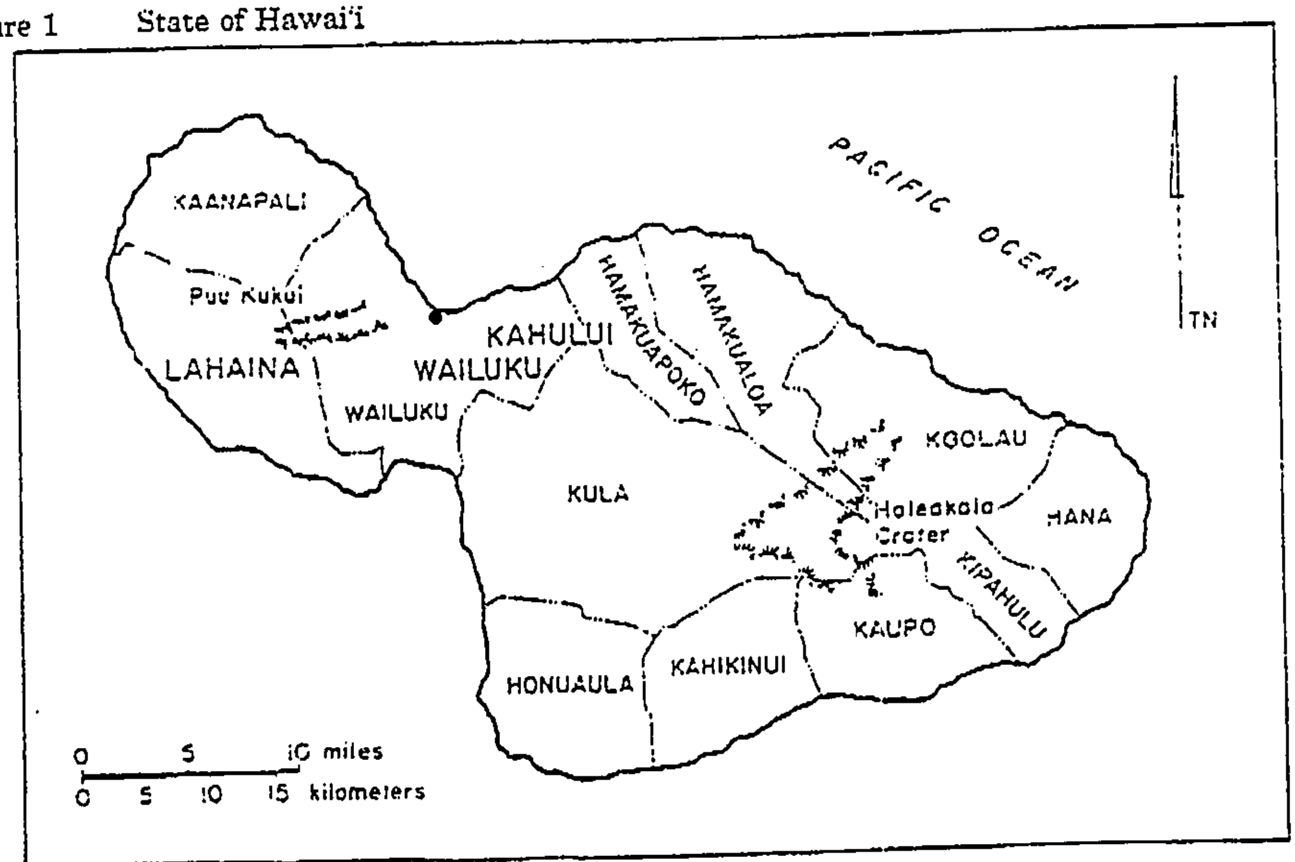

Figure 2 General Location Map, Maui Island

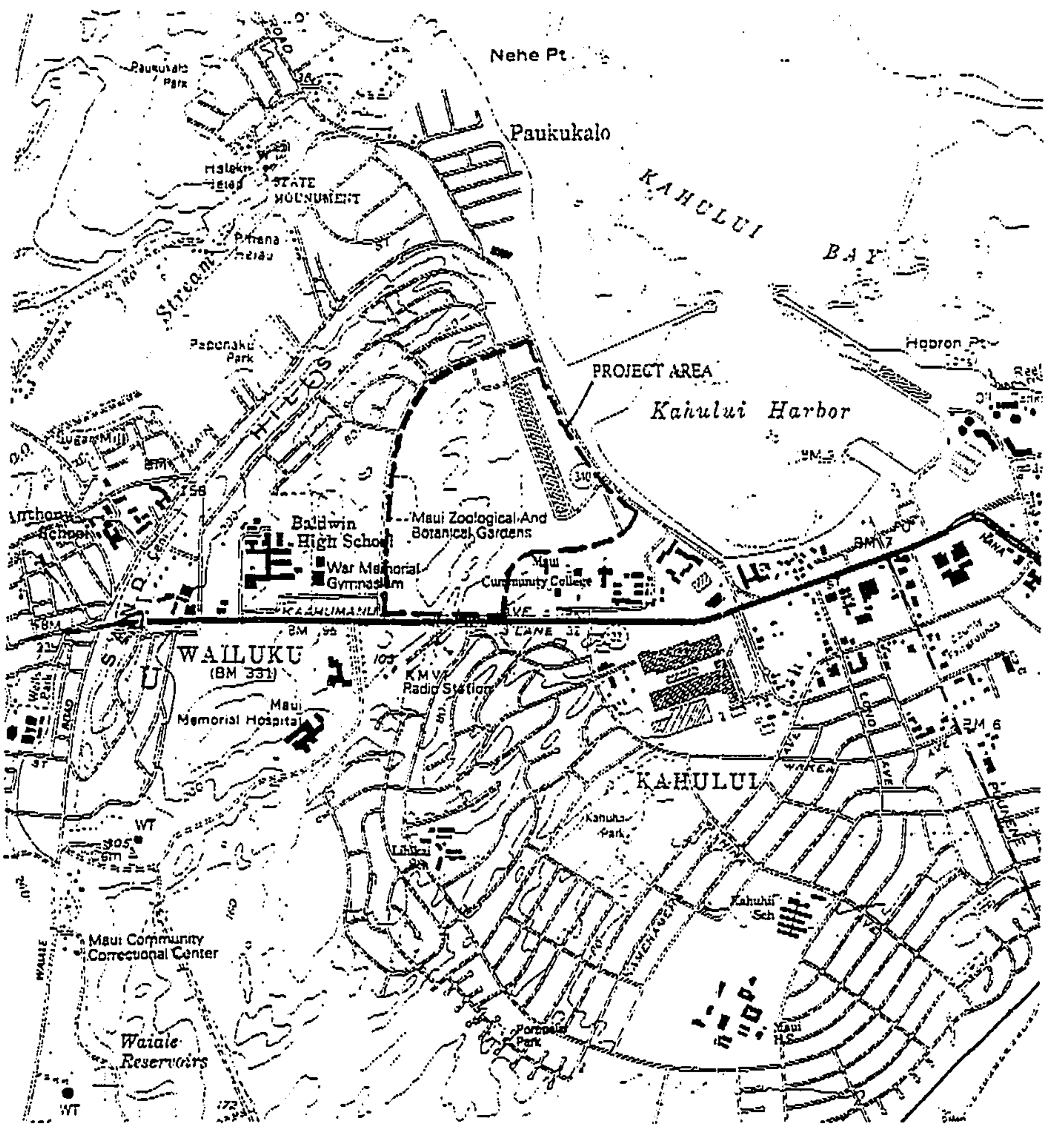

Figure 3 Portion of USGS Showing Location of Project Area

A. Scope of Work

The following scope of work would be appropriate to an environmental assessment level of study but would not meet the State requirements for an inventory survey.

1. Brief historic background which would determine prehistoric and historic land use. This historic work would include examination of Land Commission Awards, archival documents, historic maps, and previous archaeological surveys of this area.

2. A field reconnaissance of the property to determine presence or absence of surface archaeological sites and to locate potential areas of subsurface materials. Fieldwork will include backhoe testing in sample areas chosen as probable locations of buried cultural materials. If archaeological materials are found, they will be described and located with a preliminary evaluation of their significance. If human burials are encountered work will be halted in that area and location of the remains and estimate of numbers of individuals will be recorded. Backhoe testing will be accompanied by documentation of stratigraphic layers within each trench. Two days of backhoe work is included in this estimate and all trenches will be backfilled.

3. Preparation of a short report of the results of the historic research and field reconnaissance. Based on these findings recommendations would be presented for any further work which would be appropriate to precede development. If there are significant findings an inventory survey level of study will be recommended which would probably include further subsurface testing in designated sensitive areas.

B. Methods

The archaeological surface survey of the Maui Central Park project area was accomplished in three days with three archaeologists walking random transects across the project area spaced 40-50 feet apart. Ground visibility was good over approximately 75% of the area because of dry climatic conditions and a extensive trail and road network which existed throughout most portions of the project area. The remaining 25% was covered by dense *kiawe* thicket, however, during testing some of the obscured area was penetrated with the backhoe and underwent subsurface testing.

Analysis of the subsurface deposits was accomplished by excavating 21 backhoe trenches (Figure 4) of a minimum of 3 meters in length and a varying depth, depending on cementation of subsurface layers. The trenches were evenly dispersed throughout the accessible portions of the project area.

The stratigraphy in each of the 21 trenches was documented by means of profile and soil descriptions. The stratigraphic profiles throughout the project area were uniform and predictable with similar strata and sequences with only minor variations present in four trenches. For this reason only a typical profile is shown to avoid presentation of repetitive information.

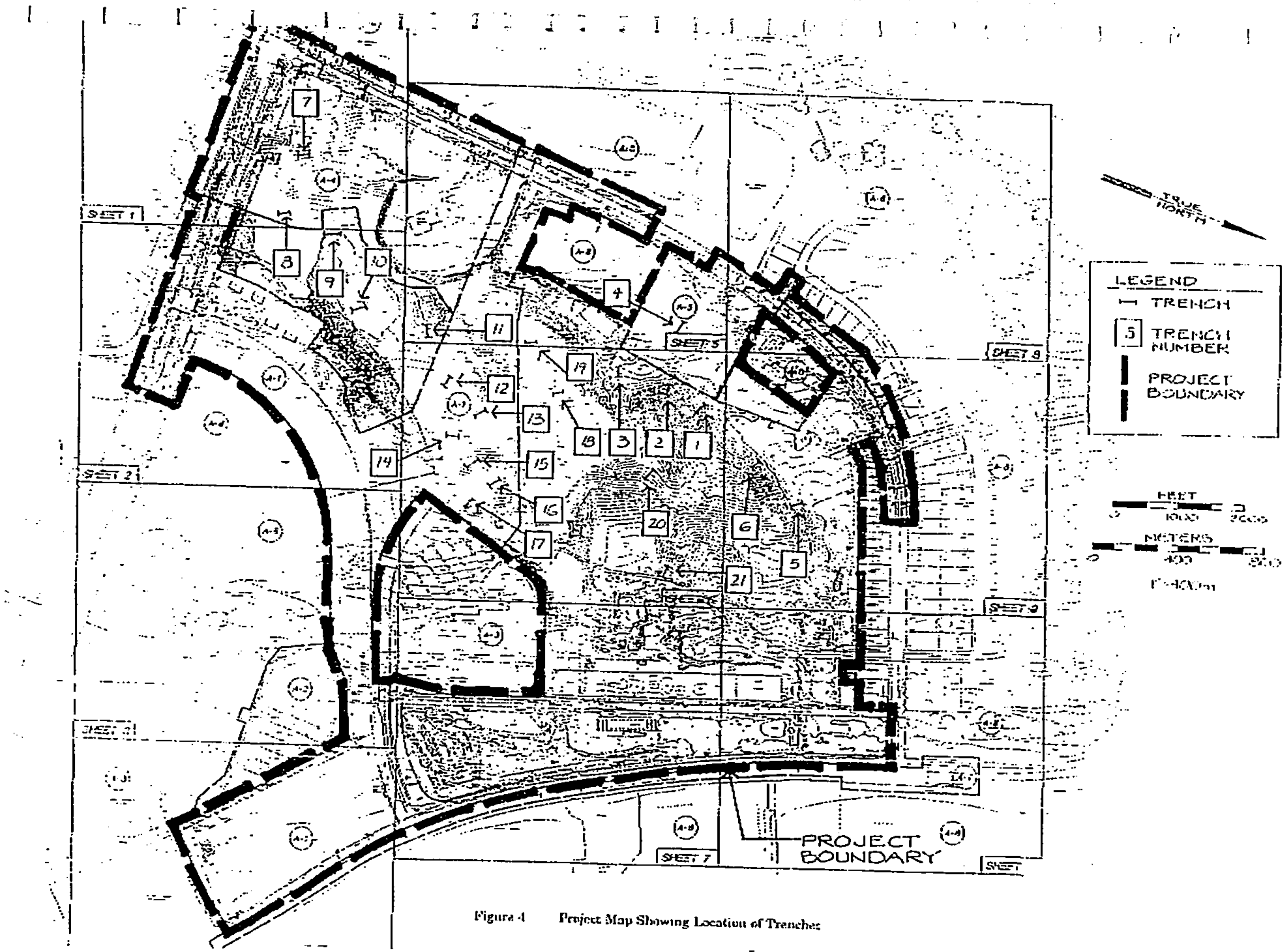

Figure 4 Project Map Showing Location of Trenches

The subsurface testing stratigraphy was controlled by the following considerations:

1) Backhoe access - which was restricted to areas without heavy vegetation, particularly *kiawe* trees which restricted movement of the backhoe. Also steep sand slopes could not be traversed by the backhoe.

2) Presence of Holocene (unconsolidated) sand deposits, as opposed to Pleistocene lithified dune. The lithified dune portions are assumed to be too old to contain cultural materials are were avoided in the testing.

3) Concentration of testing in unmodified terrain, as opposed to graded and grubbed land (Figure 5).

4) Sampling of as many portions of the project area as possible including both *mauka* and *makai* areas.

5) Sampling variations in terrain to include level areas, crests, slopes (both leeward and windward).

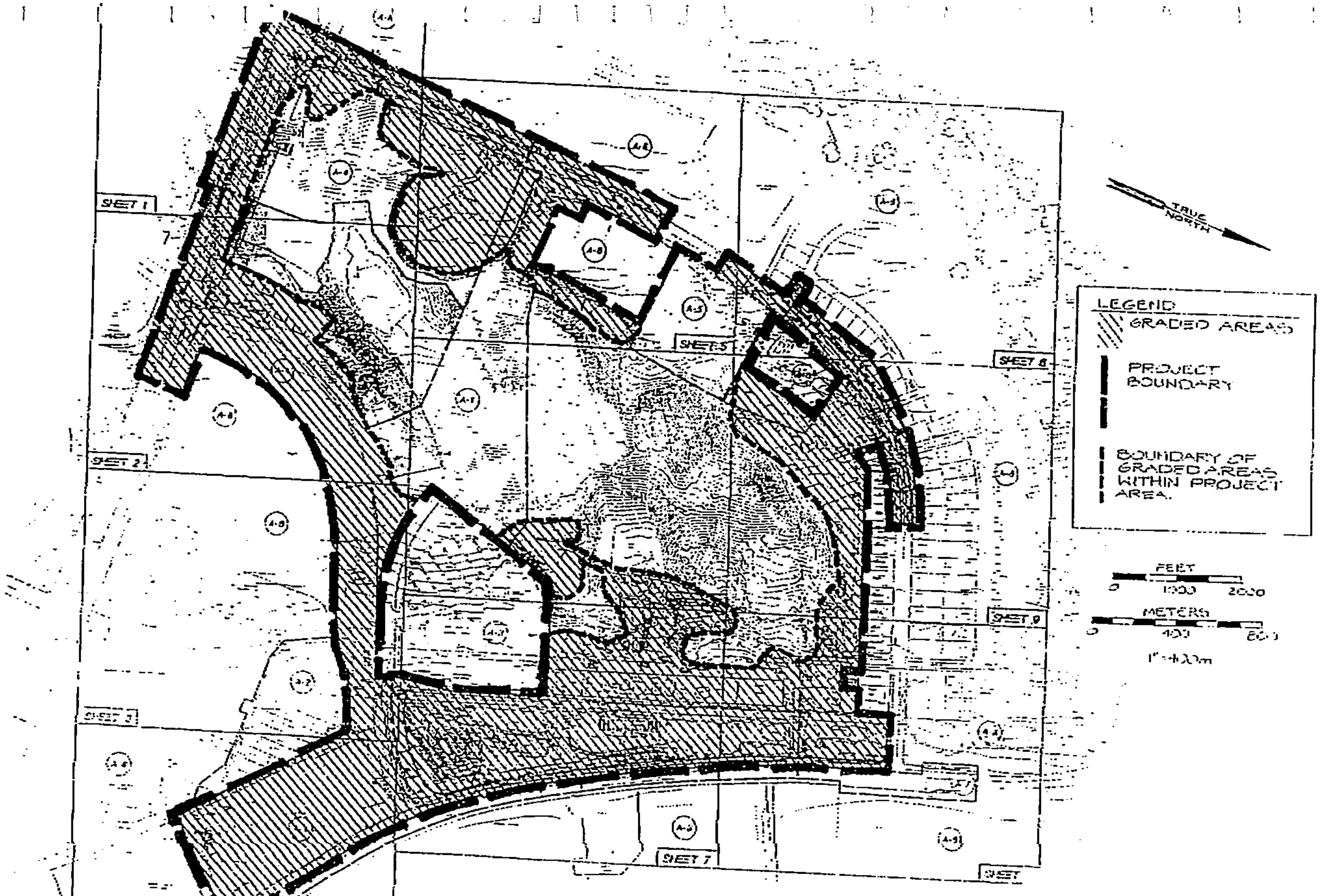

Figure 5 Project Area Showing Graded Areas

II. NATURAL SETTING

Project Area Location

The project area is in the ʻili of Owa, Wailuku Ahupuaʻa in the Wailuku District on the Island of Maui. The geographical co-ordinates are 20°54'N and 156°29W. This property belongs to the County of Maui. It lies just inland from Kahului Harbor (Kahului means "the winning", Pukui, *et. al.* 1981:67). It is bordered by Kaahumanu Avenue on the south, Kanaloa Avenue on the west, and northwest, and Kahului Beach Road along the northwest edge. Maui Community College is along its eastern border. Baldwin High School lies on the other side of Kanaloa Avenue to the west. Kaihee Place and Wakea N. Avenue are in the northeast corner of the property.

Wailuku Ahupuaʻa

Wailuku Ahupua is a large political and economic land unit of Wailuku District. It includes the coastal area of Kahului Bay from Kapukaulua to Paūkukalo, all of Iaʻo Valley, and the northern half of the Isthmus of Maui, (sometimes called the Central Plain) between Haleakala and the West Maui Mountains.

Wailuku District

Wailuku District includes the entire eastern apron of the West Maui Mountains and all of the flat land on the isthmus between West and East Maui, including the coastal portions of Kahului Bay and Maʻalaea Bay.

The Island of Maui

"Maui has the shape of a figure eight, with two large bays at its waist. The low broad Isthmus (often called he Central Plain) lies between Kahului bay at the north and Maʻalaea Bay at the South." (Kyselka and Lanterman 1980:10) This Isthmus lies between the two large volcanos of East (Haleakala) and West Maui.

Natural Setting

Rainfall in the project area is around 20 inches a year and most of it falls in the winter months (Armstrong 1973:56). Temperatures range from 60° to 80° (*Ibid*:58). Elevation of the Kahalui Beach Road, which is built up, is 12 feet but most of the project area is at 6 to 9 feet. Tsumanis hit this area in 1923, 1946, 1952 and 1957.

"Lithified calcareous sand dunes rest on the alluvial fans near the shore between Kahului and Waiheʻe and extend inland almost across the western edge of the isthmus"... The sand dunes "were formed by wind blowing sand inland from wide beaches exposed during a stand of the sea lower than the present sea level -- probably the minus-40-foot stand. Less consolidated to totally unconslidated dunes are of later date, and are still forming."(Macdonald and Abbott, 1974:326).

The soils in the project area are classified as in the Puʻuone Series which "consists of somewhat excessively drained soils on low uplands on the island of Maui. These soils developed in material derived from coral and seashells. They are moderately sloping to moderately steep.(Foote et al, 1972:117)." Pu'uone sand, 7 to 30% slopes (PZUE) is on sandhills near the ocean. Included in mapping were small areas of Iao and Jaucas soils. Also included were small areas where the cemented layer is less than 20 inches below the surface.(*Ibid*:117)."

"Kahului Harbor, the island of Maui's sole port of entry, was built rather than discovered...it just grew on a site where nothing more than an inlet exposed to the prevailing winds and often severe storms from the north had originally existed" (Stroup, 1967:45).

Charles P. Keau in a archaeology monotoring report dated Feb 2, 1990, gathered oral history from the "old people living in this area called "Raw Fish Camp, Kahului, Wailuku, Pakukalo, Melehako'a". They talked about spring water along the seashore which helped the *limu* to grow. " People in the central district of Maui gathered their *limu* (seaweed) along the seashore. These are the names: maneoneo (ogo), limu ele ele, wawai iole, lipepe'e and many which I have forgotten ."... "Because of the dredging of the harbor, the fill was dumped in the Wailuku side breakwater covering up the outlet of the fresh water, and today we have no edible seaweed, no akule-opelu, growing there. So I believe that this lava bed 14' below surface is a part of the aquifer and has a lot to do with the limu disappearing from Kahului Harbor" (Keau, 1990).

In a 1993 report on a property in Wailuku, Kennedy (1993:7) provides a description of geographical zones inclusive of and surrounding the present study area. The following description of "Zone 3" indicates the topography and vegetation present within the study area:

> Zone 3 is a moderate to steep sloped zone of large coastal dunes some of which have been disturbed by earth moving machinery. Some of the dunes have been cut and their slopes modified to aid in filling and leveling parts of Zone 2. A few subsurface trenches indicated evidence of earth-filling activities. An archery course weaves through the low lying areas of this dune system. Trails and narrow road tracks lead to target boards placed randomly atop wooden structures or tacked on large *kiawe* trees. Areas located on slopes and atop the dunes are less impacted. The elevation of this zone ranges from 6.1m to 18.9m AMSL.
>
> Vegetation in Zone 3 ranges from thick to dense, with *kiawe (Prosopis pallida)*, mixed with a low lying grass as the dominant species. Several other exotic species are present such as *Lantana camara*, and morning glory (*Ipomoea indica*). In open areas near the apex of dunes 'ilima (*Sida fallax*), is present interspersed among the grasses. One lonely specimen of Nama sandwicensis, an endemic to the Hawaiian Islands, is located near the apex of the highest dune in Zone 3."

Other plants that have been reported in the project area are *koa haole (Leucaena leucocephala)*, castor bean (*Ricinus communis*), *uhaloa (Waltheria indica)*, bufflegrass (*Cenchrus ciliaris*).

Within the project area is a very unique (in the Hawaiian Islands) Botanical Garden with many native Hawaiian species growing well and a real showcase and study area for botanists and other people interested in native Hawaiian plants. Many local people and out of state visitors come the see these gardens.

III. HISTORIC BACKGROUND

Wailuku *Ahupua'a* comprises a large portion of Wailuku District, including part of Kahului Bay (from Kapukaulua to Paūkukalo), the entire 'Iao Valley, and the north portion of the isthmus between Haleakala and the West Maui Mountains. According to Kennedy (1993:8), Wailuku served "as a gathering place and residence of important chiefs and their retinues". Kennedy indicates that prior to European contact the wet, stream-filled western half of Wailuku sustained most of the population and agriculture, while the drier eastern half was not suitable for such purposes and therefore was utilized less often. Kennedy's 1993 report provides an in-depth review of the land use history of eastern Wailuku, which is summarized below (with additional references inserted). For a review of the western portion, consult Kennedy *et al.* 1992.

Mythological and Traditional Accounts

Nineteenth century chants, recorded by Fornander, give reference to Maui place names including Wailuku *ahupua'a* and other areas of Wailuku District, mostly on the windward coast of Haleakala. Wailuku is described in the chants "as a locality of flying and sometimes dark clouds, a sheltered and shady valley locale, the place of iaiki rain, and a 'broad plain where councils are held'" (Kennedy 1993:9).

Two fresh water fishponds, Kanaha and Mau'oni, were built near Kahului by Maui ruler Kiha-a-Pi'ilani during the mid-1500s. Mau'oni Pond apparently no longer exists, but Kanaha Pond remains intact and functions as a wildlife sanctuary.

Legends characterize Wailuku as a royal burial ground and a place of war. According to one legend, the place name Wailuku (meaning "water of destruction") originated from the location of a battle fought by owls and men. Other legends denote Wailuku as the name of a certain *ali'i* or as a place of residence for chiefs.

Wailuku was Maui's political and military center, particularly during the warfare of the 1600s and 1700s. Several members of the Pi'ilani line were instrumental in the political developments on Maui, vying for control of Maui and protecting the island against chiefs from Oahu and Hawai'i. Most of these battles took place in Wailuku. The High Chief Pi'ilani unified Maui during the 1600s through warfare and his sons battled for succeeding control, as did subsequent generations of would-be rulers. King Kahekili (of the Pi'ilani lineage) resided in Wailuku and ruled from 1765 to 1790, a time of frequent warfare between the rulers of Maui and Hawai'i. During his reign, Kahekili gained control of Maui, Moloka'i, Lana'i, and Oahu for a period of four years until his defeat by Hawai'i's Kamehameha in 1790.

Early Historic Period

Several foreign influences affected Wailuku, beginning in 1778 when Captain Cook arrived offshore of Kahului Bay where he exchanged goods with the people of that area, including Kahekili. Missionaries arrived in Wailuku in 1832 and established a girls' school to teach Hawaiians their religion and way of life (Fredericksen and Fredericksen 1995:4). Along with the presence of foreigners, the introduction and growth of the sugar industry greatly affected Wailuku and continues to do so today. Hungtai Sugar Works, established in 1828 in Wailuku, was the first place of sugar production on Maui. Sugar production was contained to the western portion of Wailuku *ahupua'a* until 1876 when advancements in the industry enabled an expansion into the dry, eastern portion.

Mid-1800s (Land Commission Awards)

Land Commission Awards (LCAs) in Wailuku were more commonly awarded in the western portion of the *ahupua'a* while only two LCAs were awarded within the eastern portion, reflecting the settlement patterns in the area.

LCA 7713:23, awarded to Princess Victoria Kamamalu, "represented the former ili of Kalua and consisted of 391 acres stretching from the town of Wailuku to include a small portion of the western part of Kahului bordering the bay" (Kennedy 1993:14). The project area is located within LCA 420, awarded to Kuihelani, which constituted the majority of the *ili* of Owa and spanned the area from Wailuku Stream to Kahului Bay. According to Kennedy, "The testimony described a stone house and walls at the western end of the L.C.A near Wailuku, but did not give any information about the eastern end near Kahului Bay" where the project area is located (*ibid.*).

Most of the Wailuku *ahupua'a* was designated as Crown Land, with the region to the south of Kahului being referred to as Wailuku Commons. Much of this Crown Land would eventually be leased to businessman Claus Spreckels for commercial agricultural use.

Late 1800s

During the late 1800s, the sugar industry grew as a result of a reciprocity treaty of 1876 between Hawaii and the United States and the entrepreneurial efforts of Claus Spreckels. Financial benefits resulting from this treaty facilitated the development of sugar production in the arid eastern portion of Wailuku.

In 1878, Spreckels attained the "purchase and lease...of 40,000 acres of the dry plains that make up the eastern portion of Wailuku Ahupua'a. Among the leased lands were the Wailuku Commons." (Kennedy 1993:16) In 1882, Spreckels obtained Wailuku Commons under Grant 3343 and gained water and transport rights to supply water to his crops. Spreckels' sugar industry grew and subsequently developed Wailuku and surrounding areas into a thriving commercial landscape. The sugar plantation started by Spreckels eventually came under the control of Alexander & Baldwin and it continues to be "the principal land use in the area and the largest sugar producer on Maui" (*ibid.*:19).

Two developments which sprouted from the sugar industry were Kahului's growth as a significant port and the introduction of the railroad. T.H. Hobron had an inter-island shipping operation during the mid-1870s and Spreckels began trans-ocean shipping to North America a few years later. The port continued to modernize and prevailed as the main port on Maui into the early 1900s. Hobron and Spreckels both were instrumental in the foundation of railroads on Maui, with Hobron founding "the first commercial and passenger railroad in Hawai'i" in 1881 (which ran from Wailuku to Kahului and operated until the mid-1960s) and Spreckels instituting rail transport of his sugar cane in the early 1880s (Kennedy 1993:16-17).

Early 1900s To The Present

Kennedy notes several developments in the area of Kahului during the early 1900s. These developments include a Marine Corp camp near Maui Community College, Navy Quonset huts which were used by various entities until the 1980s, the expansion of the town boundaries and the occurrence of four tsunamis between 1923 and 1957.

Other more recent developments in the immediate area of the study parcel include the establishment of the Maui Arts and Cultural Center, Maui Community College, the YMCA, and the Maui Zoological and Botanical Gardens.

Summary

Mythological accounts and pre-European land use patterns indicate the utilization of the western portion of Wailuku *ahupua'a* for habitation and agriculture and the eastern portion for burial grounds and battle fields. With the influx of foreigners and subsequent commercial innovations, the eastern portion of Wailuku experienced a growth in population and a shift in land use as sugar production, railroads, and shipping were introduced in Wailuku and Kahului. Wailuku has grown into a significant commercial and residential community and continues to be a major component of Maui's sugar industry.

IV. PREVIOUS ARCHAEOLOGICAL RESEARCH

Walsh and Hammatt (1994) provide a thorough list of previous archaeological research within a portion of the Wailuku District, an area which encompasses and far exceeds the boundaries of the present study area. Selections from this list which adjoin or are inclusive of the present study area have been compiled below along with other relevant sources.

Fredericksen, Walter M. and Demaris L. Fredericksen
1992 *An Archaeological Inventory Survey for the Parking Lot Expansion and Retention Basin on Maui Community College Campus (TMK 3-8-07:40 & 43) Ahupua'a of Wailuku, District of Wailuku, Island of Maui* Xamanek Researches, Pukalani, Hawaii

Results: Survey of an approximately 5.0 acre lot within the Maui Community College Campus - Approximately 700 feet north of Kaahumanu Avenue. Entire parcel disturbed by previous landfill and construction projects, including WWII military activities. No sites were found.

Fredericksen, Walter M. and Demaris L. Fredericksen
1994 *An Inventory Survey of a 10-Acre Parcel of Land, Maui Central Park Parkway, Wailuku Ahupua'a, Wailuku District, Maui Island (TMK: 3-8-07: 125)*, Xamanek Researches, Pukalani, Hawaii

Results: 1994 survey and subsurface testing by backhoe of a 10 acre parcel. No sites were found and no cultural material or features were present.

Fredericksen, Walter M. and Demaris L. Fredericksen
1995 *Archaeological Inventory Survey and Subsurface Testing at the Site of Keiki Zoo Maui (TMK: 3-8-07: por.1) Wailuku Ahupua'a, Wailuku District, Maui Island*, Xamanek Researches, Pukalani, Hawaii

Results: 1995 survey and subsurface testing by backhoe of a 4 acre parcel within the present project area. One artifact, a basalt abrader, was found on the surface. No cultural materials or features were encountered during subsurface testing.

Keau, Charles P.
1990 *Archaeology Monitor*, Parks Dept., Maui County

Results: 1990 monitoring of trenching by backhoe for the burial of metals and trash at Maui Central Park, TMK: 3-7-01: 2. No cultural material or features were present.

Kennedy, Joseph
1990 *Archaeological Subsurface Testing Results at the Site of the Proposed Maui Arts and Cultural Center, TMK 3-8-07:por.1, Located at Kahului, Maui* Archaeological Consultants of Hawaii, Inc., Haleiwa, Hawaii

Results: 1988 Reconnaissance and 1990 subsurface testing of a parcel bordering the north side of Kaahumanu Avenue. No sites were found.

Kennedy, Joseph and Peter P. Brennan and Sandra Ireland
1993 *Archaeological Inventory Survey with Subsurface Testing Report for a Property Located at Portions of TMK 3-8-07:1,40,125,117 and 3-7-01:2 Wailuku Ahupua'a, Wailuku District, Island of Maui* Archaeological Consultants of Hawaii, Inc, Haleiwa, Hawaii

Results: Survey of a road corridor running through Maui Community College campus from Kahului Beach Road to Kaahumanu Avenue and Kanaloa Avenue. The area was previously disturbed and no sites were found.

Neller, Earl
1984 *Recovery of Endangered Human Bones from the Wailuku Sand Hills, Maui. TMK: 3-8-07: 2)*, State Historic Preservation Office, Honolulu, Hawaii

Results: The origin of human remains inadvertently transferred from the Wailuku sandhills to Lahaina was located a relatively short distance to the south of the current study area in a portion of the same dune formation. No other sites were observed. However, additional bones found at the burial site indicate the probable presence of other burials in the area.

In addition, some scattered human remains are reportedly present on the boundary of the southwestern corner of the Maui Community Arts and Cultural Center within the current project area (Figure 6), according to a fax received by Cultural Surveys Hawaii from W. Fredericksen of Xamanek Researches on August 6, 1996. The document indicates that skeletal remains and a coinciding report were being turned in to SHPD.

In summary, previous archaeological research conducted within or surrounded by the present study area include studies by Fredericksen and Fredericksen (1994 and 1995), Kennedy (1990), and Kennedy *et al.* (1993). The only finding, which consisted of an artifact on the ground surface, occurred during Fredericksen and Fredericksen's 1995 survey. No sites or subsurface cultural materials were encountered during these projects. Fredericksen and Fredericksen's 1996 fax reporting the existence of a burial within the current study area indicates the possible presence of additional burials within the general vicinity. Massive grading within this area would probably encounter and affect such remains.

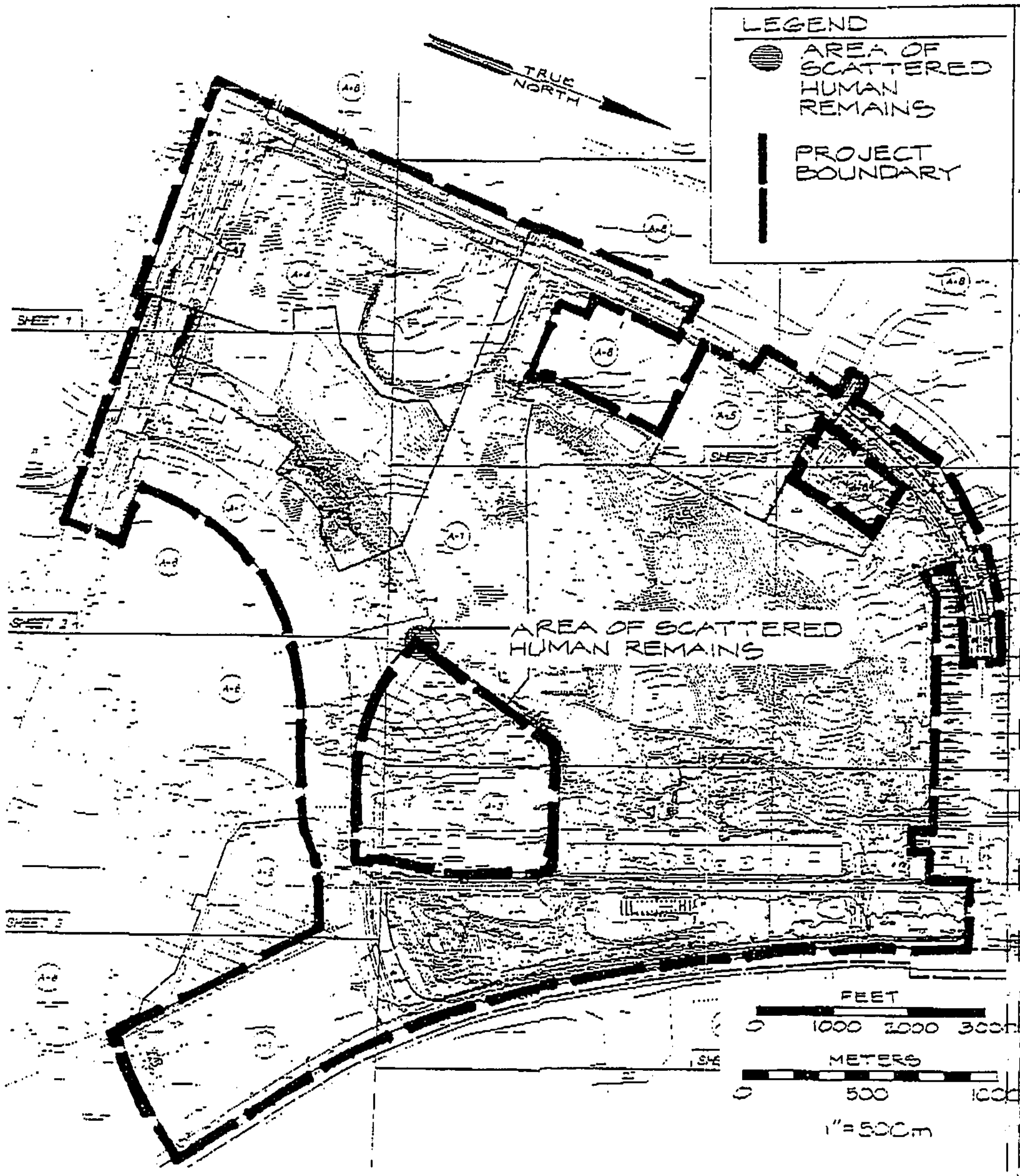

Figure 6 Project Area Showing Location of Recent Find of Human Remains

V. RECONNAISSANCE RESULTS

A. Surface Reconnaissance Results

The archaeological surface reconnaissance was conducted by two archaeologists on August 1, 1996. Additional portions of the property were covered during the backhoe testing, which was conducted on August 5 by three archaeologists. All readily accessible areas of the property were covered on foot. There was no systematic spacing or sweeping of archaeologists as the reconnaissance consisted mostly of walking down established trails and openings in vegetated areas. Areas not covered include the central northern portion of the project area as well as the southeastern portion of the project area that was not topo mapped by the land surveyors because of dense *kiawe* thickets. Lot A5 in the northwestern portion of the project area has recently been grubbed and cleared of vegetation. Although all of this lot was not covered in the ground reconnaissance attention was given to finding dark organic layers and surface artifacts in the recently-disturbed ground surface. It is estimated that 30-40% of the project area was traversed, however, not even this percentage was covered in a systematic manner, involving uniformly-spaced sweeps. During the reconnaissance no cultural materials or structures were observed.

B. Subsurface Testing Results

Trench Descriptions

Trench #:	1
Length:	5.0 m.
Width:	1.4 m.
Max Depth:	2.0 m.
Orientation:	137°TN
Location:	75 ft.at 139°TN from stake at southeast corner of YMCA property.

General Environment: Trench 1 lies at the base of a westward facing sand bluff.

Profile Description: Stratum I: (0-15/20 cmbs) Is a dark grey brown fine loamy sand (10YR 4/2), with a high concentration of loose organic material and rootlets. The boundary between Stratum I and Stratum II is clear and smooth and follows the natural slope of the sand bluff.

Stratum II: (15/20-75 cmbs) Is a brown fine sand (7.5YR 5/4), slightly compact with little organic material present. The boundary between Stratum II and Stratum III is gradual and irregular.

Stratum III: (75-200 cmbs) Is a light brown grey sand (10YR 6/2). Compact vertical pockets of white calcium carbonate cementation and sub-horizontal fine bedding are visible within this stratum extending to the base of excavation.

No culture was observed in Trench 1.

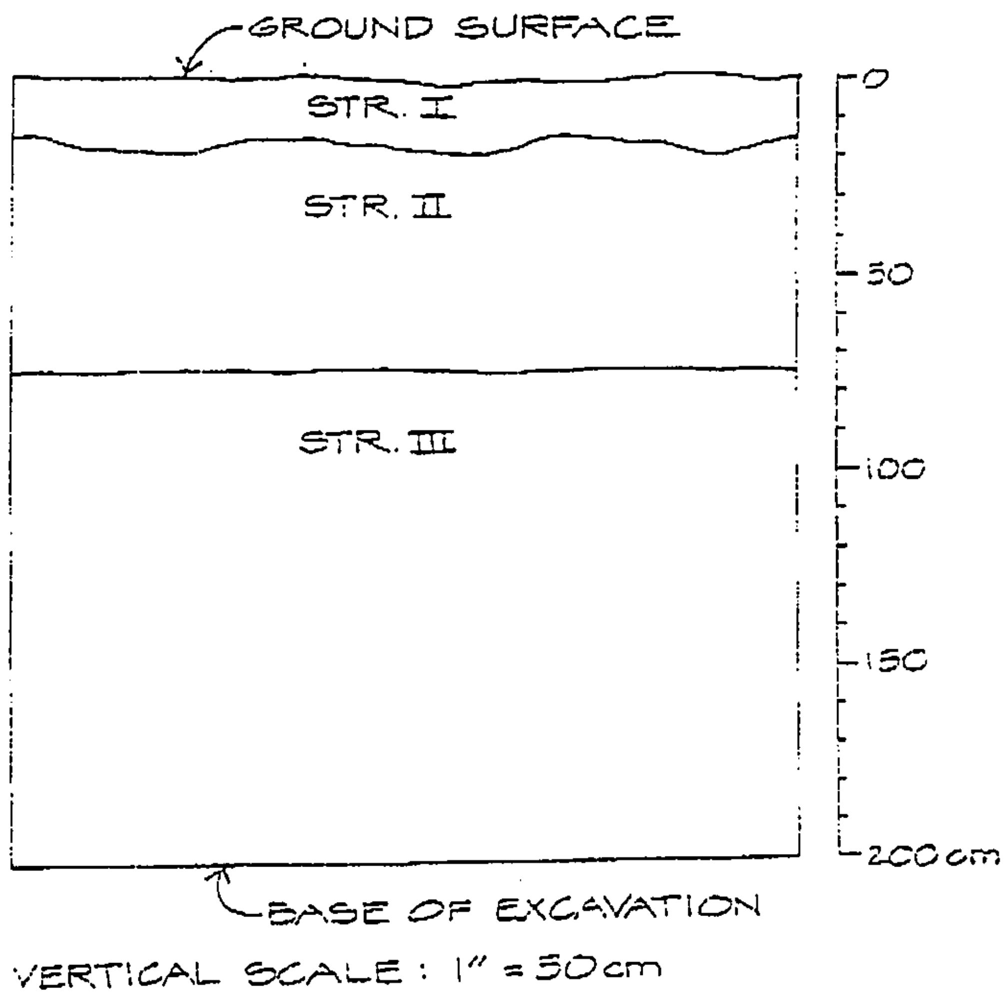

Figure 7 Profile of Trench 1

Trench #:	2
Length:	7.0 m.
Width:	1.3 m.
Max Depth:	1.6 m.
Orientation:	120° TN
Location:	350 ft. at 139° TN from southeast corner of YMCA property at 341° TN.
General Environment:	Trench 2 lies at the base of a westward facing sand bluff.

Profile Description: Stratum I: (0-15/20 cmbs) Is a dark grey brown fine loamy sand (10YR 4/2), with a high concentration of loose organic material and rootlets. The boundary between Stratum I and Stratum II is clear and smooth and follows the natural slope of the sand bluff.

Stratum II: (15/20-75 cmbs) Is a brown fine sand (7.5YR 5/4), slightly compact with little organic material present. The boundary between Stratum II and Stratum III is gradual and irregular.

Stratum III: (75-160 cmbs) Is a light brown grey sand (10YR 6/2). Compact vertical pockets of white calcium carbonate cementation and sub-horizontal fine bedding are visible within this stratum extending to the base of excavation.

No culture was observed in Trench 2.

Trench #:	3
Length:	5.5 m.
Width:	1.4 m.
Max Depth:	2.1 m.
Orientation:	140° TN
Location:	120 ft. from southeast corner of Lot A-5.
General Environment:	Trench 3 lies at the base of southwest facing sand bluff.

Profile Description: Stratum I: (0-15/20 cmbs) Is a dark grey brown fine loamy sand (10YR 4/2), with a high concentration of loose organic material and rootlets. The boundary between Stratum I and Stratum II is clear and smooth.

Stratum II: (15/20-80 cmbs) Is a brown fine sand (7.5 YR 5/4), slightly compact with little organic material present. The boundary between Stratum II and Stratum III is gradual and irregular.

Stratum III: (80-120 cmbs) Is a light brown grey sand (10YR 6/2). Compact vertical pockets of white calcium carbonate cementation and sub-horizontal fine bedding are visible within this stratum extending to the base of excavation.

No culture was observed in Trench 3.

Trench #:	4
Length:	2.6 m.
Width:	1.3 m.
Max Depth:	0.6 m.
Orientation:	101° TN
Location:	300 ft. at 27° TN from southeast corner of YMCA building.
General Environment:	Trench 4 lies on a level cleared surface in the center of lot A-5.

Profile Description: Stratum I: (0-40 cmbs) Is a dark grey brown fine loamy sand (10YR 4/2), with a high concentration of loose organic material and rootlets. The boundary between Stratum I and Stratum II is clear and smooth.

Stratum II: (40-65 cmbs) Is a light brown grey sand (10YR 6/2). Very compact stratum consisting of white calcium carbonate cementation. Due to the compactness of Stratum II excavation was discontinued at 0.6 m..

No culture was observed in Trench 4.

Trench #:	5
Length:	5.0 m.
Width:	1.4 m.
Max Depth:	1.8 m.
Orientation:	140° TN
Location:	300 ft. at 50° TN from northeast corner of YMCA Lot.
General Environment:	Trench 5 lies on a eastward sloping sand bluff.

Profile Description: Stratum I: (0-15/20 cmbs) Is a dark grey brown fine loamy sand (10YR 4/2), with a high concentration of loose organic material and rootlets. The boundary between Stratum I and Stratum II is clear and smooth.

Stratum II: (15/20-130 cmbs) Is a brown fine sand (7.5 YR 5/4), slightly compact with little organic material present. The boundary between Stratum II and Stratum III is gradual and irregular.

Stratum III: (130-180 cmbs) Is a light brown grey sand (10YR 6/2). Compact vertical pockets of white calcium carbonate cementation and sub-horizontal fine bedding are visible within this stratum extending to the base of excavation.

No culture was observed in Trench 5.

Trench #: 6
Length: 4.0 m.
Width: 1.0 m.
Max Depth: 1.7 m.
Orientation: 100° TN
Location: 350 ft. at 85° TN from northeast corner of YMCA building.
General Environment: Trench 6 lies on the west facing side of sloping sand dune.

Profile Description: Stratum I: (0-40 cmbs) Is a dark grey brown fine loamy sand (10YR 4/2), with a high concentration of loose organic material and rootlets. The boundary between Stratum I and Stratum II is clear and smooth.

Stratum II: (40-80 cmbs) Is a brown fine sand (7.5 YR 5/4), slightly compact with little organic material present. The boundary between Stratum II and Stratum III is gradual and irregular.

Stratum III: (80-170 cmbs) Is a light brown grey sand (10YR 6/2). Compact vertical pockets of white calcium carbonate cementation and sub-horizontal fine bedding are visible within this stratum extending to the base of excavation.

No culture was observed in Trench 6.

Trench #: 7
Length: 5.3 m.
Width: 1.2 m.
Max Depth: 1.4 m.
Orientation: 170° TN
Location: 375 ft. east downslope from where pavement ends along Kaneoa Road.
General Environment: Trench 7 lies on the west facing side of a sand bluff.

Profile Description: Stratum I: (0-40 cmbs) Is a dark grey brown fine loamy sand (10YR 4/2), with a high concentration of loose organic material and rootlets. The boundary between Stratum I and Stratum II is clear and smooth.

Stratum II: (40-50 cmbs) Is a brown fine sand (7.5 YR 5/4), slightly compact with little organic material present. The boundary between Stratum II and Stratum III is gradual and irregular.

Stratum III: (50-140 cmbs) Is a light brown grey sand (10YR 6/2). Compact vertical pockets of white calcium carbonate cementation and sub-horizontal fine bedding are visible within this stratum extending to the base of excavation.

No culture was observed in Trench 7.

Trench #: 8
Length: 5.0 m.
Width: 1.2 m.
Max Depth: 1.3-2.0 m.
Orientation: 66° TN
Location: 300 ft. at 83° TN from Trench 7
General Environment: Trench 8 lies in a low point at the base of a eastern facing sand bluff.

Profile Description: Stratum I: (0-40 cmbs) Consists of a dark brown silt loam soil (10YR 3/3) with high concentration of organic material.

Stratum II: (40-55 cmbs) Consists of a dark yellowish brown silt loam (10YR 4/6 grading downwards to 10YR 3/6) with little organic material. The boundary between Stratum II and Stratum III is very diffuse and smooth.

Stratum III: (55-95 cmbs) Consists of a yellowish red fine loamy sand (5YR 4/6). The boundary between Stratum III and Stratum IV is clear and smooth.

Stratum IV: (95-190 cmbs) Is a very pale brown sand (10YR 7/3), with compact vertical pockets of white calcium carbonate cementation and sub-horizontal fine bedding are visible within this stratum extending to the base of excavation.

Stratum I and Stratum II are modern layers associated with grading activities and were deposited in the area via dumping or wind activity surrounding Trench 8. Stratum III's reddish color can be also attributed to modern fill activities, as indicated by the stratigraphy of Trench 9.

Trench #: 9
Length: 5.3 m.
Width: 1.2 m.
Max Depth: 1.2 m.
Orientation: 162° TN
Location: 200 ft. at 300° TN from Trench 8.
General Environment: Trench 9 lies in a low point on semi-level ground at the base of westward facing sand bluff.

Profile Description: One stratum was present in Trench 9 extending from just under the surface (3 cmbs) to the base of excavation (120 cmbs). This compact red sandy clay loam stratum appears to be fill material deposited manually in the past, and not consistent with the soil and stratigraphic layers in other test units.

No culture was observed in Trench 9.

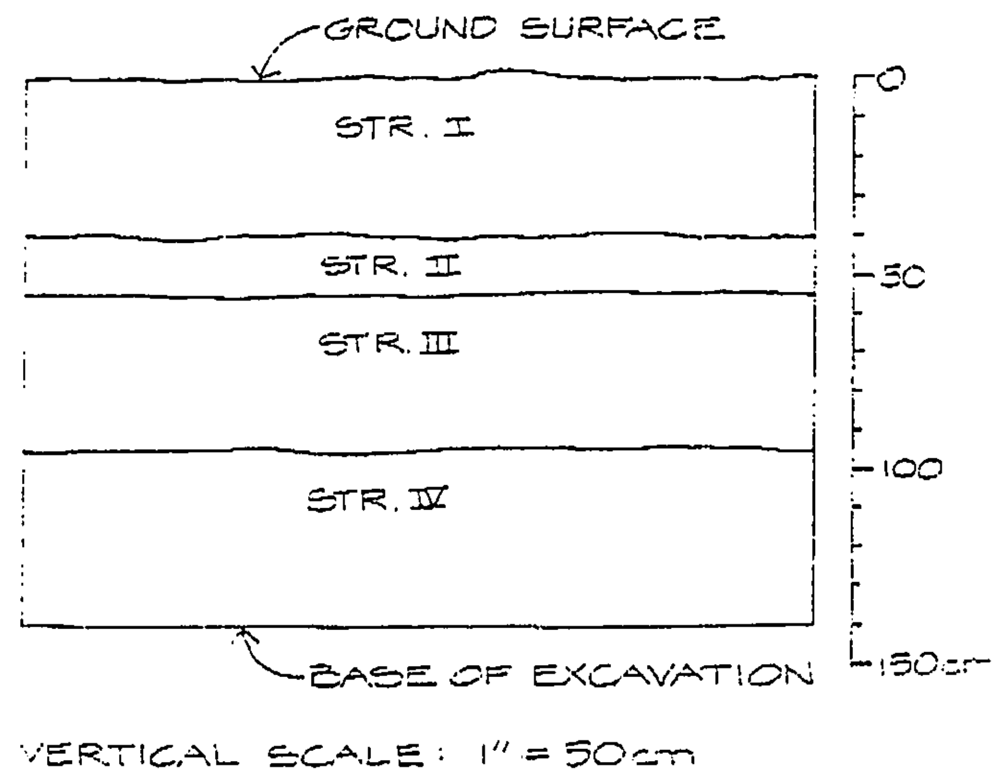

Figure 8 Profile of Trench 8

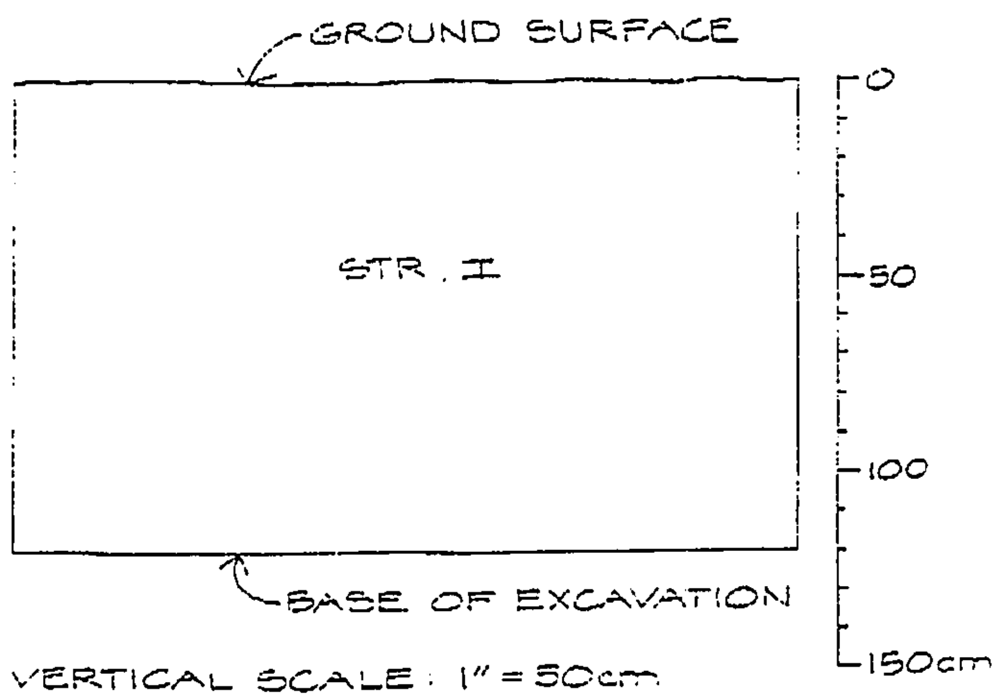

Figure 9 Profile of Trench 9

Trench #: 10
Length: 3.0 m.
Width: 1.2 m.
Max Depth: 1.2 m.
Orientation: 130° TN
Location: 330 ft. east of Youth Center and 150 ft. east of Trench 9.
General Environment: Trench 10 lies between two sand dunes on a level graded area.

Profile Description: Stratum I: (0-15 cmbs) Is a dark grey brown fine loamy sand (10YR 4/2), with a high concentration of loose organic material and rootlets. The boundary between Stratum I and Stratum II is clear and smooth.

Stratum II: (15-20 cmbs) Is a brown fine sand (7.5 YR 5/4), slightly compact with little organic material present. The boundary between Stratum II and Stratum III is gradual and irregular. Stratum III: (20-75 cmbs) Is a light brown grey sand (10YR 6/2). Compact vertical pockets of white calcium carbonate cementation and sub-horizontal fine bedding are visible. The boundary between Stratum III and Stratum IV is clear and wavy.

Stratum IV: (75-120 cmbs) Consists of lithified sand extending to the base of excavation.

No culture was observed in Trench 10.

Trench #: 11
Length: 3.0 m.
Width: 1.3 m.
Max Depth: 1.0 m.
Orientation: 201° TN
Location: 250 ft. at 174° TN from Trench 10
General Environment: Trench 11 lies on the westward face of sand bluff.

Profile Description: Stratum I: (0-40 cmbs) Is a dark grey brown fine loamy sand (10YR 4/2), with a high concentration of loose organic material and rootlets. The boundary between Stratum I and Stratum II is clear and smooth.

Stratum III: (20-75 cmbs) Is a light brown grey sand (10YR 6/2). Compact vertical pockets of white calcium carbonate cementation and sub-horizontal fine bedding are visible. The boundary between Stratum III and Stratum IV is clear and wavy.

Stratum I and Stratum III are similar to those found in Trench 1 which are typical stratigraphic layers found in this dune area. No Stratum II was observed in Trench 11.

No culture was observed in Trench 11.

Trench #:	12
Length:	3.3 m.
Width:	1.2 m.
Max Depth:	1.2 m.
Orientation:	285° TN
Location:	300 ft. at 228° TN from Trench 11.
General Environment:	Trench 12 lies on the west slope of sand dune bluff.

Profile Description: Stratum I: (0-35/40 cmbs) Is a dark grey brown fine loamy sand (10YR 4/2), with a high concentration of loose organic material and rootlets. The boundary between Stratum I and Stratum II is clear and smooth.

Stratum II: (35/40-120 cmbs) Is a brown fine sand (7.5 YR 5/4), slightly compact with little organic material present. This stratum extends to the base of excavation.

No culture observed in Trench 12.

Trench #:	13
Length:	3.5 m.
Width:	1.5 m.
Max Depth:	1.6 m.
Orientation:	306° TN
Location:	200 ft. at 25° TN from Trench 12
General Environment:	Trench 13 lies on downward western slope of sand bluff.

Profile Description: Stratum I: (0-45 cmbs) Is a dark grey brown fine loamy sand (10YR 4/2), with a high concentration of loose organic material and rootlets. The boundary between Stratum I and Stratum II is clear and smooth.

Stratum II: (45-160 cmbs) Is a brown fine sand (7.5 YR 5/4),slightly compact with little organic material present. This stratum extends to the base of excavation.

No culture observed in Trench 13.

Trench #:	14
Length:	4.3 m.
Width:	1.2 m.
Max Depth:	1.2 m.
Orientation:	north/south direction
Location:	150 ft. at 115° TN from Trench 13
General Environment:	Trench 14 lies on the west side of a linear dune extending in a

north/south direction.

Profile Description: Stratum I: (0-30 cmbs) Is a dark brown loose silty loam (10 YR 3/3), with a high concentration of organic material and rootlets. The boundary between Stratum I and Stratum II is clear and smooth and follows the natural slope of the sand dune.

Stratum II: (30-60 cmbs) Is a brown fine sand (7.5 YR 5/4), slightly compact with little organic material present. The boundary between Stratum II and Stratum III is gradual and irregular.

Stratum III: (60-120 cmbs) Is a light brown grey sand (10YR 6/2). Compact vertical pockets of white calcium carbonate cementation and sub-horizontal fine bedding are visible within this stratum extending to the base of excavation.

No culture was observed in Trench 14.

Trench #:	15
Length:	4.0 m.
Width:	1.3 m.
Max Depth:	1.4 m.
Orientation:	234° TN
Location:	220 ft. at 25° TN from Trench 14
General Environment:	Trench 15 lies on the crest of a sand dune.

Profile Description: Stratum I: (0-45 cmbs) Is a dark grey brown fine loamy sand (10YR 4/2), containing a high concentration of organic material and rootlets. A soil sample was taken from this stratum and labeled Soil Sample 1. The boundary between Stratum I and Stratum III (No Stratum II present) is smooth and gradual.

Stratum III: (45-140 cmbs) Is a light brown grey sand (10YR 6/2), with compact vertical pockets of white calcium carbonate cementation and sub-horizontal fine bedding visible within this stratum near to the base of excavation. At 70 cmbs a lens of dark stained sand was evident extending downward approximately 10 cm. in Stratum II. A soil sample was taken of this lens and labeled Soil Sample 2. The area of soil that exists directly beneath this lens had been stained due to leaching and this staining is present for an additional 10-12 cm. in Stratum II.

No culture was observed in Trench 15.

Trench #:	16
Length:	4.2 m.
Width:	1.3 m.
Max Depth:	1.3 m.
Orientation:	236° TN
Location:	100 ft. at 25° from Trench 15.

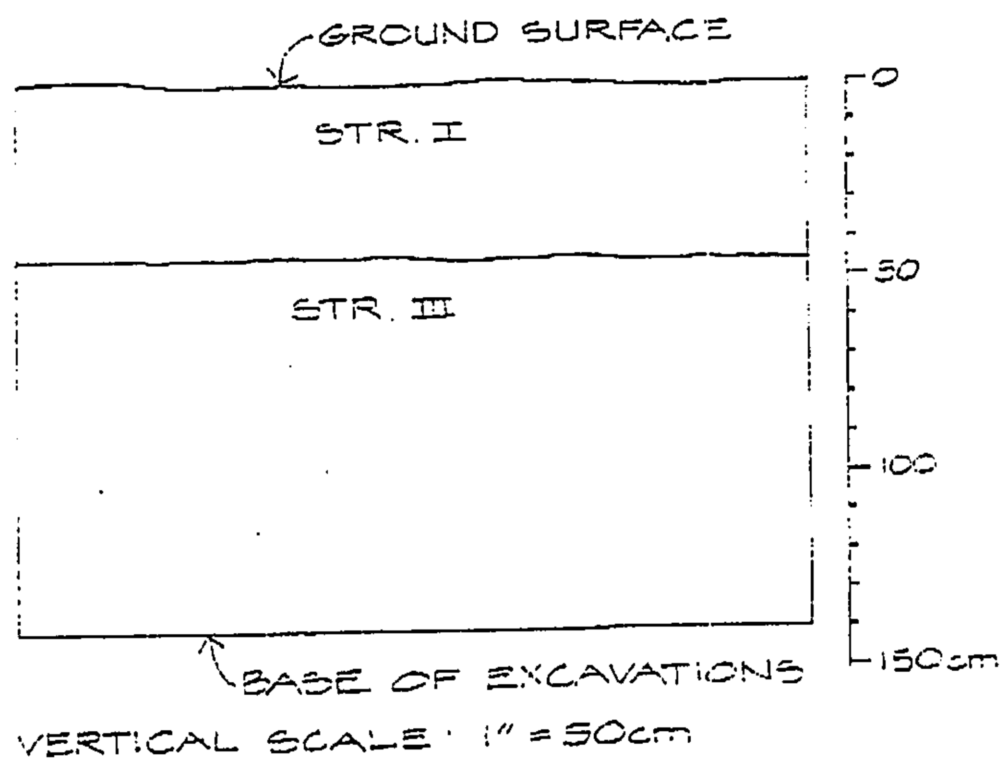

Figure 10 Profile of Trench 15

General Environment: Trench 16 lies on the west face of dune near base of bowl shaped depression.

Profile Description: Stratum I: (0-30 cmbs) Is a dark brown loose silty loam (10 YR 3/3), with a high concentration of organic material and rootlets. The boundary between Stratum I and Stratum II is clear and smooth and follows the natural slope of the sand dune.

Stratum II: (40-90 cmbs) Is a light brown grey sand (10YR 6/2). Compact vertical pockets of white calcium carbonate cementation and sub-horizontal fine bedding are visible within this stratum. The boundary between Stratum II and Stratum III is clear and smooth.

Stratum III: (90-130) Is a compact calcified dune stratum which extends to the base of excavation.

No culture was observed in Trench 16.

Trench #:	17
Length:	4.0 m.
Width:	1.3 m.
Max Depth:	1.3 m.
Orientation:	104° TN
Location:	200 ft. at 115° TN from Trench 16
General Environment:	Trench 17 lies on a dune crest which over looks the ocean to the southeast.

Profile Description: Stratum I: (0-40 cmbs) Is a dark grey brown fine loamy sand (10YR 4/2), with a high concentration of loose organic material and rootlets. The boundary between Stratum I and Stratum II is clear and smooth and follows the natural slope of the sand bluff.

Stratum II: (40-55 cmbs) Is a brown fine sand (7.5YR 5/4), slightly compact with little organic material present. The boundary between Stratum II and Stratum III is gradual and irregular.

Stratum III: (55-130 cmbs) The top 30 cm. (5YR 5/4) of Stratum III consists of a loose reddish sand layer with some organic material and rootlets. The remaining portion of Stratum III is consistent with the majority of the other trenches observed consisting of a light brown grey sand (10YR 6/2), with compact vertical pockets of white calcium carbonate cementation and sub-horizontal fine bedding that are visible extending to the base of excavation.

The reddish layer observed in Stratum III is probably the result of wind blown deposits from nearby grading activities.

No culture was observed in Trench 17.

Trench #: 18
Length: 4.4 m.
Width: 1.3 m.
Max Depth: 1.6 m.
Orientation: 234° TN
Location: 260° TN to northwest corner of tall Cultural Center building
General Environment: Trench 18 lies in the west side of archery range upon the east slope of dune crest.

Profile Description: Stratum I: (0-30 cmbs) Is a dark grey brown fine loamy sand (10YR 4/2), with a high concentration of loose organic material and rootlets. The boundary between Stratum I and Stratum II is clear and smooth and follows the natural slope of the sand bluff.

Stratum II: (30-80 cmbs) Is a brown fine sand (7.5YR 5/4), slightly compact with little organic material present. The boundary between Stratum II and Stratum III is gradual and irregular.

Stratum III: (80-160 cmbs) Is a light brown grey sand (10YR 6/2). Compact vertical pockets of white calcium carbonate cementation and sub-horizontal fine bedding are visible within this stratum extending to the base of excavation.

Trench #: 19
Length: 2.0 m.
Width: 1.3 m.
Max Depth: 1.0 m.
Orientation: 113° TN
Location: 165° TN to southeast corner of YMCA, location estimated on Topographical Map.
General Environment: Trench 19 lies on the east slope of dune crest.

Profile Description: Stratum I: (0-25 cmbs) Is a dark grey brown fine loamy sand (10YR 4/2), with a high concentration of loose organic material and rootlets. The boundary between Stratum I and Stratum II is clear and smooth.

Stratum II: (25-50 cmbs) Consists of the same type and color of soil present in Stratum I without the high concentration of organic material. The boundary between Stratum II and Stratum III is clear and smooth.

Stratum III: (50-100 cmbs) Consists of a white lithified cemented sand layer.

No culture was observed in Trench 19.

Trench #:	20
Length:	3.5 m.
Width:	1.4 m.
Max Depth:	1.3 m.
Orientation:	-
Location:	Located on Topographical Map
General Environment:	Trench 20 lies on the northern slope of a dune crest.

Profile Description: Stratum I: (0-35 cmbs) Is a dark grey brown fine loamy sand (10YR 4/2), with a high concentration of loose organic material and rootlets. The boundary between Stratum I and Stratum II is clear and smooth and follows the natural slope of the sand bluff.

Stratum II: (35-80 cmbs) Is a brown fine sand (7.5YR 5/4), slightly compact with little organic material present. The boundary between Stratum II and Stratum III is clear and smooth with a buried A-horizon extending from 80-85 cmbs.

Stratum III: (85-130 cmbs) Is a light brown grey sand (10YR 6/2). Compact vertical pockets of white calcium carbonate cementation and sub-horizontal fine bedding are visible within this stratum extending to the base of excavation.

No culture was observed in Trench 20.

Trench #:	21
Length:	2.0 m.
Width:	1.2 m.
Max Depth:	0.4 m.
Orientation:	90° TN
Location:	40 ft. *mauka* of Archery Road at 130° TN
General Environment:	Trench 20 lies on the northern slope of a dune crest.

Profile Description: Only a single stratum was observed in Trench 21. This stratum consisted of lithified light brown grey sand (10YR 6/2), with compact vertical pockets of white calcium carbonate cementation and sub-horizontal fine bedding are visible within this stratum extending to the base of excavation.

No culture was observed in Trench 21.

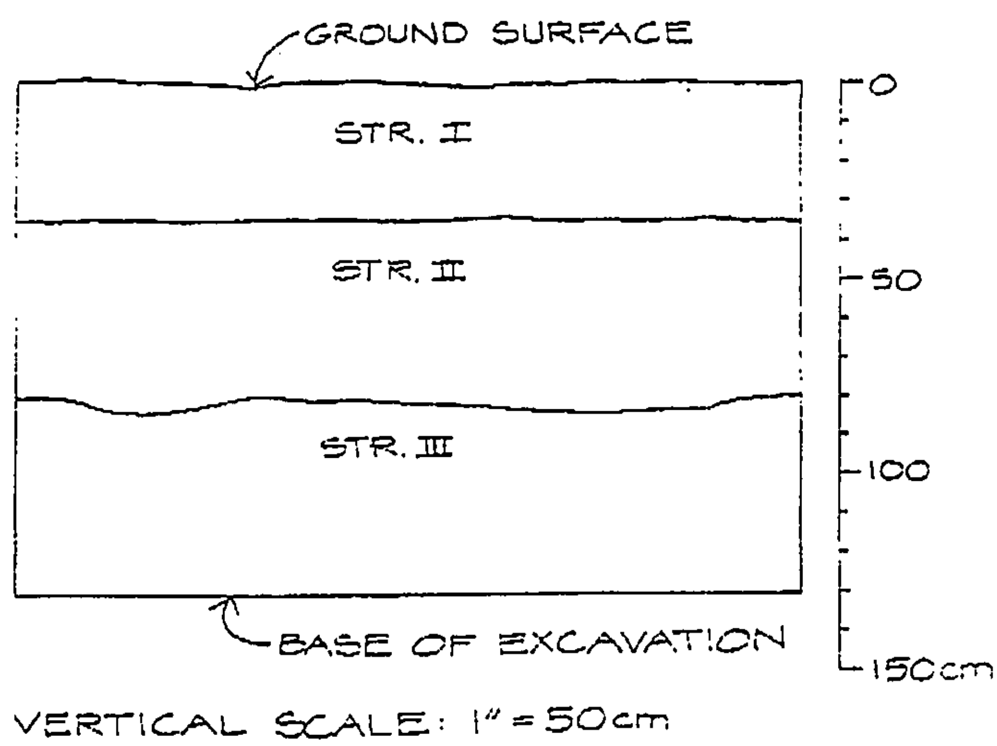

Figure 11 Profile of Trench 20

VI. SUMMARY AND RECOMMENDATIONS

Summary

This archaeological reconnaissance included ground survey for one day with two individuals, following by backhoe trenching of 21 trenches to cover as many areas of ungraded sand dune as possible. The surface reconnaissance, estimated to have covered 30-40% of the ungraded portion of the property (including the more accessible and less vegetated areas) showed no evidence of a buried cultural layer, dark organic deposits, artifacts or midden materials and no structural remains or features. These subsurface testing also resulted in no finds of buried cultural layers, features, artifacts or midden materials. In two trenches buried A-horizons were encountered but these A-horizons did not contain cultural materials.

In general, the previous archaeological studies in the immediate vicinity have resulted in no findings. However, most of these studies have been in areas of prior heavy ground disturbance. A single isolated locality containing scattered human remains has recently been reported to SHPD in the *mauka* portion of the Maui Community Arts and Cultural Center.

Recommendations

In spite of the negative findings of the present reconnaissance survey, of the subsurface testing and in previous archaeological studies, there is still likelihood of cultural materials, especially burials, occurring within the ungraded and partially graded portions of the project area. Neither the reconnaissance or the subsurface testing represent a sufficient sample of coverage to eliminate the possibility that archaeological resources occur here. Because of the shifting nature of sand dunes it may be possible to find areas of partially buried cultural materials by locating surface scatters which are not always visible.

To address these concerns it is recommended that archaeological monitoring be conducted during construction within the project area. This monitoring should be accomplished according to a monitoring plan reviewed and approved by SHPD and Maui County before construction commences. An important component of this plan should be conducting oral interviews within the community before construction, specifically directed towards uncovering any information relating to human burials, their locations and lineal descendants. The plan should also specify that, if findings are uncovered, work should immediately be halted in that area until appropriate mitigation is decided upon.

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PHOTO APPENDIX

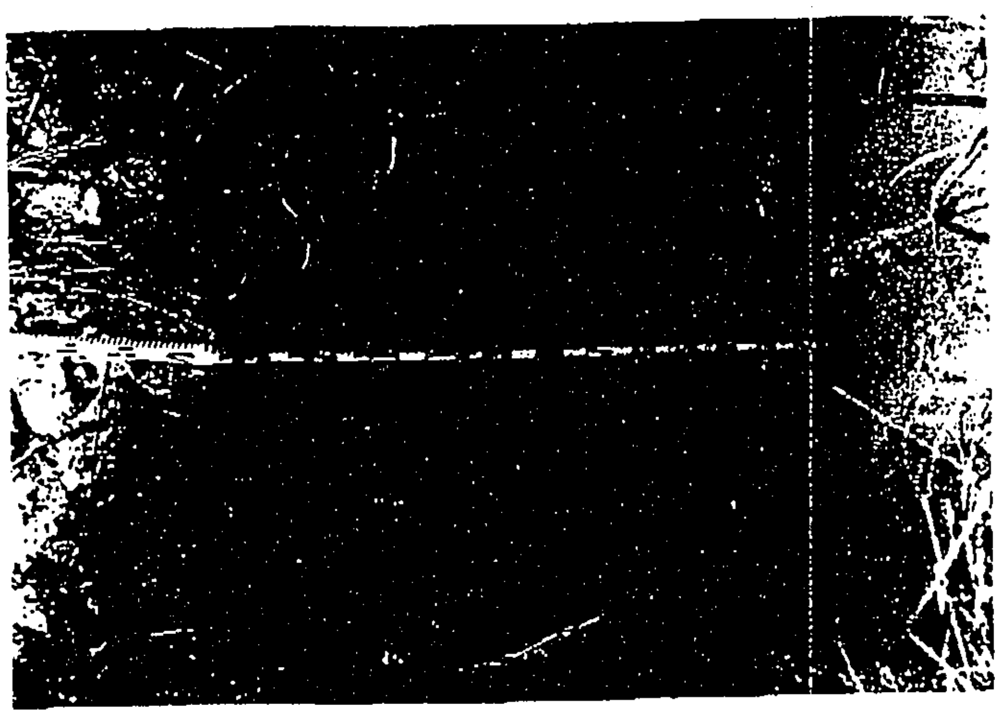
General Project Area, View Makai

General Project Area, View Mauka

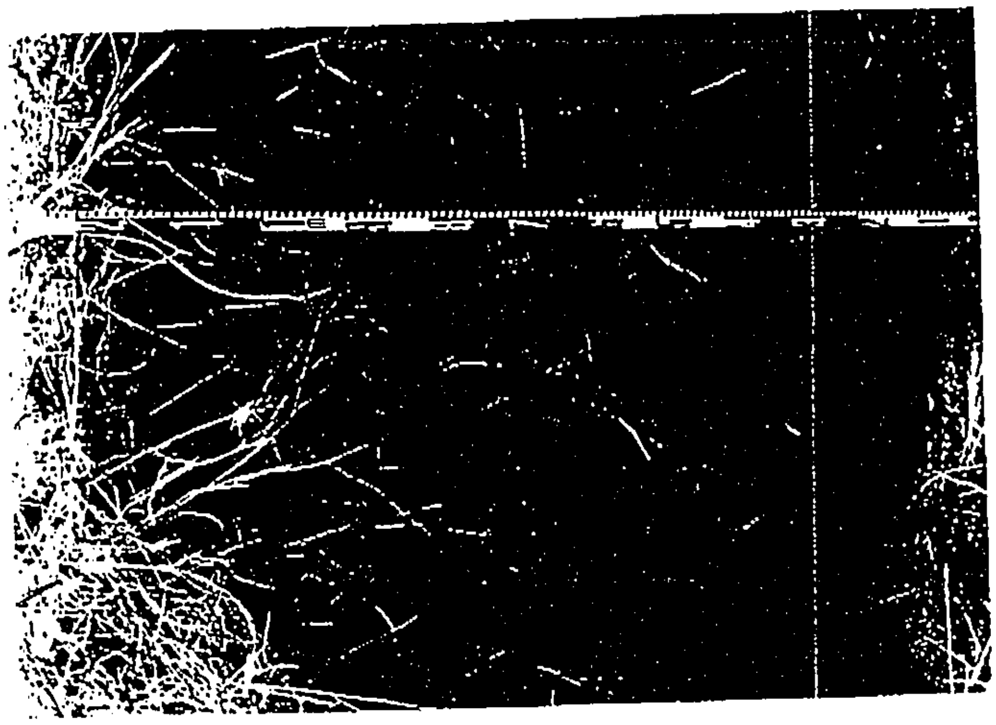
Lithified Sand Dune

North/South Roadcut Showing Lithified Sand Dune

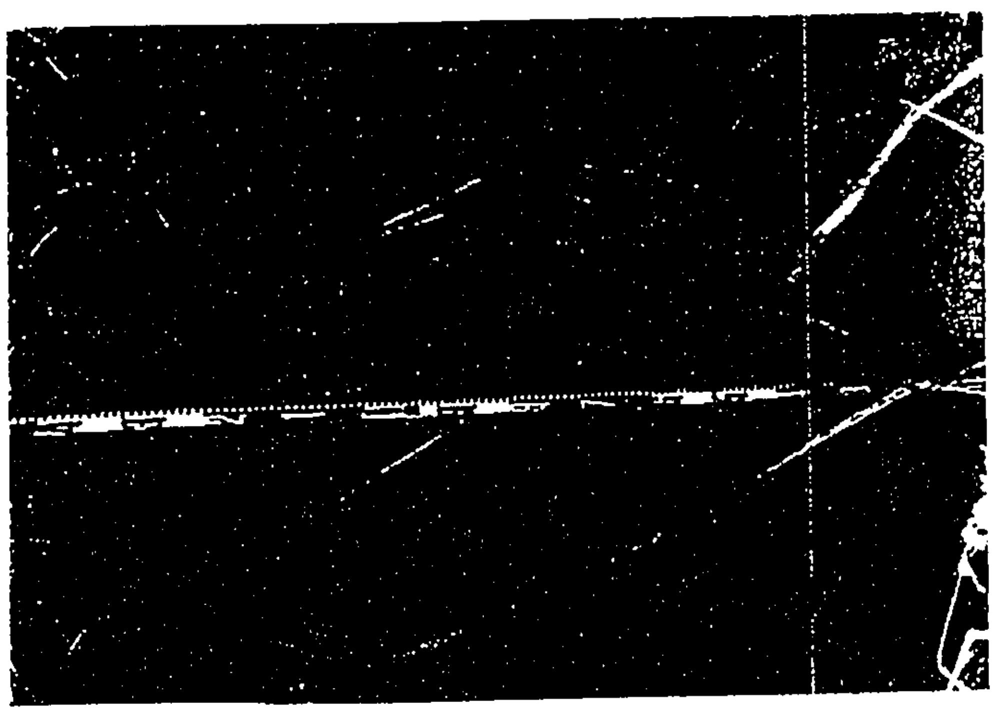
Excavation in Progress



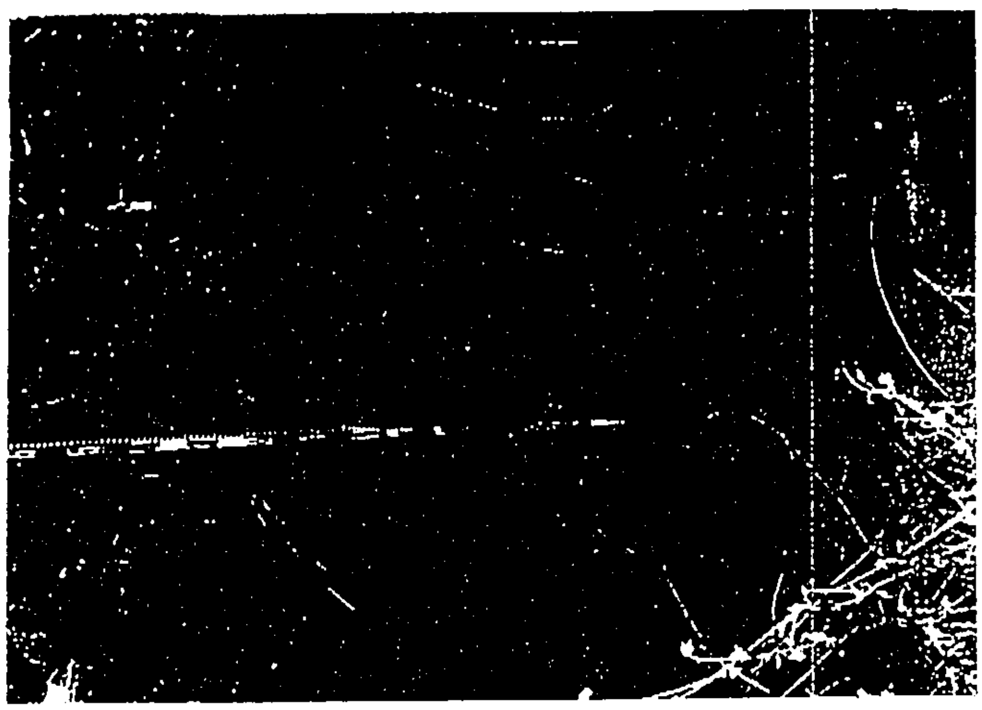
Trench 7 Profile, View Southwest



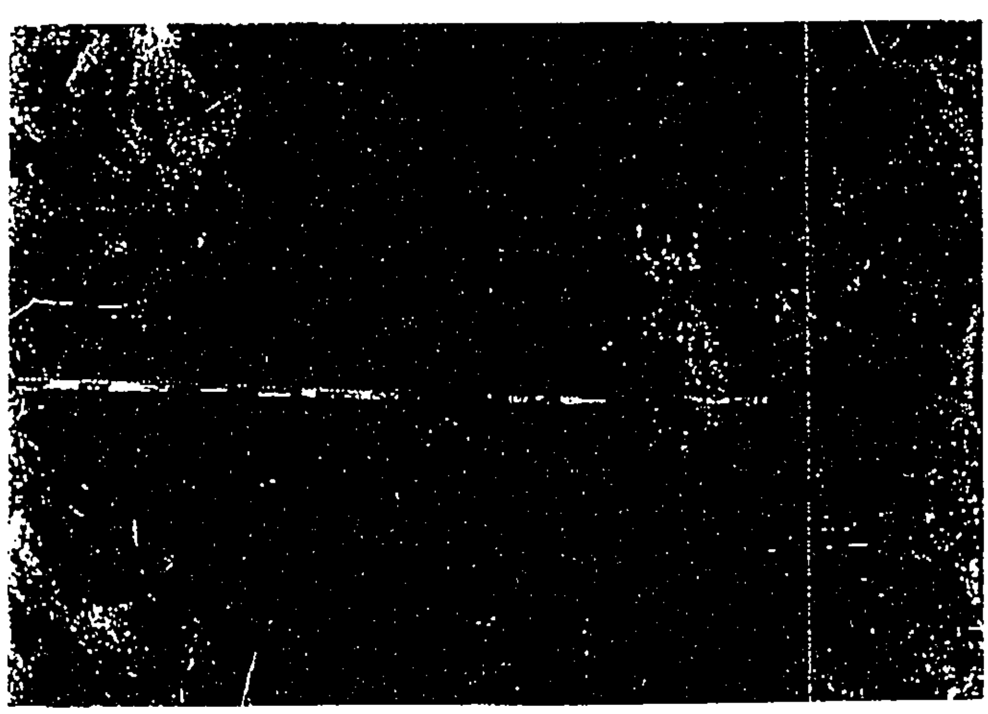
Trench 9 Profile, View North



Trench 15 Profile Showing Buried A Horizon. View Southeast



Trench 17 Profile, View North



Trench 17 Profile Showing Calcified Stratum III, View South

ARCHAEOLOGICAL INVENTORY SURVEY OF THE 110-ACRE MAUI CENTRAL PARK, WAILUKU, MAUI (TMK: 3-8-07:1 AND 3-7-01:2)

DRAFT

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ABSTRACT

Archaeological inventory survey was conducted within Maui Central Park, a 110-acre property (TMK 3-8-07:1 and 3-7-01:2) in the *makai* portion of Wailuku planned for further development of recreational facilities. This project was a continuation of a recent reconnaissance study. Thirty-one backhoe trenches were excavated and a complete surface survey of the project area was accomplished. Testing concentrated in specific facility areas proposed for grading, including: a connector road, a retention basin, and various playing fields. Findings of the surface survey and subsurface testing were negative.

Two historic sites - the Kahului Railroad berm (50-50-04-3112) and a World War II military installation (50-50-04-4232) - were previously identified in the project area. The only structural remnants of the two previously recorded sites are concrete pads, the largest of which was the foundation for numerous quonset huts.

An area containing scattered human remains has been recently identified in the central eastern portion of the project area bordering the *mauka* area of the Maui Community Arts and Cultural Center. No additional human remains were encountered in this area during the present survey.

Because of the likelihood of encountering cultural materials, especially human burials, within the project area, construction monitoring is recommended. This monitoring should be done according to a plan reviewed and approved by State Historic Preservation Division (SHPD) and Maui County before construction. The plan should also specify that if findings are uncovered, work should immediately stop in that area for appropriate assessment. If major findings are uncovered, data recovery or other mitigation may be required.

ACKNOWLEDGEMENTS

We would like to thank Milton Arakawa of Munekiyo and Arakawa, Inc. for providing maps and other information about the project area. Access was arranged through the Maui County Department of Public Works. Walter Fredericksen kindly provided information of a recent find of human remains within the project area. Backhoe services were provided by Clarence Montalvo of CCM Clearing. Barry Toyota and Peter Pascua of Wilson Okamoto & Associates, Inc. provided project area maps and grading plans which were essential for use during the fieldwork.

We also thank Charles Keau for sharing his knowledge of this part of Maui, as well as the specific project. His memories span more than six decades.

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I. INTRODUCTION

From October 7 to 11, 1996 personnel of Cultural Surveys Hawai'i conducted an archaeological inventory survey of the 110-acre Maui Central Park site (TMK 3-8-07:1 and 3-7-01:2)(Figures 1-3). A previous reconnaissance survey of this parcel which included subsurface test excavations by backhoe was conducted in early August 1996 by Cultural Surveys Hawaii. The present survey has expanded on the previous reconnaissance project in response to a September 19, 1996 review letter to the Maui County Planning Department from Theresa Donham of the *State Historic Preservation Division* (SHPD)/Department of Land and Natural Resources.

The present project was conducted for Munekiyo & Arakawa, Inc. and Wilson Okamoto & Associates, Inc.

Project Area Description

The 110-acre project area lies approximately 1 kilometer westward of Kahului Harbor and the campus of the University of Hawaii, Maui Community College. It is located with Kanaloa Avenue forming its western boundary. The Maui Zoological and Botanical Garden forms the southern boundary. The Maui YMCA complex forms the northern boundary while the Maui Arts and Cultural Center bounds the project area to the east. It consists of an area that was geologically derived from the old Kula series of lava flows and is isolated in the interface of the dominant *entisols,* volcanic ash/beach derived soils and *oxisols*, exceptionally stable lowland soils (University of Hawaii, 1983. pp. 39-41).

Soil associations are described by Donald Foote in his 1972 publication of *Soil Surveys of the Islands of Kauai, Oahu, Maui, Molokai, and Lanai, State of Hawaii.* He describes the area as Pulehu-Ewa-Jaucas, being deep, moderately sloping to nearly level, well drained and even excessively drained soils that have a moderately fine to course textured subsoil or underlying material.

The dune area in which the project area lies is classified as part of the extensive Pu'uone Sand Dune Formation. Upper layers are grayish brown, calcareous sand, underlain by grayish-brown cemented sand.

A substantial portion of the project area has been utilized by a local, Maui archery group and subsequent modifications are seen throughout the project area. These modifications consist of jeep roads, trails, target ranges and meeting areas. All of these modifications appear to be in use at the present time.

Vegetation within the project area consists of various grasses, *koa haole*, and *kiawe.*

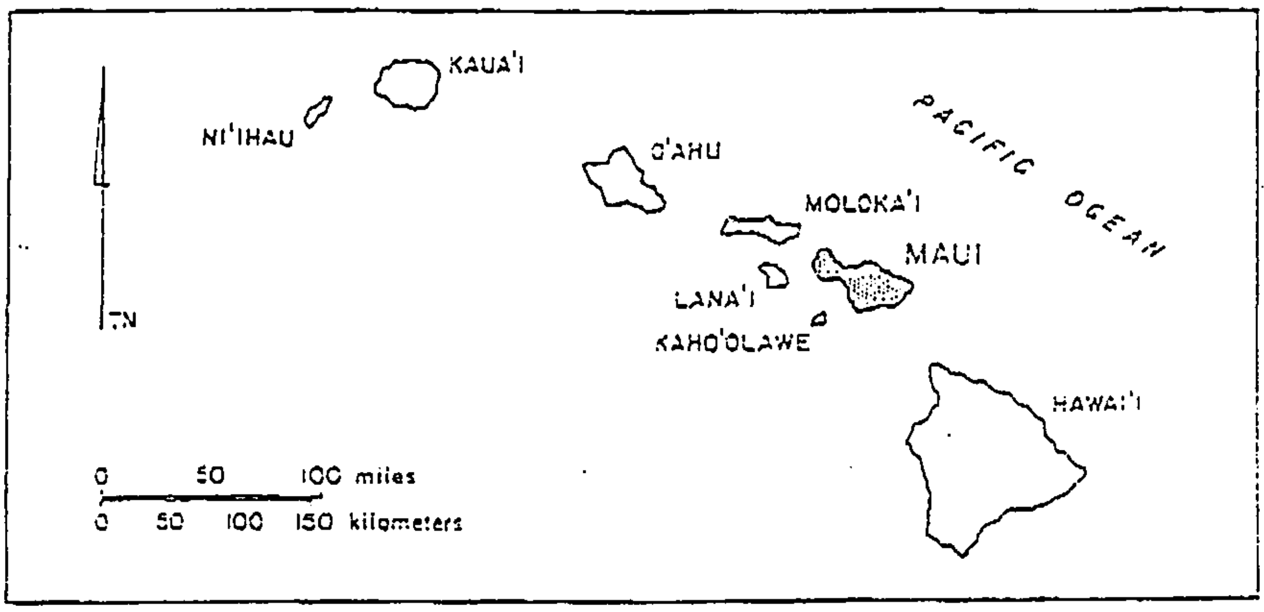

Figure 1 State of Hawai'i

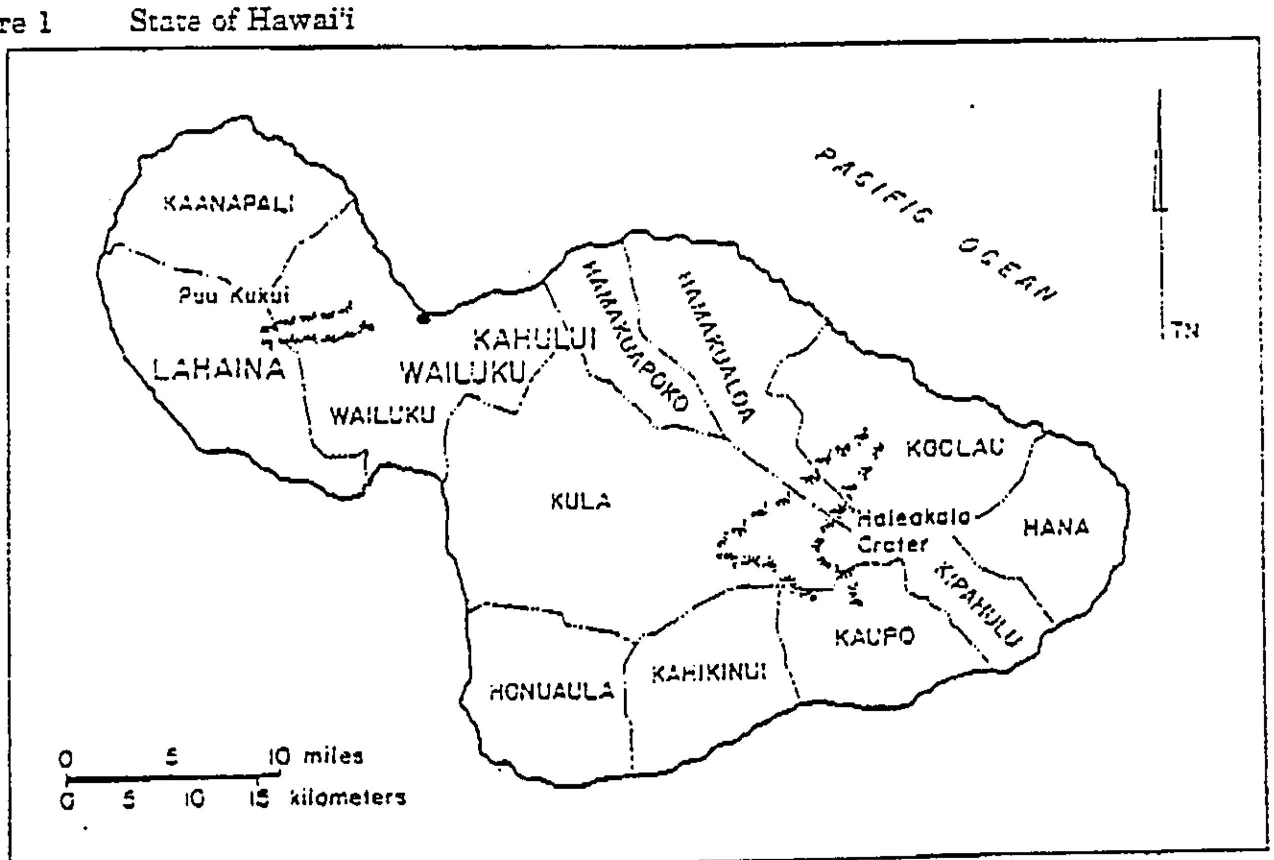

Figure 2 General Location Map, Maui Island

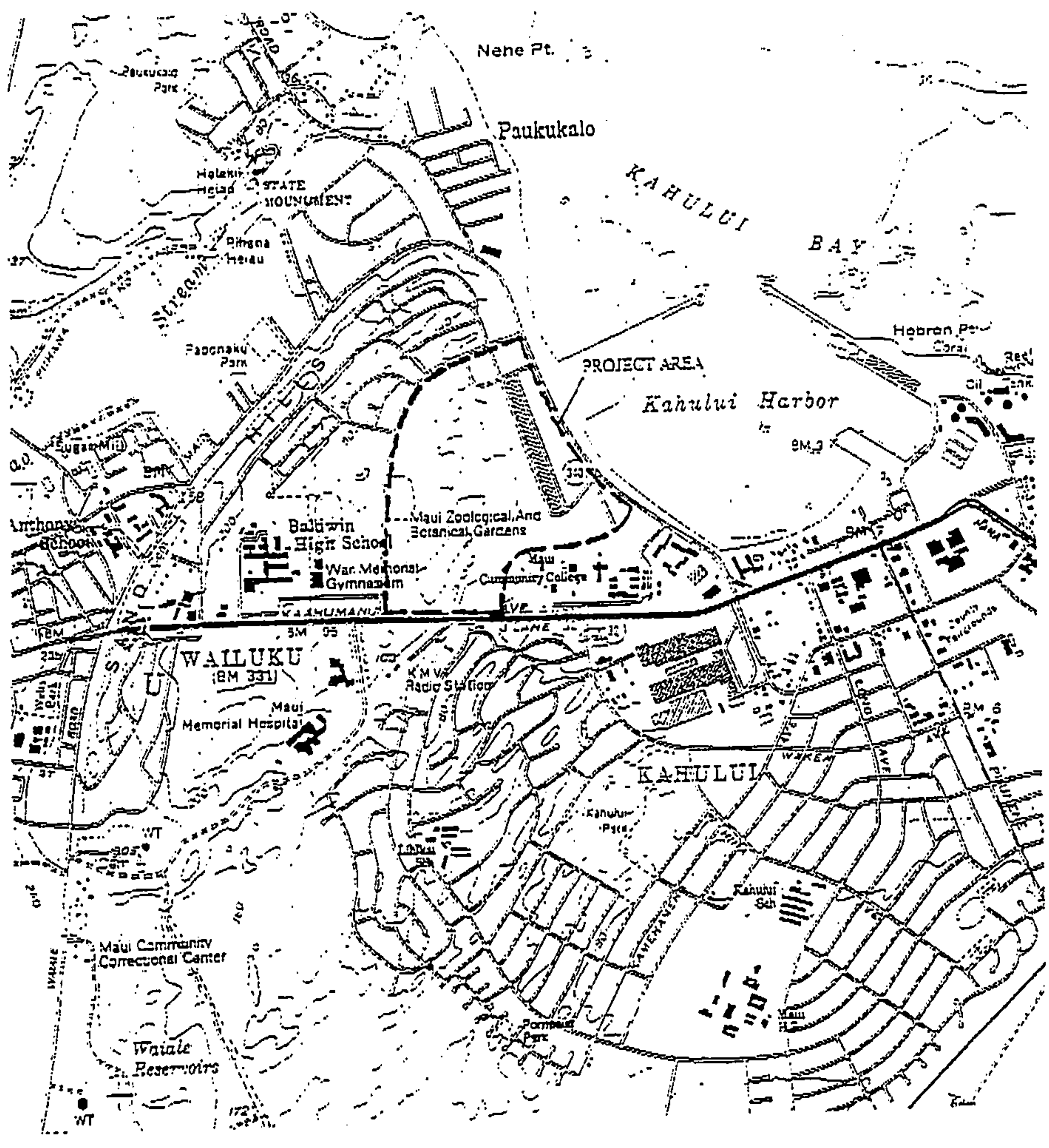

Figure 3 Portion of USGS Showing Location of Project Area

A. Scope of Work

The scope of the work for the inventory survey is as follows:

1. A complete ground survey of the entire project area for the purpose of site inventory. All sites would be located, described, and mapped with evaluation of function, interrelationships, and significance. Documentation will include photographs and scale drawings of selected sites and complexes. All sites will be assigned State site numbers.

2. Limited subsurface testing to determine location, boundaries, depth and quantity of cultural materials within archaeological sites and to obtain datable samples for chronological information if none is available for sites in the immediate area from previous studies.

3. Research on historic and archaeological background, including search of historic maps, written records, Land Commission Awards, and Native Testimony. This research will focus on the specific area with general background on the *ahupua'a* and district and will emphasize settlement patterns.

4. Preparation of a survey report which will include the following:

    a. A topographic map of the survey area showing all archaeological sites and site areas.

    b. Description of all archaeological sites with selected photographs, scale drawings, and discussions of function.

    c. Historical and archaeological background sections summarizing prehistoric and historic land use as they relate to the archaeological features.

    d. A summary of site categories, their significance in an archaeological and historic context.

    e. Recommendations based on all information generated which will specify what steps should be taken to mitigate impact of development on archaeological resources - such as data recovery (excavation) and preservation of specific areas. These recommendations will be developed in consultation with the landowner and the State and County agencies.

This scope also includes full coordination with Ms. Theresa Donham and the State Historic Preservation Division, and Maui County relating to archaeological matters. This coordination takes place after consent of the owner or representatives.

In addition to this general scope, the SHPD letter requests for work in specific areas of the proposed park as follows:

1) Retention basin area - Additional subsurface testing, investigation of known site 3120 (a site containing a habitation and burials);

2) Little League fields in the northeast portion - Investigate known features of site 423 (WW II-era features); additional subsurface testing not necessary;

3) Connector road, further subsurface testing;

4) Little League fields in center portion - Further subsurface testing;

5) Five jogging paths and lookouts - Further subsurface testing;

7) Multi-purpose field in the southwest portion - Further subsurface testing.

In addition to the specific areas the SHPD letter requests systematic ground survey of the entire project area and oral history study with *kama'āina* as part of the historic research. This *kama'aina* consultation is, in part, related to identifying potential burial areas and lineal descendants, if burials are present. SHPD is also requesting that the burials program at SHPD be contacted to help identify sources of information on possible known burials.

B. Work Accomplished and Methods

The archaeological inventory survey of the Maui Central Park project area was conducted over a period of two days by three archaeologists. Each of the development areas was surveyed in turn. Archaeologists walked transects across the project area spaced 15 meters (40-50 feet) apart. Ground visibility was good over approximately 75% of the area because of dry climatic conditions and a extensive trail and road network which existed throughout most portions of the project area. The remaining 25% was covered by dense *kiawe* thicket, however, ground visibility even in the thick *kiawe* was obscured only by matted dry grass.

The location of a previously identified human burial (which has since been disinterred) to the southwest of the Maui Arts & Cultural Center was subject to particularly careful surface survey. Brief shovel testing in the staked area believed to be the location of the former burial produced no additional findings. The surface survey of the area did not reveal any additional findings of human remains or other cultural material.

Subsurface testing was conducted over a period of three days by four archaeologists with a backhoe and operator. A total of thirty-one trenches was excavated. Trench locations were laid out in the field and plotted on project area maps (1in.=40ft. scale) by compass and tape before backhoe excavation. These maps, provided by Wilson Okamoto & Associates, included the existing topography with the proposed grading plans superimposed. Each of the development areas was considered as a discrete unit for both surface survey and subsurface testing. In this way, the work could be concentrated in areas expected to receive the most impact from grubbing and grading. The discrete development areas tested include:

1) the proposed multi-purpose field 6 at the southwestern end of the project area (five backhoe trenches);

2) the proposed Little League field 7 in the central portion of the project area (five trenches);

3) the proposed connector road planned to traverse the project area from northwest to southeast (thirteen backhoe trenches);

4) the proposed retention basins in the eastern portion of the project area (eight backhoe trenches).

The proposed Little League, softball and soccer fields in the northeast portion of the project area were not tested because of the previous extensive land disturbance dating back to World War II construction and subsequent recent grading and dumping of fill material.

The stratigraphy in each of the 30 trenches was documented by means of profile and soil descriptions. The stratigraphic profiles throughout the project area were generally uniform and predictable, with similar strata and sequences with only minor variations.

Since the subsurface testing strategy emphasized sampling of all major areas to be graded, the backhoe operator expended considerable effort to clear vegetation in thick *kiawe* groves to properly locate the trenches within the areas to be graded.

II. NATURAL SETTING

A. Project Area Location

The project area is in the *'ili* of Owa, Wailuku *ahupua'a* in the Wailuku District on the island of Maui. The geographical co-ordinates are 20°54'N and 156°29W. This property belongs to the County of Maui. It lies just inland from Kahului Harbor (Kahului means "the winning" [Pukui *et al.* 1981:67]). It is bordered by Ka'ahumanu Avenue on the south, Kanaloa Avenue on the west, and northwest, and Kahului Beach Road along the northwest edge. Maui Community College is along its eastern border. Baldwin High School lies on the other side of Kanaloa Avenue to the west. Kaihee Place and Wakea N. Avenue are in the northeast corner of the property.

Wailuku *ahupua'a*

Wailuku *ahupua'a* is a large political and economic land unit of Wailuku District. It includes the coastal area of Kahului Bay from Kapukaulua to Paūkukalo, all of Ia'o Valley, and the northern half of the Isthmus of Maui (sometimes called the Central Plain) between Haleakala and the West Maui Mountains.

Wailuku District

Wailuku District includes the entire eastern apron of the West Maui Mountains and all of the flat land on the isthmus between West and East Maui, including the coastal portions of Kahului Bay and Ma'alaea Bay.

B. Natural Setting

Rainfall in the project area is around 20 inches a year and most of it falls in the winter months (Armstrong 1973:56). Temperatures range from 60° to 80° (*Ibid*:58). Elevation of the Kahului Beach Road, which is built up, is 12 feet but most of the project area is at 6 to 9 feet. During the twentieth century, tsunamis have hit this area in 1923, 1946, 1952 and 1957.

"Lithified calcareous sand dunes rest on the alluvial fans near the shore between Kahului and Waihe'e and extend inland almost across the western edge of the isthmus"... The sand dunes "were formed by wind blowing sand inland from wide beaches exposed during a stand of the sea lower than the present sea level -- probably the minus-40-foot stand. Less consolidated to totally unconsolidated dunes are of later date, and are still forming" (Macdonald and Abbott 1974:326).

The soils in the project area are classified as in the Pu'uone Series which "consists of somewhat excessively drained soils on low uplands on the island of Maui. These soils developed in material derived from coral and seashells. They are moderately sloping to moderately steep" (Foote *et al.* 1972:117). Pu'uone sand, 7 to 30% slopes (PZUE) is on sandhills near the ocean. Included in mapping were small areas of Iao and Jaucas soils. Also included were small areas where the comented layer is less than 20 inches below the surface (*Ibid.*:117).

In a 1993 report on a property in Wailuku, Kennedy provides a description of geographical zones inclusive of and surrounding the present study area. The following description of "Zone 3" indicates the topography and vegetation present within the study area:

> Zone 3 is a moderate to steep sloped zone of large coastal dunes some of which have been disturbed by earth moving machinery. Some of the dunes have been cut and their slopes modified to aid in filling and leveling parts of Zone 2. A few subsurface trenches indicated evidence of earth-filling activities. An archery course weaves through the low lying areas of this dune system. Trails and narrow road tracks lead to target boards placed randomly atop wooden structures or tacked on large *kiawe* trees. Areas located on slopes and atop the dunes are less impacted. The elevation of this zone ranges from 6.1m to 18.9m AMSL.
>
> Vegetation in Zone 3 ranges from thick to dense, with *kiawe (Prosopis pallida)*, mixed with a low lying grass as the dominant species. Several other exotic species are present such as *Lantana camara*, and morning glory *(Ipomoea indica)*. In open areas near the apex of dunes 'ilima *(Sida fallax)*, is present interspersed among the grasses. One lonely specimen of Nama sandwicensis, an endemic to the Hawaiian Islands, is located near the apex of the highest dune in Zone 3. (Kennedy 1993:7)

Other plants that have been reported in the project area are *koa haole (Leucaena leucocephala)*, castor bean *(Ricinus communis)*, *uhaloa (Waltheria indica)*, buffalograss *(Cenchrus ciliaris)*.

III. HISTORIC BACKGROUND

Wailuku *Ahupua'a* comprises a large portion of Wailuku District, including part of Kahului Bay (from Kapukaulua to Paūkukalo), the entire 'Iao Valley, and the north portion of the isthmus between Haleakala and the West Maui Mountains. According to Kennedy (1993:8), Wailuku served "as a gathering place and residence of important chiefs and their retinues." Kennedy indicates that prior to European contact the wet, stream-filled western half of Wailuku sustained most of the population and agriculture, while the drier eastern half was not suitable for such purposes and therefore was utilized less often. Kennedy's 1993 report provides an in-depth review of the land use history of eastern Wailuku, which is summarized below (with additional references inserted). For a review of the western portion, consult Kennedy *et al.*(1992).

A. Mythological and Traditional Accounts

Nineteenth century chants, recorded by Fornander, give reference to Maui place names including Wailuku *ahupua'a* and other areas of Wailuku District, mostly on the windward coast of Haleakala. Wailuku is described in the chants "as a locality of flying and sometimes dark clouds, a sheltered and shady valley locale, the place of iaiki rain, and a 'broad plain where councils are held'" (Kennedy 1993:9).

Two fresh water fishponds, Kanaha and Mau'oni, were built near Kahului by Maui ruler Kiha-a-Pi'ilani during the mid-1500s. Mau'oni Pond apparently no longer exists, but Kanaha Pond remains intact and functions as a wildlife sanctuary.

Legends characterize Wailuku as a royal burial ground and a place of war. According to one legend, the place name Wailuku (meaning "water of destruction") originated from the location of a battle fought by owls and men. Other legends denote Wailuku as the name of a certain *ali'i* or as a place of residence for chiefs.

Wailuku was Maui's political and military center, particularly during the warfare of the 1600s and 1700s. Several members of the Pi'ilani line were instrumental in the political developments on Maui, vying for control of Maui and protecting the island against chiefs from Oahu and Hawai'i. Most of these battles took place in Wailuku. The High Chief Pi'ilani unified Maui during the 1600s through warfare and his sons battled for succeeding control, as did subsequent generations of would-be rulers. King Kahekili (of the Pi'ilani lineage) resided in Wailuku and ruled from 1765 to 1790, a time of frequent warfare between the rulers of Maui and Hawai'i. During his reign, Kahekili gained control of Maui, Moloka'i, Lana'i, and Oahu for a period of four years until his defeat by Hawai'i's Kamehameha in 1790.

B. Early Historic Period

Several foreign influences affected Wailuku, beginning in 1778 when Captain Cook arrived offshore of Kahului Bay where he exchanged goods with the people of that area, including Kahekili. Missionaries arrived in Wailuku in 1832 and established a girls' school to teach Hawaiians their religion and way of life (Fredericksen and Fredericksen 1995:4). Along with the presence of foreigners, the introduction and growth of the sugar industry greatly affected Wailuku and continues to do so today. Hungtai Sugar Works, established in 1828 in Wailuku, was the first place of sugar production on Maui. Sugar production was contained to the western portion of Wailuku *ahupua'a* until 1876 when advancements in the industry enabled an expansion into the dry, eastern portion.

C. Mid-1800s (Land Commission Awards)

Land Commission Awards (LCAs) in Wailuku were more commonly awarded in the western portion of the *ahupua'a* while only two LCAs were awarded within the eastern portion, reflecting the settlement patterns in the area.

LCA 7713:23, awarded to Princess Victoria Kamamalu, "represented the former ili of Kalua and consisted of 391 acres stretching from the town of Wailuku to include a small portion of the western part of Kahului bordering the bay" (Kennedy 1993:14). The project area is located within LCA 420, awarded to Kuihelani, which constituted the majority of the *ili* of Owa and spanned the area from Wailuku Stream to Kahului Bay. According to Kennedy, "The testimony described a stone house and walls at the western end of the L.C.A near Wailuku, but did not give any information about the eastern end near Kahului Bay" where the project area is located (*ibid.*).

Most of the Wailuku *ahupua'a* was designated as Crown Land, with the region to the south of Kahului being referred to as Wailuku Commons. Much of this Crown Land would eventually be leased to businessman Claus Spreckels for commercial agricultural use.

D. Late 1800s

During the late 1800s, the sugar industry grew as a result of a reciprocity treaty of 1876 between Hawaii and the United States and the entrepreneurial efforts of Claus Spreckels. Financial benefits resulting from this treaty facilitated the development of sugar production in the arid eastern portion of Wailuku.

In 1878, Spreckels attained the "purchase and lease...of 40,000 acres of the dry plains that make up the eastern portion of Wailuku Ahupua'a. Among the leased lands were the Wailuku Commons." (Kennedy 1993:16) In 1882, Spreckels obtained Wailuku Commons under Grant 3343 and gained water and transport rights to supply water to his crops. Spreckels' sugar industry grew and subsequently developed Wailuku and surrounding areas into a thriving commercial landscape. The sugar plantation started by Spreckels eventually came under the control of Alexander & Baldwin and it continues to be "the principal land use in the area and the largest sugar producer on Maui" (*ibid.*:19).

Two developments which sprouted from the sugar industry were Kahului's growth as a significant port and the introduction of the railroad. T.H. Hobron had an inter-island shipping operation during the mid-1870s and Spreckels began trans-ocean shipping to North America a few years later. The port continued to modernize and prevailed as the main port on Maui into the early 1900s.

Kahului Railroad Berm

The Kahului Railroad berm (Site 50-50-04-3112), one of two historic sites within the project area, passes through the eastern edge of the project parcel in the proposed retention basin area. This line was part of the network laid by the Kahului Railroad Company. The Kahului Railroad Company played an important role in the growth of Kahului and Wailuku, as it was the first and last railroad in Hawaii and was responsible for the development of Kahului Harbor.

R.S. Kuykendall (1967:99) relates the beginnings of this railway:

> The first railroad in the kingdom was a short one on Maui, from Kahului to Wailuku, built by Captain Thomas H. Hobron in 1878-79; the first train ran the line on July 21, 1879. Within a year or two the line was extended eastward from Kahului to Paia. The enterprise was incorporated, July 1, 1881, as the Kahului Railroad Company, and in 1884 was sold to Samuel G. Wilder.

The Kahului Railroad Company created an expansive railway system for the transportation of freight. In 1905 Kahului Railroad, after their offer was accepted by Wailuku Sugar Company, laid additional track to the Sugar Company's new mill and began hauling the harvest to storage in Kahului. (Condé and Best 1973:267) The railroad not only hauled freight, however. It served as transport for the community as well, with students and other commuters riding the railway until Kahului Railroad implemented a bus service for its passengers in the mid-1930s. (Bartholomew and Bailey 1994:79)

The Kahului Railroad Company was instrumental in the development of Kahului Harbor in the early 1900s. According to Bartholomew (1994:79), the company improved upon the existing docks in order to provide a more sturdy wharf for the shipping of its cargo. This improvement facilitated the harbor's growth as a major shipping port. Also, the harbor development enabled the Kahului Railroad Company to continue to service passengers, this time with passenger ships for which their "shipping department handled 278 steamers filled with 185,000 passengers" in 1925 (*op.cit*:80).

The railroad continued to operate until 1966, making it not only the first but also the last operating railroad in Hawaii. In 1970, a part of the Kahului Railroad was brought to life as a portion of its deserted tracks were laid down in Lahaina and the surrounding area to serve as a scenic, historic railway for tourists and residents. (Bartholomew and Bailey 1994:80)

E. Early 1900s To The Present

Kennedy notes several developments in the area of Kahului during the early 1900s. These developments include a Marine Corps camp near Maui Community College, Navy Quonset huts which were used by various entities until the 1980s, the expansion of the town boundaries and the occurrence of four tsunamis between 1923 and 1957.

Other more recent developments in the immediate vicinity of the study parcel include the establishment of the Maui Arts and Cultural Center, Maui Community College, the YMCA, and the Maui Zoological and Botanical Gardens.

18th Service Battalion Installation

Information on military use of the study area during World War II was obtained by Walter and Demaris Fredericksen (1992) during research for an archaeological inventory survey on the Maui Community College campus immediately adjacent to the southeast of the present study area:

> In 1944, the 18th Service Battalion (U.S.M.C.) was attached to the Fourth Marine Division at Camp Maui [a training and rest facility established during the last years of the war at Haiku], and their [*i.e.* the 18th Service Division's] camp was built and located between the present University of Hawaii, Maui Community College campus and Kanaloa Road, which is about .5 kilometer to the north. Remains of various poured, reinforced concrete floors and foundations of buildings and structures which were part of the 18th Service Battalion military camp complex are present on the survey parcel...The mission of the 18th was to provide supplies for the 4th Marines and to be responsible for the dispersal and disposal of military equipment and supplies on Maui following the conclusion of the war. Surplus material was shipped to the mainland and elsewhere...
>
> A series of Quonset Huts were built along Kahului Beach Road by the U.S. Navy "Seabees", as part of the storage/office space for the camp...They were fronted on the *makai* side by the railroad. After the camp mission was concluded in 1947, the Quonset Hut complex continued to be used by the Kahului Railroad Company until it terminated service in 1965. Private commercial businesses utilized them until their destruction and removal during the 1980's. (Fredericksen and Fredericksen 1992:5)

The structural remains of the military installation within the Central Park area have been designated State site 50-50-04-4232.

F. Interview with Charles Keau

Mr. Charles Keau, a *kama'aina* resident of Maui since the late 1920s, was interviewed by Cultural Surveys Hawaii on October 18, 1996. In addition to his knowledge of the present Central Park study area dating back more than six decades, Mr. Keau, while working for the Maui County Parks Department, was involved in archaeological monitoring during excavation of trenches for burial of debris in the area of the former 18th Service Battalion installation within Central Park. Mr. Keau's letter report summarizes the project and its findings:

> Approximately 15 trenches were dug by Shimizu Contractor for the burial of metals and trash which have accumulated since World War II. The

> measurement of the trenches varies in length from 100' to 300' and in width, from 12' to 18. Maximum depth is 14' to the lava bedrock. No excavations were done below this lava...
>
> From the depth of 14' to approximately 13' is sand. One foot above the bedrock is cinders mixed with sand and dirt. The lens of dirt and sand could be seen within this sandy strata. For the remainder of the 13', no materials of archaeological significance were seen. No artifacts, middens, pebbles, or human remains were found. Job completed 1/19/90. (Keau 1990:1)

The report also includes an "oral history" and Mr. Keau's analysis of probable fresh water conduits flowing through the lava beneath the present study area:

> The old people living in this area called Raw Fish Camp, Kahului, Wailuku, Pakukalo, Melehako'a, talk about spring water along the seashore which helped the limu to grow. People in the central district of Maui gathered their *limu* (seaweed) along the seashore. These are the names: *maneoneo* (*ogo*), *limu ele ele*, *wawae iole*, *lipepe'e* and many which I have forgotten.
>
> The people around this area believe there are fresh water springs coming into this ocean from mauka. As a young man, I too, have seen this happening along the shore. Because of the dredging of the harbor, the fill was dumped in the Wailuku side breakwater covering up the outlet of fresh water, and today we have no edible seaweed, no *akule-opelu*, growing there. So I believe that this lava bed 14' below surface is part of the aquifer and has a lot to do with the limu disappearing from Kahului Harbor. (*Ibid.*:1)

During the course of the present interview, Mr. Keau would expand upon the findings and concerns expressed in his report.

Mr. Keau was shown historic photographs of the study area from 1904 and 1920 (Figures 4 & 5). He described where he grew up and his early memories of the study area:

> *I was born and raised in Pi'ihana, where the heiau is. Then I was raised in Paukukalo* [just north of the study area]. *But I went to Kahului School.*
>
> *We wandered around* [the study area]. *We used to ride horses inside there.* [There were] *kiawe trees, bushes, lantana - the prominent thing in there was lantana. There was lots of sand. I don't remember any houses in there. This was all pasture land. All I knew there was this empty space down to Waikapu and all the way down to Ma'alaea. Maybe a long time ago, in prehistoric times, most likely you would have hale on the ocean side. But I think the hale would be either towards the Wailuku end.*
>
> *This is ranch land too. Cattle land. All the way up to the slopes of the mountain, all the way to Ka'ahumanu* [Avenue], *the whole area across the*

Figure 4 View of 'Iao Valley from the steamer "Claudine", Maui, 1904 (H.C. Ovenden; Bishop Museum Archives)

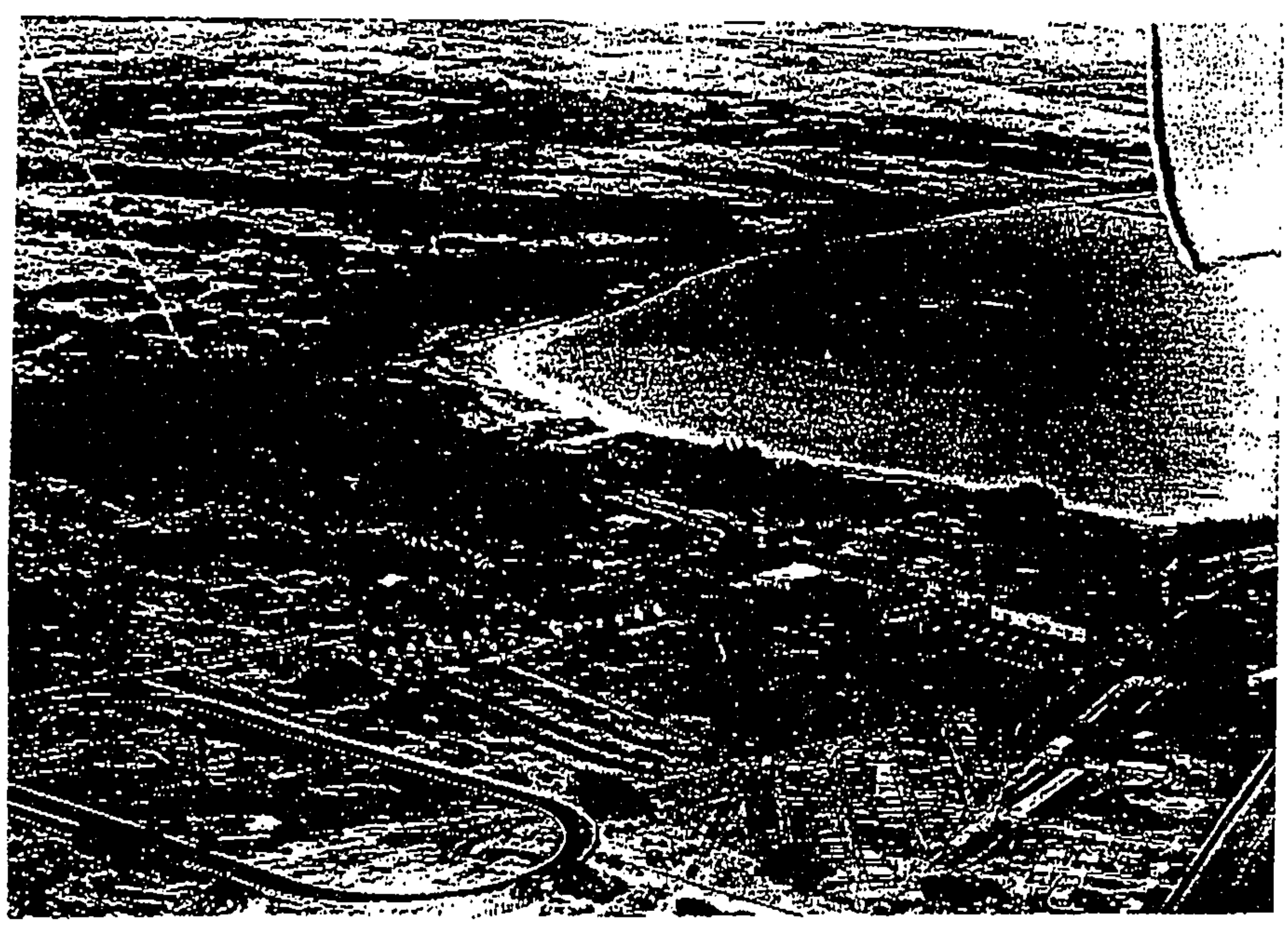

Figure 5 Aerial view of Kahului, Maui, Oct. 1920 (Bishop Museum Archives)

road to the hospital was all cow pasture. So you may find some bones around that are animal, horses or cows.

Mr. Keau cautioned on the possible presence of burials:

As far as historic and prehistoric things, there's not that much in here [inside the present study area]. *But the only thing, the* [prehistoric and historic Hawaiian] *community was down here* [in Wailuku north of the study area] *so I think there may be some burials here - that sand dune was all across and back through this side. So they may have burials. Yet the majority of the burials could be buried on the sand hill - Harbor View - up here, on this side going this way. Because of the sand you have to be very careful.*

He also mentioned having heard of burial finds during the construction of Ka'ahumanu Avenue in the 1930:

A lot of the old-timers who made [Ka'ahumanu Avenue] *were picking up bones all the way up to the bridge - Wailuku Bridge - hundreds of bones they were picking up. They may have buried bones, whatever they found, on the side of the highway. So that's the thing you may encounter, some of the burials.*

World War II provoked the development of the present study area:

All the activities came during World War II. There were the Seabees here, construction battalion, who built all the airports - Puunene Air Base and Kahului Air Station - so their supplies were in this area here. Right down here...across from the [present] *horseshoe field there were quonset huts used as supply warehouses. The railroad track was moved so that when they brought in the supplies the railroad would be right next to the quonset huts.*

There was a mound here [on the site where the concrete pad for the quonset huts was constructed]. *But when they cleared this area* [for the quonset huts] *they pushed all the dirt* [between the quonset huts and the beach road] *in case of tidal waves.*

After the end of World War II:

[In the study area] *I was told they did a lot of burials of military things...pretty close to this Kanaloa Avenue coming down to the Harbor View side. They buried a lot of military equipment in here. What I heard, some of them were still in cosmoline. Hopefully, it's not live ammo. That's the thing. I don't know where it is.*

Mr. Keau described the post-World War II use of the former military installation in the Central Park area:

> *Since this was Kahului Railroad or A&B property, they gave it back to A&B and so these quonset huts were used for Maui Pine storage of pineapple. And then later on, individual garage owners or businesses that needed a warehouse, they would rent it from A&B. They used the quonset huts.*

Mr. Keau was shown a 1950 aerial photograph of the study area (Figure 6):

> *These are all the quonset huts. This is the vocational school. This is the fertilizer company. This is Raw Fish Camp. Where the coconut trees are.*
>
> *Raw Fish Camp. The workers from the Kahului Railroad, stevedores, used to live here. Or anybody who were employed by A&B. There were a lot of Japanese and Hawaiians mostly.*
>
> *Kolo Ground is in here: you see these trees and bushes, shrubbery, this is where Kolo Ground used to be. The old folks used to live there. They went fishing. Old folks used to have their own shacks underneath the kiawe trees, coconut trees.*

Mr. Keau described the fate of the quonset huts and the origin of his involvement in the debris clean-up detailed in his 1990 archaeological monitoring report:

> *I don't know when did they started* [demolishing the quonset huts]. *Because as the buildings were getting old, A&B wouldn't restore them. It wasn't worth the price. So one by one of the buildings were falling down. They didn't issue a new lease, so gradually people moved out.*
>
> *The reason I was involved in this clean-up project: in '89, '90, someplace around there, Parks and Recreation asked me to come down. They were cleaning out all the quonset huts and all the junk automobiles and cars. They were digging deep holes* [to bury the debris].

He further explained his concerns about aquifers within the present study area:

> *They were digging holes up to fourteen feet deep until they hit the dikes, I guess you call it, fresh water dikes. Then I told them to stop because I didn't want to break the dikes because they were supposed to be the fresh water that feed the ocean. That's why over here at Kahului Bay we had plenty of limu. Good eating limu...In fact, some of the divers go out here and dive inside the ocean. They can feel this spring water coming out here...*
>
> *In this area there's so much water the County has to set up two pumps, one in the football stadium and one in the parking lot of that gym. This is drinking water, irrigation water, well water. That's why if they would dig below that lava tubing they might bust the whole thing and it's going to dry*

Figure 6 Aerial view of study area, Feb 28, 1950

up in here...That's the only thing I'd say: you have to be very careful they don't puncture lava tubes underneath there. Especially the environment down at the ocean would get screwed up, the limu, fish. So it's very dangerous.

So they stopped digging at fourteen feet. Some places at ten feet, some places at fourteen feet. I know a place they buried a whole bunch of junk that was only about two or three feet under surface.

The following portion of the interview took place within the study area. Mr. Keau further described the trenching project he monitored in 1990 in the area *mauka* of the concrete pad, the former quonset hut foundation (Figure 7):

The trenches they made to cover up the scrap iron were all mauka-makai. They averaged not more than fourteen feet deep because the lava flow was underneath and I didn't want to fracture it. I was worried that there might be the dikes for the fresh water.

They had many more trenches on the other side of that pu'u. You see that mound right there, that kiawe tree, they had many more trenches going down. I never worked on those trenches because they had already filled it and covered it.

Mr. Keau described the mounds of gravel and boulders presently on the *mauka* side of the concrete pad and alongside Kanaloa Road (Figure 8):

They were using that for fill, for construction work. I think they stockpiled that thing for future use.

Some of those pu'u over there, especially where the baseball fields are [in the future park design plan], *they were all covered up, they were all pushed onto whatever was underneath there. As you can see the earlier pictures that area was practically flat. So that all that mounds that you see where the ball field is going to go, that's all pushed sand. So, if you're going to cut those hills down, I'd sure like to know what's underneath there... If there's nothing there well, okay. What they told us, when the military moved out they buried a lot of their supplies in this area here. They dug a deep hole and then they just pushed all the lepo, all the sand, on top, covered it up, so they made mountains inside here. They went down underground but they also put the mountain on top.*

I sure wish you could test this from here all the way to Kanaloa [Road] *because they say there is all this military stuff that was pushed in there. The best thing is to do a thorough survey of everything so we know we're safe.*

You see the road over there, the black asphalt [road to the archery range], *that's where the ground was so this is all fill here* [where we're standing].

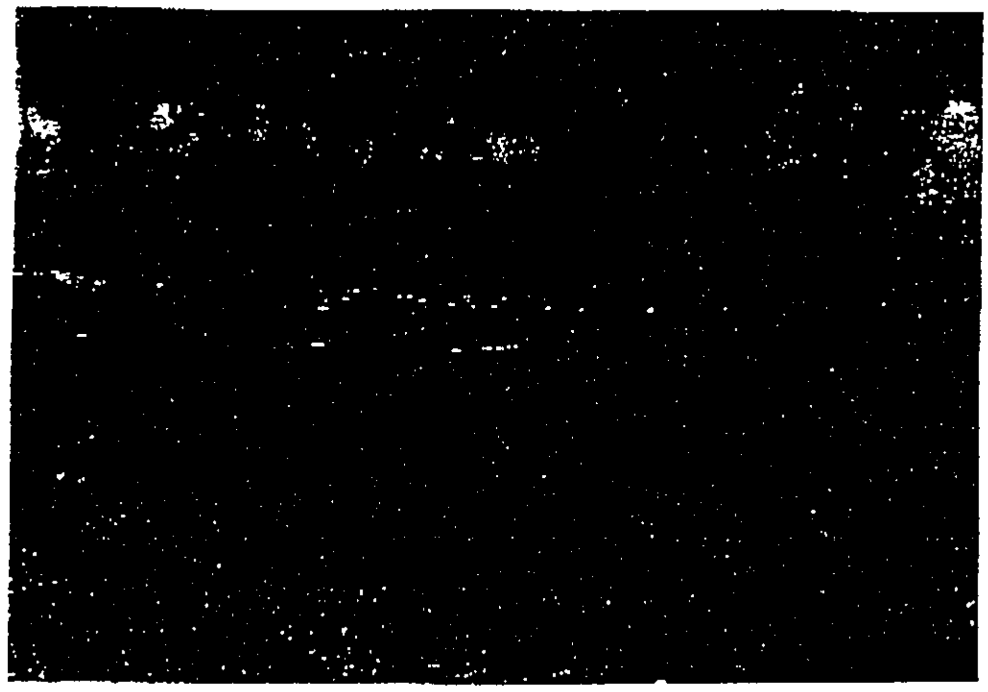

Figure 7 Area *mauka* of large concrete pad (former quonset huts foundation) monitored by Mr. Keau in 1990

Figure 8 Mounds of gravel fill alongside Kanaloa Road in the northeast portion of the project area

IV. PREVIOUS ARCHAEOLOGICAL RESEARCH

Results of previous archaeological research within the portion of the Wailuku District which encompasses and far exceeds the boundaries of the present Central Park study area are presented below. Also summarized is the recent reconnaissance and subsurface testing of the Central Park study area conducted by Cultural Surveys Hawaii (Heidel *et al.* 1996).

Fredericksen, Walter M. and Demaris L. Fredericksen
1992A *An Archaeological Inventory Survey for the Parking Lot Expansion and Retention Basin on Maui Community College Campus (TMK 3-8-07:40 & 43) Ahupua'a of Wailuku, District of Wailuku, Island of Maui* Xamanek Researches, Pukalani, Hawaii

Results: Survey of an approximately 5.0 acre lot within the Maui Community College Campus - Approximately 700 feet north of Kaahumanu Avenue. Entire parcel disturbed by previous landfill and construction projects, including WWII military activities. No sites were found.

Fredericksen, Walter M. and Demaris L. Fredericksen
1992B *An Inventory Survey of a Parcel of Land (TMK 3-8-07:123), Located in the Ahupua'a of Wailuku, District of Wailuku, Island of Maui*, Xamanek Researches, Pukalani, Hawaii

Results: Survey of an approximately 2 acre lot across from the junction of Waiehu Beach Road and Kahului Beach Road. Three archaeological sites were encountered: the historic Kahului Railroad berm (Site 3112) and two sites (3119 and 3120), both of which contain prehistoric cultural layers including midden, basalt flakes, and artifacts. The prehistoric component of Site 3119 was dated to AD 233-410 - an intriguingly old date for a Hawaiian archaeological site. A single human bone was encountered in Site 3120 but no other human remains were uncovered during the survey testing. Later work at the prehistoric component within the project area included data recovery. Preliminary results of this extensive data recovery were reported by the Fredericksens at the 9th Annual Conference of the Society of Hawaiian Archaeology in April 1996. In general, these findings, although not within the present Central Park study area, are relevant because they are from a similar environment and indicate potential presence of human remains and prehistoric cultural materials within the *makai* portion of the present study area.

Fredericksen, Walter M. and Demaris L. Fredericksen
1994 *An Inventory Survey of a 10-Acre Parcel of Land, Maui Central Park Parkway, Wailuku Ahupua'a, Wailuku District, Maui Island (TMK: 3-8-07: 125)*, Xamanek Researches, Pukalani, Hawaii

Results: 1994 survey and subsurface testing by backhoe of a 10 acre parcel.

No sites were found and no cultural material or features were present.

Fredericksen, Walter M. and Demaris L. Fredericksen
1995 *Archaeological Inventory Survey and Subsurface Testing at the Site of Keiki Zoo Maui (TMK: 3-8-07: por.1) Wailuku Ahupua'a, Wailuku District, Maui Island*, Xamanek Researches, Pukalani, Hawaii

Results: 1995 survey and subsurface testing by backhoe of a 4 acre parcel within the present project area. One artifact, a basalt abrader, was found on the surface. No cultural materials or features were encountered during subsurface testing.

Heidel, Melody, Leilani Pyle and Hallett H. Hammatt
1996 *Archaeological Reconnaissance with Subsurface Testing for Proposed 110-Acre Maui Central Park, Wailuku, Maui (TMK 3-8-07:1 and 3-7-01:2)*, Cultural Surveys Hawaii, Kailua, HI.

Results: A selective surface survey and backhoe trenching within the present Central Park study area. Work included excavation of 21 backhoe trenches. No cultural layers or human remains were encountered in the surface and subsurface reconnaissance. However, because of the potential for finding materials in undisturbed sand deposits, archaeological monitoring was recommended.

Keau, Charles P.
1990 *Archaeology Monitor*, Parks Dept., Maui County

Results: 1990 monitoring of trenching by backhoe for the burial of metals and trash at Maui Central Park, TMK: 3-7-01: 2. No cultural material or features were present.

Kennedy, Joseph
1990 *Archaeological Subsurface Testing Results at the Site of the Proposed Maui Arts and Cultural Center, TMK 3-8-07:por.1, Located at Kahului, Maui* Archaeological Consultants of Hawaii, Inc., Haleiwa, Hawaii

Results: 1988 Reconnaissance and 1990 subsurface testing of a parcel bordering the north side of Kaahumanu Avenue. No sites were found.

Kennedy, Joseph and Peter P. Brennan and Sandra Ireland
1993 *Archaeological Inventory Survey with Subsurface Testing Report for a Property Located at Portions of TMK 3-8-07:1,40,125,117 and 3-7-01:2 Wailuku Ahupua'a, Wailuku District, Island of Maui* Archaeological Consultants of Hawaii, Inc, Haleiwa, Hawaii

Results: Survey of a road corridor running through Maui Community

College campus from Kahului Beach Road to Kaahumanu Avenue and Kanaloa Avenue. The area was previously disturbed and no sites were found.

Neller, Earl
1984 *Recovery of Endangered Human Bones from the Wailuku Sand Hills, Maui. TMK: 3-8-07: 2)*, State Historic Preservation Office, Honolulu, Hawaii

<u>Results:</u> The origin of human remains inadvertently transferred from the Wailuku sandhills to Lahaina was located a relatively short distance to the south of the current study area in a portion of the same dune formation. No other sites were observed. However, additional bones found at the burial site indicate the probable presence of other burials in the area.

In addition, some scattered human remains were reported at the boundary of the southwestern corner of the Maui Community Arts & Cultural Center within the current project area (Figure 9), according to a facsimile communication received by Cultural Surveys Hawaii from W. Fredericksen of Xamanek Researches on August 6, 1996. The communication indicates that skeletal remains and a report were being turned in to the State Historic Preservation Division.

In summary, previous archaeological research conducted within or surrounded by the present Central Park study area show no findings in previous research within the study area. Adjacent studies of areas to the south also show negative findings. At present the most relevant archaeological findings - two cultural layers, one of which yielded an early precontact date - were reported (Fredericksen and Fredericksen 1992B) to the north of the present study area within the drainage of 'Iao Stream. The facsimile communication from Xamanek Researches suggests other human remains may be present within the Central Park study area.

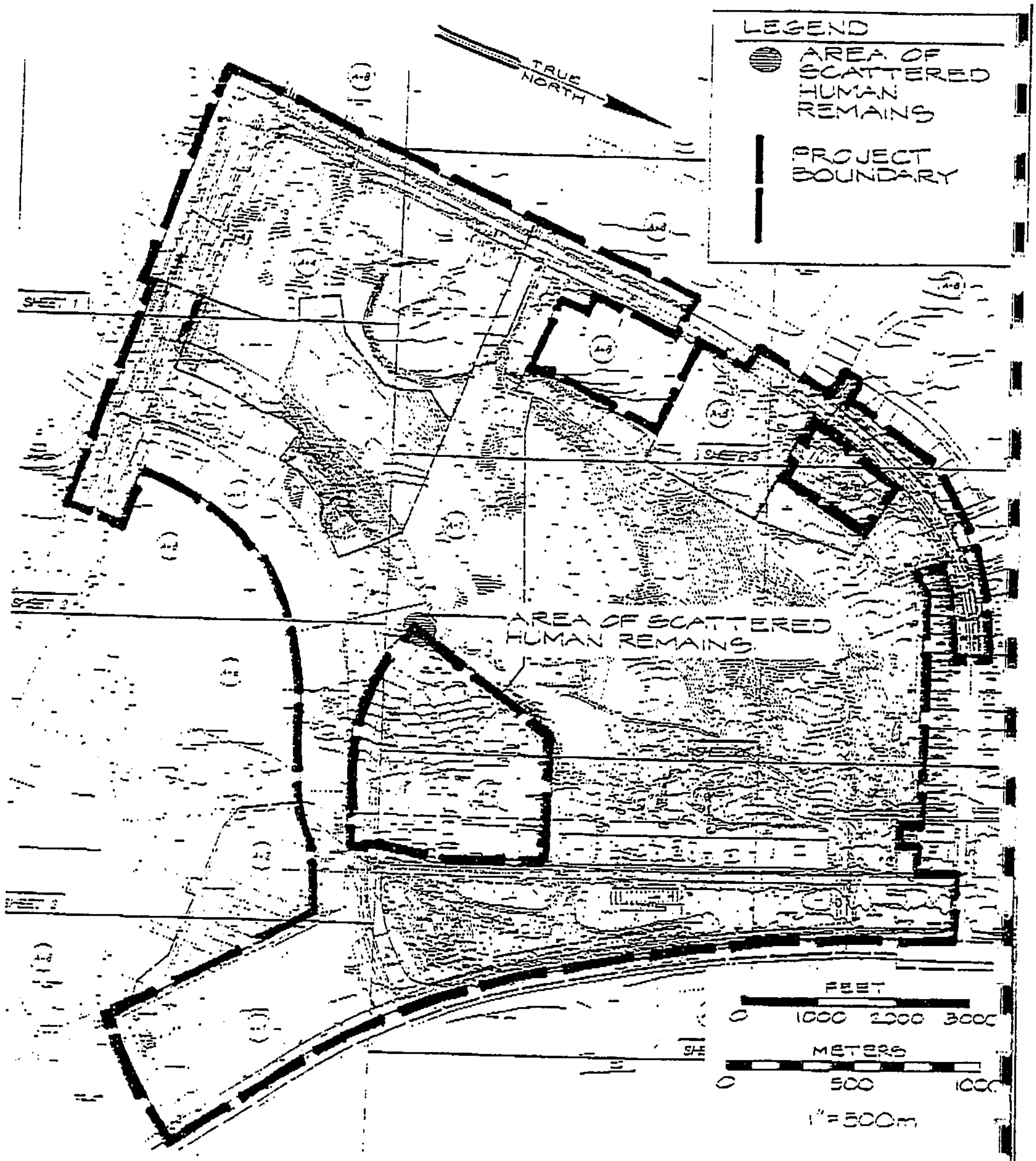

Figure 9 Project area showing location of recent find of human remains

V. INVENTORY SURVEY RESULTS

A. Surface Survey Results

The surface survey was conducted by three archaeologists surveying transects 15 meters apart. The survey covered the entire project area including each of the specific areas to be graded. Some of the survey was conducted during the laying-out of the test trench locations, which was done from prominent known points using compass and tape. No archaeological surface materials were encountered during the survey.

During the surface survey, large quantities of modern trash - including cans, bottles, junked car bodies and parts, and machinery - were encountered particularly in the northeastern portion of the project area, *mauka* and north of the existing concrete pad (location of the former quonset huts). In this area, large piles of fill material had been trucked in and dumped, extensively modifying the original topography (see Charles Keau interview above).

Particular attention was given to examination of the specific area where human remains were encountered at southwestern end of the Maui Arts & Cultural Center property (see Figure 9 above; Figures 10 & 11). A careful search of the ground surface was conducted, including areas of previously graded sand as well as the cut bank behind the Cultural Center and the area of undisturbed dune *mauka* of the location of the human remains. In addition, shovel tests were excavated within an area marked with stakes and rebar, assumed to be the exact location of the previous find. No additional human remains were encountered.

No remnants of the former Kahului Railroad berm (Site 50-50-04-3112) were encountered during the survey, although specific attempt was made to find the former location of this berm on the ground. According to Mr. Keau, the berm was covered by the widening of the Kahului Beach Road into four lanes. The 1940s side track of the railroad line to the military installation quonset huts has also been obliterated.

The only structural remnants of the former World War II military installation (Site 50-50-04-4232) are concrete pads. The largest of these pads is the foundation for the row of quonset huts that paralleled the shoreline above Kahului Harbor. The south end of this pad was removed during construction of the Maui Arts & Cultural Center; the remaining portion measures 1035 ft. long by 120 ft. wide (Figure 12). Three smaller concrete pads, presumed to be associated with the World War II installation, were observed to the north and northwest of the main pad. One measures 20 ft. by 20 ft (Figure 13). The second, partially covered by modern fill, shows an exposed area measuring 30 ft. by 20 ft (Figure 14). The third, adjacent to a dirt road accessing Kanaloa Road, has only a 10 ft. by 3 ft. section exposed, the rest being covered by modern fill (Figure 15).

B. Profile Descriptions

Profile descriptions of the thirty-one excavated backhoe trenches are presented below in a uniform format. These profiles are grouped according to specific development

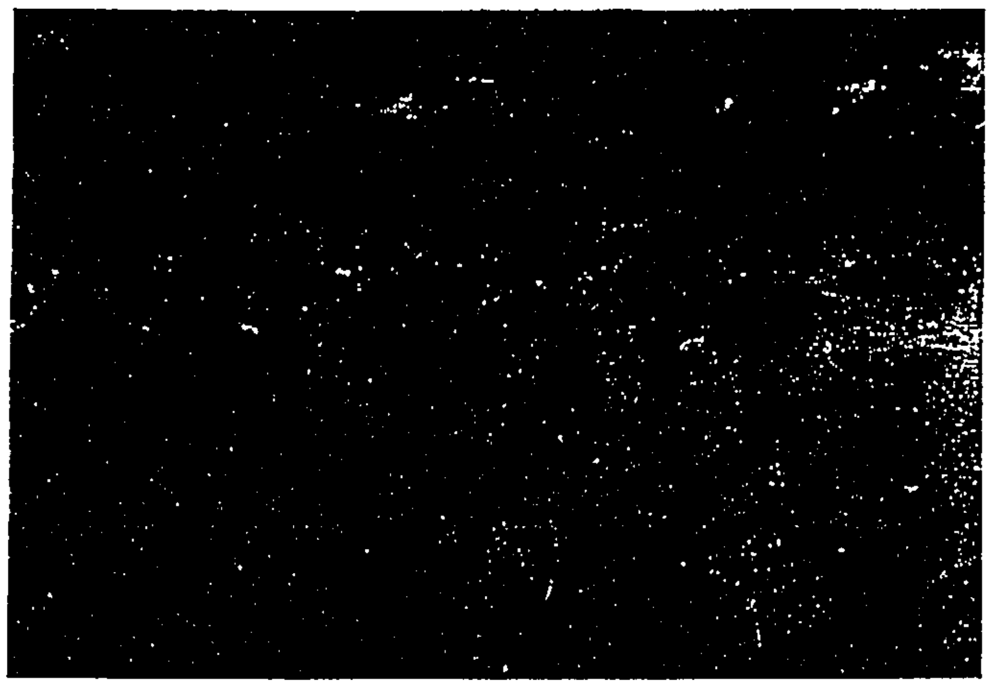

Figure 10 Disturbed sand deposit in area of previously located human remains; view to southwest

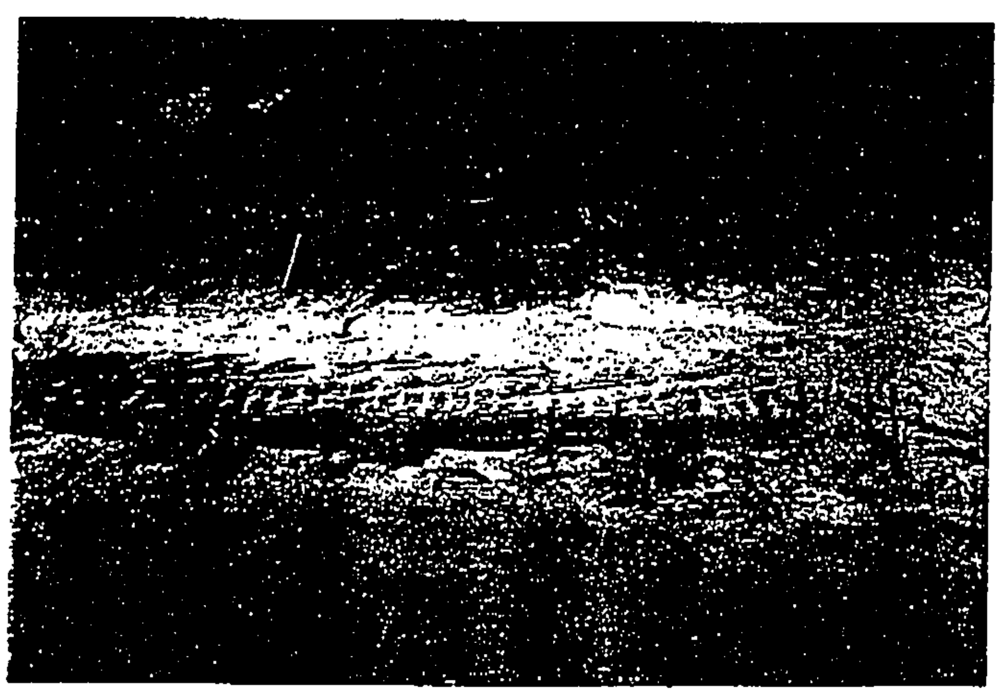

Figure 11 Cut bank *mauka* of Maui Arts & Cultural Center in area of previous find of human remains

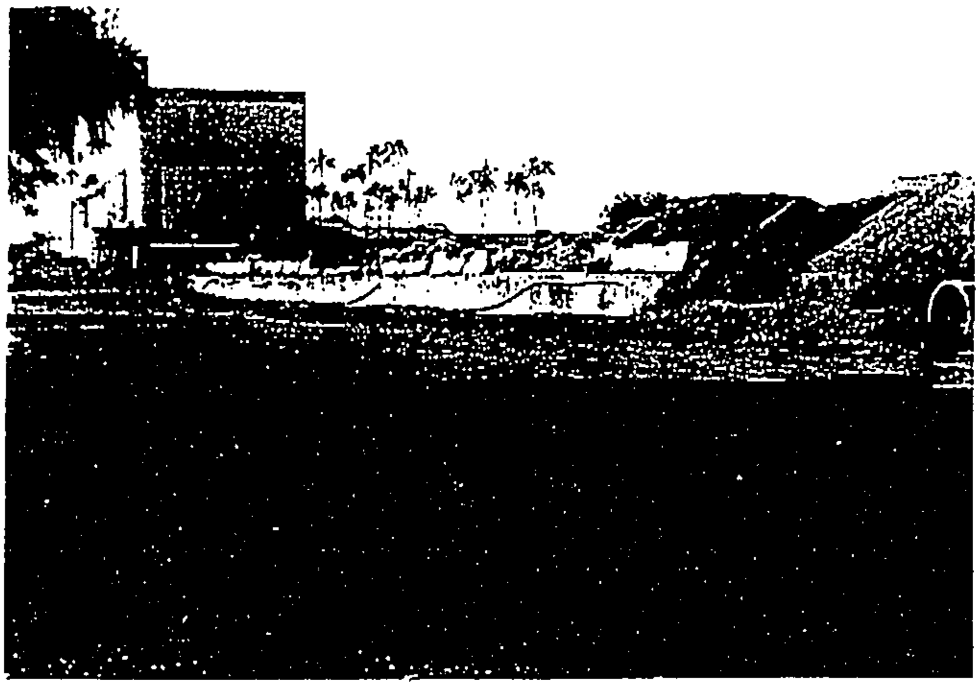

Figure 12 *Makai* face of large concrete pad (former quonset huts foundation); view to south

Figure 13 20 ft. by 20 ft. concrete pad in northeastern portion of the project area; view *makai*

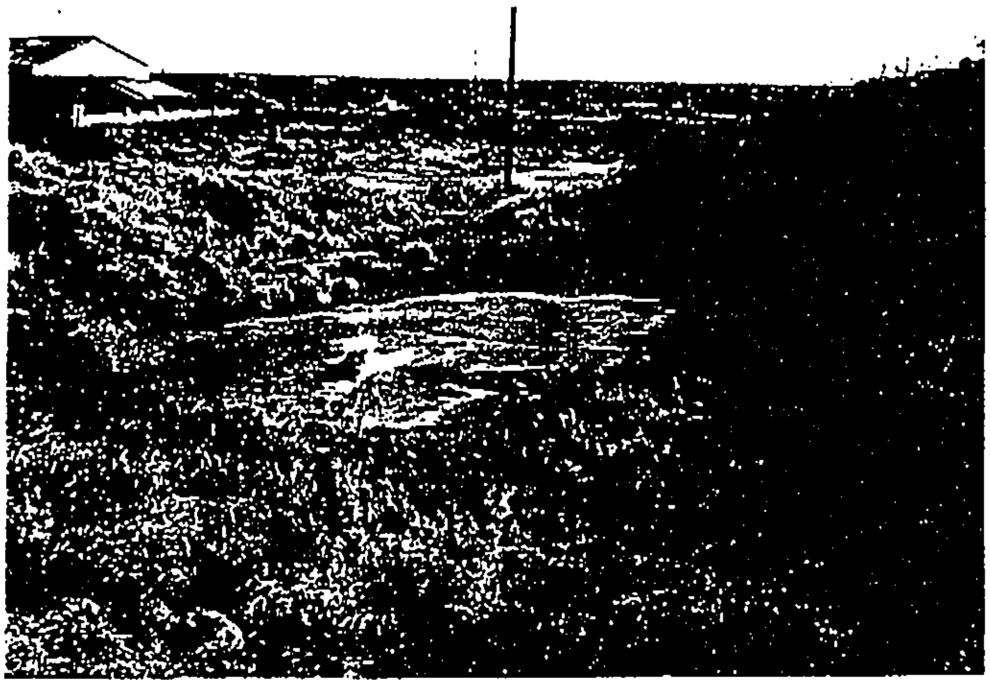

Figure 14 Concrete pad partially covered by fill; view *makai*

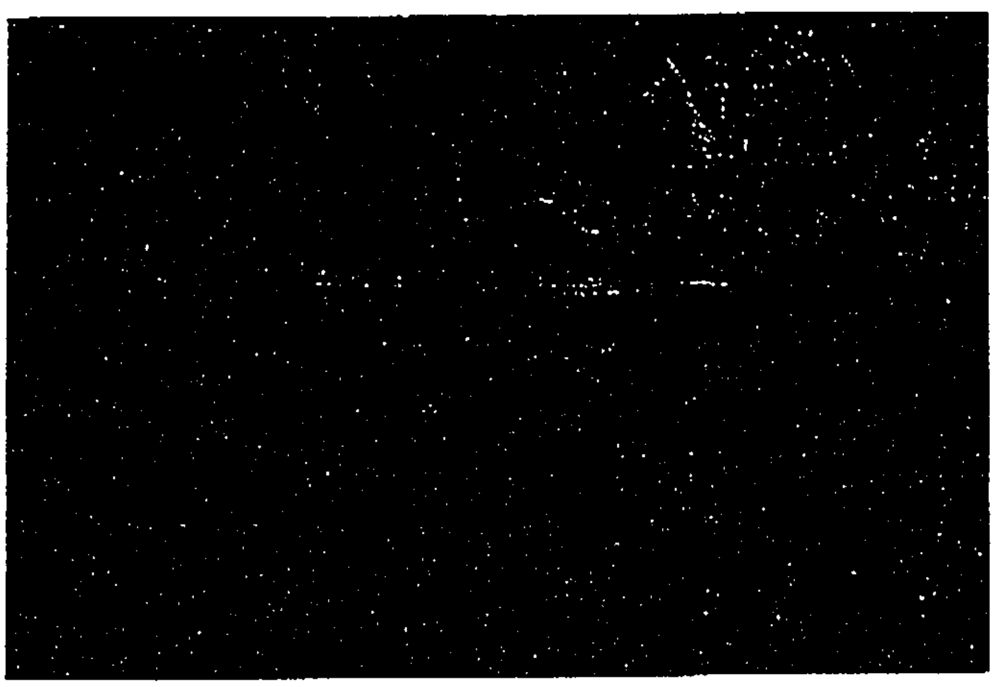

Figure 15 Small segment of covered concrete pad on edge of gravel road leading to Kanaloa Road; view *mauka*

areas within the project, including: the proposed retention basin area (eight trenches), the proposed connector road (thirteen trenches), the proposed Little League-Field 7 (five trenches), and the proposed multi-purpose field 6 (five trenches). Figure 16 map shows the overall project area with specific trenching areas located. Figures 17-21 maps are enlargements of five areas showing trench locations. Figures 22 and 23 are typical backhoe test trench profiles.

Proposed Retention Basin Area

Trench #:	RB 1 (Figure 17)
Length:	5.4 m.
Width:	1.4 m.
Max Depth:	2.1 m.
Orientation:	355°TN
Location:	100 ft. at 281°TN from Trench 2.

General Environment: Trench 1 is located on a level, partially graded area.

Profile Description: Stratum I: (0-30 cmbs) consists of a yellowish red (5YR 5/8) sandy (coral and volcanic sand) silt which appears to be a fill/push layer. The boundary between Stratum I and Stratum II is abrupt and wavy.

Stratum II: (30-160 cmbs) consists of a dark reddish brown (5YR 3/3), compact and elastic sandy clay, with less than 5% coral sand. The boundary between Stratum II and Stratum III is abrupt and wavy.

Stratum III: (160-210 cmbs) consists of a reddish brown (5YR 4/3), slightly elastic silty clay. The water table was encountered at 165 cmbs.

Trench 1 contained no cultural material and exhibited a uniform stratigraphy.

Trench #:	RB 2 (Figure 17)
Length:	4.0 m.
Width:	1.0 m.
Max Depth:	1.7 m.
Orientation:	014°TN
Location:	80 ft. at 353°TN from Trench 3, then 40 ft. at 269°TN.

General Environment: Trench 2 is located on the *makai* slope of a partially graded area.

Profile Description: Stratum I: (0-10 cmbs) consists of a yellowish brown (10YR 5/4), loose sandy loam with abundant roots. The boundary between Stratum I and Stratum II is abrupt and slightly wavy.

Stratum II: (10-60 cmbs) consists of a light brownish gray

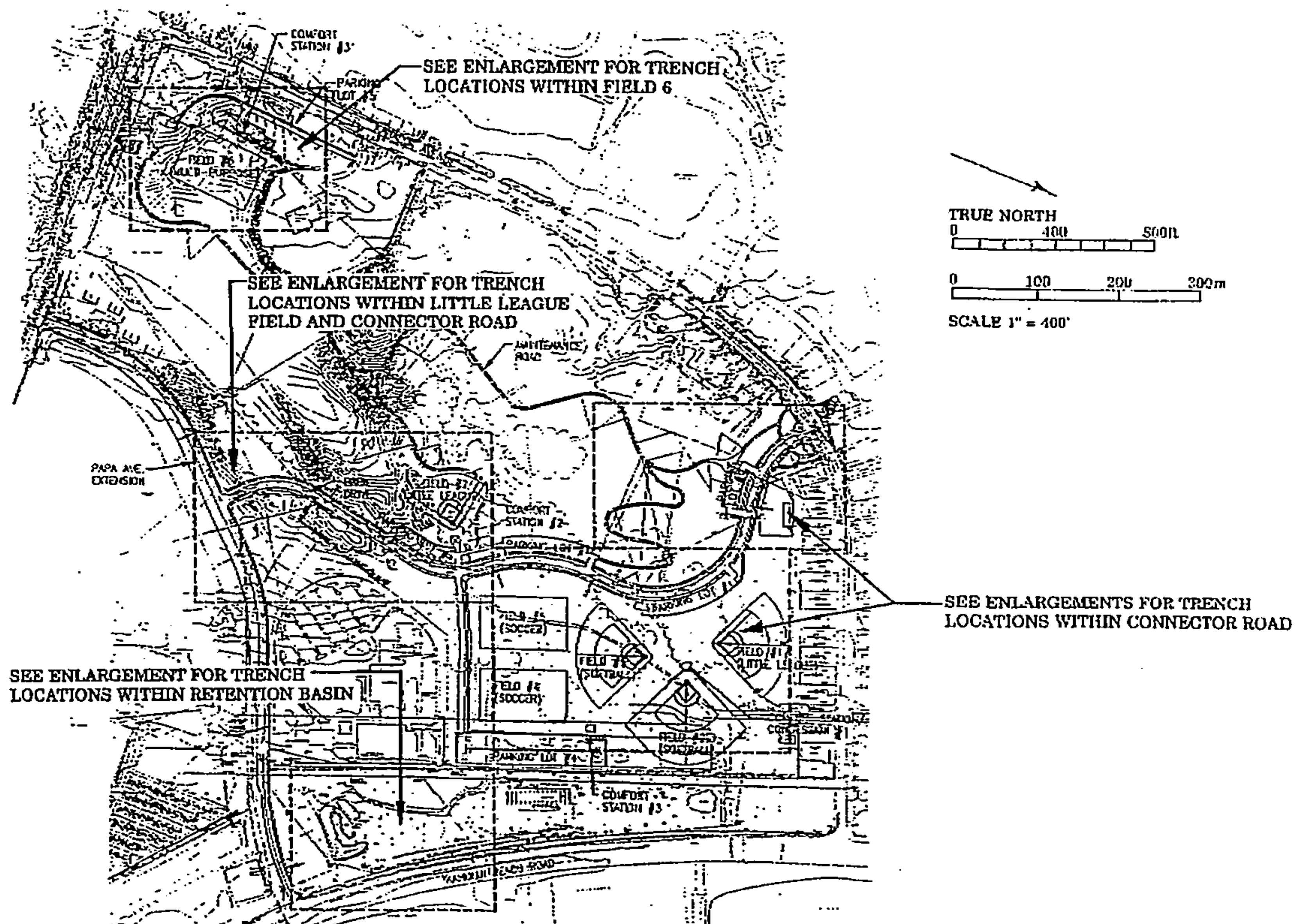

Figure 16 Project area showing areas subject to subsurface testing

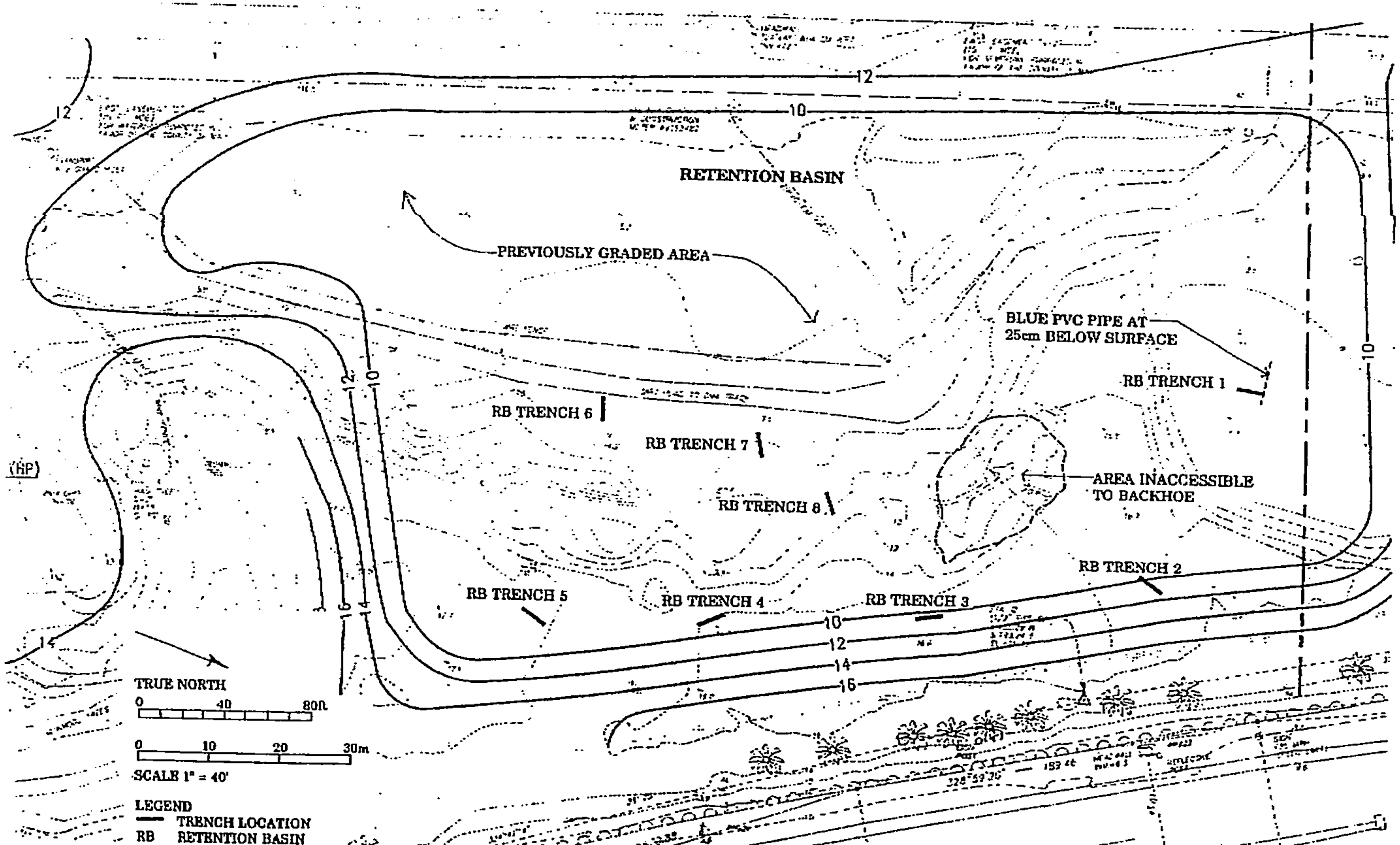

Figure 17 Proposed retention basin showing location of backhoe trenches

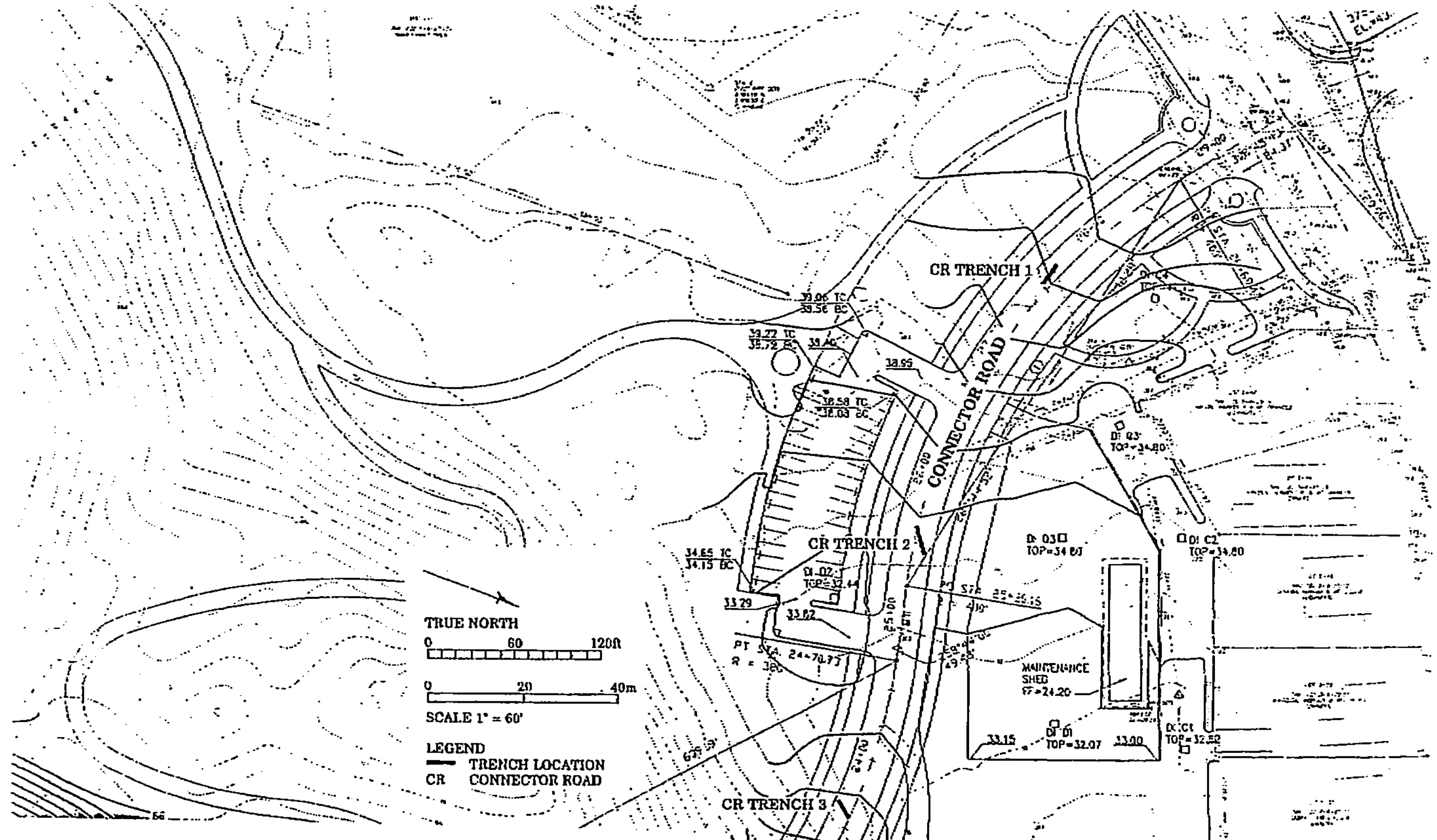

Figure 18 North portion of proposed connector road showing location of backhoe trenches

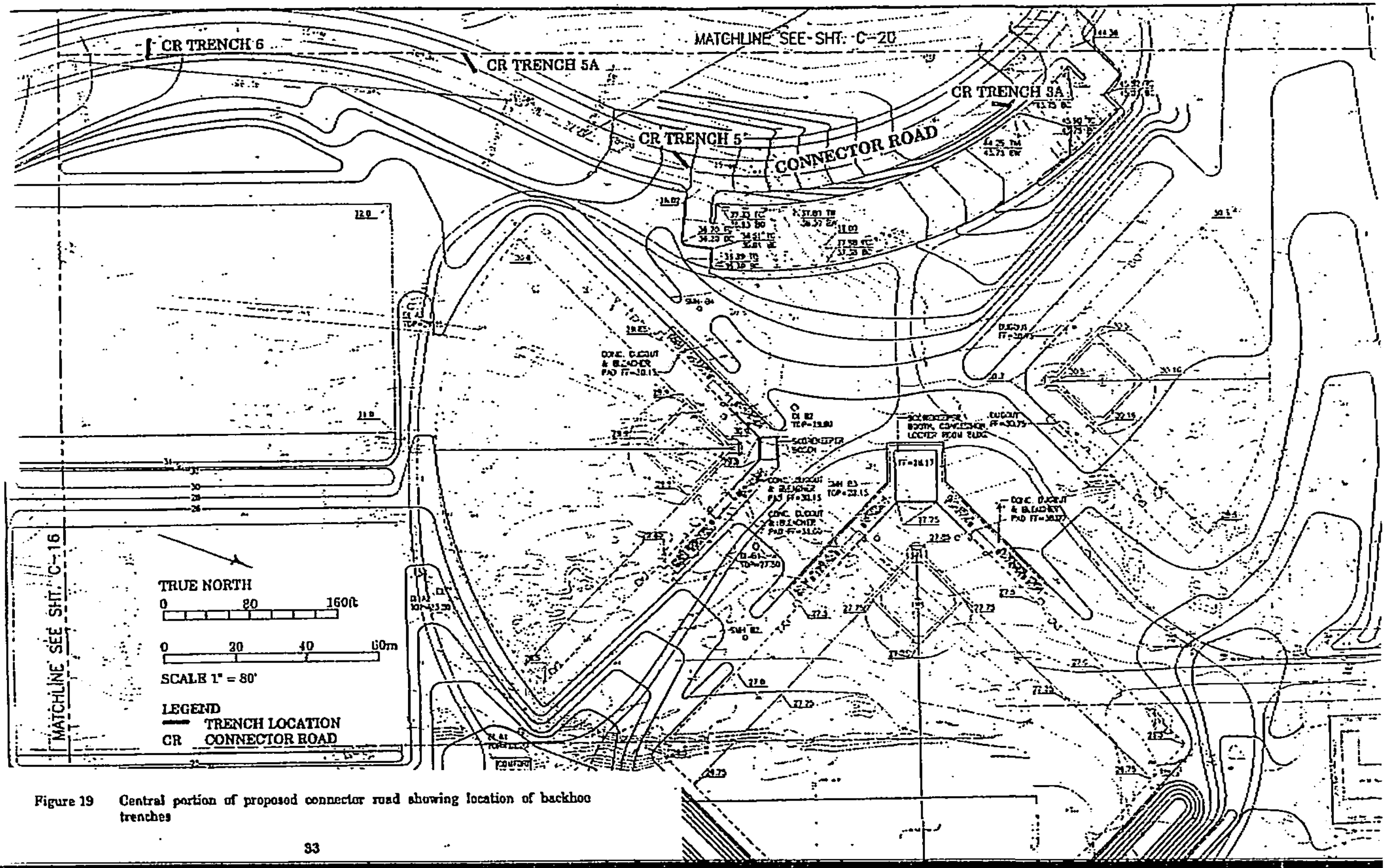

Figure 19 Central portion of proposed connector road showing location of backhoe trenches

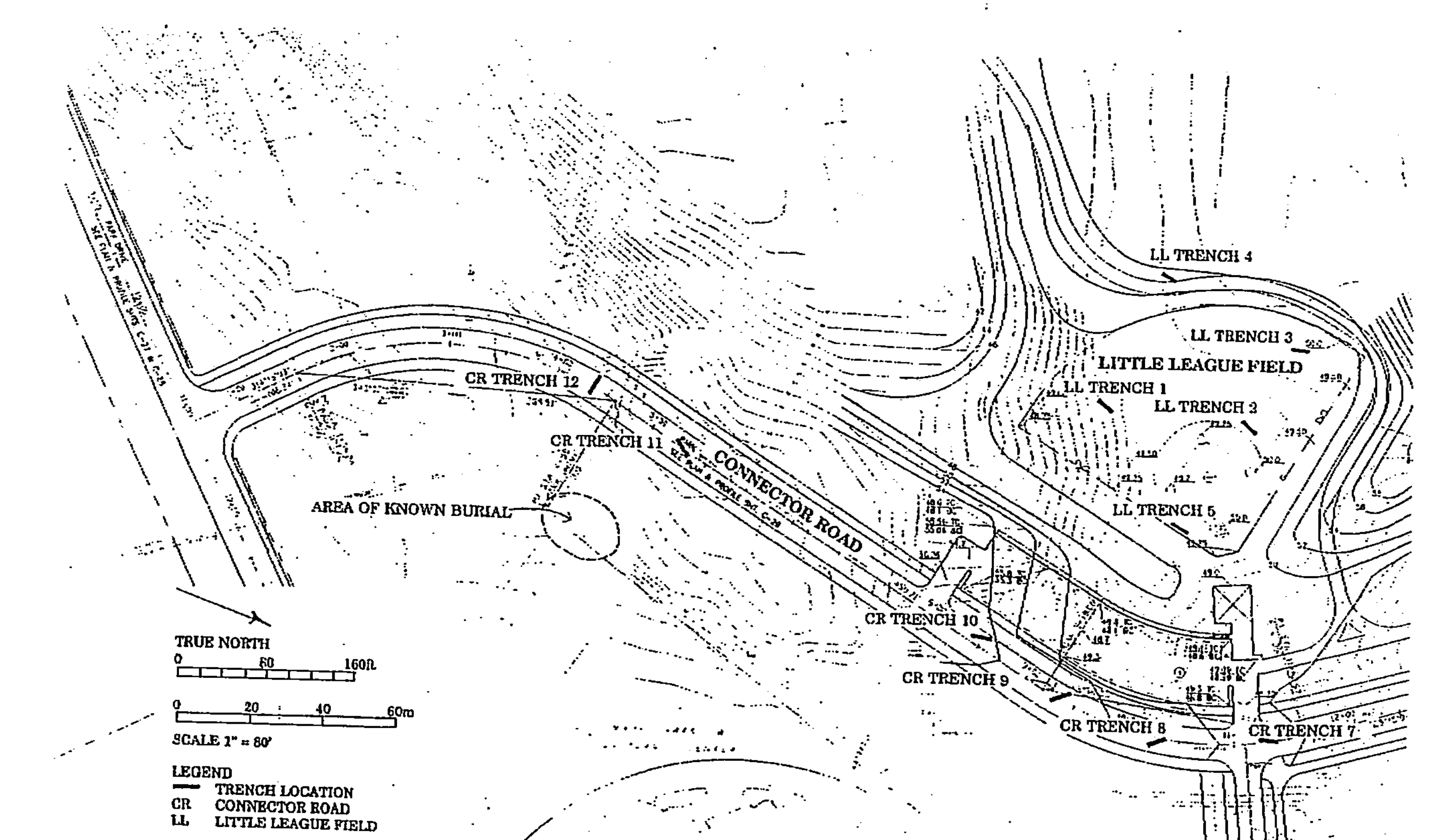

Figure 20 South portion of proposed connector road and proposed Little League field (Field 7) showing location of backhoe trenches

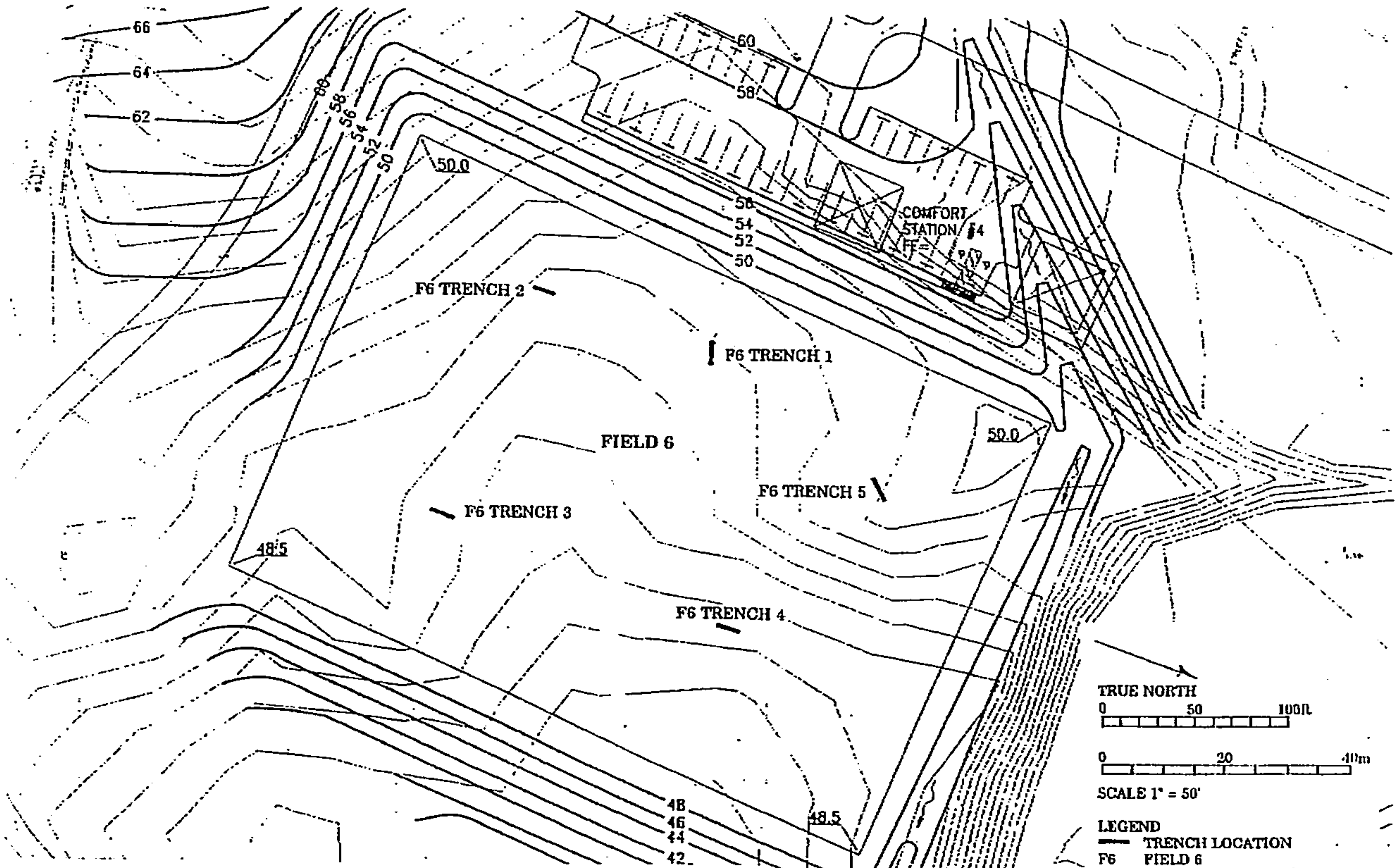

Figure 21 Proposed multi-purpose field (Field 6) showing location of backhoe trenches

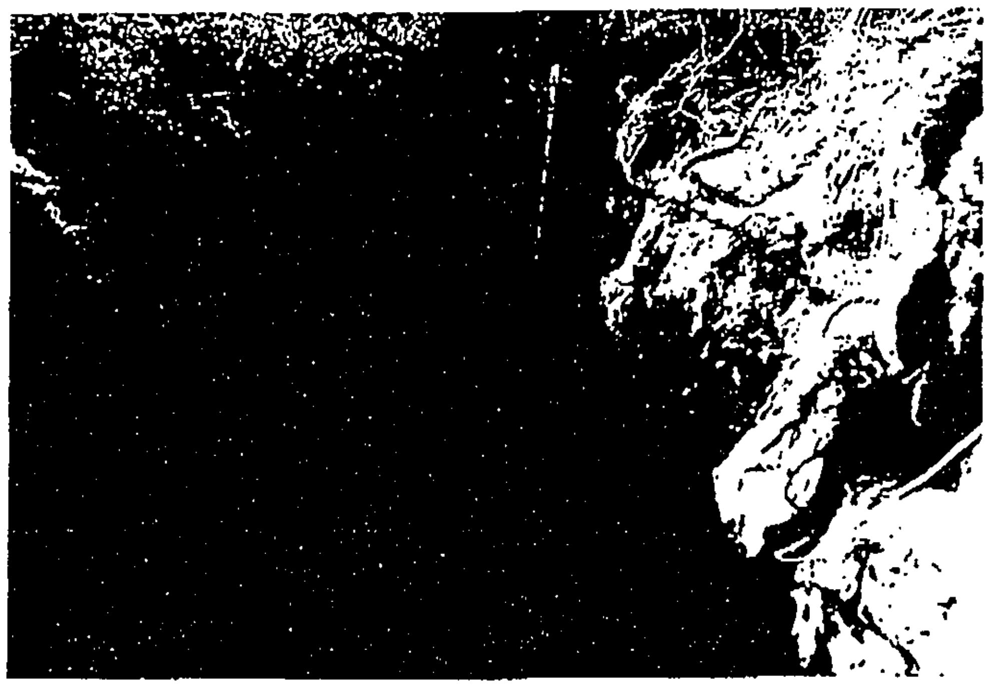

Figure 22 Proposed connector road trench 9 showing cemented dune sand

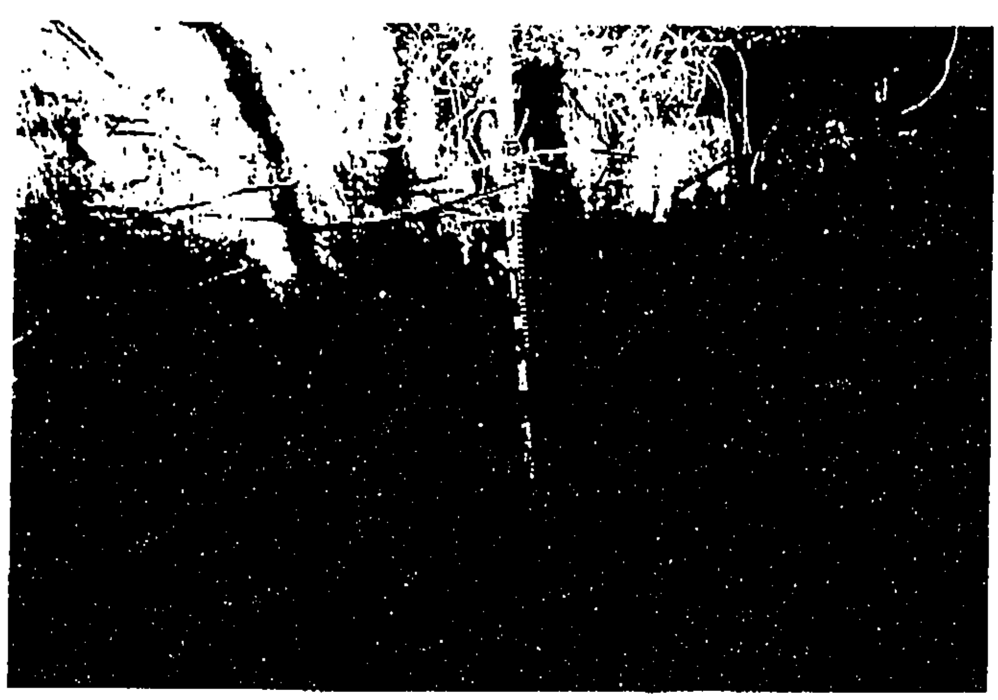

Figure 23 Proposed connector road trench 10 showing buried A-horizon

(10YR 6/2), loose sandy loam. The boundary between Stratum II and Stratum III is abrupt.

Stratum III: (60-170 cmbs) consists of a reddish brown (5YR 5/4) clay loam with alternating layers of a grayish brown (10YR 5/2), very fine basalt and coral sand mix, with some mixing of the layers. Each layer is heavily bedded and compact. Stratum III appears to be wind deposited.

Trench 2 contained no cultural material and exhibited a uniform stratigraphy. Stratum I and Stratum II appear to be fill layers while Stratum III appears to be natural dune material.

Trench #:	RB 3 (Figure 17)
Length:	4.0 m.
Width:	1.2 m.
Max Depth:	1.7 m.
Orientation:	153°TN
Location:	40 ft. at 089°TN from Trench 2, then 80 ft. at 173°TN.

General Environment: Trench 3 is located on a *makai* slope.

Profile Description: Stratum I: (0-10 cmbs) consists of a yellowish brown (10YR 5/4), loose sandy loam with abundant roots. The boundary between Stratum I and Stratum II is abrupt and slightly wavy.

Stratum II: (10-65 cmbs) consists of a light brownish gray (10YR 6/2), loose sandy loam. The boundary between Stratum II and Stratum III is abrupt.

Stratum III: (65-170 cmbs) consists of a reddish brown (5YR 5/4) clay loam with alternating layers of a grayish brown (10YR 5/2), very fine basalt and coral sand mix, with some mixing of the layers. Each layer is bedded and compact. Stratum III appears to be wind deposited.

Trench 3 contained no cultural material and exhibited a uniform stratigraphy. Stratum I and Stratum II appear to be fill layers while Stratum III appears to be natural dune material. Trench 3's profile is similar to that of Trench 2, although the bedding in Stratum III is not as obvious in Trench 3 as it is in Trench 2.

Trench #: RB 4 (Figure 17)
Length: 4.3 m.
Width: 1.1 m.
Max Depth: 1.95 m.
Orientation: 143°TN
Location: 100 ft. at 160°TN from Trench 3.

General Environment: Trench 4 is located on a *makai* slope.

Profile Description: Stratum I: (0-10 cmbs) consists of a yellowish brown (10YR 5/4), loose sandy loam with abundant roots. The boundary between Stratum I and Stratum II is abrupt and slightly wavy.

Stratum II: (10-100 cmbs) consists of a light brownish gray (10YR 6/2), slightly consolidated and compact sandy loam. The boundary between Stratum II and Stratum III is abrupt.

Stratum III: (100-195 cmbs) consists of a reddish brown (5YR 5/4) clay loam with alternating layers of a grayish brown (10YR 5/2), very fine basalt and coral sand mix, with some mixing of the layers. Each layer is bedded and compact. Stratum III appears to be wind deposited.

Trench 4 contained no cultural material and exhibited a uniform stratigraphy. Stratum I and Stratum II appear to be fill layers while Stratum III appears to be natural dune material. This trench's profile is similar to that of Trench 3, although Stratum II is more consolidated and compact and Stratum III displays less layering than in Trench 3.

Trench #: RB 5 (Figure 17)
Length: 4.4 m.
Width: 1.2 m.
Max Depth: 1.7 m.
Orientation: 011°TN
Location: 100 ft. at 160°TN from Trench 4.

General Environment: Trench 5 is located in a level area which was probably formerly graded.

Profile Description: Stratum I: (0-30 cmbs) consists of a light brownish gray (10YR 6/2) sandy loam. The boundary between Stratum I and Stratum II is abrupt and slightly wavy.

Stratum II: (30-170 cmbs) consists of a brown (7.5YR 5/4) silty basalt and coral sand mix containing 15-20% water-worn basalt pebbles and cobbles. No layering or bedding is visible.

Trench 5 contained no cultural material and exhibited a uniform stratigraphy. Stratum I is the same as Stratum II of Trench 2. Stratum II is possibly a stream bed or old shoreline.

Trench #:	RB 6 (Figure 17)
Length:	4.2 m.
Width:	1.0 m.
Max Depth:	1.9 m.
Orientation:	253°TN
Location:	100 ft. at 276°TN from Trench 5.

General Environment: Trench 6 is located on a west slope of a steep dune.

Profile Description: Stratum I: (0-10 cmbs) consists of a yellowish red (5YR 5/8) sandy (coral and volcanic sand) silt which appears to be a fill/push layer. The boundary between Stratum I and Stratum II is abrupt and wavy.

Stratum II: (10-130 cmbs) consists of a dark reddish brown (5YR 3/3), compact and elastic sandy clay, with less than 5% coral sand. The boundary between Stratum II and Stratum III is abrupt and wavy.

Stratum III: (130-190 cmbs) consists of a reddish brown (5YR 4/3), slightly elastic silty clay. The water table was encountered at 150 cmbs.

Trench 6 contained no cultural material and exhibited a uniform stratigraphy. Its profile is similar to that of Trench 1.

Trench #:	RB 7 (Figure 17)
Length:	4.1 m.
Width:	1.2 m.
Max Depth:	1.85 m.
Orientation:	240°TN
Location:	75 ft. at 353°TN from Trench 6.

General Environment: Trench 7 is located in a level area between two dunes.

Profile Description: Stratum I: (0-20 cmbs) consists of a yellowish red (5YR 5/8) sandy (coral and volcanic sand) silt which appears to be a fill/push layer. The boundary between Stratum I and Stratum II is abrupt and wavy.

Stratum II: (20-150 cmbs) consists of a dark reddish brown (5YR 3/3), compact and elastic sandy clay, with less than 5% coral sand. The boundary between Stratum II and Stratum III is abrupt and wavy.

Stratum III: (150-185 cmbs) consists of a reddish brown (5YR 4/3), slightly elastic silty clay. The water table was encountered at 160 cmbs.

Trench 7 contained no cultural material and exhibited a uniform stratigraphy. Its profile is similar to that of Trench 1.

Trench #: RB 8 (Figure 17)
Length: 4.0 m.
Width: 1.2 m.
Max Depth: 1.8 m.
Orientation: 235°TN
Location: 70 ft. at 297°TN from Trench 4.

General Environment: Trench 8 is located in a level area between two dunes.

Profile Description: Stratum I: (0-50 cmbs) consists of a yellowish red (5YR 5/8) sandy (coral and volcanic sand) silt which appears to be a fill/push layer. The boundary between Stratum I and Stratum II is abrupt and wavy.

Stratum II: (50-150 cmbs) consists of a dark reddish brown (5YR 3/3), compact and elastic sandy clay, with less than 5% coral sand. The boundary between Stratum II and Stratum III is abrupt and wavy.

Stratum III: (150-180 cmbs) consists of a reddish brown (5YR 4/3), slightly elastic silty clay. The water table was encountered at 175 cmbs.

Trench 8 contained no cultural material and exhibited a uniform stratigraphy. Its profile is similar to that of Trench 1.

Proposed Connector Road

Trench #: CR 1 (Figure 18)
Length: 3.0 m.
Width: 1.0 m.
Max Depth: 0.8 m.
Orientation: 110°TN
Location: 100 ft. at 120°TN from the Headwall.

General Environment: Trench 1 is located in a level area between private residences and the YMCA.

Profile Description: Stratum I: (0-15 cmbs) consists of a very dark grayish brown (10YR 3/2) sandy loam with abundant roots and rootlets. Stratum I is an A horizon. The boundary between Stratum I and Stratum II is very abrupt and smooth.

Stratum II: (15-80 cmbs) consists of a very pale brown (10YR 8/4), soft limestone containing 5-10% water-rounded basalt pebbles and cobbles and exhibiting pockets of silt loam and weathered clay.

Trench 1 contained no cultural material and exhibited a uniform stratigraphy. Its profile represents a weak A horizon development on a former streambed.

Trench #:	CR 2 (Figure 18)
Length:	2.8 m.
Width:	1.0 m.
Max Depth:	0.7 m.
Orientation:	060°TN
Location:	100 ft. at 090°TN from Point 2.

General Environment: Trench 2 is located in a level area on the windward side of the dunes.

Profile Description: Stratum I: (0-10 cmbs) consists of a very dark grayish brown (10YR 3/2) sandy loam with abundant roots and rootlets. Stratum I is an A horizon. The boundary between Stratum I and Stratum II is very abrupt and smooth.

Stratum II: (10-70 cmbs) consists of a very pale brown (10YR 8/4), soft limestone containing 5-10% water-rounded basalt pebbles and cobbles and exhibiting pockets of silt loam and weathered clay.

Trench 2 contained no cultural material and exhibited a uniform stratigraphy. Its profile is similar to that of Trench 1 and represents a weak A horizon development on a former streambed.

Trench #:	CR 3 (Figure 18)
Length:	4.0 m.
Width:	1.2 m.
Max Depth:	1.2 m.
Orientation:	232°TN
Location:	100 ft. at 080°TN from Point 4.

General Environment: Trench 3 is located on the windward side of a dune slope.

Profile Description: Stratum I: (0-25 cmbs) consists of a grayish brown (10YR 5/2), fine to medium sand and is a probable fill layer. The boundary between Stratum I and Stratum II is very abrupt and smooth.

Stratum II: (25-120 cmbs) consists of a dark reddish brown (5YR 3/3) clay and is a probable fill layer.

Trench 3 contained no cultural material and exhibited a uniform stratigraphy.

Trench #: CR 3A (Figure 19)
Length: 3.0 m.
Width: 1.1 m.
Max Depth: 2.0 m.
Orientation: 330°TN
Location: 100 ft. at 100°TN from Trench 3 (Point 5).

General Environment: Trench 3A is located on the east slope of a dune which is a partially graded surface.

Profile Description: Stratum I: (0-160 cmbs) consists of a grayish brown (10YR 5/2), fine to very coarse sand with nodules of lithified sand. Stratum I is a fill layer.

Stratum II: (160-200 cmbs) consists of a dark grayish brown (10YR 4/2), fine to medium sand which is a buried A horizon.

Trench 3A contained no cultural material and exhibited a uniform stratigraphy. The profile showed the original dune surface (Stratum II) buried beneath 1.6 m. of sand fill (Stratum I). The source of this fill may be a nearby dune which appears to have been mined.

Trench #: 4
Length: ---
Width: ---
Max Depth: ---
Orientation: ---
Location: 100 ft. at 147°TN from Point 8.

General Environment: See below

Profile Description: Trench 4 was not excavated due to the rough topography which prevented backhoe access.

Trench #: CR 5 (Figure 19)
Length: 4.6 m.
Width: 1.4 m.
Max Depth: 1.2 m.
Orientation: 215°TN
Location: 100 ft. at 165°TN from Trench 4 (Point 9).

General Environment: Trench 5 is located on the east slope of a dune.

Profile Description: Stratum I: (0-20 cmbs) consists of a grayish brown (10YR 5/2) sandy loam. Stratum I is an A horizon. The boundary between Stratum I and Stratum II is abrupt and wavy.

Stratum II: (20-120 cmbs) consists of a light brownish gray (10YR 6/2), fine to medium, dune sand (composed of a coral and basalt sand mix) with horizontal peds of cementation. Stratum II is a C horizon.

Trench 5 contained no cultural material and exhibited a uniform topography. Its profile shows the dune to be undisturbed in this area with no grading or filling of the natural A horizon.

Trench #: CR 5A (Figure 19)
Length: 3.0 m.
Width: 1.2 m.
Max Depth: 1.4 m.
Orientation: 268°TN
Location: 20 ft. at 235°TN from Point 12.

General Environment: Trench 5A is located in a level area on the east side of a high dune.

Profile Description: Stratum I: (0-60 cmbs) consists of a grayish brown (10YR 5/2) sandy loam. The boundary between Stratum I and Stratum II is diffused and wavy.

Stratum II: (60-140 cmbs) consists of a very pale brown (10YR 7/3), fine to medium, coral and basalt sand mix. Carbonate lenses are present from 100-140 cmbs.

Trench 5A contained no cultural material and exhibited a uniform stratigraphy. Its profile is similar to that of Trench 5.

Trench #: CR 6 (Figure 19)
Length: 4.0 m.
Width: 1.5 m.
Max Depth: 1.5 m.
Orientation: 079°TN
Location: 100 ft. at 160°TN from Point 14.

General Environment: Trench 6 is located in a level area on the east side of a high dune.

Profile Description: Stratum I: (0-30 cmbs) consists of a brown to dark brown (10YR 4/3), fine to medium, loose sand. The boundary between Stratum I and Stratum II is clear and wavy.

Stratum IIA: (30-70 cmbs) consists of a white (10YR 8/2), fine to medium sand with faint bedding and weak carbonate cementation. Stratum IIA is a C horizon.

Stratum IIB: (70-150 cmbs) consists of a white (10YR 8/2), fine to medium, dune sand with pronounced bedding and horizontal lenses of cementation.

Trench 6 contained no cultural material and exhibited a uniform stratigraphy.

Trench #:	CR 7 (Figure 20)
Length:	5.0 m.
Width:	1.6 m.
Max Depth:	1.9 m.
Orientation:	160°TN
Location:	100 ft. at 140°TN from Point 16.

General Environment: Trench 7 is located on the north slope of a dune.

Profile Description: Stratum I: (0-35 cmbs) consists of a pale brown (10YR 6/3), fine to medium, loose sand containing metal fragments and recent trash. Stratum I is an A horizon. The boundary between Stratum I and Stratum II is abrupt and wavy.

Stratum II: (35-190 cmbs) consists of a very pale brown (10YR 7/4), fine to medium sand with coral inclusions which is loosely consolidated and has massive bedding. Carbonate root casts are present from 150-190 cmbs.

Trench 7 contained no cultural material and exhibited a uniform stratigraphy.

Trench #:	CR 8 (Figure 20)
Length:	4.5 m.
Width:	1.2 m.
Max Depth:	1.7 m.
Orientation:	140°TN
Location:	100 ft. at 155°TN from Trench 7 (Point 17).

General Environment: Trench 8 is located in a level area on the east side of a dune.

Profile Description: Stratum I: (0-50 cmbs) consists of a light yellowish brown (10YR 6/4), fine to medium, loose sand. Stratum I is a recent sand fill and an A horizon. The boundary between Stratum I and Stratum II is abrupt and smooth.

Stratum II: (50-60 cmbs) consists of a dark grayish brown (10YR 4/2), loose sandy loam. Stratum II is a buried A horizon. The boundary between Stratum II and Stratum III is abrupt and wavy.

Stratum III: (60-170 cmbs) consists of a light brownish gray (10YR 6/2), fine to medium, loose sand with massive bedding and carbonate root casts. Stratum III is a C horizon.

Trench 8 contained no cultural material and exhibited a uniform stratigraphy.

Trench #:	CR 9 (Figure 20)
Length:	4.5 m.
Width:	1.2 m.
Max Depth:	1.8 m.
Orientation:	145°TN
Location:	100 ft. at 175°TN from Trench 8 (Point 18).

General Environment: Trench 9 is located near the road in a level area at the crest of a dune which is partially graded.

Profile Description: Stratum I: (0-25 cmbs) consists of a very pale brown (10YR 7/3), fine to medium, loose sand. Stratum I is an A horizon. The boundary between Stratum I and Stratum IIA is abrupt and wavy.

Stratum IIA: (25-60 cmbs) consists of a very pale brown (10YR 7/4), loose sand which is a C horizon. The boundary between Stratum IIA and Stratum IIB is gradual and wavy.

Stratum IIB: (60-180 cmbs) consists of a very pale brown (10YR 7/4) sand with pronounced cementation and sub-horizontal bedding on a 10% slope. The cementation increases downward through the stratum.

Trench 9 contained no cultural material and exhibited a uniform stratigraphy.

Trench #:	CR 10 (Figure 20)
Length:	4.5 m.
Width:	1.2 m.
Max Depth:	1.5 m.
Orientation:	020°TN
Location:	100 ft. at 180°TN from Trench 9 (Point 19).

General Environment: Trench 10 is located on the west slope of a dune.

Profile Description: Stratum I: (0-70 cmbs) consists of a pale brown (10YR 6/3), fine to medium, loose sand which is a recent fill layer. The boundary between Stratum I and Stratum IIA is abrupt and smooth.

Stratum IIA: (70-80 cmbs) consists of a dark grayish brown (10YR 4/2), fine to medium, loose sand which is a buried A horizon. The boundary between Stratum IIA and Stratum IIB is abrupt and wavy.

Stratum IIB: (80-150 cmbs) consists of a light yellowish brown (10YR 6/4), fine to medium sand with massive bedding.

Trench 10 contained no cultural material and exhibited a uniform stratigraphy.

Trench #:	CR 11 (Figure 20)
Length:	3.5 m.
Width:	1.3 m.
Max Depth:	0.5 m.
Orientation:	185°TN
Location:	100 ft. at 185°TN from Point 22.

General Environment: Trench 11 is located on the crest of a dune.

Profile Description: Stratum I: (0-10 cmbs) consists of a yellowish brown (10YR 5/4), fine to very fine, loamy sand with abundant roots. Stratum I is an A horizon. The boundary between Stratum I and Stratum II is abrupt and wavy.

Stratum II: (10-50 cmbs) consists of a pale brown (10YR 6/3), coarse to fine, bedded sand which is extremely lithified.

Trench 11 contained no cultural material and exhibited a uniform stratigraphy. The strata of Trench 11 and Trench 12 are the same, although Stratum II in Trench 11 is much harder and more lithified than that of Stratum II in Trench 12.

Trench #:	CR 12 (Figure 20)
Length:	4.0 m.
Width:	1.0 m.
Max Depth:	1.9 m.
Orientation:	281°TN
Location:	100 ft. at 180°TN from Trench 11 (Point 23).

General Environment: Trench 12 is located on the east slope of a high dune.

Profile Description: Stratum I: (0-20 cmbs) consists of a yellowish brown (10YR 5/4), fine to very fine, loamy sand with abundant roots. Stratum I is an A horizon. The boundary between Stratum I and Stratum II is abrupt and wavy.

Stratum II: (20-90 cmbs) consists of a pale brown (10YR 6/3), coarse to fine, bedded sand which is slightly lithified. The boundary between Stratum II and Stratum III is indistinct and wavy.

Stratum III: (90-190 cmbs) consists of a light yellowish brown (10YR 6/4), fine, slightly compact sand.

Trench 12 contained no cultural material and exhibited a uniform stratigraphy.

Proposed Little League Field (Field 7)

Trench #: LL 1 (Figure 20)
Length: 4.0 m.
Width: 1.5 m.
Max Depth: 1.5 m.
Orientation: 020°TN
Location: 45 ft. at 282°TN from Point 2.

General Environment: Trench 1 is located on the south slope of a dune.

Profile Description: Stratum I: (0-40 cmbs) consists of a light yellowish brown (10YR 6/4), fine loamy sand (mostly coral with some basalt sand). Stratum I is an A horizon. The boundary between Stratum I and Stratum II is abrupt and wavy.

Stratum II: (40-120 cmbs) consists of a yellowish brown (10YR 5/4), fine, semi-lithified, coral sand with abundant vertical root casts. The boundary between Stratum II and Stratum III is abrupt and wavy.

Stratum III: (120-150 cmbs) consists of a light yellowish brown (10YR 6/4), very fine, loose coral sand.

Trench 1 contained no cultural material and exhibited a uniform stratigraphy.

Trench #: LL 2 (Figure 20)
Length: 4.0 m.
Width: 1.2 m.
Max Depth: 1.6 m.
Orientation: 180°TN
Location: 55 ft. at 310°TN from Point 4.

General Environment: Trench 2 is located on the level crest of a dune.

Profile Description: Stratum I: (0-10 cmbs) consists of a brown to dark brown (10YR 4/3), very loose and organic loamy sand with abundant roots and rootlets. Stratum I is an A horizon.

Stratum II: (10-40 cmbs) consists of a brownish yellow (10YR 6/6), fine sand with 5-10 cm. thick lenses of coarse sand. The boundary between Stratum II and Stratum III is abrupt and smooth.

Stratum III: (40-70 cmbs) consists of a light yellowish brown (10YR 6/4), fine to coarse, loose sand. The boundary between Stratum III and Stratum IV is abrupt and wavy.

Stratum IV: (70-90 cmbs) consists of a brown (10YR 5/3), fine, fairly loose loamy sand containing a few roots. Stratum IV is a buried A horizon. The boundary between Stratum IV and Stratum V is faded but smooth.

Stratum V: (90-160 cmbs) consists of a pale brown (10YR 6/3), very fine, fairly loose sand. The lower portion of the stratum (130-160 cmbs) is bedded and lithified.

Trench 2 contained no cultural material and exhibited a uniform stratigraphy.

Trench #: LL 3 (Figure 20)
Length: 4.0 m.
Width: 1.4 m.
Max Depth: 1.5 m.
Orientation: 350°TN
Location: 85 ft. at 276°TN from Trench 2 (Point 5).

General Environment: Trench 3 is located on the level crest of a dune.

Profile Description: Stratum I: (0-20 cmbs) consists of a light yellowish brown (10YR 6/4), loose loamy sand with abundant roots. The boundary between Stratum I and Stratum II is mottled and uneven.

Stratum II: (20-60 cmbs) consists of a yellowish brown (10YR 5/4), fine, compact sand with a few root casts.

Stratum III: (60-150 cmbs) consists of a light brownish gray (10YR 6/2), fine, very compact sand.

Trench 3 contained no cultural material and exhibited a uniform stratigraphy. The bottom of the trench consists of a lithified material.

Trench #: LL 4 (Figure 20)
Length: 4.0 m.
Width: 1.5 m.
Max Depth: 0.5 m.
Orientation: 0°TN
Location: 30 ft. at 210°TN from Point 7.

General Environment: Trench 4 is located on the south slope of a dune.

Profile Description: Stratum I: (0-5 cmbs) consists of a brown to dark brown (10YR 4/3), loose loamy sand. Stratum I is an A horizon. The boundary between Stratum I and Stratum II is abrupt and smooth.

Stratum II: (5-20 cmbs) consists of a light yellowish brown (10YR 6/4), coarse to fine sand which is lithified, bedded, and platy. The boundary between Stratum II and Stratum III is abrupt and smooth.

Stratum III: (20-50 cmbs) consists of a yellowish brown (10YR 5/4), coarse to fine, very compact sand with horizontal bedding.

Trench 4 contained no cultural material and exhibited a uniform stratigraphy. The bottom of the trench consists of a lithified material.

Trench #: LL 5 (*Figure 20*)
Length: 4.0 m.
Width: 1.5 m.
Max Depth: 1.6 m.
Orientation: 179°TN
Location: 65 ft. at 80°TN from Point 4.

General Environment: Trench 5 is located on the level crest of a dune.

Profile Description: Stratum I: (0-90 cmbs) consists of a light yellowish brown (10YR 6/4), fine to very fine sand which is slightly bedded. The first 5 cm. are loose while the remaining portion of the stratum is compact to semi-lithified with numerous root casts. The boundary between Stratum I and Stratum II is abrupt and smooth.

Stratum II: (90-160 cmbs) consists of a yellowish brown (10YR 5/4), fine, compact to semi-lithified sand.

Trench 5 contained no cultural material and exhibited a uniform stratigraphy.

Proposed Multi-Purpose Field (Field 6)

Trench #: F6 1 (Figure 21)
Length: 4.6 m.
Width: 1.5 m.
Max Depth: 1.7 m.
Orientation: 231°TN
Location: 100 ft. at 096°TN from Point 2.

General Environment: Trench 1 is located in a level area.

Profile Description: Stratum I: (0-80 cmbs) consists of a white (10YR 8/2), medium to coarse, bedded sand containing modern trash (cans and bottles). Stratum I is a fill layer which has been pushed and disturbed. It contains a discontinuous layer of red clay fill on the surface, extending to a maximum depth of 25 cm. The boundary between Stratum I and Stratum II is abrupt and smooth.

Stratum II: (80-120 cmbs) consists of a very dark grayish brown (10YR 3/2) sandy loam which contains land snails but no cultural material. Stratum II is a buried A horizon. The boundary between Stratum II and Stratum III is diffused and wavy.

Stratum III: (120-170 cmbs) consists of a grayish brown (10YR 5/2), fine to medium sand with horizontal lines of cementation. Stratum III is a sterile C horizon.

Trench 1 contained no cultural material and exhibited a uniform stratigraphy.

Trench #: F6 2 (Figure 21)
Length: 4.6 m.
Width: 1.3 m.
Max Depth: 1.5 m.
Orientation: 350°TN
Location: 100 ft. at 185°TN from Point 3 (Trench 1).

General Environment: Trench 2 is located in a level area.

Profile Description: Stratum I: (0-50 cmbs) consists of a white (10YR 8/2), medium to coarse, bedded sand containing modern trash (cans and bottles). Stratum I is a fill layer which has been pushed and disturbed. The boundary between Stratum I and Stratum II is abrupt and smooth.

Stratum II: (50-100 cmbs) consists of a very dark grayish brown (10YR 3/2) sandy loam which contains land snails but no cultural material. Stratum II is a buried A horizon. The boundary between Stratum II and Stratum III is diffused and wavy.

Stratum III: (100-150 cmbs) consists of a grayish brown (10YR 5/2), fine to medium sand with horizontal lines of cementation. Stratum III is a sterile C horizon.

Trench 2 contained no cultural material and exhibited a uniform stratigraphy.

Trench #: F6 3 (Figure 21)
Length: 3.6 m.
Width: 1.0 m.
Max Depth: 1.3 m.
Orientation: 353°TN
Location: 120 ft. at 090°TN from Trench 2.

General Environment: Trench 3 is located in a level area.

Profile Description: Stratum I: (0-35 cmbs) consists of a very dark grayish brown (10YR 3/2) sandy loam with abundant roots and rootlets. Stratum II is an A horizon. The boundary between Stratum I and Stratum II is diffused and wavy.

Stratum II: (35-130 cmbs) consists of a white (10YR 8/2), fine to medium sand. Stratum II is a C horizon extending to the base of excavation where impenetrable, cemented sand was encountered.

Trench 3 contained no cultural material and exhibited a uniform stratigraphy. Trench 3 revealed an undisturbed sequence for this area of the dune. Its profile is similar to that of Trench 2, with the exception of the absence of an overlying fill layer. Therefore Stratum I of Trench 3 is equivalent to Stratum II of Trench 2 and Stratum II of Trench 3 is equivalent to Stratum III of Trench 2.

Trench #:	F6 4 (Figure 21)
Length:	4.3 m.
Width:	1.2 m.
Max Depth:	1.3 m.
Orientation:	08°TN
Location:	150 ft. at 0°TN from Trench 3.

General Environment: Trench 4 is located in a level area.

Profile Description: Stratum I: (0-40 cmbs) consists of a very dark grayish brown (10YR 3/2) sandy loam with abundant roots and rootlets. Stratum II is an A horizon. The boundary between Stratum I and Stratum II is diffused and wavy.

Stratum II: (40-130 cmbs) consists of a white (10YR 8/2), fine to medium sand. Stratum II is a C horizon extending to the base of excavation where impenetrable, cemented sand was encountered.

Trench 4 contained no cultural material and exhibited a uniform stratigraphy. Its profile is similar to that of Trench 3.

Trench #:	F6 5 (Figure 21)
Length:	4.0 m.
Width:	1.0 m.
Max Depth:	1.5 m.
Orientation:	205°TN
Location:	Originally located 100 ft. at 310°TN from Trench 4; due to the rough topography (preventing backhoe access), the trench was moved 33 ft. at 205°TN from the original location.

General Environment: Trench 5 is located on a long, linear rise which may have been previously graded.

Profile Description: Stratum I: (0-90 cmbs) consists of a white (10YR 8/2), medium to coarse, bedded sand containing modern trash (cans and bottles). Stratum I is a fill layer which has been pushed and disturbed. The boundary between Stratum I and Stratum II is abrupt and smooth.

Stratum II: (90-120 cmbs) contains of a very dark grayish brown (10YR 3/2) sandy loam which contains land snails but no cultural material. Stratum II is a buried A horizon. The boundary between Stratum II and Stratum III is diffused and wavy.

Stratum III: (120-150 cmbs) consists of a grayish brown (10YR 5/2), fine to medium sand with horizontal lines of cementation. Stratum III is a sterile C horizon extending to the base of excavation where lithified sand was encountered.

Trench 5 contained no cultural material and exhibited a uniform stratigraphy. The profile indicates that the original surface (Stratum II, A horizon) has been modified with the introduction of a fill layer.

VI. SUMMARY AND RECOMMENDATIONS

A. Summary

Historical research and the interview with Charles Keau suggest that traditional Hawaiian settlement in this portion of Maui was concentrated on both sides of 'Iao Stream and at the shoreline of Kahului. The present project area represents the northern portion of the Wailuku Sand Hill area which extends south into Waikapu. The sand hill area is known to be the location of human burials. Beginning in the nineteenth century, this area was used for pasture land and this use continued into the twentieth century (according to Mr. Keau). In modern times, the study area has been the location of two previously recorded archaeological sites: a portion of the Kahului Railroad line and of a World War II military installation.

The only structural remnants of the two previously recorded sites are concrete pads, the largest of which was the foundation for numerous quonset huts.

No additional human remains were observed during the survey of the area in which scattered human remains had been previously reported.

During the subsurface testing and surface survey, no archaeological remains were encountered. The trenches in undisturbed areas showed modern unconsolidated dune sand overlying older, probably pleistocene, lithified dune deposits. Terrestrial deposits - gravel and silt - were found in limited areas underlying thin cover of dune sand within the northwestern portion of the project area, in trenching for the connector road. In general, the A-horizons observed in the trenching were thin and weakly developed, reflecting the constantly shifting dune environment.

B. Archaeological Recommendations

In spite of the negative findings of the present subsurface testing and surface inventory survey, and the similarly negative results of the previous reconnaissance survey (Heidel *et al.* 1996), there is still likelihood of cultural materials, especially burials, occurring within the ungraded and partially graded portions of the project area. The specific archaeological concerns that remain to be addressed are as follows:

1) Inadvertent finds of cultural materials and human burials during grubbing and grading for the project.

2) Mr. Charles Keau expressed concern of possible reinterment in the present project area of burials found by construction workers during grading of the Ka'ahumanu Avenue alignment during the 1930s.

Based on these concerns, it is recommended that archaeological monitoring be conducted during construction within the project area. It is particularly important that an archaeologist be present during the initial phases of grubbing and grading for each of the proposed park facilities. The monitoring should be accomplished according to a monitoring plan reviewed and approved by SHPD and Maui County before construction commences. The plan should also specify that, if findings are uncovered, work should immediately be halted in that area until appropriate mitigation is decided upon. Inadvertent finds of human burials would be treated in accordance with Section 6E-43.6, Hawaii Revised Statutes.

C. Non-Archaeological Considerations

Additional general environmental issues were raised by Mr. Keau and may be taken into consideration during future planning:

1) There is the possible presence of underground water flowing within the lava bedrock underlying dune sand in the project area.

2) Mr. Keau's experiences on the property - *including information* given him and his personal observations - made him aware of burials of military and industrial debris especially in the areas *mauka* of the large concrete pad. This material may include ammunition and toxic materials.

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Appendix C

Traffic Assessment

PREFINAL DRAFT

MAUI CENTRAL PARK

TRAFFIC ASSESSMENT

PREPARED FOR

PARKS AND RECREATION,

PLANNING AND DEVELOPMENT DIVISION

COUNTY OF MAUI

PREPARED BY

WILSON OKAMOTO & ASSOCIATES, INC.

AUGUST 1996

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MAUI CENTRAL PARK

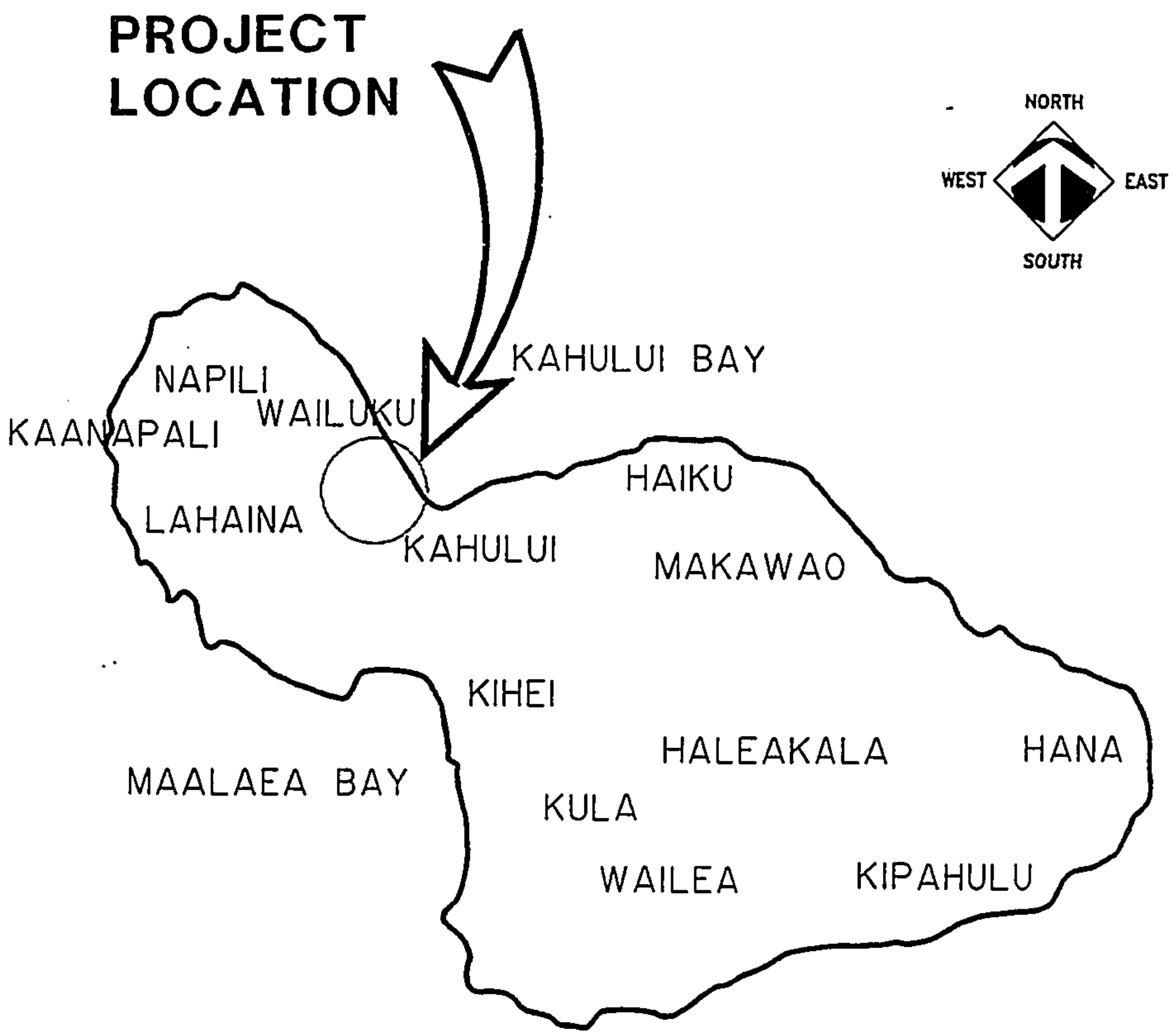
TRAFFIC ASSESSMENT

1. INTRODUCTION

A. Project Description

The County of Maui proposes to construct the Maui Central Park. Maui Central Park is located in Kahului, Maui and is bounded by Kahului Beach Road on the east, Maui Community College and Kaahumanu Avenue on the south, Kanaloa Avenue on the west and an existing residential development on the north. The 120-acre site is identified as TMK: 3-8-7: Por. 1; and 3-7-1: Por. 2. Exhibit 1 shows the project location. The facilities within the park include the following: baseball and soccer fields, a horseshoe pitching facility, skate park, storage and maintenance area, open pavilion, a keiki zoo, YMCA facility, youth center, botanical garden and paved paths for pedestrians, bicycles and maintenance service vehicles.

The construction of Maui Central Park will also include the extension of Papa Avenue to Kahului Beach Road. The existing Papa Avenue terminates at the existing Maui Community College dormitory. This road will be extended to connect with the existing road fronting the Maui Cultural and Arts Center that intersects with Kahului Beach Road. An access road to service park users will connect the west Papa Avenue Extension to Kanaloa Avenue at the intersection of Mikohu Loop. This access roadway will extend to the proposed Papa Avenue extension to form a T-intersection west of the Maui Culture & Arts Center. Exhibit 2 shows the project Vicinity Map.



WILSON OKAMOTO & ASSOCIATES, INC. ENGINEERS - PLANNERS 1907 S. BERETANIA STREET HONOLULU, HAWAII 96826	MAUI CENTRAL PARK LOCATION MAP	EXHIBIT 1

DOCUMENT CAPTURED AS RECEIVED

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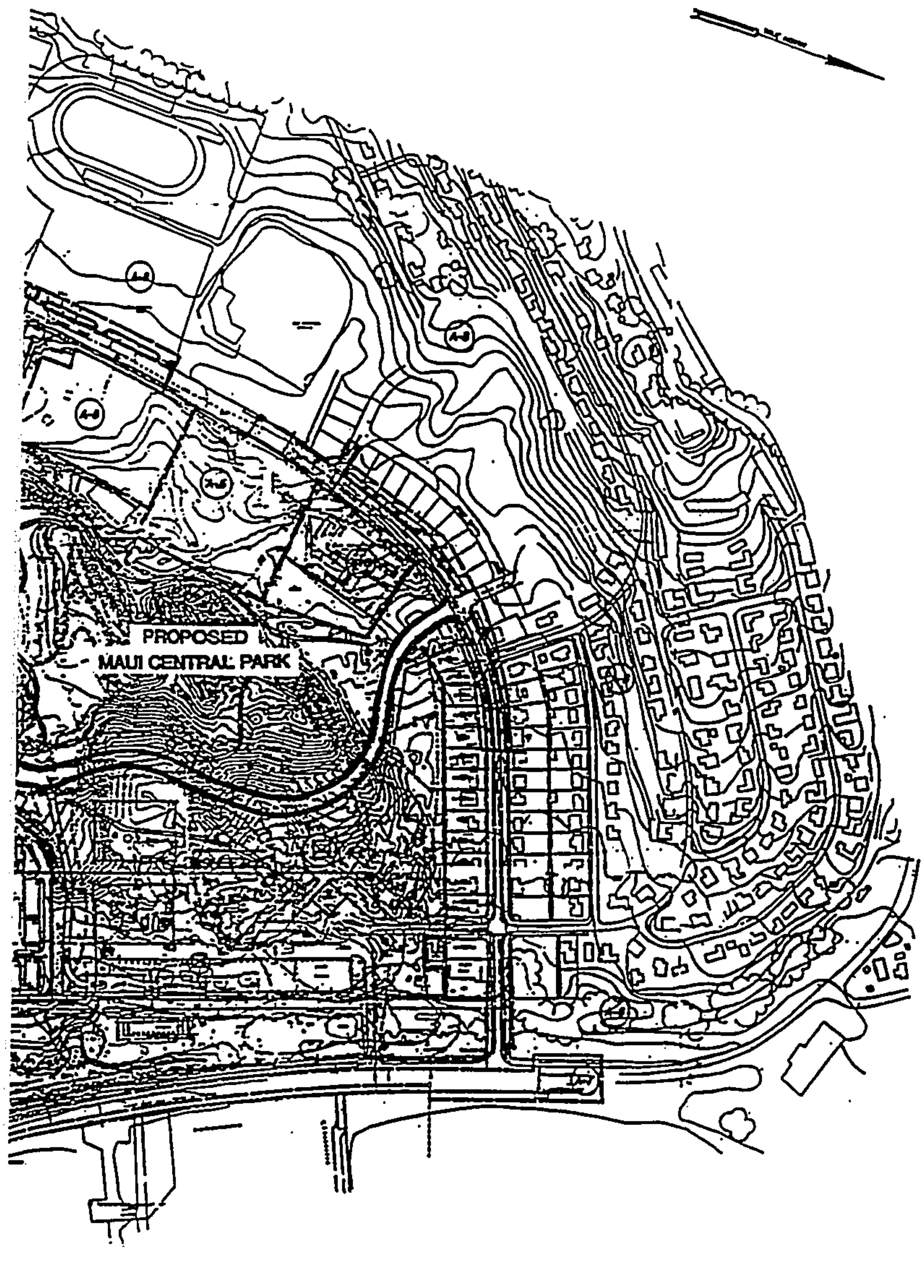


WILSON OKAMOTO & ASSOCIATES, INC. ENGINEERS - PLANNERS	MAUI CENTRAL PARK	EXHIBIT
	PROJECT SITE PLAN	2

B. Purpose

This traffic assessment will document the traffic conditions resulting from the proposed project and to determine its impact on traffic operations of the existing intersections and roadways in the vicinity. The purpose of this study includes the following:

1. Determine existing traffic operating conditions on existing roadway geometrics.

2. Determine projected traffic conditions.

3. Analyze projected traffic conditions on existing roadway geometrics.

4. Determine project trip generation and traffic distribution from proposed project.

5. Analyze projected traffic conditions on proposed roadway geometrics.

6. Identify additional roadway improvements, if appropriate, to mitigate potential roadway deficiencies.

C. Scope

This study will analyze traffic operating conditions at the intersections of Kaahumanu Avenue with Papa Avenue and Wakea Avenue. In addition, Kaahumanu Avenue fronting the project site will be evaluated. The Scope of Work includes the following:

1. Obtain existing traffic volume data at key intersections on Kaahumanu Avenue and analyze the data to establish the existing traffic operating conditions.

2. Observe existing traffic operations and conditions.

3. Project future traffic demands on Kaahumanu Avenue within the study limits.

4. Develop trip generation characteristics for the proposed project.

5. Superimpose projected traffic volumes on proposed roadway geometrics. Evaluate and assess traffic operating conditions.

6. Identify and analyze traffic impacts resulting from the proposed project.

7. Prepare a report of the findings, conclusions and recommendations of the study.

II. EXISTING TRAFFIC CONDITIONS

A. General

Wailuku and Kahului are growing communities due to the increase in residential, commercial and industrial developments. Kaahumanu Avenue and Kahului Beach Road provide the major physical link between these two communities. Kanaloa Avenue provides a connection between Kaahumanu Avenue and Kahului Beach Road.

B. Roadways

1. General

The traffic signal system on Kaahumanu is coordinated between Wharf Street on the east and Mahalani Street/Kanaloa Avenue on the west by an on-street master controller. Kaahumanu Avenue is a four- to six-lane divided urban arterial roadway generally oriented in the east-west direction. Kaahumanu Avenue is a major roadway that connects the two urban centers of Kahului and Wailuku. Kaahumanu Avenue is signalized at the intersections fronting Maui Community College (MCC), with left-turn storage lanes and right-turn deceleration and acceleration lanes at major intersections. Kaahumanu Avenue intersects Kahului Beach Road, which leads to Lower Main Street and Waiehu Beach Road in Wailuku. Kanaloa Avenue connects Kahului Beach Road and Kaahumanu Avenue. The posted speed on Kaahumanu Avenue, in the project vicinity, is 45 miles per hour.

South Papa Avenue and Wakea Avenue are two-lane, two-way collector roads which begin in the industrial area of South Kahului and connect to Kaahumanu Avenue through the Kahului residential area. South Papa Avenue, north of Kaahumanu Avenue, provides access to the MCC faculty housing.

2. Kaahumanu Avenue and Mahalani Street/Kanaloa Avenue Intersection

The intersection of Kaahumanu Avenue and Mahalani Street/Kanaloa Avenue is controlled by a traffic signal system. Kaahumanu Avenue at this intersection has exclusive left-turn lanes to southbound Mahalani Street and northbound Kanaloa Avenue. Right-turn deceleration and acceleration lanes on westbound and eastbound Kaahumanu Avenue are provided. The southbound Kanaloa Avenue approach consists of three lanes: an exclusive left-turn lane, and optional left-turn/through lane, and an exclusive right-turn lane to westbound Kaahumanu Avenue. There is an optional left-turn/through lane and an exclusive right-turn lane on the northbound Mahalani Street approach. This intersection is controlled by a six-phase traffic signal system with protected/permissive left-turn movements on Kaahumanu Avenue.

3. Kaahumanu Avenue and South Papa Avenue Intersection

The intersection of Kaahumanu Avenue and South Papa Avenue is a signalized intersection. The eastbound approach on Kaahumanu Avenue has an exclusive left-turn lane, two through lanes, and a right-turn deceleration lane to southbound South Papa Avenue. The westbound approach of Kaahumanu Avenue has an exclusive left-turn lane and two through lanes. The northbound South Papa Avenue approach has an exclusive left-turn and a shared left, through and right-turn lane. An acceleration lane is provided on Kaahumanu Avenue for the right-turn movement from northbound South Papa Avenue to eastbound Kaahumanu Avenue. The southbound approach of South Papa Avenue has one lane for the left turn, through and right turn movements. This intersection is controlled by a three phase traffic signal system with protected/permissible left-turn movements on Kaahumanu Avenue.

4. Kaahumanu Avenue and Wakea Avenue Intersection

The intersection of Kaahumanu Avenue and Wakea Avenue operates as a signalized intersection. Right-turn deceleration and acceleration lanes are provided on Kaahumanu Avenue for both eastbound and westbound traffic. The eastbound and westbound approaches on Kaahumanu Avenue at Wakea Avenue each have an exclusive left-turn lane, two through lanes, and a right-turn deceleration lane. The northbound approach of Wakea Avenue has an optional left-turn/through lane and an exclusive right-turn lane. The southbound approach exiting MCC has a shared left-turn, through and right-turn lane. This intersection is controlled by a five phase traffic signal system with protected/permissive left-turn movements on Kaahumanu Avenue.

C. Traffic Volumes and Conditions

1. General

a. Field Investigation

A field investigation was conducted on July 17 and 18, 1996, to establish baseline traffic conditions. The field investigation was comprised of a site inspection of the road and intersections, and a traffic count survey. The traffic count survey was conducted between the hours of 6:30 a.m. and 8:30 a.m. in the morning, and between 3:30 p.m. and 5:30 p.m. in the afternoon at the intersections of Kaahumanu Avenue with Papa Avenue and Wakea Avenue.

b. Capacity Analysis Methodology

The highway and intersection capacity analysis performed in this study is based upon procedures presented in the "Highway Capacity Manual", Special Report 209, Transportation Research Board, 1985 and the "Highway Capacity Software", Federal Highways Administration.

Level of Service (LOS) is a quantitative and qualitative assessment of traffic operations. Levels of Service are defined by LOS "A" through "F"; LOS "A" representing the best operating condition and LOS "F" the worst operating condition.

"Volume-to-capacity" (v/c) ratio is another measure indicating the relative traffic demand to the road's carrying capacity. A v/c ratio of 1.00 indicates that the roadway is operating at 100% of its capacity. A v/c ratio greater than one (1.00) indicates that the projected traffic demand exceeds the road's traffic handling capacity.

The definitions for the various Levels of Service are included in the Appendix.

2. Traffic Operations

Kaahumanu Avenue is the primary roadway linking the two urban centers of Wailuku and Kahului. Near the project site, Kaahumanu Avenue is a major arterial serving large traffic generators such as: Kaahumanu Shopping Center, Baldwin High School, Maui Memorial Hospital and Maui Community College.

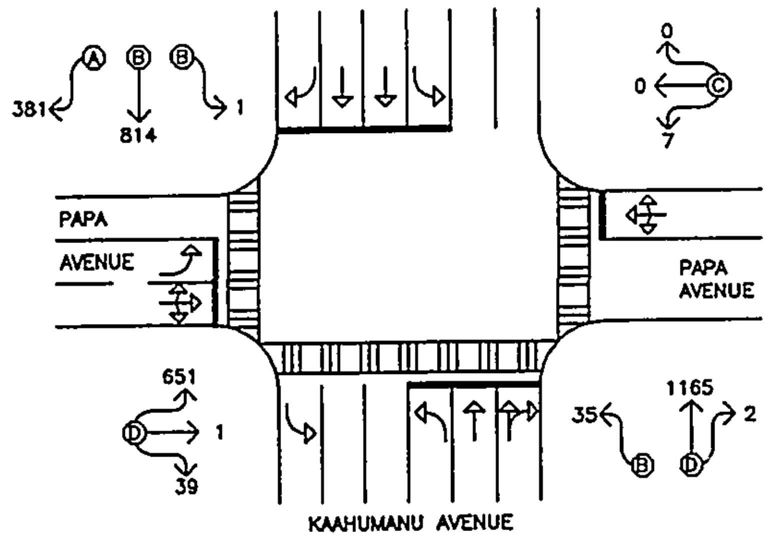
Kaahumanu Avenue exhibit periods of congestion in the Wailuku bound direction during the AM peak period of traffic. Traffic congestion on Kaahumanu Avenue would often cause vehicles to queue through the Papa Avenue intersection. The relatively high left-turn volume from north bound Papa Avenue to west bound Kaahumanu Avenue would further deteriorate the operating Level of Service at the intersection. Less severe delays were observed on the Wakea Avenue left-turn movement on to west bound Kaahumanu Avenue.

3. Existing AM Peak Hour Traffic Analysis

The AM peak hour of traffic in the study area occurs between 6:30 AM and 7:30 AM on the east side of the project limits and between 7:15 AM and 8:15 AM on the west side of the project. The shift in peak hour may be attributed to the comparatively high north bound left-turn movement from Papa Avenue to west bound Kaahumanu Avenue. Much of the traffic demand appears to originate from the residential areas of Kahului. The latter peak period caused by this movement reflects the later overall intersection peak hour. The existing AM peak hour traffic volumes and operating Levels of Service are shown in Exhibit 3.

Kaahumanu Avenue, west of Papa Avenue, carries 1816 vehicles per hour (vph) during the existing AM peak hour of traffic in the westbound direction. Kaahumanu Avenue, just west of Papa Avenue, operates at LOS "C" and at a v/c ratio of 0.53 during the existing AM peak hour of traffic.

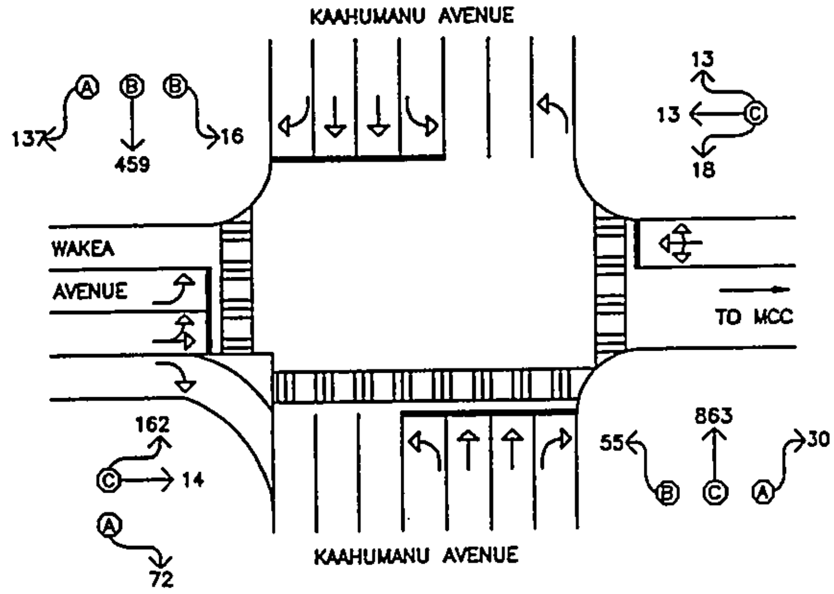
LOS C
V/C = 0.53



LEGEND

90	TRAFFIC MOVEMENT VOLUME (VPH)
	LANE USAGE
LOS	LEVEL OF SERVICE (MULTI-LANE HWY)
V/C	VOLUME-TO-CAPACITY RATIO
A	LEVEL OF SERVICE (SIGNALIZED INTERSECTION)

DATE OF COUNT: JULY 18, 1996



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MAUI CENTRAL PARK

EXISTING AM PEAK HOUR TRAFFIC

EXHIBIT

3

The intersection of Wakea Avenue and Kaahumanu Avenue operates at an overall LOS "C" during the existing AM peak hour of traffic.

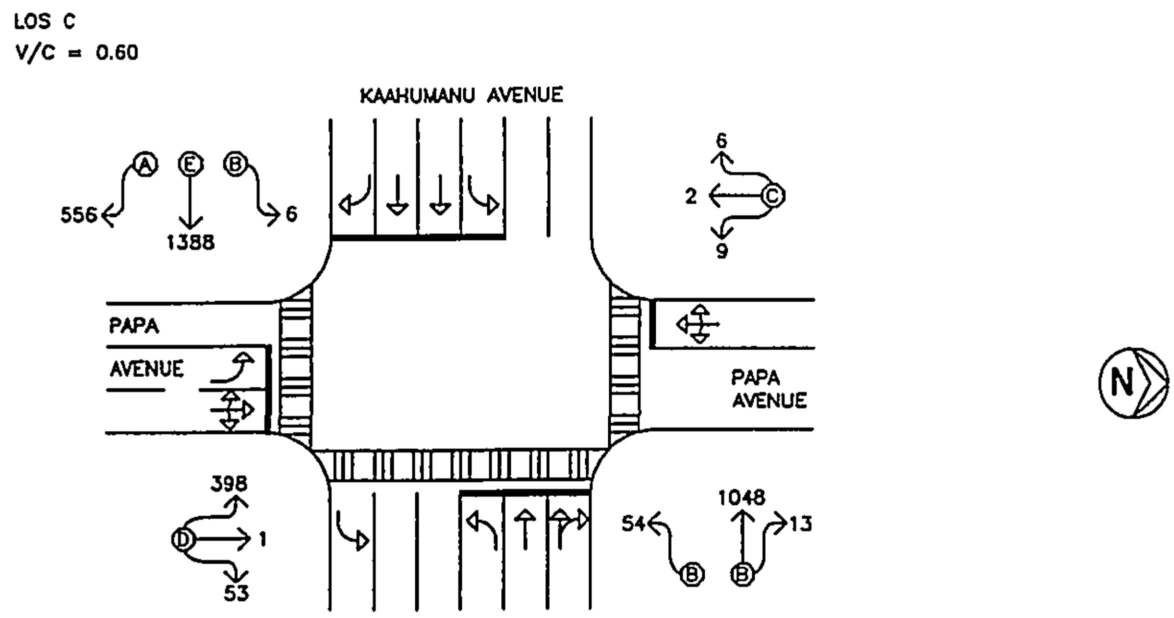
Motorists at the intersection of Papa Avenue and Kaahumanu Avenue experienced some delay on the westbound through movement and northbound left-turn movement. The overall intersection operates at LOS "D" during the existing AM peak hour of traffic.

4. **Existing PM Peak Hour Traffic Analysis**

The PM peak hour of traffic in the study starts at about 4:30 PM. The existing PM peak hour traffic volumes and operating Levels of Service are shown in Exhibit 4.

Motorists at the intersection of Wakea Avenue and Kaahumanu Avenue experienced some delay on the southbound approach of the intersection. Much of the southbound traffic entering the intersection is associated with Maui Community College. The overall intersection operates at LOS "B" during the PM peak hour of traffic.

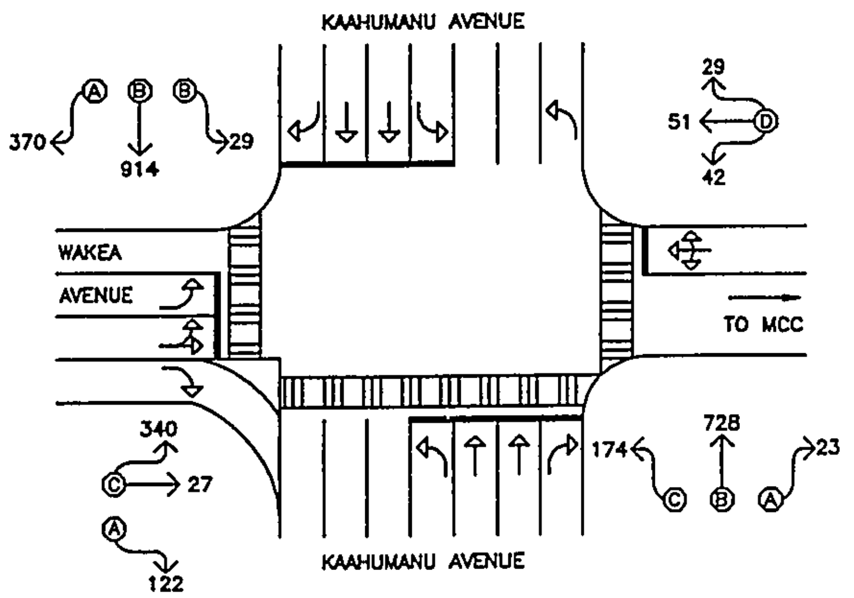
Motorists at the intersection of Papa Avenue and Kaahumanu Avenue experienced delays for the eastbound through movement and northbound approach. The overall intersection operates at LOS "D" and a during the existing PM peak hour of traffic.



LEGEND

90	TRAFFIC MOVEMENT VOLUME (VPH)
	LANE USAGE
LOS	LEVEL OF SERVICE (MULTI-LANE HWY)
V/C	VOLUME-TO-CAPACITY RATIO
Ⓐ	LEVEL OF SERVICE (SIGNALIZED INTERSECTION)

DATE OF COUNT: JULY 17, 1996



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III. PROJECTED TRAFFIC

A. General

Vehicular traffic demand is expected to increase in the project vicinity. The park is expected to be constructed in the Year 1998, thus the roadway and study intersections were evaluated in the built-out year of 1998. Data developed in a traffic assessment for the new Parkway and Papa Avenue extension, Maui Central Park, prepared by Austin Tsutsumi and Associates,Inc. dated September 1994 was used as the basis for trip distribution and traffic assignment. In addition, the County of Maui has plans to install a traffic signal system at the intersection of Kahului Beach Road and the proposed Papa Avenue Extension. For the purpose of this study, the intersection is assumed to be designed accordingly and therefore excluded in the analysis.

B. Traffic Demands

The State Department of Transportation has developed the "Traffic Survey Data - Island of Maui and Molokai - 1995". This study compiles a biennial 24 hour traffic volumes at various intersections and critical roadway segments. Volumes were taken west of Papa Avenue at the intersection of Kanaloa Avenue and Kaahumanu Avenue. Based on historical traffic volume, a linear regression factor was developed and applied to the roadway and each studied intersection to obtain projected volumes for the Year 1998.

C. Traffic Volumes and Conditions Without the Proposed Improvements

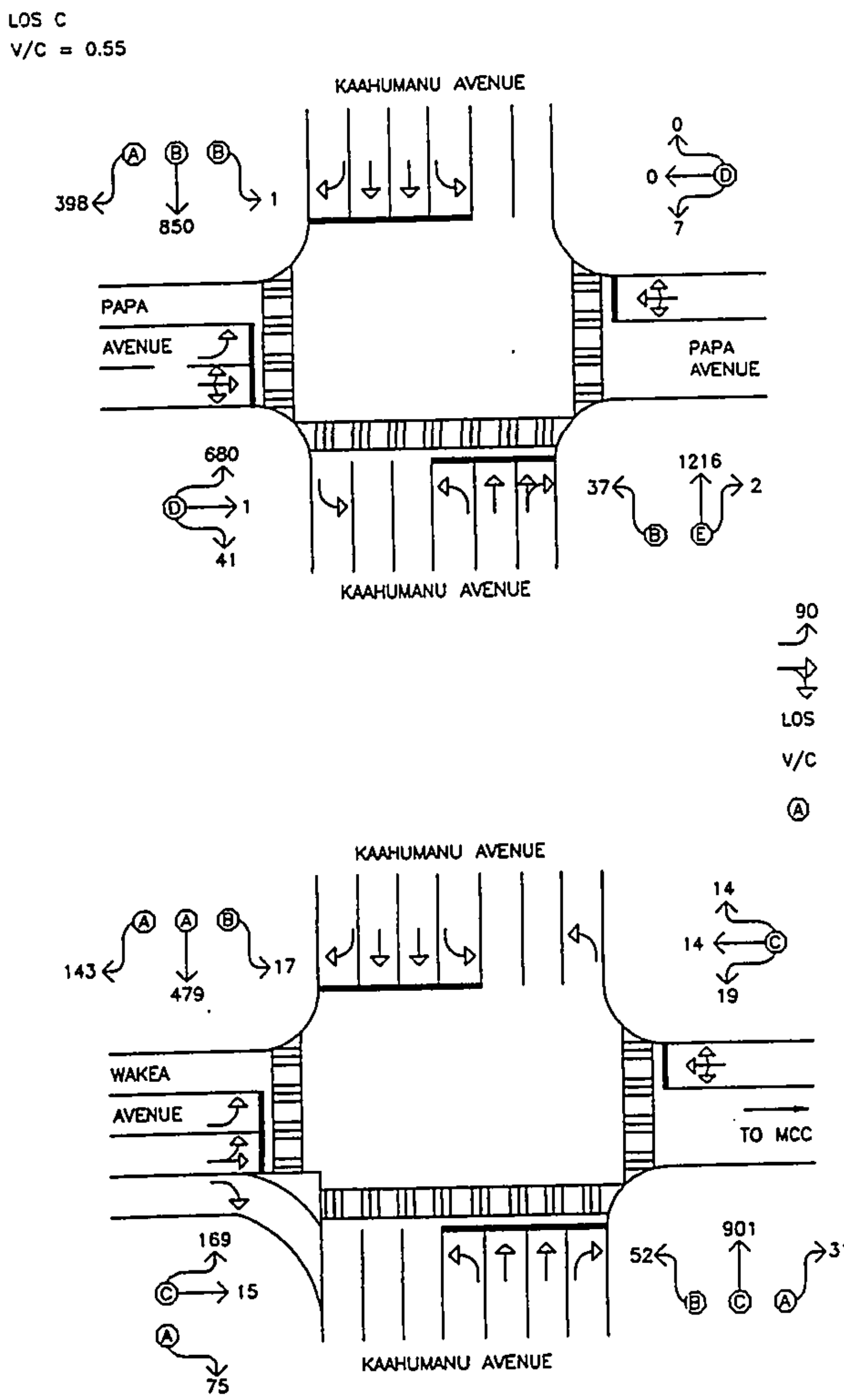
The Year 1998 traffic projections without the proposed improvements, are shown on Exhibit 5 and 6. The "Traffic Survey Data" provided by the State Department of Transportation was used as the basis in projecting existing 1996 AM and PM traffic volumes to the Year 1998. Tables 1 and 2 show the operating LOS and v/c ratios of the critical movements at the intersections in the study area for the AM and PM peak hours of traffic, without the proposed improvements, respectively.

Kaahumanu Avenue, west of Papa Avenue, is expected to carry 1,896 vph westbound during the projected AM peak hour of traffic. Given the existing roadway and intersection geometrics, Kaahumanu Avenue at this section of roadway would operate at LOS "C" with a v/c ratio of 0.55. The left-turn movement from both the southbound and northbound approaches from Papa Avenue would operate at LOS "D".

During the projected PM peak hour of traffic, Kaahumanu Avenue west of Papa Avenue, is expected to carry 2,035 vph eastbound. Kaahumanu Avenue, west of Papa Avenue, would operate at LOS "C" and at a v/c ratio of 0.63 during the projected PM peak hour of traffic. The northbound approach from Papa Avenue would operate at LOS "D".

D. Traffic Volumes and Conditions With Proposed Improvements

Exhibits 7 & 8 show the Year 1998 traffic projections with the proposed roadway improvements. The intersection capacity analysis is based on proposed roadway geometrics along with trips generated from the project.



LEGEND

90	TRAFFIC MOVEMENT VOLUME (VPH)
	LANE USAGE
LOS	LEVEL OF SERVICE (MULTI-LANE HWY)
V/C	VOLUME-TO-CAPACITY RATIO
Ⓐ	LEVEL OF SERVICE (SIGNALIZED INTERSECTION)

DATE OF COUNT: PROJECTED TO 1997

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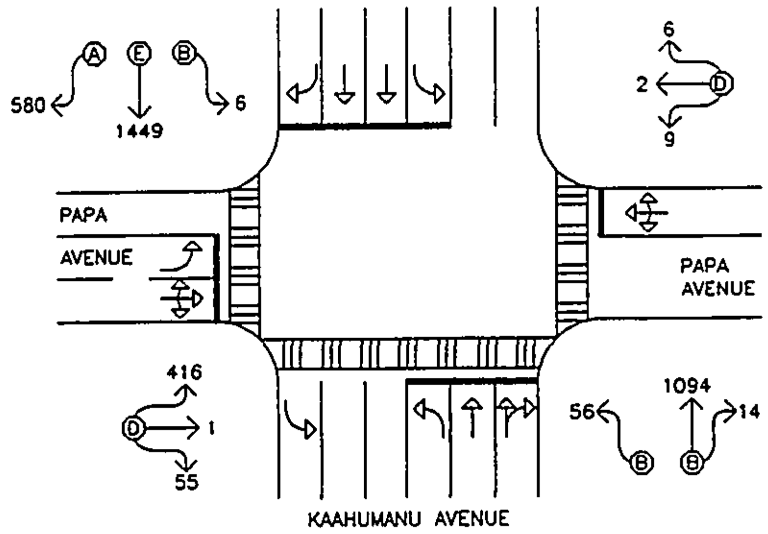
MAUI CENTRAL PARK

PROJECTED AM PEAK HOUR TRAFFIC
WITHOUT IMPROVEMENTS

EXHIBIT

5

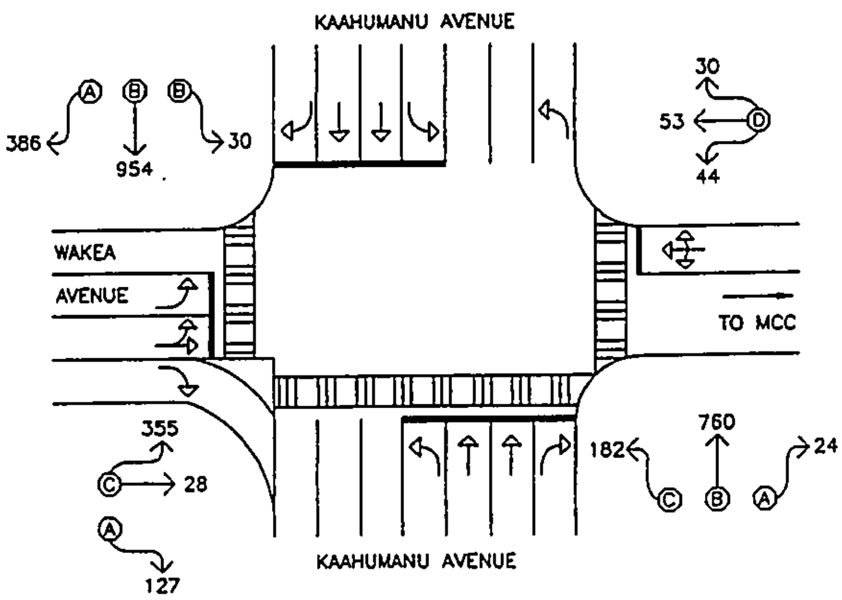
LOS C
V/C = 0.63



LEGEND

90	TRAFFIC MOVEMENT VOLUME (VPH)
	LANE USAGE
LOS	LEVEL OF SERVICE (MULTI-LANE HWY)
V/C	VOLUME-TO-CAPACITY RATIO
Ⓐ	LEVEL OF SERVICE (SIGNALIZED INTERSECTION)

DATE OF COUNT: PROJECTED TO 1997



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MAUI CENTRAL PARK

PROJECTED PM PEAK HOUR TRAFFIC
WITHOUT IMPROVEMENTS

EXHIBIT
6

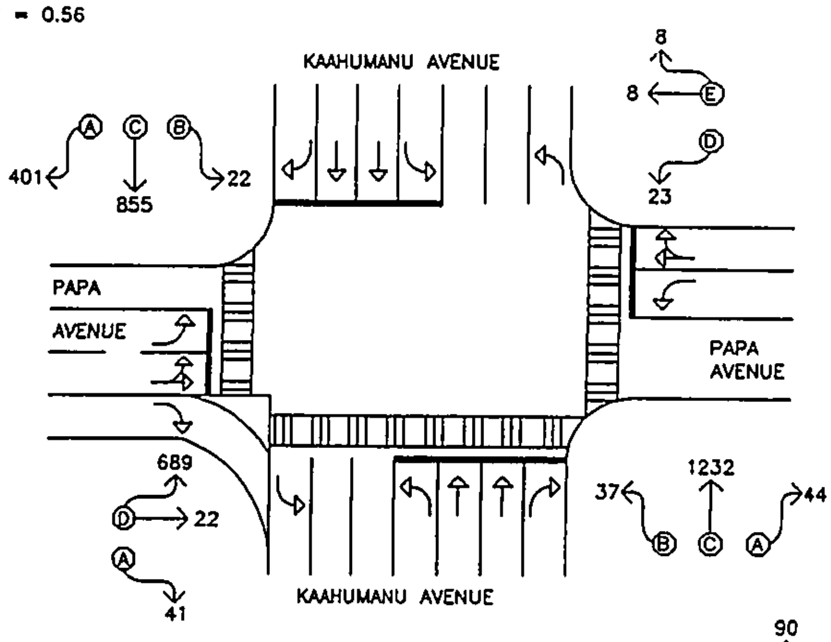
TABLE 1. PROJECTED AM PEAK HOUR OPERATING CONDITIONS WITHOUT IMPROVEMENTS

Kaahumanu Avenue	LOS	v/c
Papa Avenue Northbound Lt	D	--
Papa Avenue Southbound Lt	D	--
Papa Avenue Westbound Thru	E	--
Wakea Avenue Westbound Thru	C	--
West of Papa Avenue	C	0.55

TABLE 2. PROJECTED PM PEAK HOUR OPERATIONS CONDITIONS WITHOUT IMPROVEMENTS

Kaahumanu Avenue	LOS	v/c
Papa Avenue Northbound Lt	D	--
Wakea Avenue Southbound	D	--
Papa Avenue Eastbound Thru	E	--
West of Papa Avenue	C	0.63

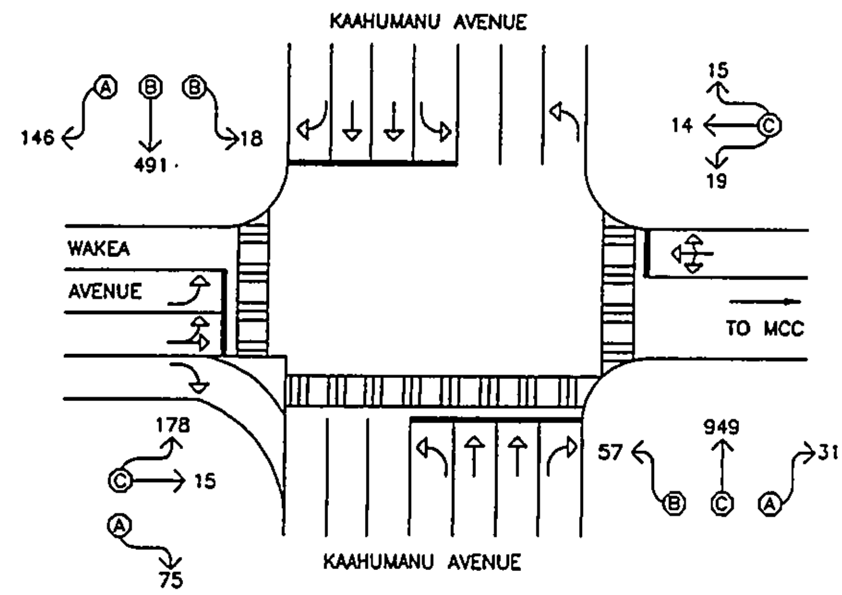
LOS C
V/C = 0.56



LEGEND

90	TRAFFIC MOVEMENT VOLUME (VPH)
	LANE USAGE
LOS	LEVEL OF SERVICE (MULTI-LANE HWY)
V/C	VOLUME-TO-CAPACITY RATIO
Ⓐ	LEVEL OF SERVICE (SIGNALIZED INTERSECTION)

DATE OF COUNT: PROJECTED TO 199˜



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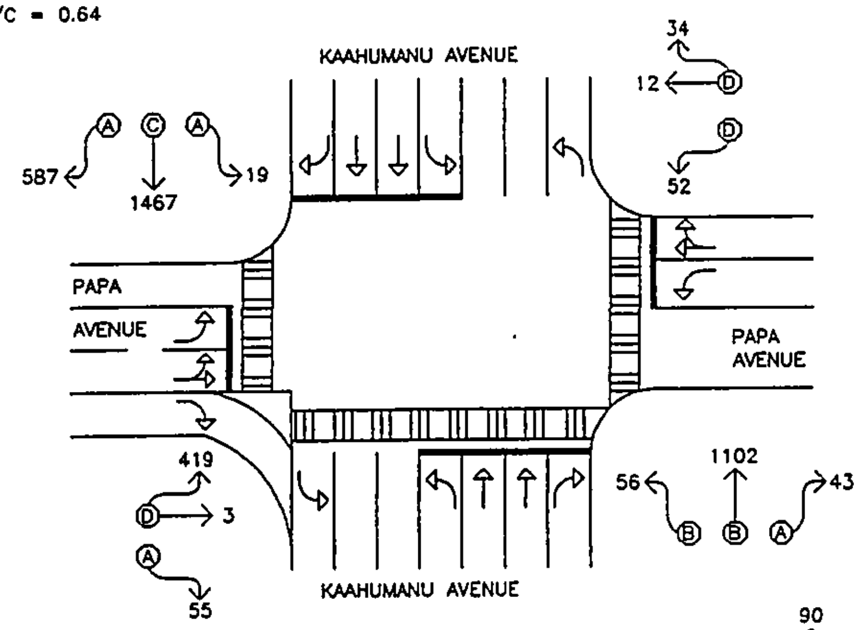
MAUI CENTRAL PARK

PROJECTED AM PEAK HOUR TRAFFIC WITH IMPROVEMENTS

EXHIBIT 7

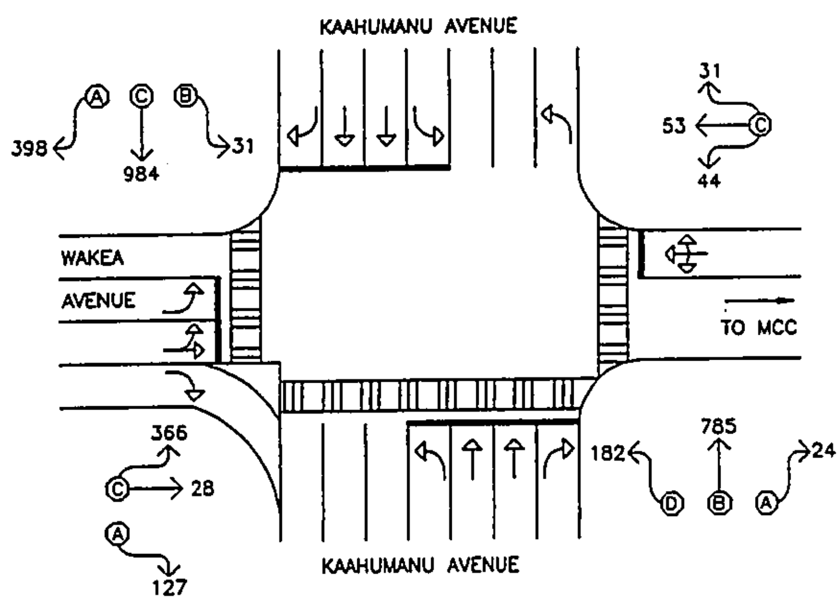
LOS C
V/C = 0.64



LEGEND

90	TRAFFIC MOVEMENT VOLUME (VPH)
	LANE USAGE
LOS	LEVEL OF SERVICE (MULTI-LANE HWY)
V/C	VOLUME-TO-CAPACITY RATIO
Ⓐ	LEVEL OF SERVICE (SIGNALIZED INTERSECTION)

DATE OF COUNT: PROJECTED TO 1997



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MAUI CENTRAL PARK

PROJECTED PM PEAK HOUR TRAFFIC WITH IMPROVEMENTS

EXHIBIT

8

The trip generation methodology used in this study is based upon generally accepted techniques developed by the Institute of Transportation Engineers (ITE) and published in "Trip Generation, 5th Edition", 1991. The ITE trip rates are developed empirically, by correlating the vehicle trip generation data with various land use characteristics, such as vehicle trips per acre of development.

For the purpose of this study, the trip generation characteristics are based on a total land area of 120 acres. Of the 120-acres, vehicular trips generated by 90 acres will be attributed to the east side of the study area and 30 acres to the west side of the study area.

The proposed 30-acre portion of the park is expected to generate 46 vehicles per hour (vph) on the west side of the project site during the AM peak hour of traffic, 33 vph entering and 13 vph exiting. On the east side of the project site, the remaining 90-acre park is expected to generate 116 vph during the AM peak hour of traffic, 84 vph entering and 32 vph exiting.

During the projected PM peak hour of traffic, the proposed 30-acre portion of the park is expected to generate 45 vph on the west side, 16 vph entering and 29 vph exiting. On the east side, the proposed 90-acre portion of the park is expected to generate 125 vph during the projected PM peak hour of traffic, 44 vph entering and 81 vph exiting. The trip generation characteristics are summarized in Tables 3 & 4.

The vehicular traffic generated by the proposed project is distributed to the street system in the vicinity of the project. The site-generated traffic is assigned to the roadway system proportionately to the volume of existing turning movements at each relevant approach. Tables 5 & 6 show LOS for the various critical movements for the projected AM and

TABLE 3. TRIP GENERATION SUMMARY

Project: Maui Central Park Location: Kanaloa Avenue/Kaahumanu Avenue Independent Variable: Acres			30
Average Weekday Vehicle Trip Ends		ITE Rate 2.99	Trip Ends 90
AM Peak Hour of Generator	Enter Exit Total	1.10 0.43 1.53	33 13 46
PM Peak Hour of Generator	Enter Exit Total	0.53 0.97 1.50	16 29 45

TABLE 4. TRIP GENERATION SUMMARY

Project: Maui Central Park Location: Papa Avenue/Kaahumanu Avenue Independent Variable: Acres			90
Average Weekday Vehicle Trip Ends		ITE Rate 2.99	Trip Ends 270
AM Peak Hour of Generator	Enter Exit Total	0.93 0.36 1.29	84 32 116
PM Peak Hour of Generator	Enter Exit Total	0.49 0.90 1.39	44 81 125

TABLE 5. PROJECTED AM PEAK HOUR OPERATING CONDITIONS WITH IMPROVEMENTS

Kaahumanu Avenue	LOS	v/c
Papa Avenue Northbound Lt	C	--
Papa Avenue Southbound Lt	D	--
Papa Avenue Westbound Thru	C	--
Wakea Avenue Westbound Thru	C	--
West of Papa Avenue	C	0.56

TABLE 6. PROJECTED PM PEAK HOUR OPERATIONS CONDITIONS WITH IMPROVEMENTS

Kaahumanu Avenue	LOS	v/c
Papa Avenue Northbound Lt	D	--
Wakea Avenue Southbound	C	--
Papa Avenue Eastbound Thru	C	--
West of Papa Avenue	C	0.64

PM hours of traffic with the proposed project at the study intersections, respectively.

IV. TRAFFIC IMPACT ANALYSIS

A. AM Peak Hour

Kaahumanu Avenue, west of Papa Avenue, would operate at LOS "C" and at a v/c ratio of 0.56 during the projected AM peak hour with the proposed improvements. The northbound left-turn movement from Papa Avenue would improve from LOS "D" operating conditions to LOS "C" with the proposed improvements. Similarly, the westbound through movement along Kaahumanu Avenue at both Papa Avenue and Wakea Avenue would improve to LOS "C" and LOS "C", respectively. The other traffic movements at each intersection would operate at satisfactory LOS.

B. PM Peak Hour

Kaahumanu Avenue, west of Papa Avenue, would operate at LOS "C" at a v/c ratio of 0.64 during the PM peak hour with the proposed improvements. The northbound left-turn movement from Papa Avenue would remain constant at LOS "D" operating conditions.

At the intersection of Papa Avenue and Kaahumanu Avenue, the eastbound through movement would improve from LOS "E" operating conditions to LOS "C" with the proposed improvements. The other traffic movements at each intersection would operate at satisfactory LOS.

V. RECOMMENDATIONS AND CONCLUSIONS

A. Recommendations

Based upon the analysis of the projected traffic demands, the following are the recommendations of this study:

1. Provide an exclusive right-turn/deceleration lane on the westbound Kaahumanu Avenue approach at Papa Avenue.

2. Construct an exclusive right-turn lane, an optional left/through lane, and an exclusive left-turn lane on the northbound approach of Papa Avenue at Kaahumanu Avenue.

3. Construct an exclusive left-turn, and an optional through/right-turn lane on the southbound approach of Papa Avenue at Kaahumanu Avenue.

4. Install a traffic signal system at the intersection of Kahului Beach Road and the Papa Avenue Extension.

B. Conclusions

Based on the draft report of the "Maui Long Range Land Transportation Plan" (MLRLTP), the proposed roadway improvements and new development plans of other projects in the Kahului-Wailuku area are expected to reduce the traffic demand on Kaahumanu Avenue. However, projected traffic demands on Kaahumanu Avenue were estimated using historical traffic volumes since roadway improvements included in the MLRLTP affect the forecasted reduction in traffic demands and are expected to be implemented beyond the anticipated completion of Maui Central Park. The AM and PM peak hour traffic volumes on Kaahumanu Avenue, west of Papa Avenue with the proposed park improvements, would both increase by approximately 2% over projected traffic conditions without the proposed project.

With the implementation of roadway improvements and new roadway discussed in this report, the proposed Maui Central Park should not have any significant impact on traffic in the vicinity of the project.

APPENDIX

APPENDIX A

LEVEL OF SERVICE DEFINITIONS

LEVEL OF SERVICE DEFINITIONS

1. LEVEL-OF-SERVICE CRITERIA FOR MULTILANE HIGHWAY

Level of Service (LOS) criteria for multilane highways are defined in terms of density. Density is a measure which quantifies the proximity to other vehicles in the traffic stream. It expresses the degree of maneuverability within the traffic stream.

Level of service criteria depend on the design speed of the highway element being studied. A "highway element" can be an isolated geometric element, such as a curve of grade having a reduced design speed, or a series of such geometric elements that dominate the operation of a longer segment of highway.

Level of Service A describes completely free-flow conditions. The operation of vehicles is virtually unaffected by the presence of other vehicles, and operations are constrained only by the geometric features of the highway and driver preferences. Vehicles are spaced at an average of 440 feet, or 22 car-lengths, at a maximum density of 12 pc/mi/ln. The ability to maneuver within the traffic stream is high. Minor disruptions to flow are easily absorbed at this level without causing significant delays or queuing.

Level of Service B is also indictive of free flow, although the presence of other vehicles begins to be noticeable. Average travel speeds are somewhat diminished from LOS A. Vehicles are spaced at an average of approximately 264 feet, or 13 car-lengths, at a maximum density of 20 pc/mi/ln. Minor disruptions are still easily absorbed at this level, although local deterioration in LOS will be more obvious.

Level of service C represents a range in which the influence of traffic density on operations become marked. The ability to maneuver within the traffic stream, and to select an operating speed, is now clearly affected by the presence of other vehicles. The average spacing of vehicles is reduced to approximately 175 feet, or 9 car-lengths, at a maximum density of 30 pc/mi/ln. Minor disruptions may be expected to cause serious local deterioration in service, and queues may form behind any significant disruption. Severe of long-term disruptions may cause the facility to operate at LOS F.

Level of Service D borders on unstable flow. Speeds and ability to maneuver are severely restricted because of traffic congestion. The average spacing of vehicles is 125 feet, or 6 car-lengths, at a maximum density of 42 pc/mi/ln. Only the most minor of disruptions can be absorbed without the formation of extensive queues and the determination of service to LOS F.

Level of Service E represents operations at or near capacity, and is quite unstable. At capacity, vehicles are spaced at only 80 feet, or 4 car-lengths, at a maximum density of 67 pc./mi/ln. This is the minimum spacing at which uniform flow can be maintained, and effectively defines a traffic stream with no usable gaps. Thus, disruptions cannot be damped or dissipated, and any disruption, no matter how minor, will cause queues to form and service to deteriorate to LOS F.

Level of Service F represents forced or breakdown flow. It occurs at a point where vehicles arrive either at a rate greater than that at which they are discharged, or at a point on a planned facility where forecasted demand exceeds the computed capacity. While operations at such points (and on immediately downstream sections) will appear to be at capacity or better, queues will form behind these breakdowns. Operations within queues are highly unstable, with vehicles experiencing short spurts of movement followed by stoppages. Densities are higher than 67 pc/mi/ln. Note that the term "LOS F" may be used to characterize both the point of the breakdown and the operating conditions within the queue. It must be remembered, however, that it is the point of breakdown that causes the queue to form, and that operations within the queue are generally not related to defects along the highway segment over which the queue extends.

2. LEVEL OF SERVICE OF SIGNALIZED INTERSECTIONS

Level of service for signalized intersections is defined in terms of delay. Delay is a measure of driver discomfort, frustration, fuel consumption and lost travel time. Specifically, level-of-service criteria are stated in terms of the average stopped delay per vehicle for a 15-minute analysis period. The criteria are given in Table A-1.

Table A-1. Level-of Service Criteria for Signalized Intersections

Level of Service	Stopped Delay for Vehicle (SEC)
A	≤ 5.0
B	5.1 TO 15.0
C	15.1 TO 25.0
D	25.1 TO 40.0
E	40.1 TO 60.0
F	> 60.0

Delay is a complex measure, and is dependent on a number of variables, including the quality of progression, the cycle length, the green ratio, and the v/c ratio for the lane group or approach in question.

Level-of-service A describes operations with very low delay, i.e., less than 5.0 seconds per vehicle. This occurs when progression is extremely favorable, and most vehicles arrive during the green phase. Most vehicles do not stop at all. Short cycle lengths may also contribute to low delay.

Level-of-service B describes operations with delay in the range of 15.1 to 25.0 seconds per vehicle. These higher delays may result from fair progression and/or longer cycle lengths. More vehicles stop than for LOS A, causing higher levels of average delay.

Level-of-service C describes operations with delay in the range of 15.1 to 25.0 seconds per vehicle. These higher delays may result from fair progression and/or longer cycle lengths. Individual cycle failures may begin to appear in this level. The number of vehicles stopping is significant at this level, although many still pass through the intersection without stopping.

Level-of-service D describes operations with delay in the range of 25.1 to 40.0 seconds per vehicle. At level D, the influence of congestion becomes more noticeable. Longer delays may result from some combination of unfavorable progression, long cycle lengths, or high v/c ratios. Many vehicles stop, and the proportion of vehicles not stopping declines. Individual cycle failures are noticeable.

Level-of-service E describes operations with delay in the range of 40.1 to 60.0 seconds per vehicle. This is considered to be the limit of acceptable delay. These high delay values generally indicate poor progression, long cycle lengths and high v/c ratios. Individual cycle failures are frequent occurrences.

Level-of-service F describes operations with delay in excess of 60.0 seconds per vehicle. This is considered to be unacceptable to most drivers. This condition often occurs with over saturation, i.e. when arrival flow exceed the capacity of the intersection. It may also occur at high v/c ratios below 1.00 with many individual cycle failures. Poor progression and long cycle lengths may also be major contributing causes to such delay levels.

APPENDIX B

LEVEL OF SERVICE DEFINITIONS

1. EXISTING TRAFFIC COUNT DATA
2. EXISTING CONDITION
3. FUTURE TRAFFIC WITHOUT PROPOSED IMPROVEMENT
4. FUTURE TRAFFIC WITH PROPOSED IMPROVEMENT

APPENDIX B

LEVEL OF SERVICE DEFINITIONS

1. EXISTING TRAFFIC COUNT DATA

:ITE CODE : 1
Major St. : KAAHUMANU AVENUE
Minor St. : WAKEA AVE.
leather : RAIN,WET PAVT.

Primary Movements: Vehicles

PAGE: 1
FILE: WKAAHUAM
DATE: 7/18/96

Time	From North			From East			From South			From West			Vehicle
:egin	RT	THRU	LT	RT	THRU	LT	RT	THRU	LT	RT	THRU	LT	Total
6:30	1	1	2	6	153	14	9	1	29	32	58	2	308
6:45	2	2	3	6	165	7	26	4	55	27	116	3	416
IR TOTAL	3	3	5	12	318	21	35	5	84	59	174	5	724
7:00 AM	4	4	5	8	214	15	19	4	35	36	129	5	478
7:15	6	6	8	10	331	19	18	5	43	42	156	6	650
Break													
IR TOTAL	10	10	13	18	545	34	37	9	78	78	285	11	1128
Break													
DAY TOTAL	13	13	18	30	863	55	72	14	162	137	459	16	1852

PEAK PERIOD ANALYSIS FOR THE PERIOD: 6:30 AM - 8:30 AM

DIRECTION FROM	START PEAK HOUR	PEAK HR FACTOR	VOLUMES Right	Thru	Left	Total	PERCENTS Right	Thru	Left
North	6:30 AM	0.55	13	13	18	44	30	30	41
East	6:30 AM	0.66	30	863	55	948	3	91	6
South	6:30 AM	0.73	72	14	162	248	29	6	65
West	6:30 AM	0.75	137	459	16	612	22	75	3

Entire Intersection

DIRECTION FROM	START PEAK HOUR	PEAK HR FACTOR	Right	Thru	Left	Total	Right	Thru	Left
North	6:30 AM	0.55	13	13	18	44	30	30	41
East		0.66	30	863	55	948	3	91	6
South		0.73	72	14	162	248	29	6	65
West		0.75	137	459	16	612	22	75	3

SITE CODE : 1
Major St. : KAAHUMANU AVENUE
Minor St. : WAKEA AVE.
Weather : SUNNY

PAGE: 1
FILE: WKAAHUPM
DATE: 7/17/96

Primary Movements: Vehicles

Time Begin	From North RT	From North THRU	From North LT	From East RT	From East THRU	From East LT	From South RT	From South THRU	From South LT	From West RT	From West THRU	From West LT	Vehicle Total
4:30	6	10	8	4	203	32	29	5	81	88	262	5	733
4:45	8	8	10	6	161	49	29	12	95	72	218	6	674
HR TOTAL	14	18	18	10	364	81	58	17	176	160	480	11	1407
5:00 PM	7	20	13	7	173	40	31	7	95	97	226	8	724
5:15	8	13	11	6	191	53	33	3	69	113	208	10	718
Break													
HR TOTAL	15	33	24	13	364	93	64	10	164	210	434	18	1442
Break													
DAY TOTAL	29	51	42	23	728	174	122	27	340	370	914	29	2849

PEAK PERIOD ANALYSIS FOR THE PERIOD: 4:30 PM - 6:30 PM

DIRECTION FROM	START PEAK HOUR	PEAK HR FACTOR	VOLUMES Right	VOLUMES Thru	VOLUMES Left	VOLUMES Total	PERCENTS Right	PERCENTS Thru	PERCENTS Left
North	4:30 PM	0.76	29	51	42	122	24	42	34
East	4:30 PM	0.93	23	728	174	925	2	79	19
South	4:30 PM	0.90	122	27	340	489	25	6	70
West	4:30 PM	0.92	370	914	29	1313	28	70	2

Entire Intersection

North	4:30 PM	0.76	29	51	42	122	24	42	34
East		0.93	23	728	174	925	2	79	19
South		0.90	122	27	340	489	25	6	70
West		0.92	370	914	29	1313	28	70	2

SITE CODE : 1
Major St. : KAAHUMANU AVENUE
Minor St. : PAPA AVE.
Weather : RAIN,WET PAVT.

Primary Movements: Vehicles

PAGE: 1
FILE: PAPAAM
DATE: 5/18/96

Time	From North			From East			From South			From West			Vehicle
Begin	RT	THRU	LT	RT	THRU	LT	RT	THRU	LT	RT	THRU	LT	Total
6:30	0	0	0	0	178	5	9	0	106	42	83	0	423
6:45	0	1	1	1	217	4	14	0	92	40	131	2	503
HR TOTAL	0	1	1	1	395	9	23	0	198	82	214	2	926
7:00 AM	1	0	0	0	249	4	10	2	118	53	160	1	598
7:15	0	0	7	1	360	19	12	0	185	107	185	0	876
7:30	0	0	0	1	334	7	5	0	194	123	196	0	860
7:45	0	0	0	0	270	3	12	0	129	88	218	0	720
HR TOTAL	1	0	7	2	1213	33	39	2	626	371	759	1	3054
8:00 AM	0	0	0	0	201	6	10	1	143	63	215	1	640
8:15	1	0	0	1	208	3	14	0	87	72	172	1	559
DAY TOTAL	2	1	8	4	2017	51	86	3	1054	588	1360	5	5179

PEAK PERIOD ANALYSIS FOR THE PERIOD: 6:30 AM - 8:30 AM

DIRECTION	START	PEAK HR	.... VOLUMES				.... PERCENTS ...		
FROM	PEAK HOUR	FACTOR	Right	Thru	Left	Total	Right	Thru	Left
North	6:30 AM	0.36	1	1	8	10	10	10	80
East	7:00 AM	0.82	2	1213	33	1248	0	97	3
South	7:15 AM	0.87	39	1	651	691	6	0	94
West	7:15 AM	0.94	381	814	1	1196	32	68	0
			Entire Intersection						
North	7:15 AM	0.25	0	0	7	7	0	0	%100
East		0.79	2	1165	35	1202	0	97	3
South		0.87	39	1	651	691	6	0	94
West		0.94	381	814	1	1196	32	68	0

SITE CODE : 1
Major St. : KAAHUMANU AVENUE
Minor St. : PAPA AVE.
Weather : RAIN,WET PAVT.

Primary Movements: Vehicles

FILE: PAPAPM
DATE: 5/17/96

Time Begin	From North RT	From North THRU	From North LT	From East RT	From East THRU	From East LT	From South RT	From South THRU	From South LT	From West RT	From West THRU	From West LT	Vehicle Total
4:30	0	0	0	0	282	8	7	0	88	104	348	0	837
4:45	0	0	0	3	246	15	9	0	120	99	287	0	779
HR TOTAL	0	0	0	3	528	23	16	0	208	203	635	0	1616
5:00 PM	1	0	3	2	259	14	15	0	83	112	313	0	802
5:15	0	1	0	4	256	8	14	0	98	109	317	0	807
5:30	2	1	4	5	282	18	5	0	101	185	383	6	992
5:45	3	0	2	2	251	14	19	1	116	150	375	0	933
HR TOTAL	6	2	9	13	1048	54	53	1	398	556	1388	6	3534

Break

DAY TOTAL	6	2	9	16	1576	77	69	1	606	759	2023	6	5150

PEAK PERIOD ANALYSIS FOR THE PERIOD: 4:30 PM - 6:30 PM

DIRECTION FROM	START PEAK HOUR	PEAK HR FACTOR	VOLUMES Right	Thru	Left	Total	PERCENTS Right	Thru	Left
North	5:00 PM	0.61	6	2	9	17	35	12	53
East	5:00 PM	0.91	13	1048	54	1115	1	94	5
South	5:00 PM	0.83	53	1	398	452	12	0	88
West	5:00 PM	0.85	556	1388	6	1950	29	71	0

Entire Intersection

North	5:00 PM	0.61	6	2	9	17	35	12	53
East		0.91	13	1048	54	1115	1	94	5
South		0.83	53	1	398	452	12	0	88
West		0.85	556	1388	6	1950	29	71	0

SITE CODE : 1
Location : KAAHUMANU WEST OF PAPA
Weather :
Operator : 0349

PAGE: 1
FILE: MAUICP

DATE: 7/17/96

DAY: WEDNESDAY

TIME BEGIN	WEST AM		WEST PM		EAST AM		EAST PM		COMBINED AM		COMBINED PM	
12:00	*		*		*		*		*		*	
12:15	*		*		*		*		*		*	
12:30	*		*		*		*		*		*	
12:45	*	*	223	223	*	*	270	270	*	*	493	493
1:00	*		368		*		334		*		702	
1:15	*		330		*		322		*		652	
1:30	*		324		*		302		*		626	
1:45	*	*	346	1368	*	*	337	1295	*	*	683	2663
2:00	*		342		*		338		*		680	
2:15	*		350		*		354		*		704	
2:30	*		366		*		370		*		736	
2:45	*	*	348	1406	*	*	356	1418	*	*	704	2824
3:00	*		312		*		366		*		678	
3:15	*		368		*		411		*		779	
3:30	*		356		*		407		*		763	
3:45	*	*	338	1374	*	*	414	1598	*	*	752	2972
4:00	*		355		*		452		*		807	
4:15	*		368		*		546		*		914	
4:30	*		365		*		488		*		853	
4:45	*	*	352	1440	*	*	426	1912	*	*	778	3352
5:00	*		343		*		404		*		747	
5:15	*		333		*		402		*		735	
5:30	*		364		*		548		*		912	
5:45	*	*	350	1390	*	*	488	1842	*	*	838	3232
6:00	*		238		*		322		*		560	
6:15	*		247		*		266		*		513	
6:30	*		238		*		243		*		481	
6:45	*	*	170	893	*	*	210	1041	*	*	380	1934
7:00	*		172		*		176		*		348	
7:15	*		177		*		173		*		350	
7:30	*		171		*		150		*		321	
7:45	*	*	144	664	*	*	202	701	*	*	346	1365
8:00	*		154		*		150		*		304	
8:15	*		152		*		128		*		280	
8:30	*		136		*		116		*		252	
8:45	*	*	166	608	*	*	152	546	*	*	318	1154
9:00	*		167		*		130		*		297	
9:15	*		120		*		120		*		240	
9:30	*		80		*		100		*		180	
9:45	*	*	70	437	*	*	84	434	*	*	154	871
10:00	*		69		*		70		*		139	
10:15	*		80		*		73		*		153	
10:30	*		63		*		46		*		109	
10:45	*	*	60	272	*	*	78	267	*	*	138	539
11:00	*		40		*		62		*		102	
11:15	*		40		*		41		*		81	
11:30	*		38		*		37		*		75	
11:45	*	*	27	145	*	*	20	160	*	*	47	305
TOTALS	*		10220		*		11484		*		21704	
DAY TOTALS		10220				11484				21704		
SPLIT %	*		47.1		*		52.9					
PEAK HOUR	*		4:00		*		4:00		*		4:00	
VOLUME	*		1440		*		1912		*		3352	
P.H.F.	*		0.98		*		0.88		*		0.92	

APPENDIX B

LEVEL OF SERVICE COMPUTATIONS

2. EXISTING CONDITIONS

SITE CODE : 1
Location : KAAHUMANU WEST OF PAPA
Weather :
Operator : 0349

PAGE: 2
FILE: MAUICP

DATE: 7/18/96

TIME BEGIN	WEST AM		WEST PM		EAST AM		EAST PM		COMBINED AM		COMBINED PM	
												DAY: THURSDAY
12:00	20		*		23		*		43		*	
12:15	14		*		16		*		30		*	
12:30	15		*		20		*		35		*	
12:45	16	65	*	*	11	70	*	*	27	135	*	*
1:00	10		*		12		*		22		*	
1:15	18		*		8		*		26		*	
1:30	11		*		11		*		22		*	
1:45	9	48	*	*	19	50	*	*	28	98	*	*
2:00	9		*		6		*		15		*	
2:15	7		*		6		*		13		*	
2:30	11		*		9		*		20		*	
2:45	5	32	*	*	3	24	*	*	8	56	*	*
3:00	6		*		2		*		8		*	
3:15	14		*		7		*		21		*	
3:30	16		*		9		*		25		*	
3:45	9	45	*	*	12	30	*	*	21	75	*	*
4:00	20		*		10		*		30		*	
4:15	17		*		17		*		34		*	
4:30	42		*		19		*		61		*	
4:45	28	107	*	*	34	80	*	*	62	187	*	*
5:00	49		*		32		*		81		*	
5:15	58		*		56		*		114		*	
5:30	98		*		88		*		186		*	
5:45	118	323	*	*	98	274	*	*	216	597	*	*
6:00	150		*		94		*		244		*	
6:15	215		*		120		*		335		*	
6:30	294		*		150		*		444		*	
6:45	304	963	*	*	190	554	*	*	494	1517	*	*
7:00	420		*		244		*		664		*	
7:15	523		*		316		*		839		*	
7:30	514		*		326		*		840		*	
7:45	378	1835	*	*	260	1146	*	*	638	2981	*	*
8:00	334		*		232		*		566		*	
8:15	295		*		262		*		557		*	
8:30	324		*		252		*		576		*	
8:45	272	1225	*	*	262	1008	*	*	534	2233	*	*
9:00	250		*		267		*		517		*	
9:15	283		*		230		*		513		*	
9:30	320		*		281		*		601		*	
9:45	276	1129	*	*	297	1075	*	*	573	2204	*	*
10:00	278		*		349		*		627		*	
10:15	298		*		315		*		613		*	
10:30	298		*		328		*		626		*	
10:45	*	874	*	*	*	992	*	*	*	1866	*	*
11:00	*		*		*		*		*		*	
11:15	*		*		*		*		*		*	
11:30	*		*		*		*		*		*	
11:45	*	*	*	*	*	*	*	*	*	*	*	*
TOTALS	6646		*		5303		*		11949		*	
DAY TOTALS		6646				5303				11949		
SPLIT %	55.6		*		44.4		*					
PEAK HOUR	7:00		*		9:45		*		7:00		*	
VOLUME	1835		*		1289		*		2981		*	
P H F	0.88		*		[illegible]		*		[illegible]		*	

1985 HCM: SIGNALIZED INTERSECTIONS
SUMMARY REPORT
****
INTERSECTION..KAAHUMANU AVENUE/WAKEA AVENUE
AREA TYPE.....CBD
ANALYST.......AS
DATE..........7/18/96
TIME.........6:30-7:30 AM
COMMENT.......WAKEAAM

VOLUMES

	EB	WB	NB	SB
LT	16	55	162	18
TH	459	863	14	13
RT	137	30	72	13
RR	0	0	0	0

GEOMETRY

EB		WB		NB		SB	
L	11.0	L	11.0	L	10.5	LTR	10.5
T	11.0	T	11.0	LT	10.5		12.0
T	11.0	T	11.0	R	10.5		12.0
R	10.5	R	10.5		12.0		12.0
	12.0		12.0		12.0		12.0
	12.0		12.0		12.0		12.0

ADJUSTMENT FACTORS

	GRADE (%)	HV (%)	ADJ Y/N	PKG Nm	BUSES Nb	PHF	PEDS	PED. BUT. Y/N	min T	ARR. TYPE
EB	0.00	2.00	N	0	0	0.75	15	Y	13.2	5
WB	0.00	2.00	N	0	0	0.66	0	N	13.2	5
NB	0.00	1.00	N	0	0	0.73	15	Y	24.4	3
SB	0.00	0.00	N	0	0	0.55	15	Y	24.4	3

SIGNAL SETTINGS — CYCLE LENGTH = 90.0

		PH-1	PH-2	PH-3	PH-4
EB	LT	X	X		
	TH		X		
	RT		X		
	PD		X		
WB	LT	X	X		
	TH		X		
	RT		X		
	PD		X		
GREEN		5.0	38.0	0.0	0.0
YELLOW		3.0	5.0	0.0	0.0

		PH-1	PH-2	PH-3	PH-4
NB	LT		X		
	TH		X		
	RT		X		
	PD		X		
SB	LT	X			
	TH	X			
	RT	X			
	PD				
GREEN		15.0	16.0	0.0	0.0
YELLOW		3.0	5.0	0.0	0.0

LEVEL OF SERVICE

	LANE GRP.	V/C	G/C	DELAY	LOS	APP. DELAY	APP. LOS
EB	L	0.101	0.533	7.9	B	4.4	A
	T	0.465	0.444	5.4	B		
	R	0.168	0.844	0.4	A		
WB	L	0.173	0.533	8.3	B	20.5	C
	T	0.993	0.444	22.0	C		
	R	0.042	0.844	0.3	A		
NB	L	0.381	0.200	24.1	C	16.6	C
	LT	0.443	0.200	21.0	C		
	R	0.104	0.733	2.2	A		
SB	LTR	0.371	0.167	22.0	C	22.0	C

INTERSECTION: Delay = 15.2 (sec/veh) V/C = 0.675 LOS = C

1985 HCM: SIGNALIZED INTERSECTIONS
SUMMARY REPORT
****
INTERSECTION..KAAHUMANU AVENUE/WAKEA AVENUE
AREA TYPE.....CBD
ANALYST.......AS
DATE..........7/17/96
TIME..........4:30-5:30 PM
COMMENT.......WAKEAPM

	VOLUMES				GEOMETRY							
	EB	WB	NB	SB	EB		WB		NB		SB	
LT	29	174	340	42	L	11.0	L	11.0	L	10.5	LTR	10.5
TH	914	728	27	51	T	11.0	T	11.0	LT	10.5		12.0
RT	370	23	122	29	T	11.0	T	11.0	R	10.5		12.0
RR	0	0	0	0	R	10.5	R	10.5		12.0		12.0
						12.0		12.0		12.0		12.0
						12.0		12.0		12.0		12.0

ADJUSTMENT FACTORS

	GRADE (%)	HV (%)	ADJ Y/N	PKG Nm	BUSES Nb	PHF	PEDS	PED. BUT. Y/N	min T	ARR. TYPE
EB	0.00	2.00	N	0	0	0.92	15	Y	13.2	5
WB	0.00	2.00	N	0	0	0.93	0	N	13.2	5
NB	0.00	1.00	N	0	0	0.90	15	Y	24.4	3
SB	0.00	0.00	N	0	0	0.76	15	Y	24.4	3

SIGNAL SETTINGS   CYCLE LENGTH = 90.0

		PH-1	PH-2	PH-3	PH-4
EB	LT	X	X		
	TH		X		
	RT		X		
	PD		X		
WB	LT	X	X		
	TH		X		
	RT		X		
	PD		X		
GREEN		5.0	35.0	0.0	0.0
YELLOW		3.0	5.0	0.0	0.0

		PH-1	PH-2	PH-3	PH-4
NB	LT		X		
	TH		X		
	RT		X		
	PD		X		
SB	LT	X			
	TH	X			
	RT	X			
	PD				
GREEN		15.0	19.0	0.0	0.0
YELLOW		3.0	5.0	0.0	0.0

LEVEL OF SERVICE

	LANE GRP.	V/C	G/C	DELAY	LOS	APP. DELAY	APP. LOS
EB	L	0.082	0.500	8.9	B	9.3	B
	T	0.816	0.411	12.7	B		
	R	0.369	0.844	0.5	A		
WB	L	0.627	0.500	18.6	C	10.1	B
	T	0.643	0.411	8.5	B		
	R	0.023	0.844	0.3	A		
NB	L	0.556	0.233	24.6	C	18.2	C
	LT	0.639	0.233	22.4	C		
	R	0.142	0.733	2.3	A		
SB	LTR	0.735	0.167	29.9	D	29.9	D

INTERSECTION: Delay = 12.1 (sec/veh) V/C = 0.736 LOS = B

1985 HCM: SIGNALIZED INTERSECTIONS
SUMMARY REPORT

****

INTERSECTION..KAAHUMANU AVENUE/PAPA AVENUE
AREA TYPE.....CBD
ANALYST.......AS
DATE..........5/18/96
TIME..........7:15-8:15 AM
COMMENT.......PAPAAM

	VOLUMES					GEOMETRY							
	EB	WB	NB	SB	:	EB		WB		NB		SB	
LT	1	35	651	7	:	L	11.0	L	11.0	L	11.0	LTR	11.0
TH	814	1165	1	0	:	T	11.0	T	11.0	LTR	11.0		12.0
RT	381	2	39	0	:	T	11.0	TR	12.0		12.0		12.0
RR	110	0	20	0	:	R	10.5		12.0		12.0		12.0
					:		12.0		12.0		12.0		12.0
					:		12.0		12.0		12.0		12.0

ADJUSTMENT FACTORS

	GRADE (%)	HV (%)	ADJ Y/N	PKG Nm	BUSES Nb	PHF	PEDS	PED. Y/N	BUT. min T	ARR. TYPE
EB	0.00	2.00	N	0	0	0.94	0	N	10.9	5
WB	0.00	2.00	N	0	0	0.79	15	Y	10.9	5
NB	0.00	1.00	N	0	0	0.87	10	Y	22.1	3
SB	0.00	0.00	N	0	0	0.50	15	Y	22.1	3

SIGNAL SETTINGS CYCLE LENGTH = 90.0

		PH-1	PH-2	PH-3	PH-4			PH-1	PH-2	PH-3	PH-4
EB	LT	X	X			NB	LT	X			
	TH		X				TH	X			
	RT		X				RT	X			
	PD		X				PD	X			
WB	LT	X	X			SB	LT		X		
	TH		X				TH		X		
	RT		X				RT		X		
	PD		X				PD		X		
GREEN		4.0	39.0	0.0	0.0	GREEN		24.0	7.0	0.0	0.0
YELLOW		3.0	5.0	0.0	0.0	YELLOW		5.0	3.0	0.0	0.0

LEVEL OF SERVICE

	LANE GRP.	V/C	G/C	DELAY	LOS	APP. DELAY	APP. LOS
EB	L	0.005	0.533	7.5	B	5.8	B
	T	0.641	0.456	7.5	B		
	R	0.260	0.856	0.4	A		
WB	L	0.124	0.533	8.0	B	37.3	D
	TR	1.078	0.456	38.1	D		
NB	L	0.872	0.289	35.4	D	35.8	D
	LTR	0.928	0.289	36.3	D		
SB	LTR	0.120	0.078	25.0	C	25.0	C

INTERSECTION: Delay = 26.4 (sec/veh) V/C = 0.865 LOS = D

1985 HCM: SIGNALIZED INTERSECTIONS
SUMMARY REPORT
****
INTERSECTION..KAAHUMANU AVENUE/PAPA AVENUE
AREA TYPE.....CBD
ANALYST.......AS
DATE..........5/17/96
TIME..........5:00-6:00 PM
COMMENT.......PAPAPM

VOLUMES	EB	WB	NB	SB
LT	6	54	398	9
TH	1388	1048	1	2
RT	556	13	53	6
RR	110	12	20	5

GEOMETRY

EB		WB		NB		SB	
L	11.0	L	11.0	L	11.0	LTR	11.0
T	11.0	T	11.0	LTR	11.0		12.0
T	11.0	TR	12.0		12.0		12.0
R	10.5		12.0		12.0		12.0
	12.0		12.0		12.0		12.0
	12.0		12.0		12.0		12.0

ADJUSTMENT FACTORS

	GRADE (%)	HV (%)	ADJ Y/N	PKG Nm	BUSES Nb	PHF	PEDS	PED. Y/N	BUT. min T	ARR. TYPE
EB	0.00	2.00	N	0	0	0.85	0	N	10.9	5
WB	0.00	2.00	N	0	0	0.91	15	Y	10.9	5
NB	0.00	1.00	N	0	0	0.83	10	Y	22.1	3
SB	0.00	0.00	N	0	0	0.61	15	Y	22.1	3

SIGNAL SETTINGS CYCLE LENGTH = 90.0

		PH-1	PH-2	PH-3	PH-4
EB	LT	X	X		
	TH		X		
	RT		X		
	PD		X		
WB	LT	X	X		
	TH		X		
	RT		X		
	PD		X		
GREEN		5.0	43.0	0.0	0.0
YELLOW		3.0	5.0	0.0	0.0

		PH-1	PH-2	PH-3	PH-4
NB	LT	X			
	TH	X			
	RT	X			
	PD	X			
SB	LT		X		
	TH		X		
	RT		X		
	PD		X		
GREEN		18.0	8.0	0.0	0.0
YELLOW		5.0	3.0	0.0	0.0

LEVEL OF SERVICE

	LANE GRP.	V/C	G/C	DELAY	LOS	APP. DELAY	APP. LOS
EB	L	0.028	0.589	5.9	B	33.5	D
	T	1.102	0.500	43.6	E		
	R	0.480	0.844	0.7	A		
WB	L	0.281	0.589	7.2	B	7.7	B
	TR	0.766	0.500	7.7	B		
NB	L	0.726	0.222	30.0	D	32.0	D
	LTR	0.861	0.222	33.7	D		
SB	LTR	0.166	0.089	24.5	C	24.5	C

INTERSECTION: Delay = 25.2 (sec/veh) V/C = 0.869 LOS = D

1985 HCM:MULTILANE HIGHWAYS
****

FACILITY SECTION..... KAAHUMANU AVENUE
ANALYST............. AS
TIME OF ANALYSIS..... 7:00-8:00 AM
DATE OF ANALYSIS..... 7/18/96
OTHER INFORMATION.... KAAHUAM

A) ADJUSTMENT FACTORS

PERCENTAGE OF TRUCKS................. 2 (TYPICAL - 200 #/HP)
PERCENTAGE OF BUSES.................. 0
PERCENTAGE OF RECREATIONAL VEHICLES.. 0
DESIGN SPEED (MPH)................... 60
PEAK HOUR FACTOR..................... .9
DRIVER POPULATION FACTOR............. 1 (WEEKDAY/COMMUTER)
LANE WIDTH (FT)...................... 11
OBSTRUCTIONS......................... NO
DISTANCE (FT) FROM ROADWAY EDGE...... 6
TYPE OF MULTILANE HIGHWAY............ RURAL, DIVIDED

B) CORRECTION FACTORS

TERRAIN TYPE	E_T	E_B	E_R	f_{HV}	f_w	f_p	f_E
LEVEL	1.7	1.5	1.6	0.99	0.97	1.00	1.00

C) OPERATIONAL ANALYSIS RESULTS
****

NO. OF LANES................ 2
INPUT VOLUME................ 1816
V/C RATIO................... .53
LEVEL OF SERVICE............ C
COMPUTED CAPACITY (pcphpl).. 1055
SPEED (mph)................. 46
DENSITY (pcpmpl)............ 22

1985 HCM:MULTILANE HIGHWAYS
****

FACILITY SECTION..... KAAHUMANU AVENUE
ANALYST.............. AS
TIME OF ANALYSIS..... 4:00-5:00 PM
DATE OF ANALYSIS..... 7/17/96
OTHER INFORMATION.... KAAHUPM

A) ADJUSTMENT FACTORS

PERCENTAGE OF TRUCKS................. 2 (TYPICAL - 200 #/HP)
PERCENTAGE OF BUSES.................. 0
PERCENTAGE OF RECREATIONAL VEHICLES.. 0
DESIGN SPEED (MPH)................... 60
PEAK HOUR FACTOR..................... .85
DRIVER POPULATION FACTOR............. 1 (WEEKDAY/COMMUTER)
LANE WIDTH (FT)...................... 11
OBSTRUCTIONS......................... NO
DISTANCE (FT) FROM ROADWAY EDGE...... 6
TYPE OF MULTILANE HIGHWAY............ RURAL, DIVIDED

B) CORRECTION FACTORS

TERRAIN TYPE	E_T	E_B	E_R	f_{HV}	f_w	f_p	f_E
LEVEL	1.7	1.5	1.6	0.99	0.97	1.00	1.00

C) OPERATIONAL ANALYSIS RESULTS
****

NO. OF LANES................ 2
INPUT VOLUME................ 1950
V/C RATIO................... .6
LEVEL OF SERVICE............ C
COMPUTED CAPACITY (pcphpl).. 1199
SPEED (mph)................. 45
DENSITY (pcpmpl)............ 26

APPENDIX B

LEVEL OF SERVICE COMPUTATIONS

3. FUTURE TRAFFIC WITHOUT PROPOSED IMPROVEMENT

1985 HCM: SIGNALIZED INTERSECTIONS
SUMMARY REPORT
****
INTERSECTION..KAAHUMANU AVENUE/WAKEA AVENUE
AREA TYPE.....CBD
ANALYST.......AS
DATE..........PROJECTED
TIME..........AM PEAK HOUR
COMMENT.......PROJECTED TO YEAR 1997 (FWAKEAAM)

VOLUMES	EB	WB	NB	SB	:	GEOMETRY EB		WB		NB		SB	
LT	17	57	169	19	:	L	11.0	L	11.0	L	10.5	LTR	10.5
TH	479	901	15	14	:	T	11.0	T	11.0	LT	10.5		12.0
RT	143	31	75	14	:	T	11.0	T	11.0	R	10.5		12.0
RR	0	0	0	0	:	R	10.5	R	10.5		12.0		12.0
					:		12.0		12.0		12.0		12.0
					:		12.0		12.0		12.0		12.0

ADJUSTMENT FACTORS

	GRADE (%)	HV (%)	ADJ Y/N	PKG Nm	BUSES Nb	PHF	PEDS	PED. Y/N	BUT. min T	ARR. TYPE
EB	0.00	2.00	N	0	0	0.75	15	Y	13.2	5
WB	0.00	2.00	N	0	0	0.66	0	N	13.2	5
NB	0.00	1.00	N	0	0	0.73	15	Y	24.4	3
SB	0.00	0.00	N	0	0	0.55	15	Y	24.4	3

SIGNAL SETTINGS

CYCLE LENGTH = 90.0

		PH-1	PH-2	PH-3	PH-4
EB	LT	X	X		
	TH		X		
	RT		X		
	PD		X		
WB	LT	X	X		
	TH		X		
	RT		X		
	PD		X		
GREEN		5.0	42.0	0.0	0.0
YELLOW		3.0	5.0	0.0	0.0

		PH-1	PH-2	PH-3	PH-4
NB	LT		X		
	TH		X		
	RT		X		
	PD		X		
SB	LT	X			
	TH	X			
	RT	X			
	PD				
GREEN		13.0	14.0	0.0	0.0
YELLOW		3.0	5.0	0.0	0.0

LEVEL OF SERVICE

	LANE GRP.	V/C	G/C	DELAY	LOS	APP. DELAY	APP. LOS
EB	L	0.107	0.578	6.5	B	3.7	A
	T	0.441	0.489	4.6	A		
	R	0.175	0.844	0.4	A		
WB	L	0.172	0.578	6.8	B	14.6	B
	T	0.942	0.489	15.5	C		
	R	0.043	0.844	0.3	A		
NB	L	0.448	0.178	26.0	D	17.8	C
	LT	0.522	0.178	23.0	C		
	R	0.105	0.756	1.9	A		
SB	LTR	0.457	0.144	23.9	C	23.9	C

INTERSECTION: Delay = 11.9 (sec/veh) V/C = 0.705 LOS = B

1985 HCM: SIGNALIZED INTERSECTIONS
SUMMARY REPORT
****
INTERSECTION..KAAHUMANU AVENUE/WAKEA AVENUE
AREA TYPE.....CBD
ANALYST.......AS
DATE..........PROJECTED
TIME..........PM PEAK HOUR
COMMENT.......PROJECTED TO YEAR 1997 (FWAKEAPM)

VOLUMES

	EB	WB	NB	SB
LT	30	182	355	44
TH	954	760	28	53
RT	386	24	127	30
RR	0	0	0	0

GEOMETRY

	EB		WB		NB		SB
L	11.0	L	11.0	L	10.5	LTR	10.5
T	11.0	T	11.0	LT	10.5		12.0
T	11.0	T	11.0	R	10.5		12.0
R	10.5	R	10.5		12.0		12.0
	12.0		12.0		12.0		12.0
	12.0		12.0		12.0		12.0

ADJUSTMENT FACTORS

	GRADE (%)	HV (%)	ADJ Y/N	PKG Nm	BUSES Nb	PHF	PEDS	PED. Y/N	BUT. min T	ARR. TYPE
EB	0.00	2.00	N	0	0	0.92	15	Y	13.2	5
WB	0.00	2.00	N	0	0	0.93	0	N	13.2	5
NB	0.00	1.00	N	0	0	0.90	15	Y	24.4	3
SB	0.00	0.00	N	0	0	0.76	15	Y	24.4	3

SIGNAL SETTINGS CYCLE LENGTH = 90.0

		PH-1	PH-2	PH-3	PH-4
EB	LT	X	X		
	TH		X		
	RT		X		
	PD		X		
WB	LT	X	X		
	TH		X		
	RT		X		
	PD		X		
GREEN		5.0	35.0	0.0	0.0
YELLOW		3.0	5.0	0.0	0.0

		PH-1	PH-2	PH-3	PH-4
NB	LT		X		
	TH		X		
	RT		X		
	PD		X		
SB	LT	X			
	TH	X			
	RT	X			
	PD				
GREEN		15.0	19.0	0.0	0.0
YELLOW		3.0	5.0	0.0	0.0

LEVEL OF SERVICE

	LANE GRP.	V/C	G/C	DELAY	LOS	APP. DELAY	APP. LOS
EB	L	0.088	0.500	9.0	B	9.9	B
	T	0.851	0.411	13.6	B		
	R	0.385	0.844	0.5	A		
WB	L	0.697	0.500	23.0	C	11.1	B
	T	0.671	0.411	8.7	B		
	R	0.024	0.844	0.3	A		
NB	L	0.581	0.233	25.1	D	18.6	C
	LT	0.667	0.233	23.1	C		
	R	0.148	0.733	2.3	A		
SB	LTR	0.765	0.167	31.6	D	31.6	D

INTERSECTION: Delay = 12.9 (sec/veh) V/C = 0.772 LOS = B

1985 HCM: SIGNALIZED INTERSECTIONS
SUMMARY REPORT
****
INTERSECTION..KAAHUMANU AVENUE/PAPA AVENUE
AREA TYPE.....CBD
ANALYST.......AS
DATE..........PROJECTED
TIME..........AM PEAK HOUR
COMMENT.......PROJECTED TO YEAR 1997 (FPAPAAM)

	VOLUMES				:	GEOMETRY							
	EB	WB	NB	SB	:	EB		WB		NB		SB	
LT	1	37	680	7	:	L	11.0	L	11.0	L	11.0	LTR	11.0
TH	850	1216	1	0	:	T	11.0	T	11.0	LTR	11.0		12.0
RT	398	2	41	0	:	T	11.0	TR	12.0		12.0		12.0
RR	110	0	20	0	:	R	10.5		12.0		12.0		12.0
					:		12.0		12.0		12.0		12.0
					:		12.0		12.0		12.0		12.0

ADJUSTMENT FACTORS

	GRADE (%)	HV (%)	ADJ Y/N	PKG Nm	BUSES Nb	PHF	PEDS	PED. BUT. Y/N	min T	ARR. TYPE
EB	0.00	2.00	N	0	0	0.94	0	N	10.9	5
WB	0.00	2.00	N	0	0	0.79	15	Y	10.9	5
NB	0.00	1.00	N	0	0	0.87	10	Y	22.1	3
SB	0.00	0.00	N	0	0	0.50	15	Y	22.1	3

SIGNAL SETTINGS CYCLE LENGTH = 90.0

		PH-1	PH-2	PH-3	PH-4			PH-1	PH-2	PH-3	PH-4
EB	LT	X	X			NB	LT	X			
	TH		X				TH	X			
	RT		X				RT	X			
	PD		X				PD	X			
WB	LT	X	X			SB	LT		X		
	TH		X				TH		X		
	RT		X				RT		X		
	PD		X				PD		X		
GREEN		5.0	39.0	0.0	0.0	GREEN		25.0	5.0	0.0	0.0
YELLOW		3.0	5.0	0.0	0.0	YELLOW		5.0	3.0	0.0	0.0

LEVEL OF SERVICE

	LANE GRP.	V/C	G/C	DELAY	LOS	APP. DELAY	APP. LOS
EB	L	0.005	0.544	7.1	B	6.0	B
	T	0.670	0.456	7.7	B		
	R	0.280	0.844	0.4	A		
WB	L	0.131	0.544	7.7	B	50.5	E
	TR	1.125	0.456	51.7	E		
NB	L	0.877	0.300	35.1	D	36.0	D
	LTR	0.937	0.300	36.7	D		
SB	LTR	0.168	0.056	26.3	D	26.3	D

INTERSECTION: Delay = 32.3 (sec/veh) V/C = 0.905 LOS = D

1985 HCM: SIGNALIZED INTERSECTIONS
SUMMARY REPORT

****

INTERSECTION..KAAHUMANU AVENUE/PAPA AVENUE
AREA TYPE.....CBD
ANALYST.......AS
DATE..........PROJECTED
TIME..........PM PEAK HOUR
COMMENT.......PROJECTED TO YEAR 1997 (FPAPAPM)

	VOLUMES EB	WB	NB	SB		GEOMETRY EB		WB		NB		SB
LT	6	56	416	9	L	11.0	L	11.0	L	11.0	LTR	11.0
TH	1449	1094	1	2	T	11.0	T	11.0	LTR	11.0		12.0
RT	580	14	55	6	T	11.0	TR	12.0		12.0		12.0
RR	110	12	20	5	R	10.5		12.0		12.0		12.0
						12.0		12.0		12.0		12.0
						12.0		12.0		12.0		12.0

ADJUSTMENT FACTORS

	GRADE (%)	HV (%)	ADJ Y/N	PKG Nm	BUSES Nb	PHF	PEDS	PED. Y/N	BUT. min T	ARR. TYPE
EB	0.00	2.00	N	0	0	0.85	0	N	10.9	5
WB	0.00	2.00	N	0	0	0.91	15	Y	10.9	5
NB	0.00	1.00	N	0	0	0.83	10	Y	22.1	3
SB	0.00	0.00	N	0	0	0.61	15	Y	22.1	3

SIGNAL SETTINGS CYCLE LENGTH = 90.0

		PH-1	PH-2	PH-3	PH-4			PH-1	PH-2	PH-3	PH-4
EB	LT	X	X			NB	LT	X			
	TH		X				TH	X			
	RT		X				RT	X			
	PD		X				PD	X			
WB	LT	X	X			SB	LT		X		
	TH		X				TH		X		
	RT		X				RT		X		
	PD		X				PD		X		
GREEN		5.0	44.0	0.0	0.0	GREEN		18.0	7.0	0.0	0.0
YELLOW		3.0	5.0	0.0	0.0	YELLOW		5.0	3.0	0.0	0.0

LEVEL OF SERVICE

	LANE GRP.	V/C	G/C	DELAY	LOS	APP. DELAY	APP. LOS
EB	L	0.031	0.600	5.6	B	38.7	D
	T	1.126	0.511	50.5	E		
	R	0.506	0.844	0.7	A		
WB	L	0.291	0.600	7.0	B	7.7	B
	TR	0.783	0.511	7.7	B		
NB	L	0.759	0.222	31.6	D	35.1	D
	LTR	0.902	0.222	38.0	D		
SB	LTR	0.190	0.078	25.2	D	25.2	D

INTERSECTION: Delay = 28.5 (sec/veh) V/C = 0.907 LOS = D

1985 HCM:MULTILANE HIGHWAYS
****

FACILITY SECTION..... KAAHUMANU AVENUE
ANALYST.............. AS
TIME OF ANALYSIS..... AM PEAK HOUR
DATE OF ANALYSIS..... PROJECTED
OTHER INFORMATION.... PROJECTED TO YEAR 1997 (FKAAHUAM)

A) ADJUSTMENT FACTORS

PERCENTAGE OF TRUCKS................	2	(TYPICAL - 200 #/HP)
PERCENTAGE OF BUSES.................	0	
PERCENTAGE OF RECREATIONAL VEHICLES..	0	
DESIGN SPEED (MPH)..................	60	
PEAK HOUR FACTOR....................	.9	
DRIVER POPULATION FACTOR............	1	(WEEKDAY/COMMUTER)
LANE WIDTH (FT).....................	11	
OBSTRUCTIONS........................	NO	
DISTANCE (FT) FROM ROADWAY EDGE......	6	
TYPE OF MULTILANE HIGHWAY...........	RURAL, DIVIDED	

B) CORRECTION FACTORS

TERRAIN TYPE	E_T	E_B	E_R	f_{HV}	f_w	f_p	f_E
LEVEL	1.7	1.5	1.6	0.99	0.97	1.00	1.00

C) OPERATIONAL ANALYSIS RESULTS
****

NO. OF LANES................	2
INPUT VOLUME................	1896
V/C RATIO...................	.55
LEVEL OF SERVICE............	C
COMPUTED CAPACITY (pcphpl)..	1101
SPEED (mph).................	46
DENSITY (pcpmpl)............	23

1985 HCM:MULTILANE HIGHWAYS
****

FACILITY SECTION..... KAAHUMANU AVENUE
ANALYST............. AS
TIME OF ANALYSIS..... PM PEAK HOUR
DATE OF ANALYSIS..... PROJECTED
OTHER INFORMATION.... PROJECTED TO YEAR 1997 (FKAAHUPM)

A) ADJUSTMENT FACTORS

PERCENTAGE OF TRUCKS................	2	(TYPICAL - 200 #/HP)
PERCENTAGE OF BUSES.................	0	
PERCENTAGE OF RECREATIONAL VEHICLES..	0	
DESIGN SPEED (MPH)..................	60	
PEAK HOUR FACTOR....................	.85	
DRIVER POPULATION FACTOR............	1	(WEEKDAY/COMMUTER)
LANE WIDTH (FT).....................	11	
OBSTRUCTIONS........................	NO	
DISTANCE (FT) FROM ROADWAY EDGE......	6	
TYPE OF MULTILANE HIGHWAY...........	RURAL, DIVIDED	

B) CORRECTION FACTORS

TERRAIN TYPE	E_T	E_B	E_R	f_{HV}	f_w	f_p	f_E
LEVEL	1.7	1.5	1.6	0.99	0.97	1.00	1.00

C) OPERATIONAL ANALYSIS RESULTS
****

NO. OF LANES...............	2
INPUT VOLUME...............	2035
V/C RATIO..................	.63
LEVEL OF SERVICE...........	C
COMPUTED CAPACITY (pcphpl)..	1251
SPEED (mph)................	44
DENSITY (pcpmpl)...........	28

APPENDIX B

LEVEL OF SERVICE COMPUTATIONS

4. FUTURE TRAFFIC WITH PROPOSED IMPROVEMENT

1985 HCM: SIGNALIZED INTERSECTIONS
SUMMARY REPORT
****
INTERSECTION..KAAHUMANU AVENUE/WAKEA AVENUE
AREA TYPE.....CBD
ANALYST.......AS
DATE..........PROJECTED
TIME..........AM PEAK HOUR
COMMENT.......PROJECTED TO YEAR 1997 W/ IMPROVEMENTS (FWAKEAAI)

VOLUMES

	EB	WB	NB	SB
LT	18	57	178	19
TH	491	949	15	14
RT	146	31	75	15
RR	0	0	0	0

GEOMETRY

EB		WB		NB		SB	
L	11.0	L	11.0	L	10.5	LTR	10.5
T	11.0	T	11.0	LT	10.5		12.0
T	11.0	T	11.0	R	10.5		12.0
R	10.5	R	10.5		12.0		12.0
	12.0		12.0		12.0		12.0
	12.0		12.0		12.0		12.0

ADJUSTMENT FACTORS

	GRADE (%)	HV (%)	ADJ Y/N	PKG Nm	BUSES Nb	PHF	PEDS	PED. Y/N	BUT. min T	ARR. TYPE
EB	0.00	2.00	N	0	0	0.75	15	Y	13.2	5
WB	0.00	2.00	N	0	0	0.66	0	N	13.2	5
NB	0.00	1.00	N	0	0	0.73	15	Y	24.4	3
SB	0.00	0.00	N	0	0	0.55	15	Y	24.4	3

SIGNAL SETTINGS CYCLE LENGTH = 90.0

		PH-1	PH-2	PH-3	PH-4			PH-1	PH-2	PH-3	PH-4
EB	LT	X	X			NB	LT		X		
	TH		X				TH		X		
	RT		X				RT		X		
	PD		X				PD		X		
WB	LT	X	X			SB	LT	X			
	TH		X				TH	X			
	RT		X				RT	X			
	PD		X				PD				
GREEN		5.0	39.0	0.0	0.0	GREEN		14.0	16.0	0.0	0.0
YELLOW		3.0	5.0	0.0	0.0	YELLOW		3.0	5.0	0.0	0.0

LEVEL OF SERVICE

	LANE GRP.	V/C	G/C	DELAY	LOS	APP. DELAY	APP. LOS
EB	L	0.114	0.544	7.6	B	4.3	A
	T	0.485	0.456	5.3	B		
	R	0.179	0.844	0.4	A		
WB	L	0.183	0.544	8.0	B	16.4	C
	T	0.959	0.456	17.3	C		
	R	0.043	0.844	0.3	A		
NB	L	0.419	0.200	24.5	C	17.0	C
	LT	0.485	0.200	21.5	C		
	R	0.106	0.744	2.1	A		
SB	LTR	0.435	0.156	23.1	C	23.1	C

INTERSECTION: Delay = 13.0 (sec/veh) V/C = 0.686 LOS = B

1985 HCM: SIGNALIZED INTERSECTIONS
SUMMARY REPORT
****
INTERSECTION..KAAHUMANU AVENUE/WAKEA AVENUE
AREA TYPE.....CBD
ANALYST.......AS
DATE..........PROJECTED
TIME..........PM PEAK HOUR
COMMENT.......PROJECTED TO YEAR 1997 W/ IMPROVEMENTS (FWAKEAPI)

	VOLUMES				:	GEOMETRY							
	EB	WB	NB	SB	:	EB		WB		NB		SB	
LT	31	182	366	44	:	L	11.0	L	11.0	L	10.5	LTR	10.5
TH	984	785	28	53	:	T	11.0	T	11.0	LT	10.5		12.0
RT	398	24	127	31	:	T	11.0	T	11.0	R	10.5		12.0
RR	0	0	0	0	:	R	10.5	R	10.5		12.0		12.0
					:		12.0		12.0		12.0		12.0
					:		12.0		12.0		12.0		12.0

ADJUSTMENT FACTORS

	GRADE (%)	HV (%)	ADJ PKG Y/N	Nm	BUSES Nb	PHF	PEDS	PED. BUT. Y/N	min T	ARR. TYPE
EB	0.00	2.00	N	0	0	0.92	15	Y	13.2	5
WB	0.00	2.00	N	0	0	0.93	0	N	13.2	5
NB	0.00	1.00	N	0	0	0.90	15	Y	24.4	3
SB	0.00	0.00	N	0	0	0.76	15	Y	24.4	3

SIGNAL SETTINGS CYCLE LENGTH = 90.0

		PH-1	PH-2	PH-3	PH-4			PH-1	PH-2	PH-3	PH-4
EB	LT	X	X			NB	LT		X		
	TH		X				TH		X		
	RT		X				RT		X		
	PD		X				PD		X		
WB	LT	X	X			SB	LT	X			
	TH		X				TH	X			
	RT		X				RT	X			
	PD		X				PD				
GREEN		5.0	32.0	0.0	0.0	GREEN		18.0	19.0	0.0	0.0
YELLOW		3.0	5.0	0.0	0.0	YELLOW		3.0	5.0	0.0	0.0

LEVEL OF SERVICE

	LANE GRP.	V/C	G/C	DELAY	LOS	APP. DELAY	APP. LOS
EB	L	0.099	0.467	10.2	B	14.6	B
	T	0.955	0.378	20.1	C		
	R	0.397	0.844	0.6	A		
WB	L	0.764	0.467	30.2	D	13.5	B
	T	0.754	0.378	10.2	B		
	R	0.024	0.844	0.3	A		
NB	L	0.599	0.233	25.5	D	19.2	C
	LT	0.685	0.233	23.6	C		
	R	0.155	0.700	2.9	A		
SB	LTR	0.643	0.200	24.5	C	24.5	C

INTERSECTION: Delay = 15.5 (sec/veh) V/C = 0.797 LOS = C

1985 HCM: SIGNALIZED INTERSECTIONS
SUMMARY REPORT
****
INTERSECTION..KAAHUMANU AVENUE/PAPA AVENUE
AREA TYPE.....CBD
ANALYST.......AS
DATE..........PROJECTED
TIME..........AM PEAK HOUR
COMMENT.......PROJECTED TO YEAR 1997 W/ IMPROVEMENTS (FPAPAAMI)

	VOLUMES				GEOMETRY							
	EB	WB	NB	SB	EB		WB		NB		SB	
LT	22	37	689	23	L	11.0	L	11.0	L	11.0	L	11.0
TH	855	1232	22	8	T	11.0	T	11.0	LT	11.0	TR	11.0
RT	401	44	41	8	T	11.0	T	11.0	R	11.0		12.0
RR	392	44	40	8	R	10.5	R	10.5		12.0		12.0
						12.0		12.0		12.0		12.0
						12.0		12.0		12.0		12.0

ADJUSTMENT FACTORS

	GRADE (%)	HV (%)	ADJ Y/N	PKG Nm	BUSES Nb	PHF	PEDS	PED. Y/N	BUT. min T	ARR. TYPE
EB	0.00	2.00	N	0	0	0.99	0	N	16.4	1
WB	0.00	2.00	N	0	0	0.99	0	Y	16.4	1
NB	0.00	1.00	N	0	0	0.99	0	Y	24.4	1
SB	0.00	0.00	N	0	0	0.99	0	Y	24.4	1

SIGNAL SETTINGS CYCLE LENGTH = 90.0

		PH-1	PH-2	PH-3	PH-4			PH-1	PH-2	PH-3	PH-4
EB	LT	X	X			NB	LT	X			
	TH		X				TH	X			
	RT		X				RT	X			
	PD		X				PD	X			
WB	LT	X	X			SB	LT		X		
	TH		X				TH		X		
	RT		X				RT		X		
	PD		X				PD		X		
GREEN		5.0	38.0	0.0	0.0	GREEN		26.0	5.0	0.0	0.0
YELLOW		3.0	5.0	0.0	0.0	YELLOW		5.0	3.0	0.0	0.0

LEVEL OF SERVICE

	LANE GRP.	V/C	G/C	DELAY	LOS	APP. DELAY	APP. LOS
EB	L	0.105	0.544	7.5	B	17.7	C
	T	0.606	0.456	18.2	C		
	R	0.008	0.867	0.9	A		
WB	L	0.099	0.544	7.5	B	24.0	C
	T	0.873	0.456	24.5	C		
	R	0.000	0.867	0.9	A		
NB	L	0.727	0.322	24.3	C	28.5	D
	LT	0.769	0.322	32.5	D		
	R	0.001	0.867	0.9	A		
SB	L	0.233	0.067	30.5	D	34.6	D
	TR	0.078	0.067	46.1	E		

INTERSECTION: Delay = 23.3 (sec/veh) V/C = 0.719 LOS = C

```
1985 HCM: SIGNALIZED INTERSECTIONS
SUMMARY REPORT
***************************************************************************
INTERSECTION..KAAHUMANU AVENUE/PAPA AVENUE
AREA TYPE.....CBD
ANALYST.......AS
DATE..........PROJECTED
TIME..........PM PEAK HOUR
COMMENT.......PROJECTED TO YEAR 1997 W/ IMPROVEMENTS (FPAPAPMI)
---------------------------------------------------------------------------
          VOLUMES              :                 GEOMETRY
      EB    WB    NB    SB     :    EB          WB          NB          SB
LT    19    56   419    52     : L  11.0   L   11.0   L   11.0   L   11.0
TH  1467  1102     3    12     : T  11.0   T   11.0   LT  11.0   TR  11.0
RT   587    43    55    34     : T  11.0   T   11.0   R   11.0       12.0
RR   110    12    20     5     : R  10.5   R   10.5       12.0       12.0
                               :    12.0       12.0       12.0       12.0
                               :    12.0       12.0       12.0       12.0
---------------------------------------------------------------------------
                          ADJUSTMENT FACTORS
     GRADE    HV    ADJ PKG  BUSES   PHF   PEDS   PED. BUT.    ARR. TYPE
      (%)     (%)   Y/N  Nm   Nb                  Y/N  min T
EB    0.00   2.00    N   0    0     0.85     0    N    16.4       5
WB    0.00   2.00    N   0    0     0.91    15    Y    16.4       5
NB    0.00   1.00    N   0    0     0.83    10    Y    24.4       3
SB    0.00   0.00    N   0    0     0.90    15    Y    24.4       3
---------------------------------------------------------------------------
                        SIGNAL SETTINGS              CYCLE LENGTH =  90.0
          PH-1   PH-2   PH-3   PH-4                  PH-1  PH-2  PH-3  PH-4
EB   LT    X      X                     NB   LT       X
     TH           X                          TH       X
     RT           X                          RT       X
     PD           X                          PD       X
WB   LT    X      X                     SB   LT             X
     TH           X                          TH             X
     RT           X                          RT             X
     PD           X                          PD             X
GREEN      5.0   46.0    0.0    0.0     GREEN        16.0   7.0   0.0   0.0
YELLOW     3.0    5.0    0.0    0.0     YELLOW        5.0   3.0   0.0   0.0
---------------------------------------------------------------------------
                         LEVEL OF SERVICE
    LANE GRP.    V/C     G/C     DELAY    LOS    APP. DELAY     APP. LOS
EB      L       0.095   0.633     4.9      A        16.5            C
        T       1.013   0.544    21.5      C
        R       0.500   0.867     0.6      A
WB      L       0.291   0.633     6.0      B         6.5            B
        T       0.751   0.544     6.7      B
        R       0.031   0.867     0.2      A
NB      L       0.763   0.211    32.2      D        29.0            D
        LT      0.814   0.211    30.6      D
        R       0.038   0.844     0.7      A
SB      L       0.435   0.089    31.0      D        28.6            D
        TR      0.361   0.089    25.6      D
---------------------------------------------------------------------------
INTERSECTION:       Delay =   15.2 (sec/veh)    V/C = 0.844     LOS = C
```

1985 HCM:MULTILANE HIGHWAYS

****

FACILITY SECTION..... KAAHUMANU AVENUE
ANALYST.............. AS
TIME OF ANALYSIS..... AM PEAK HOUR
DATE OF ANALYSIS..... PROJECTED
OTHER INFORMATION.... PROJECTED TO YEAR 1997 W/ IMPROVEMENTS (FKAAHUAI)

A) ADJUSTMENT FACTORS

PERCENTAGE OF TRUCKS..................	2	(TYPICAL - 200 #/HP)
PERCENTAGE OF BUSES...................	0	
PERCENTAGE OF RECREATIONAL VEHICLES..	0	
DESIGN SPEED (MPH)....................	60	
PEAK HOUR FACTOR......................	.9	
DRIVER POPULATION FACTOR..............	1	(WEEKDAY/COMMUTER)
LANE WIDTH (FT).......................	11	
OBSTRUCTIONS..........................	NO	
DISTANCE (FT) FROM ROADWAY EDGE......	6	
TYPE OF MULTILANE HIGHWAY............	RURAL, DIVIDED	

B) CORRECTION FACTORS

TERRAIN TYPE	E_T	E_B	E_R	f_{HV}	f_w	f_p	f_E
LEVEL	1.7	1.5	1.6	0.99	0.97	1.00	1.00

C) OPERATIONAL ANALYSIS RESULTS

****

NO. OF LANES................	2
INPUT VOLUME................	1929
V/C RATIO...................	.56
LEVEL OF SERVICE............	C
COMPUTED CAPACITY (pcphpl)..	1120
SPEED (mph).................	46
DENSITY (pcpmpl)............	24

1985 HCM:MULTILANE HIGHWAYS
****

FACILITY SECTION..... KAAHUMANU AVENUE
ANALYST.............. AS
TIME OF ANALYSIS..... PM PEAK HOUR
DATE OF ANALYSIS..... PROJECTED
OTHER INFORMATION.... PROJECTED TO YEAR 1997 W/ IMPROVEMENTS (FKAAHUPI)

A) ADJUSTMENT FACTORS

PERCENTAGE OF TRUCKS................. 2 (TYPICAL - 200 #/HP)
PERCENTAGE OF BUSES.................. 0
PERCENTAGE OF RECREATIONAL VEHICLES.. 0
DESIGN SPEED (MPH)................... 60
PEAK HOUR FACTOR..................... .85
DRIVER POPULATION FACTOR............. 1 (WEEKDAY/COMMUTER)
LANE WIDTH (FT)...................... 11
OBSTRUCTIONS......................... NO
DISTANCE (FT) FROM ROADWAY EDGE...... 6
TYPE OF MULTILANE HIGHWAY............ RURAL, DIVIDED

B) CORRECTION FACTORS

TERRAIN TYPE	E_T	E_B	E_R	f_{HV}	f_w	f_p	f_E
LEVEL	1.7	1.5	1.6	0.99	0.97	1.00	1.00

C) OPERATIONAL ANALYSIS RESULTS
****

NO. OF LANES................ 2
INPUT VOLUME................ 2073
V/C RATIO................... .64
LEVEL OF SERVICE............ C
COMPUTED CAPACITY (pcphpl).. 1275
SPEED (mph)................. 44
DENSITY (pcpmpl)............ 29

Appendix D

Hydrology Study

MAUI CENTRAL PARK

HYDROLOGY STUDY

Kahului, Maui, Hawaii

Prepared for

Department of Parks & Recreation

County of Maui

Prepared by

Wilson Okamoto & Associates, Inc.

October 1996

TABLE OF CONTENTS

I. INTRODUCTION

A. Purpose

This hydrology study was conducted to:

1. Calculate storm runoff quantities flowing through the proposed project site from drainage areas mauka of the site.

2. Evaluate the flows within the proposed site.

3. Recommend any storm drainage improvements such as culverts or open channels as required to facilitate the grading and drainage of the project site.

Previous drainage and hydrology studies or reports prepared for development in the Maui Central Park area included the following:

1. Preliminary Drainage Report for Maui Central Park, prepared by Ronald M. Fukumoto Engineering, Inc., May 1996.

B. Proposed Project Location

The Maui Central Park site is bound by Kaahumanu Avenue, Kanaloa Avenue, Kahului Beach Road, and the proposed Papa Avenue extension. The Maui Community College Housing off Kaahumanu Avenue, Central Maui Youth Center, the Keiki Zoo, the Maui YMCA, Maui Arts and Cultural Center, and single family residential lots along Kanaloa Avenue are also bounded by the above-mentioned streets to be the neighboring development of the park. The project site excluding these developed areas is approximately 110 acres.

C. Existing Topography

Existing topography of the project site is irregular and undulating. The northeasterly portion is relatively flat. However, the area to the east of the Maui Youth Center and YMCA is hilly with mounds and high grounds. The elevation ranges from 5 to 90 feet above mean sea level.

D. Soils

Soil series and mapping units for the island of Maui are found in maps by the U.S. Department of Agricultural, Soil. Conservation Services. The majority of the soil within the project limits consists of Pumone sand and cemented sand.

E. Climate

Temperature: The average daily temperature in the Kahului. Maui area varies from approximately 70°F in February to 85°F in August.

II. EXISTING DRAINAGE CONDITIONS

A. Drainage

Currently, several culverts cross Kanaloa Avenue and outlet at the Maui Central Park site. Near the corner of Kanaloa Avenue and Kaahumanu Avenue, a 78" diameter pipe culvert crosses Kanaloa Avenue, and a 42" pipe culvert lies under Kaahumanu Avenue discharging onto the site. From the War Memorial Park which is to the west of the project site, one 24" and four 30" pipe culverts cross Kanaloa Avenue and outlet onto the site. Runoff from these culverts is generally ponded and pooled in low-lying areas and percolate into the ground. A 48" pipe culvert near the intersection of Mikohu Street and Kanaloa Avenue also outlets at the project site. Runoff from the above-mentioned pipe culverts that enters the site empties into the existing low-lying and sump areas mauka of the beach road and percolates into the soil. See Figure 1.

B. Flood Control

The eastern boundary of the project site approximately 700' from Kahului Beach Road is within the 100-year flood limits. The majority of the site is in an area of minimal flooding.

III. PROPOSED DRAINAGE CONCEPT

The proposed concept for drainage improvement is to maintain the low-lying areas to accommodate the on-site and off-site runoff for the area to the west of the new Park Drive and the West Papa Drive Extension. The existing retention basins or sumps along the eastern project site

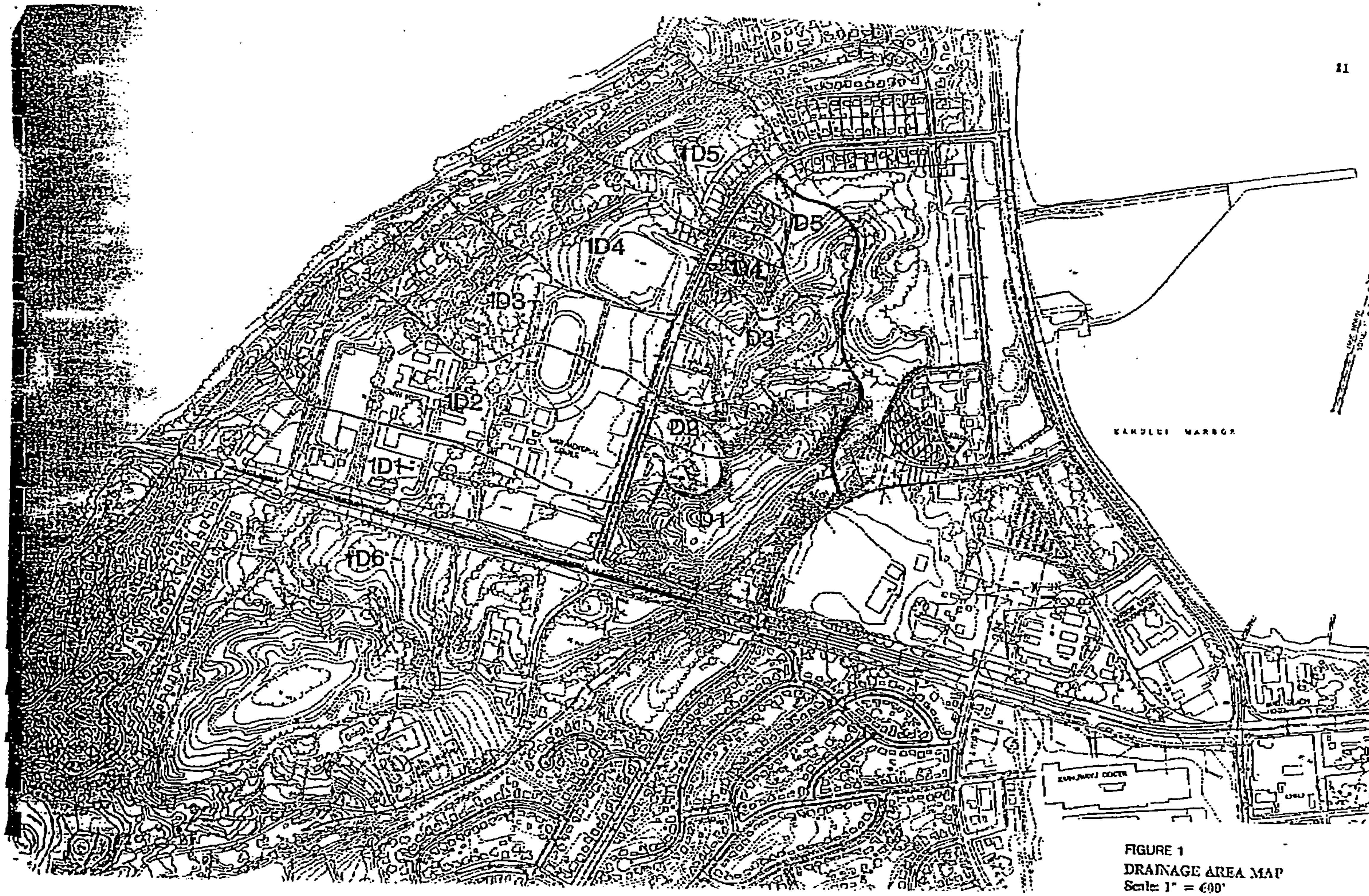
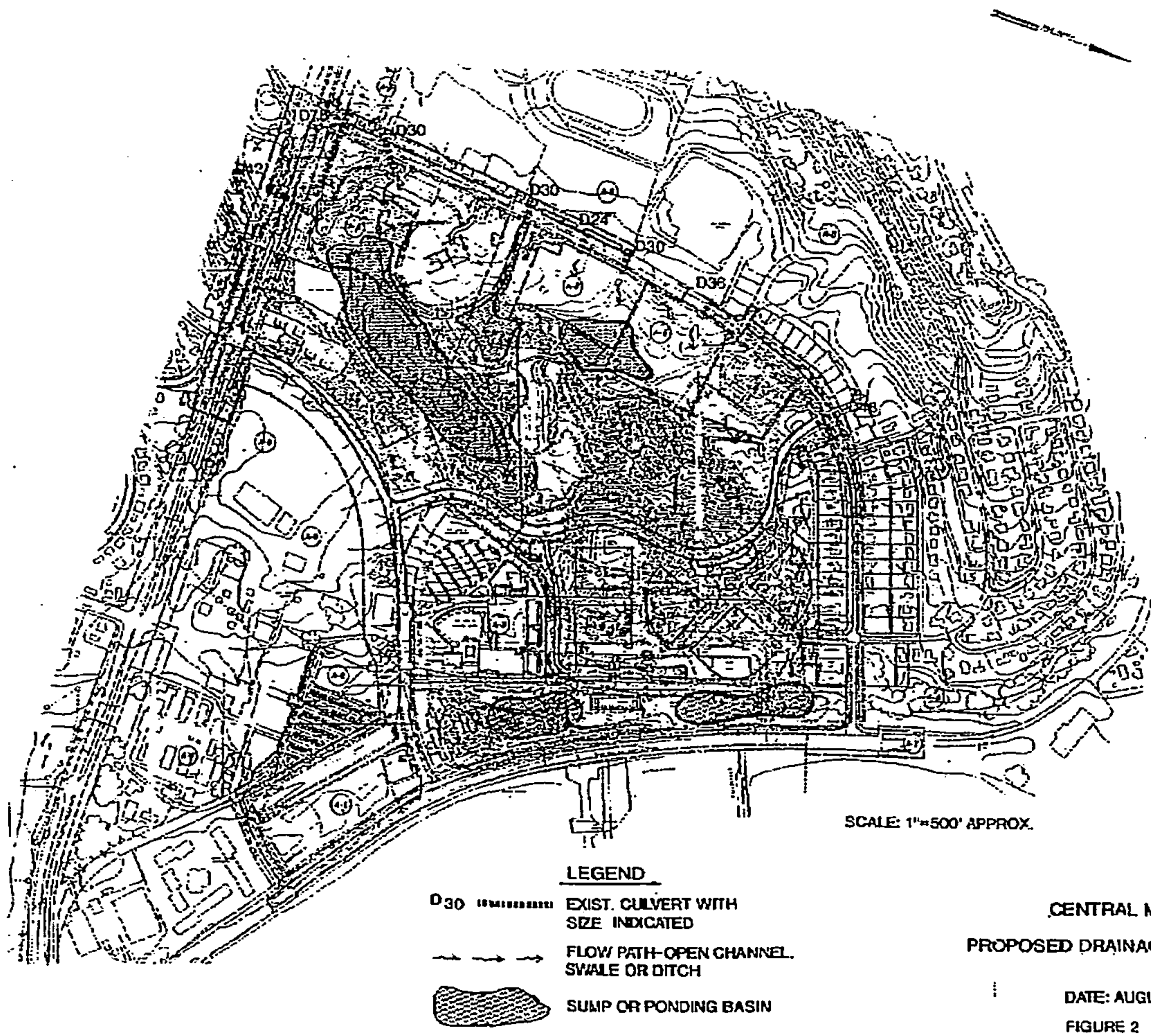


FIGURE 1
DRAINAGE AREA MAP
Scale: 1" = 600'



CENTRAL MAUI PARK

PROPOSED DRAINAGE IMPROVEMENTS

DATE: AUGUST 5, 1996

FIGURE 2

boundary fronting Kahului Beach Road will be utilized to drain the proposed soccer and baseball fields. See Figure 2.

IV. HYDROLOGIC CRITERIA

The hydrology analysis is based on the "Department of Public Works and Waste Management, County of Maui. Rules for the Design of Storm Drainage Facilities in the County of Maui" effective November 12, 1995. The Rational Method was used to determine peak discharges.

V. HYDROLOGY ANALYSIS

A. Rational Method

Design runoff flows were determined by the Rational Method expressed as:

$$Q = C * I * A$$

where:

Q	=	Flowrate in cubic feet per second (cfs)
C	=	Runoff coefficient
I	=	Rainfall intensity in inches per hour for a duration equal to the time of concentration.
A	=	Drainage Area, in acres.

See Appendix 1 for calculations for storm runoff by the Rational Method.

Drainage Area: The limits of the drainage basins were drawn based on topographic maps of the area.

Rainfall Intensity: The runoff time of concentration and correction factor was determined in accordance with plates 7 of the "Rules for the Design of Storm Drainage Facilities in the County of Maui". A rainfall intensity of 2.5 inches/hour was based on a 50-year, 1-hour rainfall. The equivalent rainfall intensities for the time of concentration can be found in Appendix 1.

Runoff Coefficient: The runoff coefficients for the given areas were derived using previous reports, references, and County of Maui Drainage Design Standards.

Grassed Area:

Infiltration		0.07 (medium)
relief		0.03 (flat)
vegetal cover		0.03 (good)
development type		0.15 (park)
	c =	0.28

Roadway Area:

pavement and gutter	c =	0.95

VI. RESULTS OF HYDROLOGY ANALYSIS

The table below shows the peak discharge as calculated by the Rational Method for each drainage basin area. The new ballfields created will reduce the runoff quantity while the paved surface of the new roadway will increase the on-site runoff. The difference in storm runoff quantities between existing and future condition within the park site for the area to the west of Park Drive will remain the same since improvements will be minimal.

EXISTING CONDITION
OFF-SITE RUNOFF

LOCATION	AREA (ACRES)	RUNOFF (CFS)
1D1	39	91.3
1D2	49	95.6
1D3	30	70.2
1D4	33	70.8
1D5	22	57.2
1D6	100	162.5

EXISTING CONDITION
ON-SITE RUNOFF

LOCATION	AREA (ACRES)	RUNOFF (CFS)
D1	32.9	30.4
D2	6.5	7.3
D3	16.9	17.0
D4	5.4	6.8
D5	9.6	12.1
Ball Fields	22.0	27.7

PROPOSED CONDITION
ON-SITE RUNOFF

LOCATION	AREA (ACRES)	RUNOFF (CFS)
BALL FIELDS	22	20.3
PARK DRIVE	2	6.0

VII. PROPOSED IMPROVEMENTS

Drainage improvements for the construction of Maui Central Park construction will include on-site retention basins or sumps at various locations. An existing low-lying area located in the southwest corner of the site will intercept and retain runoff from off-site drainage basins conveyed through the 78-inch diameter and 42-inch diameter culverts under Kanaloa Avenue and Kaahumanu Avenue, respectively. The existing nursery site will be utilized as a retention basin to accommodate runoff from the Maui Track and Field Stadium collected via a 30-inch diameter culvert under Kanaloa Avenue and an open channel.

A depressed area east or makai of the proposed Maui Keiki Zoo is planned to collect off-site runoff from the Maui Baseball stadium through existing culverts under Kanaloa Avenue. These retention basins and existing low-lying areas will have the capacity to retain the rainfall runoff quantities.

Two (2) retention basins or sumps fronting the beach road will be graded to provide the required storage and retention capacities for the runoff quantities from the drainage areas east or makai of the proposed

Park Drive. The sump located near the Kanaloa Avenue and the beach road intersection, has an existing 24-inch diameter drain pipe discharging to the harbor under the beach road.

In addition to the proposed retention or sumps outlined above, numerous localized depressed lawn areas will become drainage retardation elements to reduce the runoff time of concentration and minimize the runoff quantities. The sandy nature of the on-site soil will allow much of the rainfall water to percolate and dissipate into the ground or sub-surface strata.

In addition, drainage pipe culverts will be implemented to relieve or avoid localized ponding.

VII. CONCLUSION

This hydrology analysis indicates that the impact of the proposed Maui Central Park development on drainage conditions in the general vicinity will be minimal. The existing low-lying areas to the west of the proposed Park Drive have adequate storage volume to accommodate the off-site runoff entering the project site and any on-site runoff. The runoff from the new Park Drive, soccer fields and baseball fields will outlet at the sumps or retention basins fronting Kahului Beach Road.

IX. APPENDIX

DRAINAGE AREA CALCULATIONS (Q = C * I * A) OFF-SITE EXISTING CONDITION

C = 0.65 1-HR RAINFALL INTENSITY = 2.5 (50-YR)

DRAINAGE AREA # 106

RISE, R = 60 FT.

LENGTH, L = 3600 FT.

SLOPE, S = 0.017 FT./FT.

Tc = 50 MIN.

I50 = 2.7 IN.

AREA, A = 100 ACRES

Q50 = 162.5 C.F.S.

DRAINAGE AREA # 101

RISE, R = 50 FT.

LENGTH, L = 2900 FT.

SLOPE, S = 0.017 FT./FT.

Tc = 29 MIN.

I50 = 3.6 IN.

AREA, A = 39 ACRES

Q50 = 91.3 C.F.S.

DRAINAGE AREA # 102

RISE, R = 50 FT.

LENGTH, L = 2500 FT.

SLOPE, S = 0.020 FT./FT.

Tc = 45 MIN.

I50 = 3.0 IN.

AREA, A = 49 ACRES

Q50 = 95.6 C.F.S.

DRAINAGE AREA # 103

RISE, R = 45 FT.

LENGTH, L = 2000 FT.

SLOPE, S = 0.023 FT./FT.

Tc = 27 MIN.

I50 = 3.6 IN.

AREA, A = 30 ACRES

Q50 = 70.2 C.F.S.

DRAINAGE AREA # 104

RISE, R = 40 FT.

LENGTH, L = 1550 FT.

SLOPE, S = 0.026 FT./FT.

Tc = 34 MIN.

I50 = 3.3 IN.

AREA, A = 33 ACRES

Q50 = 70.8 C.F.S.

DRAINAGE AREA # 105

RISE, R = 30 FT.

LENGTH, L = 1100 FT.

SLOPE, S = 0.027 FT./FT.

Tc = 22 MIN.

I50 = 4.0 IN.

AREA, A = 22 ACRES

Q50 = 57.2 C.F.S.

DRAINAGE AREA CALCULATIONS (Q = C * I * A) ON-SITE EXISTING CONDITION

C = 0.38 1-HR RAINFALL INTENSITY = 2.5 (50-YR)

DRAINAGE AREA # D1

RISE, R = 45 FT.
LENGTH, L = 1300 FT.
SLOPE, S = 0.034 FT./FT.
Tc = 32 MIN.
I50 = 3.3 IN.
AREA, A = 32.9 ACRES
Q50 = 30.4 C.F.S.

DRAINAGE AREA # D2

RISE, R = 30 FT.
LENGTH, L = 600 FT.
SLOPE, S = 0.05 FT./FT.
Tc = 21 MIN.
I50 = 4.0 IN.
AREA, A = 6.5 ACRES
Q50 = 7.3 C.F.S.

DRAINAGE AREA # D3

RISE, R = 35 FT.
LENGTH, L = 900 FT.
SLOPE, S = 0.039 FT./FT.
Tc = 28 MIN.
I50 = 3.6 IN.
AREA, A = 16.9 ACRES
Q50 = 17.0 C.F.S.

DRAINAGE AREA # D4

RISE, R = 40 FT.
LENGTH, L = 400 FT.
SLOPE, S = 0.10 FT./FT.
Tc = 16 MIN.
I50 = 4.5 IN.
AREA, A = 5.4 ACRES
Q50 = 6.8 C.F.S.

DRAINAGE AREA # D5

RISE, R = 40 FT.
LENGTH, L = 400 FT.
SLOPE, S = 0.10 FT./FT.
Tc = 16 MIN.
I50 = 4.5 IN.
AREA, A = 9.6 ACRES
Q50 = 12.1 C.F.S.

DRAINAGE AREA # BALL FIELDS

RISE, R = 50 FT.
LENGTH, L = 600 FT.
SLOPE, S = 0.083 FT./FT.
Tc = 17 MIN.
I50 = 4.5 IN.
AREA, A = 22 ACRES
Q50 = 37.7 C.F.S.

DRAINAGE AREA CALCULATIONS (Q = C * I * A) ON-SITE PROPOSED CONDITION

C = ________ 1-HR RAINFALL INTENSITY = 2.5 (50-YR)

DRAINAGE AREA # BALL FIELDS

RISE, R = 7 FT.

LENGTH, L = 900 FT.

SLOPE, S = 0.008 FT./FT.

C = 0.40

Tc = 35 MIN.

I50 = 2.3 IN.

AREA, A = 22 ACRES

Q50 = 20.3 C.F.S.

DRAINAGE AREA # PARK DRIVE

RISE, R = 10 FT.

LENGTH, L = 2500 FT.

SLOPE, S = 0.004 FT./FT.

C = 0.90

Tc = 25 MIN.

I50 = 3.0 IN.

AREA, A = 2 ACRES

Q50 = 6 C.F.S.

DRAINAGE AREA # ______

RISE, R = ________ FT.

LENGTH, L = ________ FT.

SLOPE, S = ________ FT./FT.

Tc = ________ MIN.

I50 = ________ IN.

AREA, A = ________ ACRES

Q50 = ________ C.F.S.

DRAINAGE AREA # ______

RISE, R = ________ FT.

LENGTH, L = ________ FT.

SLOPE, S = ________ FT./FT.

Tc = ________ MIN.

I50 = ________ IN.

AREA, A = ________ ACRES

Q50 = ________ C.F.S.

DRAINAGE AREA # ______

RISE, R = ________ FT.

LENGTH, L = ________ FT.

SLOPE, S = ________ FT./FT.

Tc = ________ MIN.

I50 = ________ IN.

AREA, A = ________ ACRES

Q50 = ________ C.F.S.

DRAINAGE AREA # ______

RISE, R = ________ FT.

LENGTH, L = ________ FT.

SLOPE, S = ________ FT./FT.

Tc = ________ MIN.

I50 = ________ IN.

AREA, A = ________ ACRES

Q50 = ________ C.F.S.

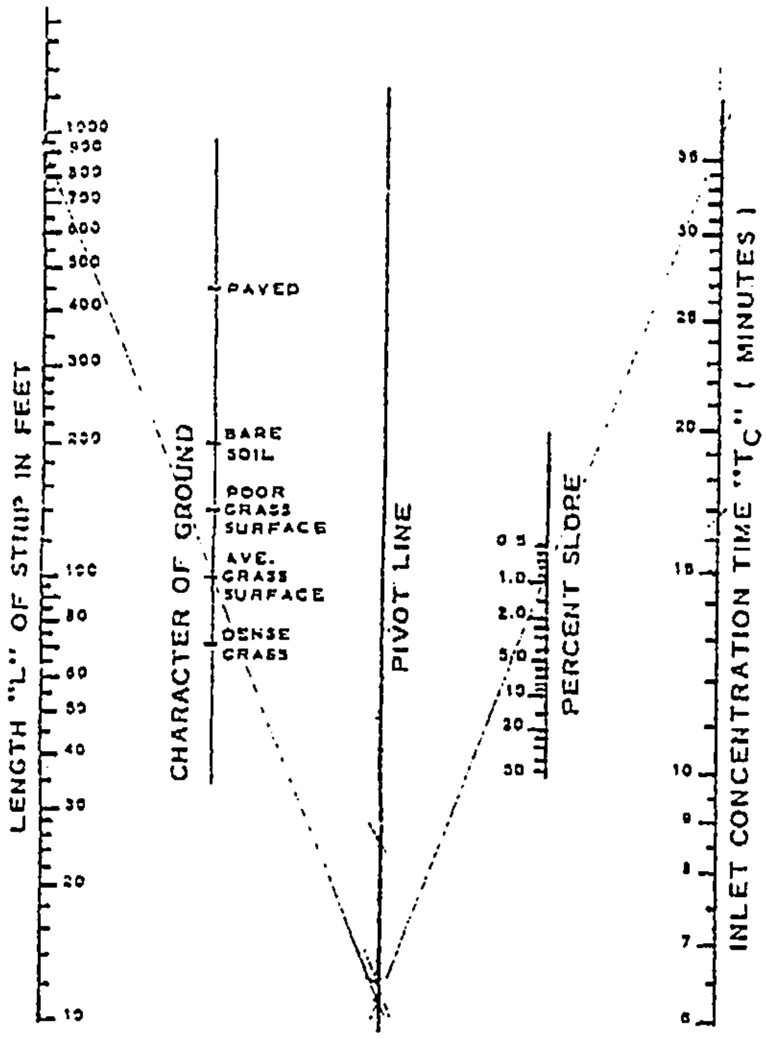
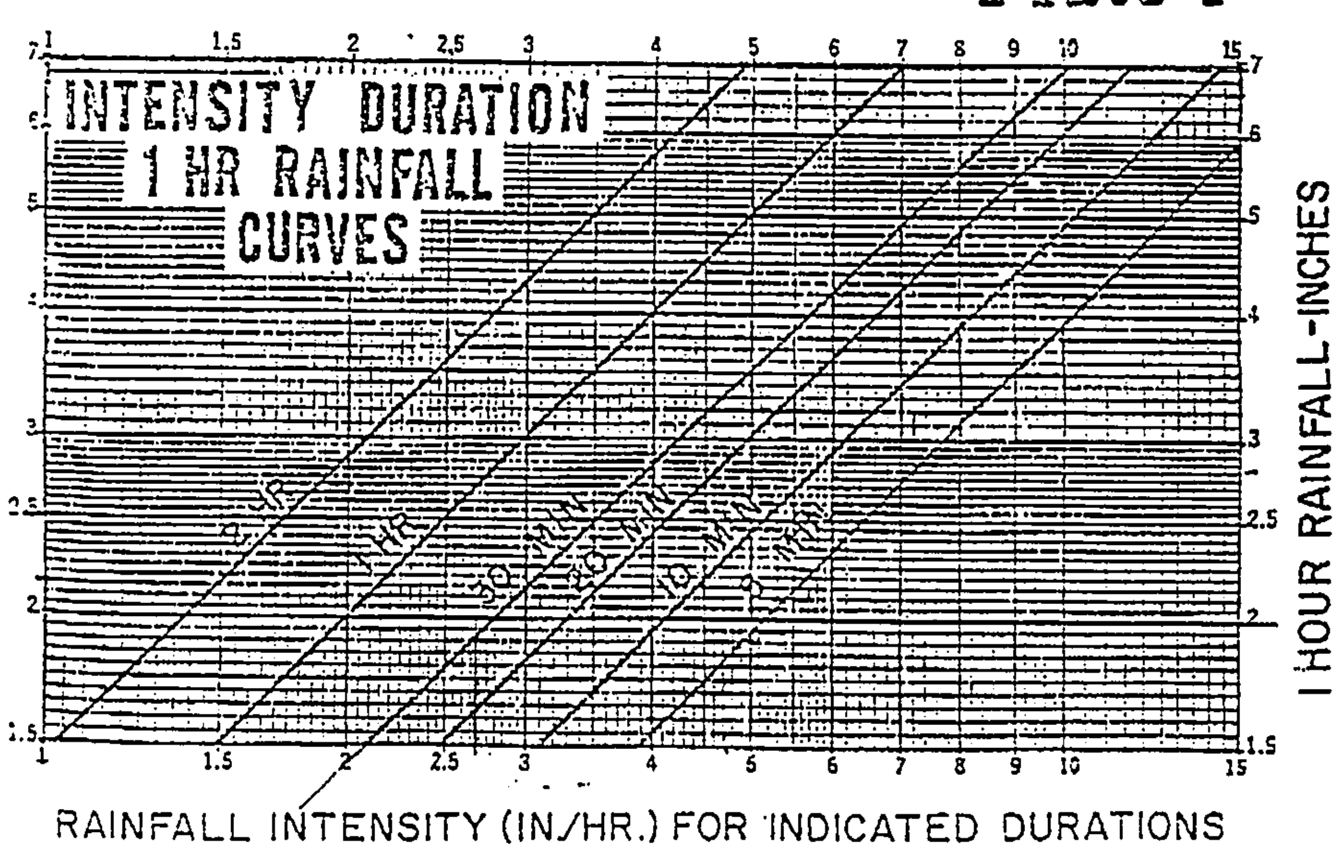


Plate 3

Overland Flow Chart

Plate 4



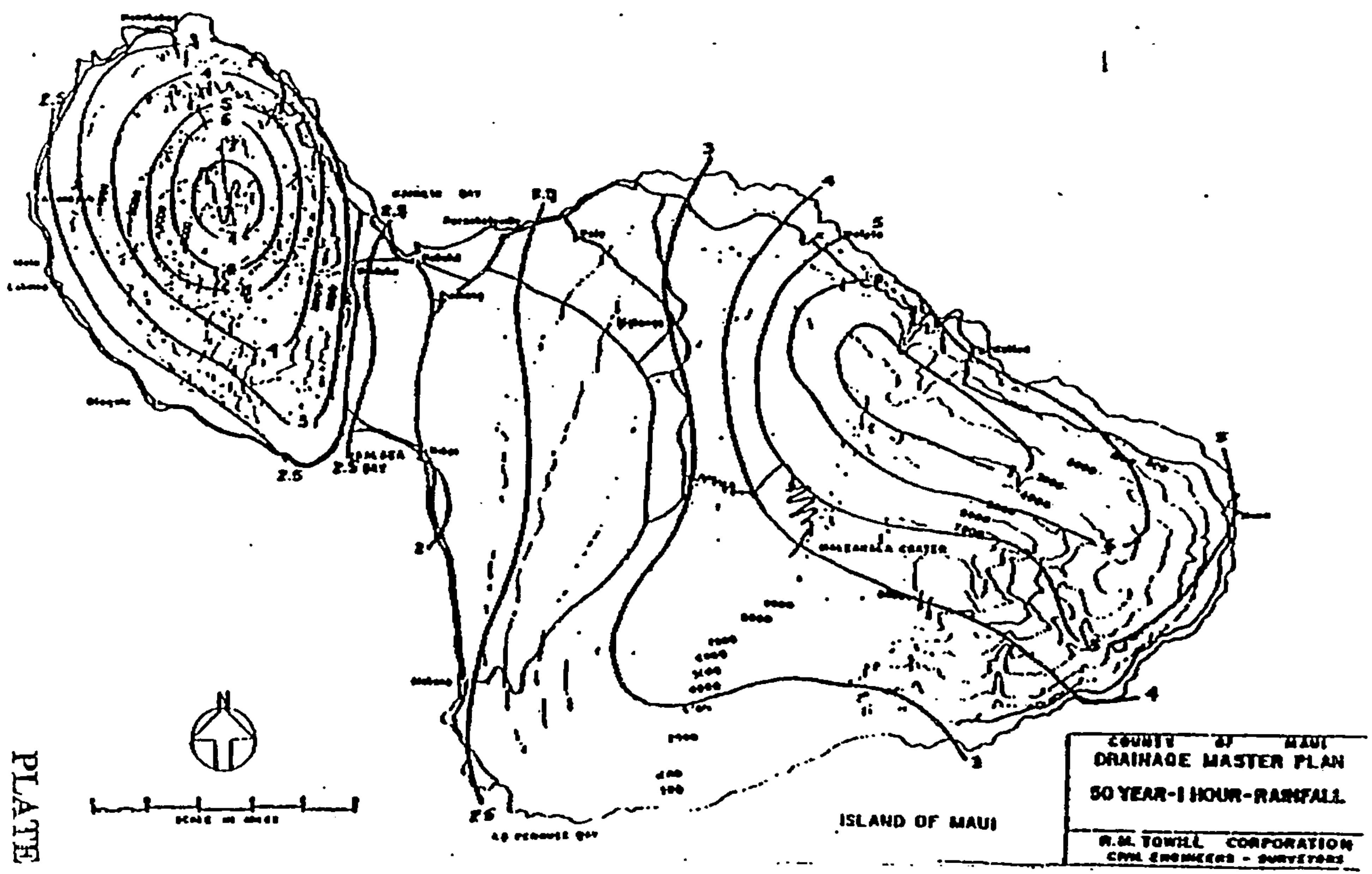

COUNTY OF MAUI
DRAINAGE MASTER PLAN
50 YEAR-1 HOUR-RAINFALL
R.M. TOWILL CORPORATION
CIVIL ENGINEERS - SURVEYORS
ISLAND OF MAUI
HALEAKALA CRATER
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PLATE 7

Table 1

GUIDE FOR THE DETERMINATION OF RUNOFF COEFFICIENTS FOR BUILT-UP AREAS*

WATERSHED CHARACTERISTICS	EXTREME	HIGH	MODERATE	LOW
INFILTRATION	NEGLIGIBLE 0.20	SLOW 0.14	MEDIUM 0.07	HIGH 0.0
RELIEF	STEEP (> 25%) 0.08	HILLY (15 - 25%) 0.06	ROLLING (5 - 15%) 0.03	FLAT (0-5%) 0.0
VEGETAL COVER	NONE 0.07	POOR (< 10%) 0.05	GOOD (10 - 50%) 0.03	HIGH (50 - 90%) 0.0
DEVELOPMENT TYPE	INDUSTRIAL & BUSINESS 0.55	HOTEL - APARTMENT 0.45	RESIDENTIAL 0.40	AGRICULTURAL 0.15

*NOTE: *The design coefficient "c" must result from a total of the values for all four watershed characteristics of the site.*

Table 2

APPROXIMATE AVERAGE VELOCITIES OF RUNOFF FOR CALCULATING TIME OF CONCENTRATION

TYPE OF FLOW	VELOCITY IN FPS FOR SLOPES (in percent) INDICATED			
OVERLAND FLOW:	0–3%	4–7%	8–11%	12–15%
Woodlands	1.0	2.0	3.0	3.5
Pastures	1.5	3.0	4.0	4.5
Cultivated	2.0	4.0	5.0	6.0
Pavements	5.0	12.0	15.0	18.0
OPEN CHANNEL FLOW:				
Improved Channels	Determine Velocity by Manning's Formula			
Natural Channel* (not well defined)	1.0	3.0	5.0	8.0

**These values vary with the channel size and other conditions so that the ones given are the averages of a wide range. Wherever possible, more accurate determinations should be made for particular conditions by Manning's formula.*