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LLOYD P.C.W. LEE, P.E.
Engineering Division
DAVID WISSMAR, P.E.
Solid Waste Division
BRIAN HASHIRO, P.E.
Highways Division

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

July 26, 1993

Office of Environmental Quality Control
Central Pacific Plaza
220 S. King Street, 4th Floor
Honolulu, Hawaii 96813

Gentlemen:

SUBJECT: MAUI CENTRAL PARK PARKWAY AND PAPA AVENUE EXTENSION (TMK: 3-8-7:POR. 1, POR. 117, POR. 125, AND 3-7-1: POR. 2), KAHULUI, MAUI, HAWAII

In accordance with the requirements of Chapter 343, Hawaii Revised Statutes, and Chapter 200 of Title 11, Administrative Rules, a Final Environmental Assessment has been prepared for the subject project.

Notice of availability of the Draft Environmental Assessment was published in the June 23, 1993 OEQC Bulletin. No written responses were received during the 30-day public comment period.

As the proposing agency, we have determined that there will be no significant impacts as a result of the project and, therefore, are filing the final Environmental Assessment as a negative declaration. One copy of the OEQC Bulletin Publication Form and four copies of the Final Environmental Assessment are enclosed. We respectfully request that notice of the Final Environmental Assessment be published in the next OEQC Bulletin.

Sincerely,

George N. Kaya

GEORGE N. KAYA
Director of Public Works

Enclosures

cc: Engineering Division

125

1993-08-08-HA-FEA-Maui Central Park Parkway & Papa Avenue Extension

AUG - 8 1993

Final Environmental Assessment

Maui Central Park Parkway and Papa Avenue Extension

Prepared for:

July 1993

County of Maui
Department of Public Works
and Waste Management

Michael T. Munekiyo Consulting, Inc.

Final
Environmental Assessment

Maui Central Park Parkway and Papa Avenue Extension

Prepared for:

County of Maui
Department of Public Works
and Waste Management

July 1993

Michael T. Munekiyo Consulting, Inc.

CONTENTS

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Preface

The County of Maui, Department of Public Works and Waste Management, proposes to construct the Maui Central Park Parkway and Papa Avenue Extension in Kahului, Maui, Hawaii (TMK 3-8-7:por. 1, por. 40, por. 117, por. 125 and 3-7-1:por. 2). Pursuant to Chapter 343, Hawaii Revised Statutes, and Chapter 200, of Title 11, Administrative Rules, Environmental Impact Statement Rules, this Environmental Assessment documents the project's technical characteristics and environmental impacts, and advances findings and conclusions relative to the significance of the project.

Summary

Applicant and Landowner

The applicant for the Maui Central Park Parkway and Papa Avenue Extension Project is the County of Maui, Department of Public Works and Waste Management. Landowners are the County of Maui and the State of Hawaii.

Contact Person

For further information, contact George Kaya, Director of Public Works and Waste Management, 200 South High Street, Wailuku, Hawaii 96793, or at telephone (808) 243-7835.

Property Location and Description

The proposed Maui Central Park Parkway and Papa Avenue Extension Project would be located in Kahului, Maui, Hawaii (TMK 3-8-7:por.1, por. 40, por. 117, por. 125 and 3-7-1:por.2). The project extends from the area of Kanaloa Avenue south of the Maui Zoological and Botanical Gardens to Kahului Beach Road between the Maui Community College and the Maui Community Arts and Cultural Center. Lands extending from the Papa Avenue - Kaahumanu Avenue intersection to the new Parkway are also part of the project.

The project site is vacant, primarily vegetated with haole koa, kiawe, bermuda grass, fingergrass and other low lying shrubs.

Proposed Action

The new Parkway is proposed as a four-lane divided parkway within a 100-foot wide right-of-way, except the segment from the Maui Community Arts and Cultural Center access road to Kahului Beach Road, where the right-of-way width will be 90 feet. The length of the new Parkway, from its Kanaloa Avenue intersection to Kahului Beach Road, measures approximately 3,200 feet.

A typical 100-foot wide right-of-way section would include a 16-foot wide landscaped median with standard concrete curbs on both sides, two 32-foot wide asphalt concrete roadways on both sides of the median with concrete curbs and gutters abutting two 10-foot wide shoulders. A 6-foot wide sidewalk and grass landscaping is proposed on one shoulder with the other Parkway shoulder being landscaped with grass.

The typical 90-foot wide right-of-way section from the Maui Community Arts and Cultural Center access road to Kahului Beach Road, would include a 16-foot wide landscaped median with standard concrete curbs on both sides, a 32-foot wide asphalt concrete roadway abutting one side of the median with a standard concrete curb and gutter abutting a 10-foot shoulder. Within the shoulder, there is a proposed 6-foot wide sidewalk and grass landscaping. On the other side of the median, there is a 24-foot wide asphalt concrete roadway with standard concrete curb and gutter abutting an 8-foot grassed shoulder.

The proposed Papa Avenue extension is proposed as a two-lane collector within a 60-foot wide right-of-way. The length of the Papa Avenue extension measures approximately 1,500 feet.

The Papa Avenue right-of-way section includes a 24-foot asphalt concrete roadway with 18 feet of grassed shoulder of both sides of the pavement.

Determination

Construction of the proposed project will involve short-term environmental impacts typically associated with construction activities. These include air quality and noise impacts. Dust control measures such as watering and sprinkling will be undertaken to minimize dust. Construction activities are also anticipated to be limited to daylight hours. Impacts generated from construction activities are not considered adverse.

From a long term perspective, the proposed project is not anticipated to result in adverse environmental impacts. There are no rare, endangered species of flora and fauna at the project site. Further construction activities should have "no effect" on significant historic resources. In case human osteological remains or small occupation deposits are encountered during construction, applicable procedures to ensure compliance with Chapter 6E, HRS, will be followed. In the long-term, adverse noise conditions are not anticipated as a result of the project.

Impacts to the local economy are anticipated to be positive involving support for construction-related employment in the short-term. The proposed project will have a positive impact on peak period traffic operations by redistributing traffic and reducing the demands at congested intersections. The roadways will also serve to help distribute traffic whenever there are special events at the War Memorial Center or at Maui Central Park. The Parkway will also provide another access to Maui Community College. It is anticipated that there will be no significant adverse drainage impacts as a result of the project.

The project is also not anticipated to have adverse impacts upon medical, police, and fire protection services as well as other infrastructure systems.

In light of the foregoing findings, it is concluded that the proposed action will not result in any significant environmental effects.

Chapter 1

Project Overview

I. PROJECT OVERVIEW

A. PROPERTY LOCATION, EXISTING USE, AND LANDOWNERSHIP

The applicant, County of Maui, Department of Public Works and Waste Management, proposes to construct the Maui Central Park Parkway and Papa Avenue extension in Kahului, Maui, Hawaii (TMK 3-8-7:por.1, por. 40, por. 117, por. 125 and 3-7-1:por.2). See Figure 1. The new Parkway will link Kanaloa Avenue with Kahului Beach Road. The new Parkway is located on the southern border of the proposed Maui Central Park. The Parkway would extend from the area of Kanaloa Avenue south of the Maui Zoological and Botanical Gardens to Kahului Beach Road between Maui Community College and the Maui Community Arts and Cultural Center. Papa Avenue is proposed to be extended from its intersection with Kaahumanu Avenue to the new Parkway.

The proposed Parkway will traverse vacant and undeveloped lands. Beginning at the intersection of Kaahumanu Avenue and Papa Avenue, and extending in a northerly direction, the Papa Avenue extension will also traverse vacant lands.

The County of Maui is the landowner of TMK 3-8-7:1, 117 and 3-7-1:2. Lands designated as TMK 3-8-7:40 and 125 are owned by the State of Hawaii.

B. PROPOSED ACTION

1. Project Need

The Maui Central Park Parkway would provide a landscaped entryway to the future development of the Maui Central Park which would span the area to the north of the Parkway up to existing development at Kanaloa Avenue and Kahului Beach Road. The

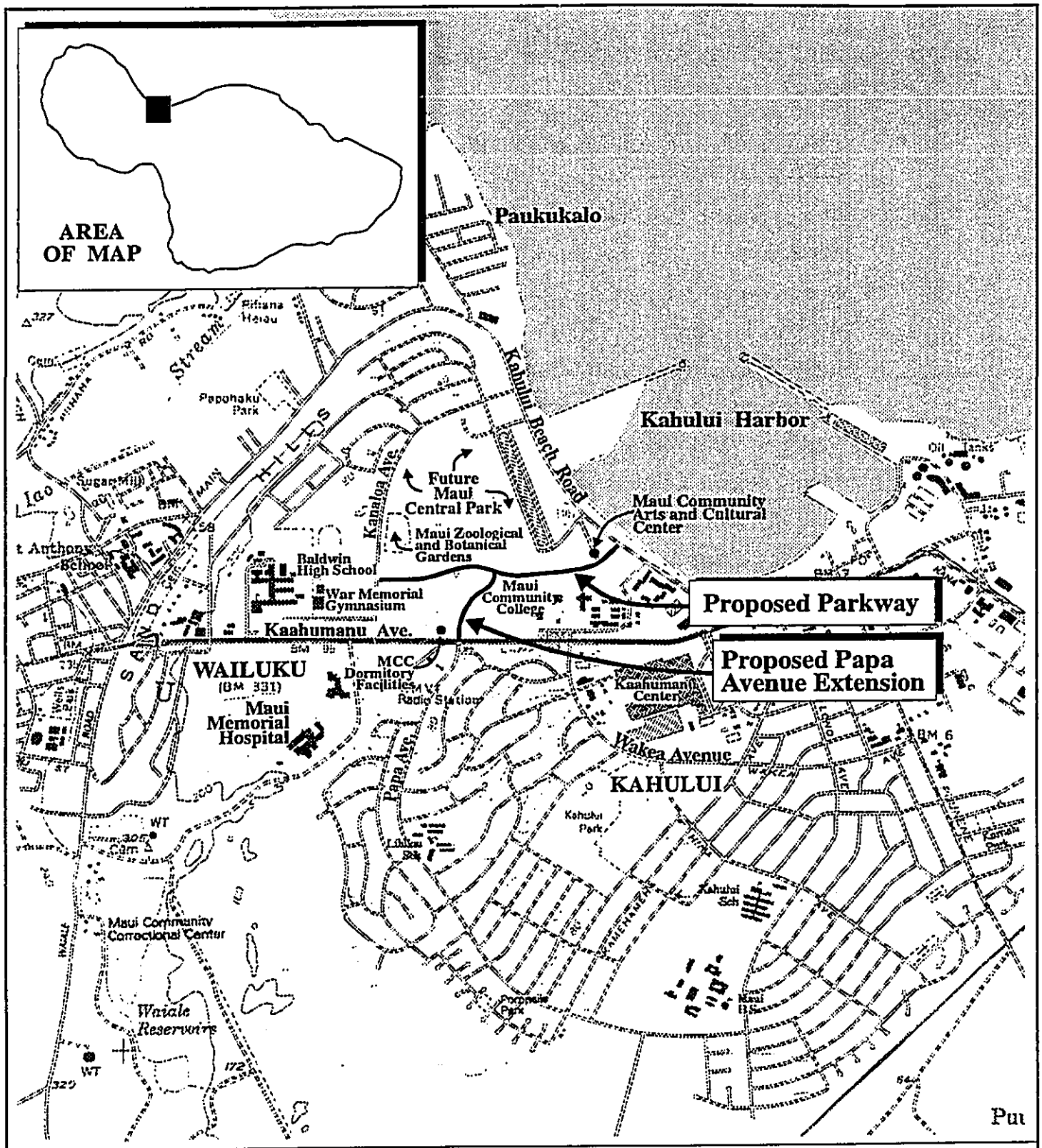

Figure 1 Maui Central Park Parkway and Papa Avenue Extension

Regional Location Map

0 1000 2000 4000 Feet

Michael T. Munekiyo Consulting, Inc.

Prepared for: County of Maui, Dept. of Public Works

implementation of the Maui Central Park is (a regional park) intended as a future project.

The Parkway and Papa Avenue extension would also divert some existing traffic from neighboring arterial and collector roads. This would help improve levels of service at a number of key intersections within the Wailuku-Kahului region. During special events at the War Memorial Complex, Baldwin High School, Maui Community College, and the Maui Community Arts and Cultural Center, the proposed project will aid in dispersing and transporting traffic from this area.

2. ***Proposed Improvements***

The new Parkway is proposed as a four-lane divided parkway within a 100-foot wide right-of-way, except the segment from the Maui Community Arts and Cultural Center access road to Kahului Beach Road, where the right-of-way width will be 90 feet. See Figure 2. The length of the new Parkway, from its Kanaloa Avenue intersection to Kahului Beach Road, measures approximately 3,200 feet.

A typical 100-foot wide right-of-way section would include a 16-foot wide landscaped median with standard concrete curbs on both sides, two 32-foot wide asphalt concrete roadways on both sides of the median with concrete curbs and gutters abutting two 10-foot wide shoulders. A 6-foot wide sidewalk and grass landscaping is proposed on one shoulder with the other shoulder being landscaped with grass. See Figure 3.

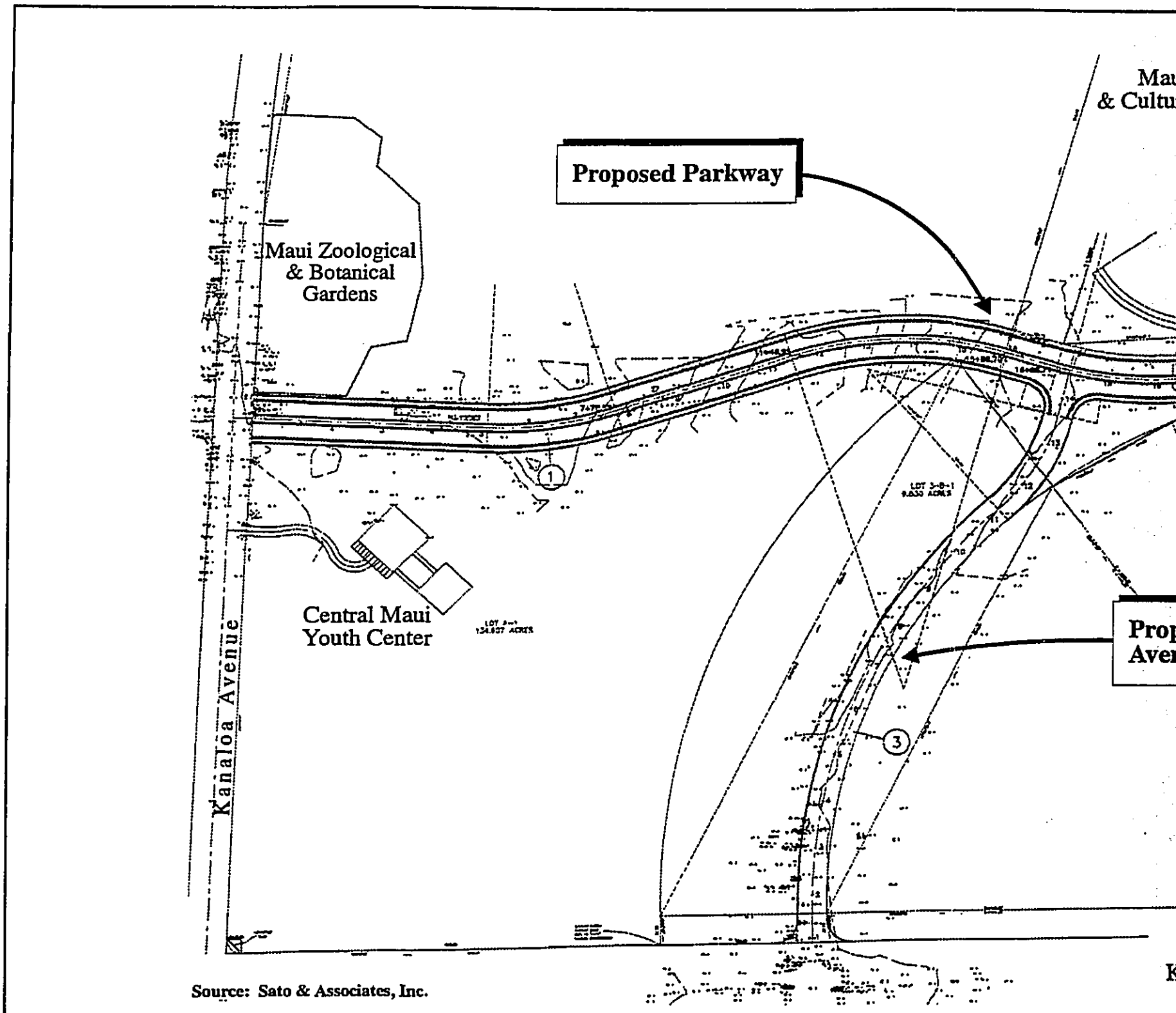

Figure 2 Maui Central Park Parkway and Papa A

Site Plan

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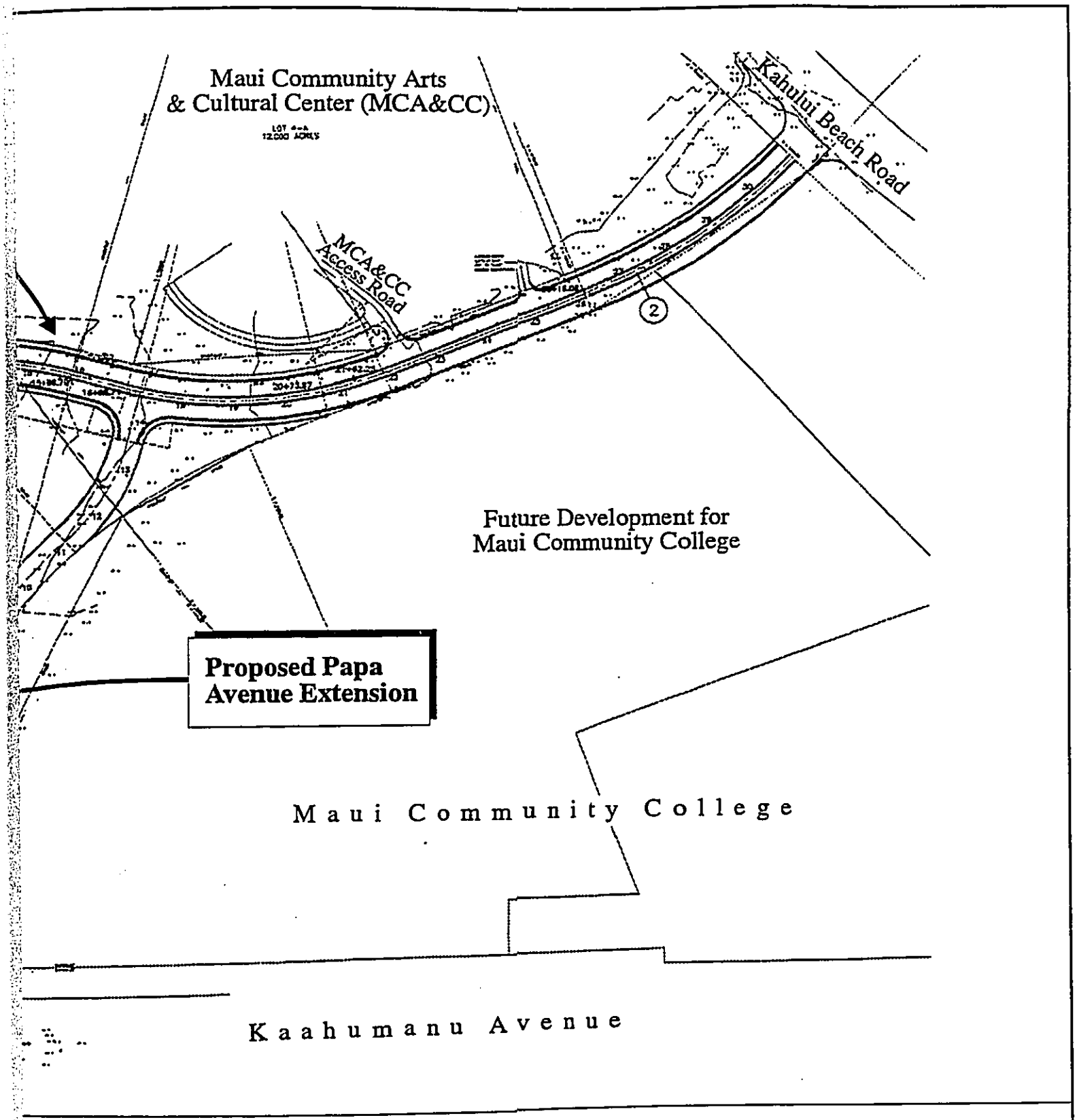

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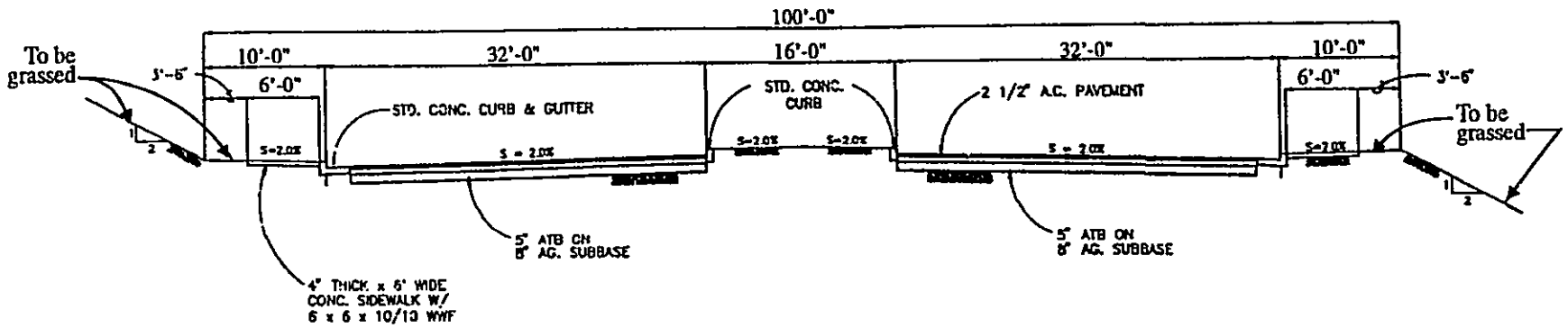
Michael T. Munekiyo Consulting, Inc.
Prepared for: County of Maui, Dept. of Public Works



Source: Sato & Associates, Inc.

Figure 3 Maui Central Park Parkway and Papa Avenue Extension
Typical 100-Foot Parkway Section

NOT TO SCALE

Michael T. Munekiyo Consulting, Inc.
Prepared for: County of Maui, Dept. of Public Works

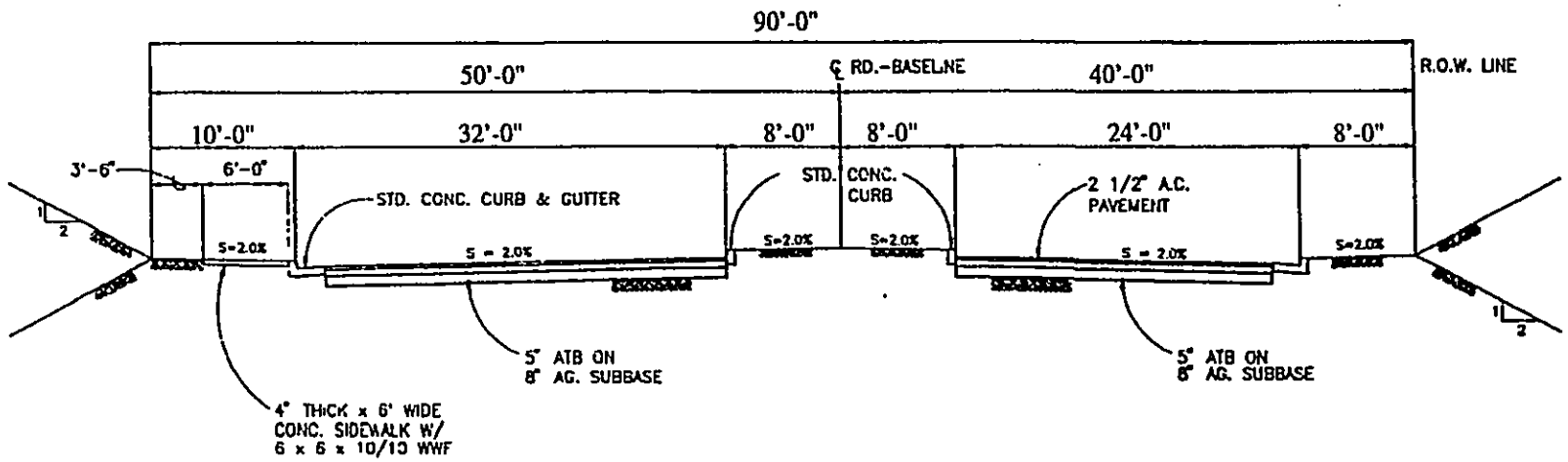
The typical 90-foot wide right-of-way section from the Maui Community Arts and Cultural Center access road to Kahului Beach Road, would include a 16-foot wide landscaped median with standard concrete curbs on both sides, a 32-foot wide asphalt concrete roadway abutting one side of the median with a standard concrete curb and gutter abutting a 10-foot shoulder. Within the shoulder, there is a proposed 6-foot wide sidewalk and grass landscaping. On the other side of the median, there is a 24-foot wide asphalt concrete roadway with standard concrete curb and gutter abutting an 8-foot grassed shoulder. See Figure 4.

The proposed Papa Avenue extension is proposed as a two-lane collector within a 60-foot wide right-of-way. The length of the Papa Avenue extension measures approximately 1,500 feet.

The Papa Avenue right-of-way section includes a 24-foot asphalt concrete roadway with 18 feet of grassed shoulder of both sides of the pavement width. See Figure 5.

Since County funds and State and County lands are involved in the project, an Environmental Assessment is being prepared in accordance with Chapter 343, HRS.

A Special Management Area (SMA) Use Permit has been obtained for the Parkway segment from the Maui Community Arts and Cultural Center access road to Kahului Beach Road. This Parkway segment was approved as part of the SMA action for the Maui Community Arts and Cultural Center. However, the remaining portions of the Parkway and Papa Avenue extension are within the County's SMA boundaries. Thus, an SMA Use Permit must be



Source: Sato & Associates, Inc.

Figure 4 Maui Central Park Parkway and Papa Avenue Extension
Typical 90-Foot Parkway Section

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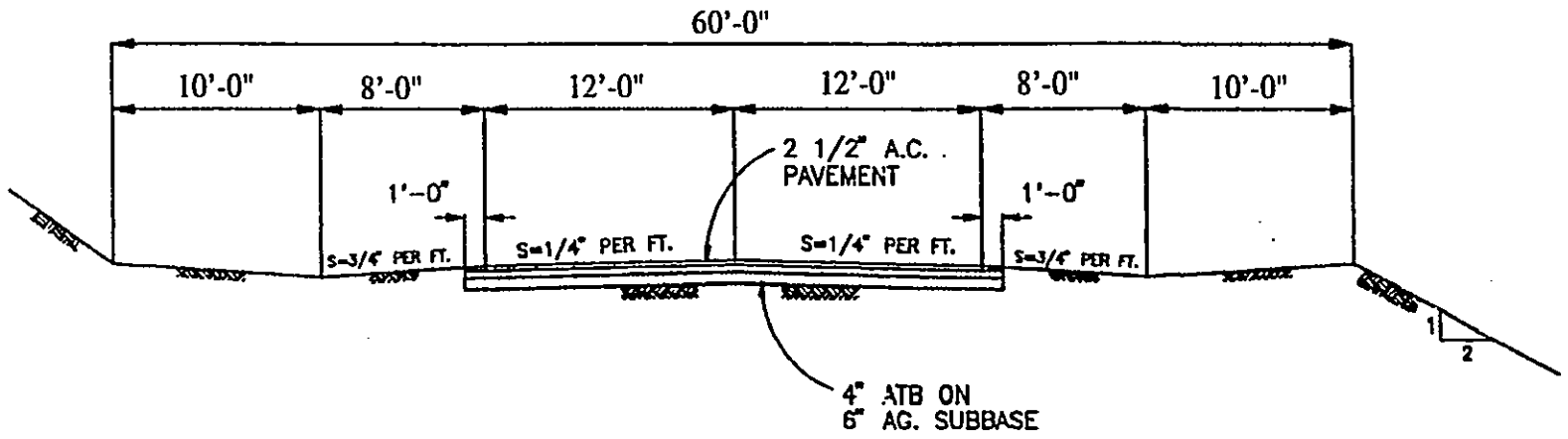


Source: Sato & Associates, Inc.

Figure 5

Maui Central Park Parkway and Papa Avenue Extension

Papa Avenue Extension - Typical 60-Foot Roadway Section

Michael T. Munekiyo Consulting, Inc.

Prepared for: County of Maui, Dept. of Public Works

reviewed and approved by the Maui Planning Commission for the segment of the Parkway, from Kanaloa Avenue to the Maui Community Arts and Cultural Center access road, and the Papa Avenue extension.

The total cost of all improvements for the project is estimated to be $4.5 million. The project is divided into 3 phases. Phase I involves construction of a two lane section of the Parkway, from the Maui Community Arts and Cultural Center access road to Kahului Beach Road. Completion of construction for Phase I is anticipated in mid-1994. Phase II involves extension of two lanes of the Parkway to Kanaloa Avenue and construction of the Papa Avenue extension. Implementation is planned for Fiscal Years 1994-1995. Phase III involves construction of the additional two lanes for the Parkway from Kahului Beach Road to Kanaloa Avenue. Implementation is scheduled for Fiscal Years 1995-1996.

Chapter II

Description of the Existing Environment

II. DESCRIPTION OF THE EXISTING ENVIRONMENT

A. PHYSICAL ENVIRONMENT

1. Surrounding Land Uses

The project site is located within Kahului, the Island of Maui's center of commerce. Kahului is home to Kahului Harbor, the Island's only deep water port, and the Kahului Airport, the second busiest airport in the State. With its proximity to the Harbor and the Airport, the Kahului region has emerged as the focal point for heavy industrial, light industrial and commercial activities and services such as warehousing, baseyard operations, automotive sales and maintenance, and retailing for equipment and materials suppliers. The region is considered Central Maui's commercial retailing center with the Kaahumanu Center, the Maui Mall and the Kahului Shopping Center, located within a mile from the project site.

Situated to the southeast of the proposed roadway corridors is the Maui Community College campus, while to the north is the Maui Community Arts and Cultural Center. The War Memorial Center is located west of the Parkway site, while the Maui Community College dormitories are situated to the immediate west of the Papa Avenue extension. In addition, the proposed roadway corridors will traverse vacant lands that are vegetated by haole koa, kiawe, and various exotic shrubs.

2. Climate

Like most areas of Hawaii, Maui's climate is relatively uniform year-round. Characteristic of Hawaii's climate, the project site experiences mild and uniform temperatures year round, moderate

humidity and a relatively consistent northeasterly tradewind. Variation in climate on the Island is largely left to local terrain.

Average temperatures at the project site (based on temperatures recorded at Kahului Airport) range from lows in the 60°s to highs in the 80°s. August is historically the warmest month, while January and February are the coolest. Rainfall at the project site averages approximately 20 inches per year. Winds in the Kahului region are predominantly out of the north-northeast and northeast.

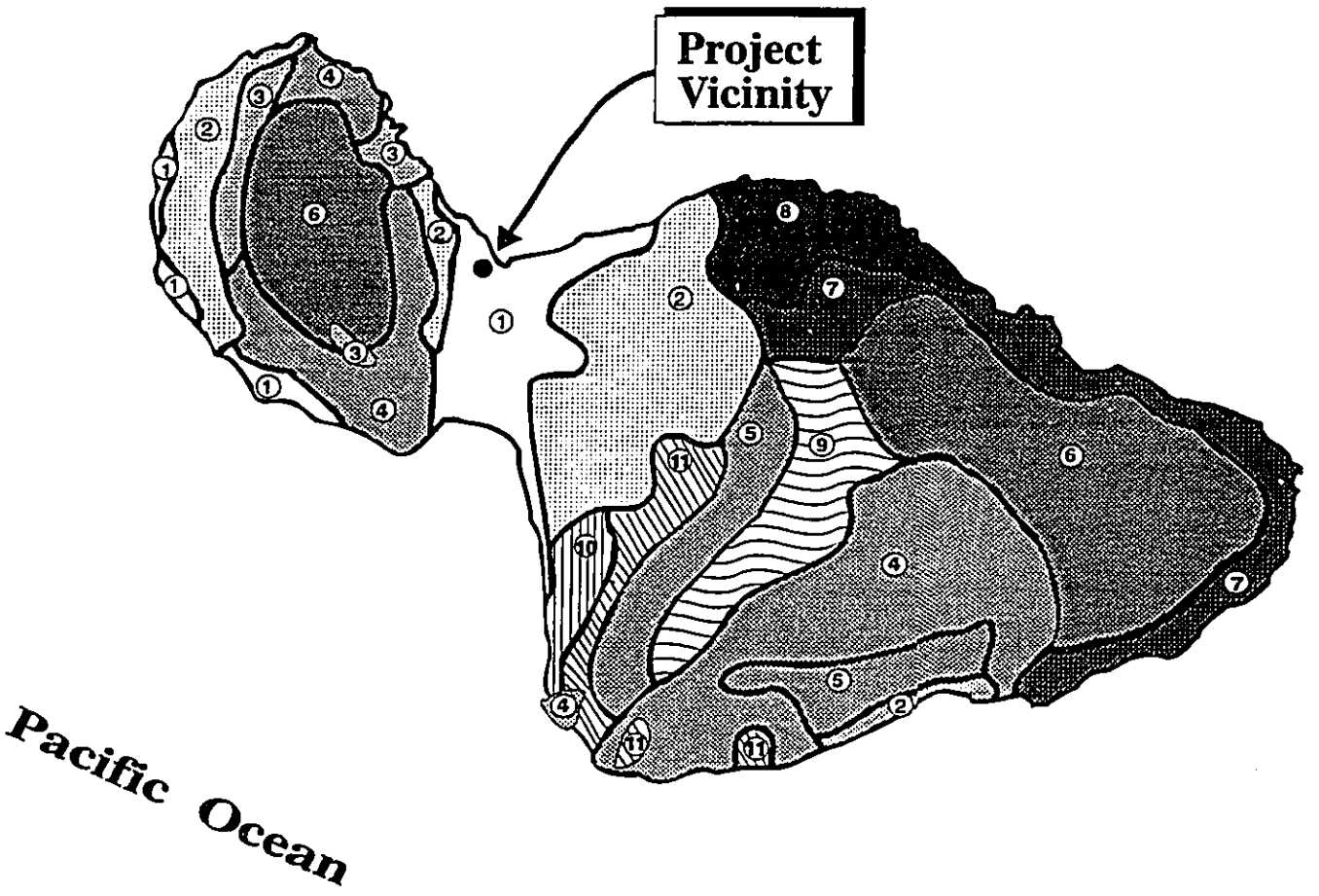
3. ***Topography and Soil Characteristics***

The project site is located on Maui's flat central isthmus ranging in elevations from 12 to 70 feet. The high point, along the west side of project site, near Kanaloa Avenue, slopes down in a northeast direction towards Kahului Beach Road. There are some sand hills within the area, however, they are not considered significant topographical constraints.

Underlying the proposed roadway sites and surrounding lands are soils belonging to the Pulehu-Ewa-Jaucas association. See Figure 6. This soil association is characteristically deep and well-drained and located on alluvial fans and in basins. The soil type specific to the project site is of the Puuone Series' Puuone Sand classification (PZUE). See Figure 7. PZUE soils predominate in the Kahului region and is typified by a sandy surface layer underlain by cemented sand. Naturally occurring vegetation on this series include bermuda grass, kiawe, and lantana.

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 6 Maui Central Park Parkway and Papa Avenue Extension
Soil Association Map

NOT TO SCALE

Michael T. Munekiyo Consulting, Inc.
Prepared for: County of Maui, Dept. of Public Works

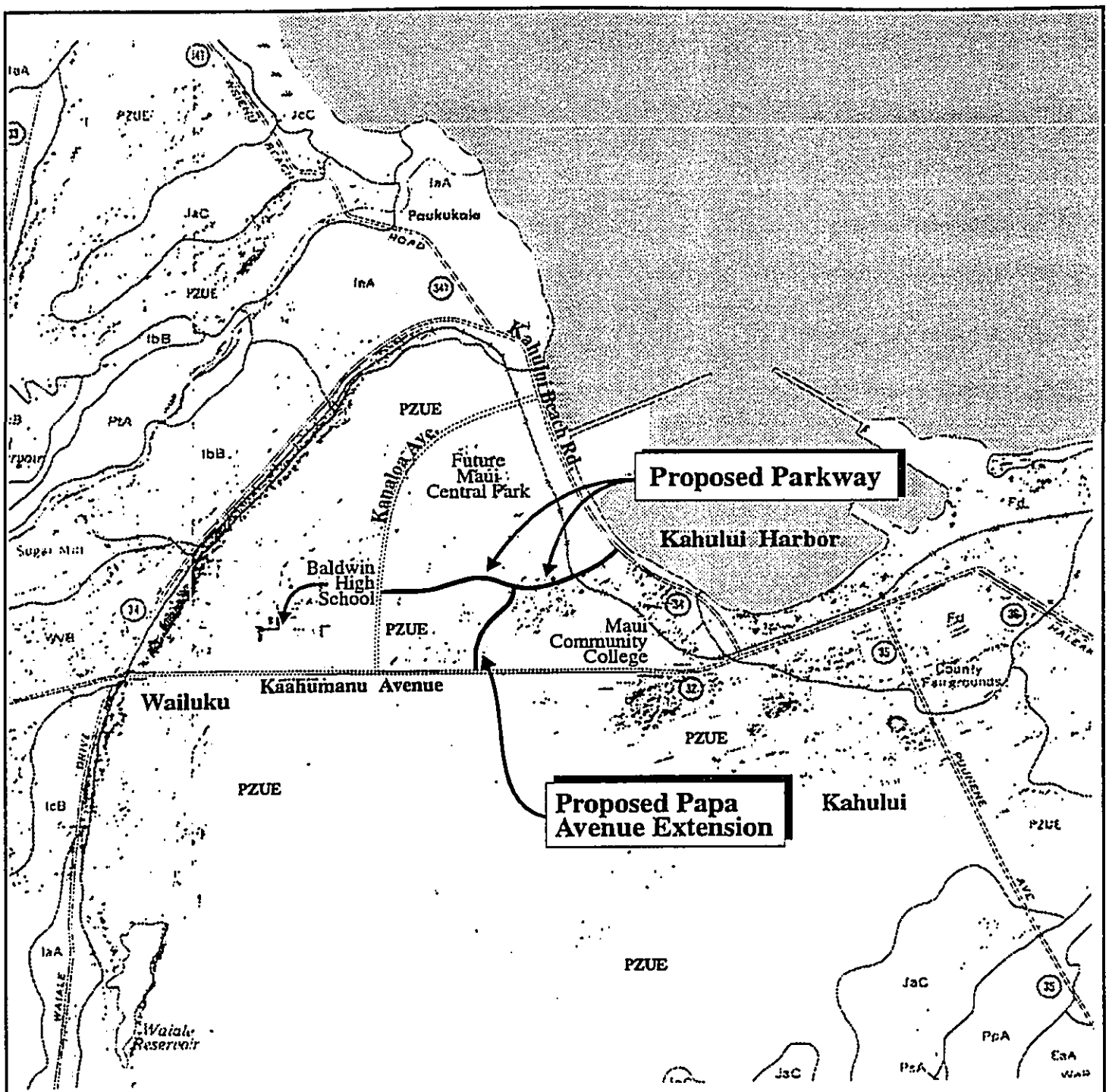


Figure 7 Maui Central Park Parkway and Papa Avenue Extension

Soil Classification

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4. ***Flood and Tsunami Hazard***

Most of the area proposed for the Parkway and Papa Avenue extension are located on lands that are designated Zone "C" by the Flood Insurance Rate Map. See Figure 8. Zone "C" is an area of minimal flooding. However, the northeast extent of the Parkway is designated as Zone "A-4" (areas inundated by the 100-year flood with a base elevation of 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 17-18 feet above mean sea level).

5. ***Flora and Fauna***

The proposed roadway corridors will traverse vacant lands that are vegetated with haole koa, kiawe, bermuda grass, fingergrass and other low lying shrubs. There are no known rare, endangered or threatened species of plants within the proposed roadway project sites.

Fauna and avifauna that are found in the vicinity of the project site are typical of the urban setting of Kahului. Fauna typically found in the vicinity include mongoose, cats, dogs and rats. Avifauna typically include mynas, several types of doves, house sparrows and francolin. There are no rare or endangered species of fauna or avifauna found within the project site.

6. ***Archaeological Resources***

An archaeological inventory survey was conducted for the area of the proposed roadway corridors. See Appendix A. The field work consisted of a 100 percent surface survey and the excavation of 54 trenches within the corridors of the roadways. Test trenches were

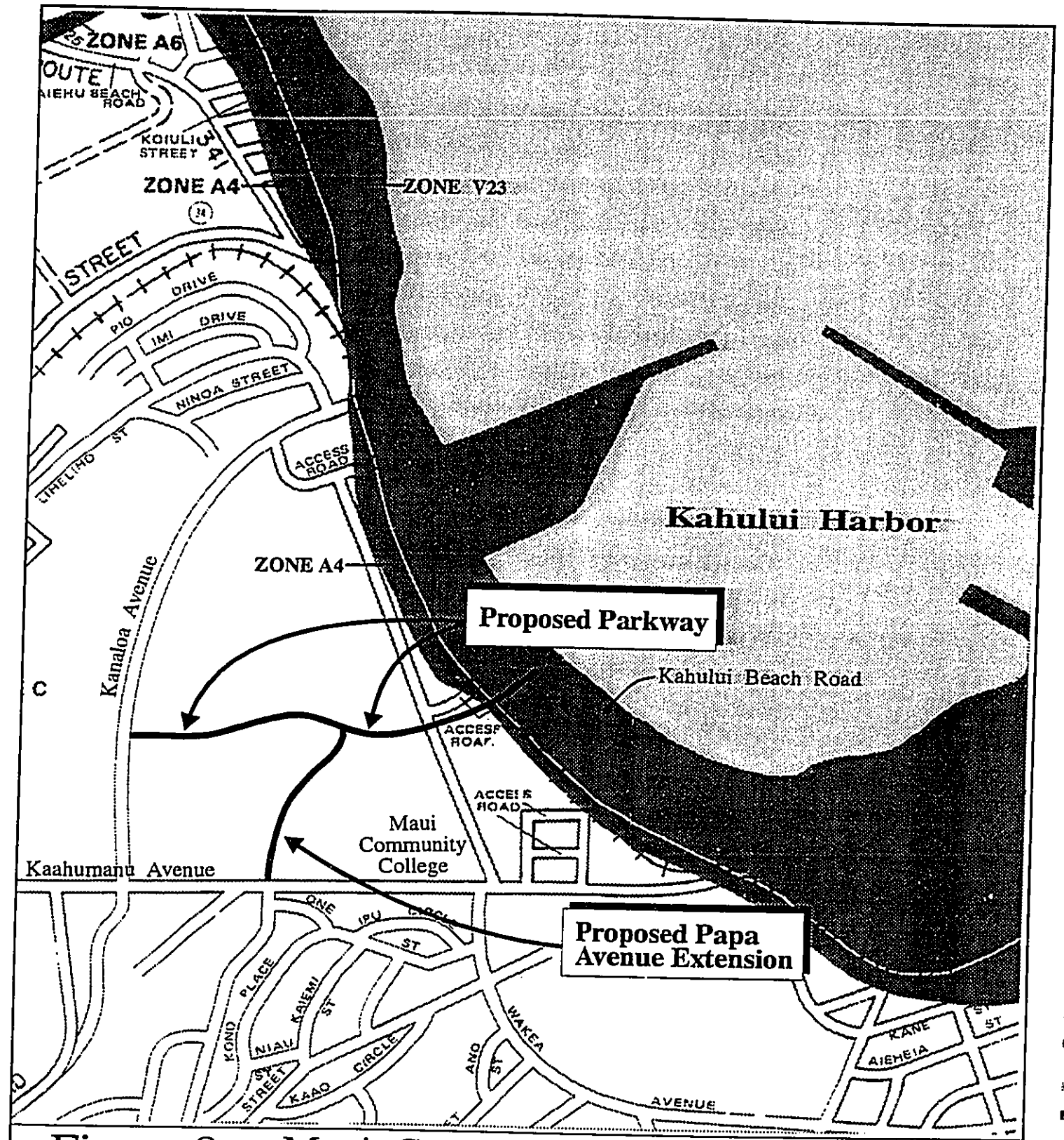

Figure 8 Maui Central Park Parkway and Papa Avenue Extension Flood Insurance Rate Map

Michael T. Munekiyo Consulting, Inc.

Prepared for: County of Maui, Dept. of Public Works

excavated either by backhoe or a mechanical excavator.

There were no surface features or pre-contact type artifacts recovered during the archaeological survey of the subject property. There were no human burials or human remains encountered.

Subsurface features encountered during mechanical excavation were few and limited to modern historical deposits. There were two features discovered on the subject property.

The first feature consisted of a small pit which contained 25 intact, machine made bottles, associated with copper tubing, oxidized metal in an unidentifiable state, with a large piece of rubber material which encased some of these bottles. Twenty of the bottles were clear and retained their black, plastic screw top caps. Two modern machine made soda bottles were associated with this feature. All bottles appeared modern and less than 50 years old. Thus, this feature is not significant to the interests of historic preservation.

The second feature was the upper end of a charred wood post or beam, which may have been squared. The shape of the post and its undecomposed state suggest that it is less than 50 years old. It is expected that a wooden post, much older than 50 years, would have decomposed in the aerobic conditions within the sand.

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 are not

significant to generate high concentration 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 burning of sugar cane in fields located to the southeast of the Kahului residential core.

8. *Noise*

Traffic noise from the existing roadways of Kanaloa, Kaahumanu and Papa Avenues, and Kahului Beach Road is the predominant source of background noise in the vicinity of the project. To the east, the Kahului Harbor activity can also add to the background noise levels in the surrounding region.

9. *Visual Resources*

Scenic resources to the west of the project sites include Iao Valley and the West Maui Mountain Range. Looking southeast, Haleakala is clearly visible. To the northeast, lies the Kahului Harbor and the Pacific Ocean. South of project sites, the Kahului commercial center is visible.

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 population estimated to be 100,374, a 41.7% increase over the 1980 population of 70,847. Growth in the County is expected to continue, with resident population projections to the years 2000 and 2010, estimated to be 123,900 and 145,200, respectively (DBED,1990).

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 40,119 by the year 2000 and to 47,597 by the year 2010 (Community Resources, Inc., 1992).

2. *Economy*

As noted previously, 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 significant agricultural acreages which include sugar cane fields, pineapple fields, and macadamia nut orchards. The vast expanse of agricultural land, managed by Hawaiian Commercial & Sugar (HC&S) and Wailuku Agribusiness Company, is considered a key component of the local economy.

C. *PUBLIC SERVICES*

1. *Recreational Facilities*

The Wailuku-Kahului region encompasses a full range of recreational opportunities, including shoreline and boating activities at the Kahului Harbor and adjoining beach parks, and individual and organized athletic activities offered at numerous County parks and the War Memorial Complex. The proposed roadway corridors are in close proximity to the Kahului Community Center, the County's Kanaha Beach Park and Iao Valley State Park. In addition, the proposed project will provide access for the future Maui Central Park.

2. ***Police and Fire Protection***

Police protection for the Wailuku-Kahului region is provided by the County Police Department headquartered at the Wailuku Station, approximately 0.3 mile from the project site's intersection with Kanaloa Avenue. The region is served by the Department's Central Maui patrol.

Fire prevention, suppression, and protection services for the Wailuku-Kahului region is provided by the County Department of Fire Control's Wailuku Station, located in Wailuku Town, approximately 1.0 mile from the Parkway intersection at Kanaloa Avenue. In addition, the Department has constructed a new Kahului Station (located on Dairy Road). The portion of the proposed project site at the Kahului Beach Road intersection is approximately 2.2 miles from the Kahului Station.

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 are disposed at the County's 55-acre Central Maui Landfill, located four miles southeast of the Kahului Airport. In addition to County-collected refuse, the Central Maui Landfill accepts commercial waste from private collection companies.

4. ***Health Care***

Maui Memorial Hospital, the only major medical facility on the Island, services the Wailuku-Kahului region. Acute, general and emergency care services are provided by the 145-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 public school system as well as several privately operated schools accommodating elementary, intermediate and high school students. Department of Education facilities in the Kahului area include Lihikai and Kahului Schools (Grades K-6), Maui Waena Intermediate School (Grades 7-8), 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 Community College.

D. *INFRASTRUCTURE*

1. *Roadways*

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

Kaahumanu Avenue is a four to six-lane, divided State arterial highway. All of the intersections within the study area are controlled by traffic-actuated traffic signal systems, which are supervised by a master controller for coordinated operations. Each of the intersections is channelized to provide for separate left-turn lanes and right-turn deceleration lanes on the Kaahumanu Avenue

roadway approaches to the intersection. The traffic signal systems function on a protected/permissive mode for left-turning vehicles on Kaahumanu Avenue.

Kahului Beach Road is a two-lane, two-way State collector road. It begins at Kaahumanu Avenue and ends at the Lower Main Street/Waiehu Beach Road intersection, about 1,200 feet north of the Kanaloa Avenue intersection.

Kanaloa Avenue is a County four-lane collector road between Kaahumanu Avenue and the makai limits of the War Memorial Center area, where it narrows to a wide, two-lane roadway to its intersection with Kahului Beach Road. The Kahului Beach Road/Kanaloa Avenue intersection is controlled by a three-phase, traffic-actuated signal system.

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 6.0 million gallons per day (MGD). Average daily flow currently processed through the plant is approximately 5.3 MGD.

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. Recent

estimates place the monthly average withdrawal from the aquifer at over 18 MGD.

4. ***Drainage***

The proposed right-of-way is currently unimproved. The project site slopes in a northeast direction from Kanaloa Avenue toward Kahului Beach Road. The area's rolling sand dune hills provide natural depressions and areas for storm water ponding and disposal.

Chapter III

Potential Impacts and Mitigation Measures

III. POTENTIAL IMPACTS AND MITIGATION MEASURES

A. PHYSICAL ENVIRONMENT

1. Surrounding Uses

The proposed new Parkway and the extension of Papa Avenue will provide access for the new Maui Community Arts and Cultural Center and the future Maui Central Park. The proposed roadway corridors will be compatible with surrounding uses and are not anticipated to have an adverse effect upon the surrounding uses.

2. Topography

The proposed project will involve the clearing, grubbing and grading of lands that are presently undeveloped. Excavation and filling will be required for the construction of the roadways. In general, however, finished contours will follow existing grades to minimize earthwork costs and maintain existing drainage patterns which tie into the immediate surrounding lands.

While terrain within the corridors will be locally modified to meet design requirements for roadway grades, the proposed new Parkway and extension of Papa Avenue will not disturb the relatively flat slope that is characteristic of the Kahului region.

3. Flora and Fauna

There are no known significant habitats or rare, endangered or threatened species of flora and fauna located within the project sites. The proposed project is therefore not considered an adverse impact upon these environmental features.

4. ***Archaeological Resources***

An archaeological inventory survey was conducted for the area of the proposed roadway corridors. See Appendix A. There were no significant surface features which were identified. Two features were identified in the subsurface excavation, a trash pit containing bottles and associated materials, and a wooden post. Neither feature is considered significant to the interests of historic preservation.

No significant historic materials were encountered on the road corridor. Future construction activities along this road corridor will have "no effect" on significant historic resources. In case human osteological remains or small occupation deposits are encountered during construction, applicable procedures to ensure compliance with Chapter 6E, HRS, will be followed.

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 and utilities and roadway construction for example, will generate airborne particulates. Dust control measures such as regular watering and sprinkling will be implemented as needed to minimize wind-blown emissions.

The proposed new Parkway and extension of Papa Avenue will provide access to the Maui Community Arts and Cultural Center as well as the future Maui Central Park. The Maui Community Arts and Cultural Center and proposed Maui Central Park which abut the project would generate a relatively small portion of overall traffic

activity in the 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. However, audible construction noise will probably be unavoidable during the construction period. Noise sensitive properties which would experience high levels of noise during construction are the existing Maui Community College student dormitory area adjacent to the Papa Avenue extension and the Maui Central Park areas along the proposed Parkway. To aid in the mitigation of noise impacts, construction activities will be conducted during the daylight hours only.

On a long-term basis, the project will not generate adverse noise conditions. Future traffic noise levels along the existing sections of Papa Avenue, Kaahumanu Avenue, Kanaloa Avenue, and Kahului Beach Road are expected to remain similar to existing levels following completion of the project. Thus, traffic noise mitigation measures along the existing roadways are not considered necessary. See Appendix B.

The greatest increases in traffic noise levels are expected to occur within the Maui Central Park complex, along the extension of Papa Avenue and along the new Parkway. This is due to the relatively low existing background ambient noise levels within the interior areas of Maui Central Park which are removed from the existing roadways surrounding the park. Traffic noise contributions from the new Parkway are predicted to be less than 50 dB at the future Maui Community Arts and Cultural Center, and adverse noise

impacts are not expected at that location. Future traffic noise levels at the student dormitory buildings closest to the Papa Avenue extension are expected to range from 63 to 60.Ldn, which is below FHA/HUD and FHWA noise abatement standards. Traffic noise mitigation measures are not required due to the relatively low-to-moderate traffic noise levels predicted along the new section of Papa Avenue. However, should noise mitigation measures be desired at the dormitories, there are a number of alternatives, including construction of a 6-foot wall between the dormitory buildings and the roadway, reduction of vehicle speeds along the Papa Avenue extension, closure and air conditioning of the dormitory units, or sound attenuating windows installed in place of existing dormitory windows.

7. *Visual Resources*

As an at-grade roadway, the new parkway and the Papa Avenue extension will not adversely impact 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.

B. *SOCIO-ECONOMIC ENVIRONMENT*

1. *Population and Local Economy*

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

The proposed new Parkway and the extension of Papa Avenue would provide access to the future Maui Central Park and the Maui

Community Arts and Cultural Center as well as provide additional traffic capacity within the Wailuku-Kahului region. The proposed project is not anticipated to have an adverse impact upon the local economy or population.

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.

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 for the disposal of clearing and grubbing material from the site during construction.

C. *INFRASTRUCTURE*

1. *Traffic*

A traffic assessment report was done for the project. See Appendix C. The report notes that the new roadways will have a positive impact on peak period traffic operations by redistributing traffic and reducing the demands at the congested intersections. The roadways will also serve to help distribute traffic whenever there are special events at the War Memorial Center or at Maui Central Park. The Parkway will also provide another access to Maui Community College.

The conclusions of the traffic assessment are as follows:

1. The proposed Parkway and Papa Avenue extension will not adversely impact traffic

operations on the existing streets in the vicinity of the project.

2. The new roadways offer motorists alternative routes of getting from point to point in the Kahului area.

3. The critical intersections for travel between Wailuku and Kahului remain the same; i.e., the Kaahumanu Avenue/Kanaloa Avenue/Mahalani Street intersection and the Kahului Beach Road/Kanaloa Avenue intersection. Until the master planned roadways, by the State Department of Transportation/County of Maui Island-Wide Highway Master Plan are implemented, all traffic between these two population centers must funnel through the two critical intersections.

Based on the analysis, the traffic assessment recommends the following improvements:

1. The Kaahumanu Avenue/Kanaloa Avenue/ Mahalani Street intersection should be improved to provide a double left-turn capability from Kaahumanu Avenue to Mahalani Street, and a longer deceleration/right-turn lane on Kaahumanu Avenue to Kanaloa Avenue. These improvements are required to accommodate existing traffic demand.

2. The Kaahumanu Avenue/Papa Avenue intersection be improved to provide the following:

   a. South bound approach -- separate left-turn, through and right-turn lanes. The left-turn storage lane should be a minimum of 200 feet long.

   b. The traffic signal system be modified to provide six-phase operation.

c. Papa Avenue south of Kaahumanu Avenue be widened to provide two south bound lanes for a distance of 1,000 feet.

d. The deceleration/right-turn lane of east bound Kaahumanu Avenue be lengthened to 800 feet. A minimum 300-foot long deceleration/right-turn lane be provided on the west bound Kaahumanu Avenue for right turns to Papa Avenue.

e. These improvements should be implemented with the Phase II work.

3. The new Parkway/Kanaloa Avenue intersection will be a four-legged intersection by including the access driveway to the War Memorial Center parking area. Kanaloa Avenue at this location should have two through lanes in each direction, left-turn storage lanes and right-turn deceleration lanes. The side street approaches should provide for a left-turn, through and right-turn lane.

The storage lane lengths should be as follows:

a. Kanaloa Avenue: south bound 180 feet; north bound 100 feet;
b. Parkway - 180 feet;
c. Parking lot - 180 feet; and
d. Deceleration/right-turn - 200 feet.

A five-phase traffic signal system should be implemented with the Phase II work.

4. The Parkway/Kahului Beach Road intersection is a T-intersection which should provide a separate left-turn lane on Kahului Beach Road with a minimum length of 120 feet. Deceleration and acceleration lanes should be provided on Kahului Beach Road. Conduits for a future traffic signal system should be placed at the time the intersection is constructed. The

traffic signal system should be implemented with the Phase II construction.

5. The Parkway/Papa Avenue Extension should contain a Parkway left-turn storage lane of 100 feet. A traffic signal system is not warranted at this intersection until traffic volumes increase significantly on the Parkway.

2. *Wastewater System*

There will be no net increase in the average daily flow of wastewater for the Kahului Wastewater Treatment Facility as a result of the proposed new Parkway and the extension of Papa Avenue. As such, the project is not anticipated to have an adverse impact upon the region's wastewater system.

3. *Water*

Water for landscaping of the project will be furnished by the domestic system servicing the area.

4. *Drainage and Erosion Control*

Road drainage for the proposed parkway will be collected in catch basins located along the parkway. Drainage from Phase I of the project would outlet through underground culverts outside of the right-of-way and pond in natural low-lying areas. Phase II construction will include connecting with the County's proposed master plan drainage system. This system is expected to address drainage concerns for all phases of the project. It is anticipated that there will be no significant drainage impacts of the project and surrounding areas. See Appendix D.

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 9. The proposed action involves the use of the property for a new Parkway and the extension of Papa Avenue. The proposed use of the property 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 policy:

Objective:

To develop a program for anticipating and enlarging the local street and highway systems in a timely response to planned growth.

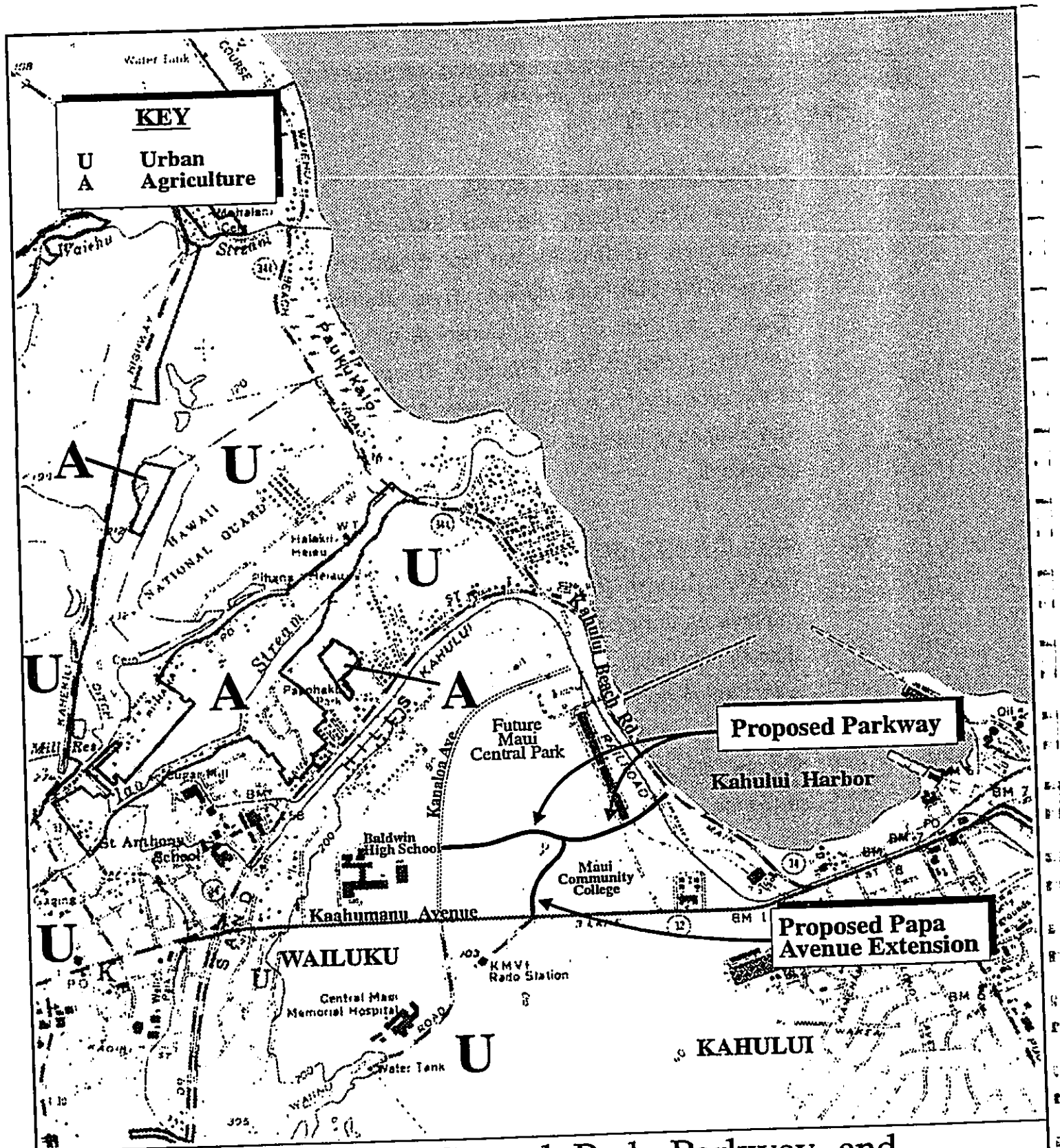

Figure 9 Maui Central Park Parkway and Papa Avenue Extension
State Land Use District Designations

Michael T. Munekiyo Consulting, Inc.
Prepared for: County of Maui, Dept. of Public Works

Policy:

Ensure that transportation facilities are anticipated and programmed for construction in order to support planned growth.

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 10. The proposed new Parkway and a small portion of the Papa Avenue extension are designated "Park", while the remainder 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.

D. *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, 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.

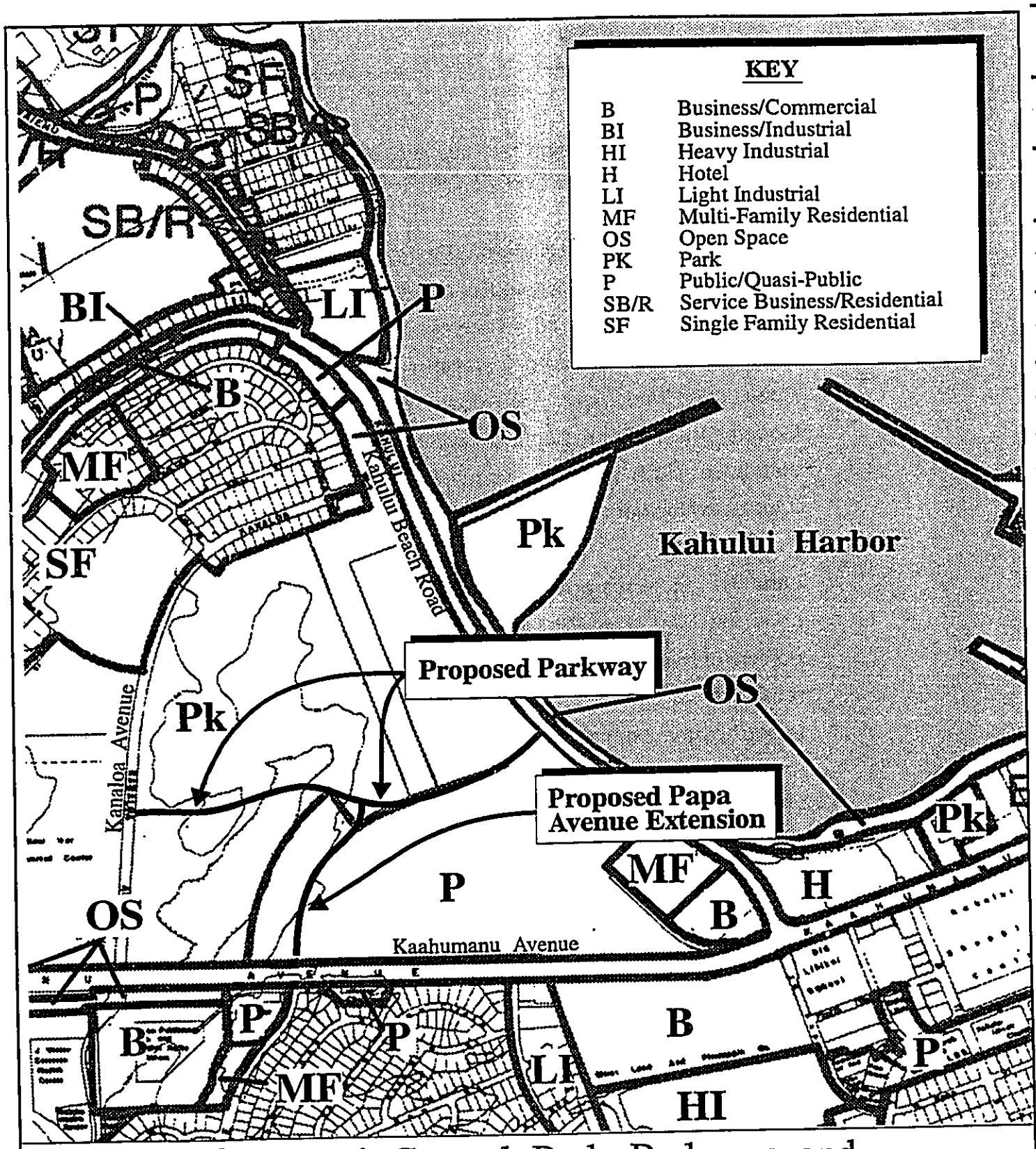

Figure 10 Maui Central Park Parkway and Papa Avenue Extension
Wailuku-Kahului Community Plan Land Use Designations

Michael T. Munekiyo Consulting, Inc.
Prepared for: County of Maui, Dept. of Public Works

1. ***Recreational Resources***

Objective: Provide coastal recreational resources accessible to the public.

Policies:

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

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

   a. Protecting coastal resources uniquely suited for *recreation activities that cannot be provided in other* areas,

   b. Requiring replacement of coastal resources having significant recreational value, including but not limited to surfing sites 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;

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

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

   e. Encouraging expanding public recreational use of county, state, and federally owned or controlled shoreline lands and waters having recreational value;

   f. 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

   g. Encouraging reasonable dedication of shoreline areas with recreational value for public use as part of discretionary approvals or permits, and crediting such

dedication against the requirements of Section 46-6 of the Hawaii Revised Statutes.

Response:

The proposed project will not affect coastal zone recreational opportunities. Accessibility to shoreline areas will not be impacted 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:

1. Identify and analyze significant archaeological resources;
2. Maximize information retention through preservation of remains and artifacts or salvage operations; and
3. Support state goals for protection, restoration, interpretation and display of historic resources.

Response:

An archaeological inventory survey for the area of the proposed Parkway and Papa Avenue extension did not find any pre-contact Hawaiian artifacts. The project is anticipated to have "no effect" on significant 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:

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

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

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

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

Response:

The proposed project will not adversely impact scenic or open space resources. The proposed project will not significantly affect public views to the shoreline.

4. *Coastal Ecosystems*

Objective:

Protect valuable coastal ecosystems from disruption and minimize adverse impacts on all coastal ecosystems.

Policies:

1. Improve the technical basis for natural resource management;

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

3. 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

4. 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 completion of the proposed project will not significantly disrupt or impact coastal ecosystems. Appropriate soil erosion mitigation measures will be implemented during the construction of the project to minimize 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:

1. Concentrate in appropriate areas the location of coastal dependent development necessary to the state's economy;

2. Insure that coastal dependent development such as harbors and ports, 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

3. 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:

   a. Utilization of presently designated locations is not feasible,

   b. Adverse environmental effects are minimized, and

   c. Important to the state's economy.

Response:

The project would have a beneficial short-term impact on the local economy during construction. After completion, the project would not have an effect upon coastal dependent development.

6. ***Coastal Hazards***

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

Policies:

1. Develop and communicate adequate information on storm wave, tsunami, flood, erosion and subsidence hazard;

2. Control development in areas subject to storm wave, tsunami, flood, erosion and subsidence hazard;

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

4. Prevent coastal flooding from inland projects.

Response:

The southwest section of the new Parkway and the Papa Avenue extension are located in an area of minimal flooding. The northeast portion of the new Parkway at the intersection of Kahului Beach Road is located in Zone A4 which has a base flood elevation of 17 feet above mean sea level. In addition, this portion of the Parkway is located in Zone V23, which includes areas inundated by the 100-year coastal flood with velocity hazards and a base flood elevation of 17-18 feet above mean sea level. Drainage for Phase I construction will be handled by an underground culvert and will pond in natural low-lying areas. Drainage for Phase II will be addressed by the County's proposed master plan drainage system. With the master plan drainage

improvements, the project is not anticipated to adversely impact downstream or adjacent properties.

7. ***Managing Development***

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

Policies:

1. Effectively utilize and implement existing law to the maximum extent possible in managing present and future coastal zone development;

2. Facilitate timely processing of application for development permits and resolve overlapping of conflicting permit requirements; and

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

Response:

Early consultation is provided through the process of preparing the Environmental Assessment. Public comments are also afforded during the review period of the Draft Environmental Assessment. The County's Special Management Area permitting process provides another avenue for review.

Applicable State and County requirements will be adhered to in the design and construction of the proposed project.

Chapter V

Findings and Conclusion

V. FINDINGS AND CONCLUSION

The proposed project would involve the construction of a new Maui Central Park Parkway, extending from Kanaloa Avenue to Kahului Beach Road, as well as an extension of Papa Avenue, from Kaahumanu Avenue to the new Parkway.

Construction of the proposed project will involve short-term environmental impacts typically associated with construction activities. These include air quality and noise impacts. Dust control measures such as watering and sprinkling will be undertaken to minimize dust. Construction activities are also anticipated to be limited to daylight hours. Impacts generated from construction activities are not considered adverse.

From a long term perspective, the proposed project is not anticipated to result in adverse environmental impacts. There are no rare, endangered species of flora and fauna at the project site. Future construction activities should have "no effect" on significant historic resources. In case human osteological remains or small occupation deposits are encountered during construction, applicable procedures to ensure compliance with Chapter 6E, HRS, will be followed. In the long-term, adverse noise conditions are not anticipated as a result of the project.

Impacts to the local economy are anticipated to be positive involving support for construction-related employment in the short-term.

The proposed project will have a positive impact on peak period traffic operations by redistributing traffic and reducing the demands at congested intersections. The roadways will also serve to help distribute traffic whenever there are special events at the War Memorial Center or at Maui Central Park. The Parkway will also provide another access to Maui Community College. It is anticipated that there will be no significant adverse drainage impacts as a result of the project.

The project is also not anticipated to have adverse impacts upon medical, police, and fire protection services as well as other infrastructure systems.

In light of the foregoing findings, it is concluded that the proposed action will not result in any significant environmental effects.

Chapter VI

Agencies Contacted in the Preparation of the Draft Environmental Assessment and Responses Received

VI. AGENCIES CONTACTED IN THE PREPARATION OF THE DRAFT ENVIRONMENTAL ASSESSMENT AND RESPONSES RECEIVED

1. U.S. Army Corps of Engineers
   Pacific Ocean Division
   Building 230
   Honolulu, Hawaii 96858

2. David Nakagawa
   Department of Health
   54 High Street
   Wailuku, Hawaii 96793

3. Robert Siarot
   Maui District Engineer
   Department of Transportation
   650 Palapala Drive
   Kahului, Hawaii 96732

4. Keith Ahue, Chairperson
   Department of Land and
   Natural Resources
   1151 Punchbowl Street
   Honolulu, Hawaii 96813

5. Department of Land and
   Natural Resources
   State Historic Preservation
   District
   1151 Punchbowl Street
   Honolulu, Hawaii 96813

6. State of Hawaii
   Department of Agriculture
   635 Mua Street
   Kahului, Hawaii 96732

7. Brian Miskae, Director
   Department of Planning
   250 South High Street
   Wailuku, Hawaii 96793

8. David Craddick, Director
   Department of Water Supply
   200 South High Street
   Wailuku, Hawaii 96793

9. Charmaine Tavares, Director
   Department of Parks and
   Recreation
   200 South High Street
   Wailuku, Hawaii 96793

10. Howard Tagomori, Chief
    Police Department
    55 Mahalani Street
    Wailuku, Hawaii 96793

11. Maui Community Arts and
    Cultural Center
    101 Kaahumanu Avenue,
    Suite A-A
    Kahului, Hawaii 96732

12. Maui Community College
    310 Kaahumanu Avenue
    Kahului, Hawaii 96732

13. Mr. James Lawrence
    Kahului Town Association
    P. O. Box 156
    Kahului, Hawaii 96732

MAR 2 9 1993

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

REPLY TO ATTENTION OF
Operations Division

March 26, 1993

SUBJECT: Proposed Parkway and Papa Avenue Extension, Kahului, Maui, Hawaii

Mr. Michael T. Munekiyo, A.I.C.P.
Michael T. Munekiyo Consulting, Inc.
1823 Wells Street, Suite 3
Wailuku, Hawaii 96793

Dear Mr. Munekiyo:

This responds to your March 12, 1993 letter regarding your preparation of an environmental assessment (EA) for the subject project.

Based on the scope of the project as described in your project summary sheet, I believe that a botanical survey is warranted to determine if any wetland indicator species are present on the project site. This information should be included in the EA. The Corps would then be able to determine Department of the Army permit requirements based on the survey and additional project details that are disclosed in the EA.

Sincerely,

Michael T. Lee
Chief, Operations Division

APR 2 1 1993

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

April 20, 1993

REPLY TO
ATTENTION OF
Operations Division

Mr. Michael T. Munekiyo, A.I.C.P.
Michael T. Munekiyo Consulting, Inc.
1823 Wells Street, Suite 3
Wailuku, Hawaii 96793

Dear Mr. Munekiyo:

This is to acknowledge receipt of your letter dated April 12, 1993 requesting a review of the video tape for the proposed Maui Central Park Parkway and Papa Avenue Extension.

Based on the video tape and information you provided, it appears that there are no wetlands or other waters of the U.S. on the project site. Since no work will be done in waters of the U.S., a Department of the Army (DA) permit is not required.

File No. NP93-038 has been assigned to this project. Please refer to this number in future correspondence. Should you have any questions please contact my staff at 438-9258.

Sincerely,

for Clarence Kawamoto
Michael T. Lee
Chief, Operations Division

MAR 1 6 1993

JOHN WAIHEE
GOVERNOR OF HAWAII

STATE OF HAWAII
DEPARTMENT OF HEALTH
MAUI DISTRICT HEALTH OFFICE
54 HIGH STREET
WAILUKU, MAUI, HAWAII 96793

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

PAUL E. HOFFMAN, M.D., M.P.H.
DISTRICT HEALTH SERVICES ADMINISTRATOR (M.D.)

March 15, 1993

Mr. Michael Munekiyo, A.I.C.P.
Michael T. Munekiyo Consulting, Inc.
1823 Wells Street, Suite 3
Wailuku, Hawaii 96793

Dear Mr. Munekiyo:

Subject: Proposed Construction of New Parkway and Papa Avenue Extension within the New Maui Central Park

Thank you for the opportunity to review and comment on the subject proposal. We have no comments at this time.

Sincerely,

David H. Nakagawa

DAVID H. NAKAGAWA
Chief Sanitarian

JOHN WAIHEE
GOVERNOR

MAR 1 9 1993

REX D. JOHNSON
DIRECTOR

DEPUTY DIRECTORS
JOYCE T. OMINE
AL PANG
JEANNE K. SCHULTZ
CALVIN M. TSUDA

IN REPLY REFER TO:

HWY-M 2.168-93

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

March 17, 1993

Mr. Michael T. Munekiyo, A.I.C.P.
Michael T. Munekiyo Consulting, Inc.
1823 Wells St.
Suite 3
Wailuku, Hawaii 96793

Dear Mr. Munekiyo:

SUBJECT: PROPOSED CONSTRUCTION OF NEW PARKWAY AND PAPA AVENUE EXTENSION WITHIN THE NEW MAUI CENTRAL PARK, TMK NO. 3-8-7: POR 1 AND 3-7-1: POR 2

Thank you for the opportunity to comment on the project summary for the proposed project. We have these comments to offer:

1. Design and construction of the Maui Central Park Parkway shall be coordinated with our Kahului Beach Road Widening project;

2. Design and construction of this project should also be coordinated with the required roadway improvements for Maui Cultural Arts and Cultural Center and MCC Buildings S & J;

3. Kaahumanu Avenue/Papa Avenue intersection may need to be improved. Provide copy of traffic study/traffic assignment to support the proposed improvements;

4. The SMA application and EA should contain drainage report, preliminary plans and traffic study; and,

5. Construction plans for work within state highway right-of-way must be submitted for review and approval.

Very truly yours,

Robert O. Siarot
District Engineer, Maui

/fmc

JOHN WAIHEE
GOVERNOR OF HAWAII

KEITH W. AHUE, CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES

DEPUTIES
JOHN P. KEPPELER, II
DONA L. HANAIKE

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

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES

P. O. BOX 621
HONOLULU, HAWAII 96809

REF:OCEA:SKK

FILE NO.: 93-509
DOC. NO.: 2613

APR 21 1993

Mr. Michael T. Munekiyo, A.I.C.P.
Michael T. Munekiyo Consulting, Inc.
1823 Wells Street, Suite 3
Wailuku, Hawaii 96793

Dear Mr. Munekiyo:

SUBJECT: Early Consultation for an Environmental Assessment (EA) and Special Management Area (SMA) Permit Application: Proposed New Maui Central Park and Extension of Papa Avenue, Kahului, Maui, TMK: 3-7-01: por. 2; 3-8-07: por. 1

We have reviewed the preliminary EA information for the subject project transmitted by your letter dated March 15, 1993, and note that our Historic Preservation Division recommended in their letter sent to you directly, that an archaeological inventory survey be conducted for this project and that the results be presented in final report form in the EA.

We have no other comments to offer at this time. Thank you for the opportunity to comment on this matter.

Please feel free to contact Steve Tagawa at our Office of Conservation and Environmental Affairs, at 587-0377, should you have any questions.

Very truly yours,

Keith W. Ahue

KEITH W. AHUE

APR 1 5 1993

JOHN WAIHEE
GOVERNOR OF HAWAII

KEITH AHUE, CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCE

DEPUTIES

JOHN P. KEPPELER II
DONA L. HANAIKE

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

April 14, 1993

LOG NO: 7794
DOC NO: 9304AG24

Mr. Michael T. Munekiyo, A.I.C.P.
1823 Wells St., Suite 3
Wailuku, Hawaii 96793

Dear Mr. Munekiyo:

SUBJECT: **Historic Preservation Review of Proposed Construction of New Parkway and Papa Avenue Extension Kahului, Wailuku, Maui TMK: 3-8-07: por. 1, 3-7-01: por. 2**

This is in response to your letter of April 12, 1993 requesting our comments on this proposed project.

There are no known historic sites on the proposed route of Parkway and Papa Avenue extension. Previous archaeological research in the vicinity of the project site have resulted in mixed results. Testing at the Maui Community College and the Maui Community Arts and Cultural Center identified no historic sites. However, recent work at the makai end of Lower Main Street has identified two significant historic sites consisting of a railroad bed and prehistoric subsurface cultural deposits. Also, the sand dunes in the Kahului area are known to contain human burials. Thus, it is possible that historic sites are present at the proposed project site. For this project, we recommend that an archaeological inventory survey be conducted and the results should be presented in the environmental assessment in the form of a final report.

Should you have any questions, please contact Ms. Annie Griffin at 587-0013.

Sincerely,

DON HIBBARD, Administrator
State Historic Preservation Division

c: Steve Tagawa, OCEA (File No.: 93-509)

AG:111

LINDA CROCKETT LINGLE
Mayor

BRIAN W. MISKAE
Planning Director

COUNTY OF MAUI
PLANNING DEPARTMENT
250 S. HIGH STREET
WAILUKU, MAUI, HAWAII 96793

March 18, 1993

Mr. Michael Munekiyo
1823 Wells St.
Suite 3
Wailuku, Hawaii 96793

Dear Mr. Munekiyo:

Re: Proposed construction of new Parkway and Papa Avenue extension within the new Maui Central Park

Our preliminary review indicates that the proposed project is located within the Special Management Area (SMA) and that an SMA Use Permit will be required. Of additional concern is the drainage improvements that may be associated with the new roadway. Should the drainage improvements involve work within Kahului Harbor such as increased capacity of the existing outlets a shoreline setback approval/variance may also be required as well as review and approval from the Department of Transportation Harbors Division, Department of Land and Natural Resources and Army Corps of Engineers.

Further, your review should analyze the impacts on traffic in the area as a result of the construction of the extension of Papa Avenue to Kahului Beach Road and other roadway improvements that may be necessary to existing streets to accommodate the new traffic flows.

Thank you for the opportunity to comment. If additional clarification is required please contact my office at any time.

Very truly yours,

BRIAN MISKAE
Planning Director

cc: C. Suyama
C. Yoshida

POLICE DEPARTMENT
COUNTY OF MAUI

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

HOWARD H. TAGOMORI
CHIEF OF POLICE

STANLEY T. TADAKI
DEPUTY CHIEF OF POLICE

R REFERENCE
GN:at
YOUR REFERENCE

March 16, 1993

Michael T. Munekiyo, A.I.C.P.
1823 Wells Street, Suite 3
Wailuku, Hawaii 96793

Dear Mr. Munekiyo:

Subject: Proposed Construction of new Parkway and Papa Avenue Extension within the new Maui Central Park

Thank you for informing us of this project and the opportunity for providing input.

At this time, the only item we would like considered is to have the intersection of the Parkway and Kahului Beach Road signalized.

Very truly yours,

HOWARD H. TAGOMORI
Chief of Police

References

References

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Appendix A

Archaeological Inventory Survey

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

JUNE 1993

DRAFT

NOT FOR DISTRIBUTION

Prepared for: Michael T. Munekiyo
1823 Wells Street, Suite 3
Wailuku, Hawaii 96793

Prepared by: Archaeological Consultants of Hawaii, Inc.
Joseph Kennedy, M.A.
Peter P. Brennan, M.A.
Sandra Ireland, B.A.
59-624 Pupukea Road
Haleiwa, Hawaii 96712

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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, ON THE ISLAND OF MAUI

Abstract

At the request of Michael T. Munekiyo Consulting, Inc., an archaeological inventory survey with subsurface testing was conducted on the subject property. The construction of the Maui County Road Project is imminent and involves the building of two roads. The road corridors constitute the subject property for the current investigations. Archaeological testing is needed to determine the presence or absence of significant historical resources within the corridors of the two roads *before construction* occurs. Due to the large percentage of sand dunes covering the property it was expected that human burials might be present. A 100% surface survey was conducted within the boundaries of the Maui County Road Project, and no significant surface features were identified. Fifty-four test trenches were excavated mechanically, either by backhoe or mechanical excavator. No significant cultural resources were discovered during the testing and no human burials were identified. Materials recovered on the property date to the last 50 years and are not significant to the interests of historic preservation.

The results of the archaeological testing indicate that it is unlikily that significant cultural resources are present on the subject property within the defined boundaries of the Maui County Road Project. Therefore, Archaeological Consultants of Hawaii, Inc., concludes that future construction activites within the corridors of the 'Road Project' will have 'no effect' on significant historic resources and no further archaeological mitigation is required. In the event that a human burial is encountered during construction activities the State Historic Preservation Division and the Maui Burial Council should be contacted immediately.

CORRECTION

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

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List of Illustrations (cont.)

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, ON THE ISLAND OF MAUI

Abstract

At the request of Michael T. Munekiyo Consulting, Inc., an archaeological inventory survey with subsurface testing was conducted on the subject property. The construction of the Maui County Road Project is imminent and involves the building of two roads. The road corridors constitute the subject property for the current investigations. Archaeological testing is needed to determine the presence or absence of significant historical resources within the corridors of the two roads before construction occurs. Due to the large percentage of sand dunes covering the property it was expected that human burials might be present. A 100% surface survey was conducted within the boundaries of the Maui County Road Project, and no significant surface features were identified. Fifty-four test trenches were excavated mechanically, either by backhoe or mechanical excavator. No significant cultural resources were discovered during the testing and no human burials were identified. Materials recovered on the property date to the last 50 years and are not significant to the interests of historic preservation.

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Section 1: Introduction

The subject property is located at TMK: 3-8-07: 1, 40, 125, 117 (portions), and TMK: 3-7-01: 2(por.); in the ahupua'a of Wailuku, in the district of Wailuku, on the island of Maui (see Map 1). At present the property is owned by the County of Maui. Archaeological Consultants of Hawaii, Inc., was contracted by Michael T. Munekiyo Consulting Inc., to conduct an inventory level survey with subsurface testing along corridors for the Maui County Road Project.

The Maui County Road Project involves the construction of two roads crossing the subject land parcel. Located on the property are aeolian deposited sand dunes. The proposed corridors of the two roads will bisect these dunes. In the Hawaiian Islands, human burials are known to have been discovered in sand dunes. Due to the absence of surface markers indicating the presence of burials, the State Historic Preservation Office required subsurface testing on the property. Thus, the ultimate goals of this survey were to identify significant cultural resources, if any, on the subject property, and to determine if isolated or clustered burials were present.

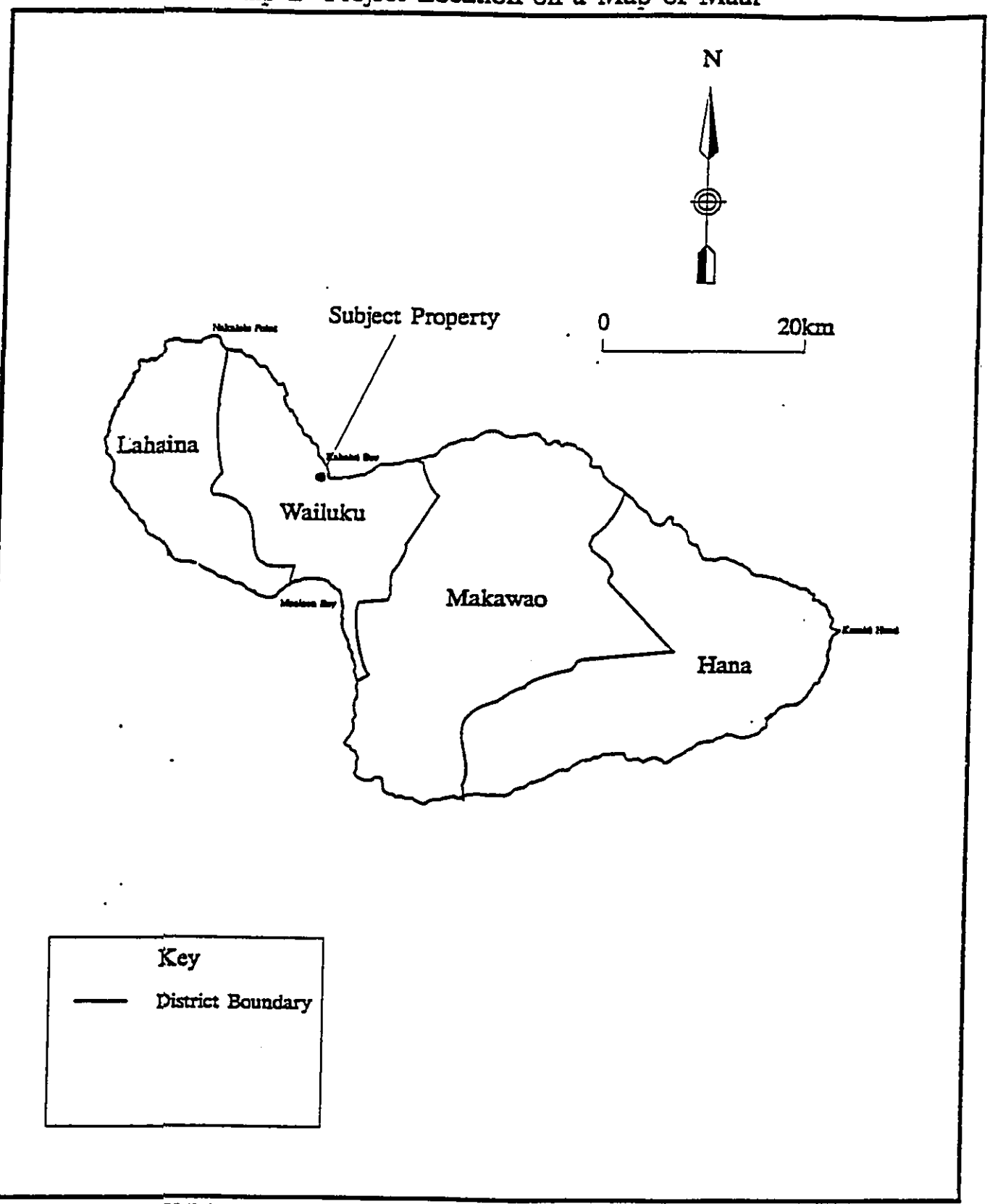
The eastern portion of the subject property and road corridor begin approximately 60m west and inland of Kahului Harbor. The close proximity to the coast would suggest that Hawaiians may have used this area while exploiting the nearby coastal resources. Archaeological finds associated with use of the coast are possible.

This report contains a detailed description of the location and environment of the subject property which the Maui County Road Project will transect. It also summarizes the historical background, land use patterns and previous archaeological research in the area and ahupua'a of Wailuku. Included is a description of the archaeological field methods and findings, and an assessment of the archaeological significance of the findings.

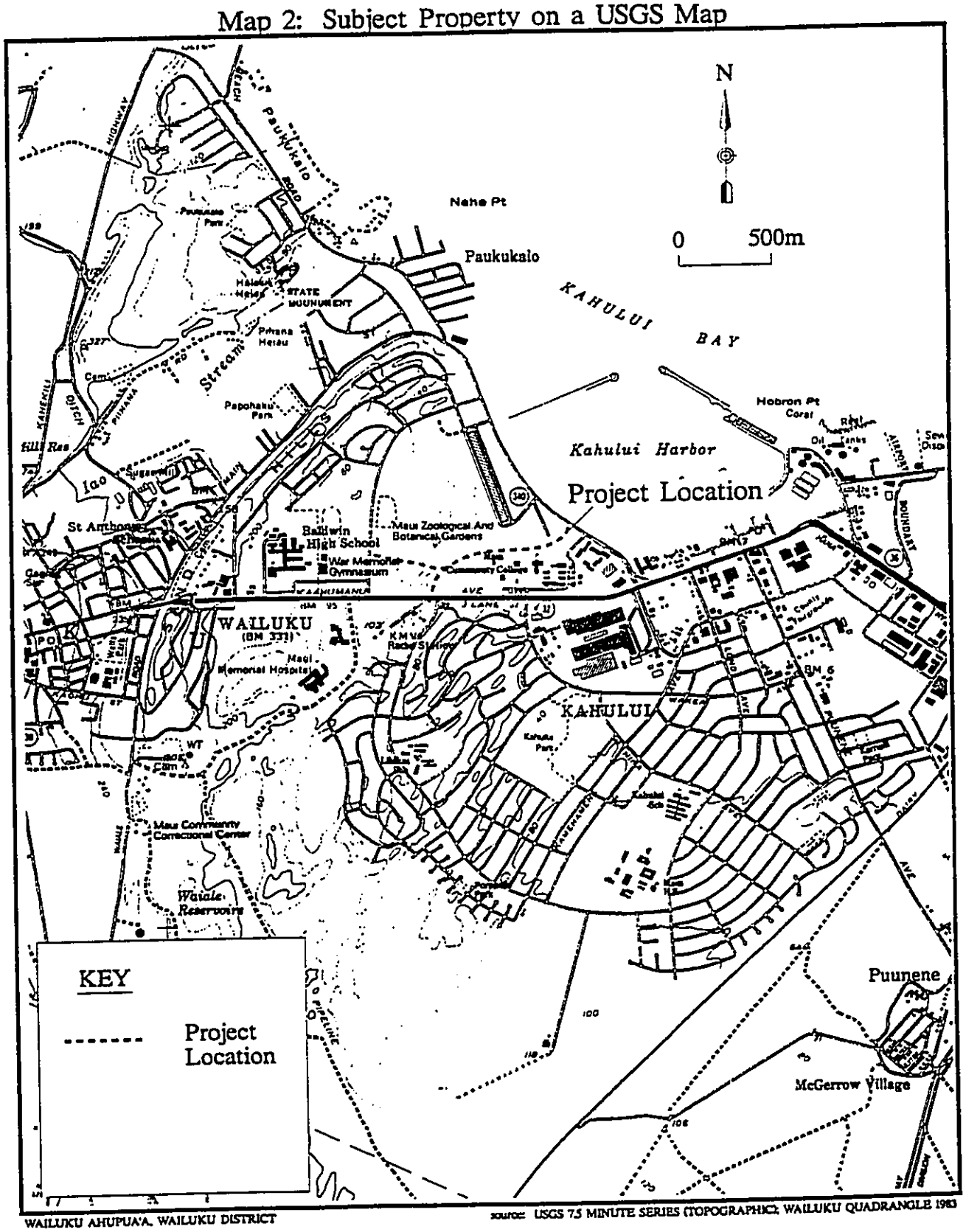
Section 2: Physical Location

The subject property which the Maui County Road Project will transect is located on the northeast coast of Maui near Kahului Harbor at geographic grid coordinates 20 53'45'N and 156 29'15'W, and at UTM coordinates 2313000mN and 7615000mE. According to the survey map prepared by Richard M. Sato & Assoc., Inc. the road project is located between 1 and 22 meters above mean sea level (AMSL), and aapproximately 60 to 1100 meters inland and west of the Kahului Harbor shoreline (see Map 2). This area receives between 20 to 30 inches of rain annually (Armstrong 1973: 56).

Map 1: Project Location on a Map of Maui



Map 2: Subject Property on a USGS Map



WAILUKU AHUPUA'A, WAILUKU DISTRICT

source: USGS 7.5 MINUTE SERIES (TOPOGRAPHIC), WAILUKU QUADRANGLE 1983

The Maui County Road Project involves the construction of two roads bisecting several portions of land parcels known as the subject property (see above for TMK numbers). The primary corridor for the project traverses the property in a east to west direction, and passes just south of the Maui Community Arts and Cultural Center and north of the Maui Community College. This corridor is presently termed the Maui Central Parkway (see Map 3). It covers a distance of 990.6m and is 45.7m wide. The eastern boundary of the 'parkway' corridor borders Kahului Beach Road and it's western boundary is Kanaloa Road.

The secondary corridor for the road project on the subject property is presently known as the Papa Extension. The Papa Extension begins its north-south course at its midroute intersection with the Maui Central Parkway's east-west traverse (see Map 3). The secondary corridor passes directly east of the Maui Community College Dormitories and terminates at its southern boundary with Ka'ahumanu Avenue. The corridor covers a distance of 417.6m and is 45.7m wide (see Map 3).

The entire subject property is geologically part of the Kula series of lava flows. It lies in an area of both oxisols and entisols. Oxisols are very stable and occur as lowland soils on old geomorphic surfaces. Entisols are weakly developed soils usually found in old beach sand or volcanic ash in Hawaii (Armstrong 1973: 40-41).

The general landscape of the subject property ranges from low lying sand dunes in the east near the harbour, to high coastal dunes in the west. The soils of the Kahului coastal region are described as sandhills with the characteristic Puuone sand series present along with patches of Jaucas sand (Foote et al., 1972: 117 and Sheet 99). The soils encountered on the subject property range from primarily aeolian sand with a variety of color and textural variations, through mixes of silt, loam, and loamy clay. Some humus soil has formed on the surface due to the vegetative decay. In many of the undisturbed areas root penetration and matting is intense due to dense vegetative growth. The soils and stratigraphy are discussed in detail below (refer to Section 7 and Table 1).

For ease in describing the locations and stratigraphy of trenches across the subject property, the corridor of the Maui County Road Project has been divided into six geographical zones (see Map 3). Each zone has been sub-divided on the basis of its topography or on the basis of recent land uses.

Zone 1 appears to be a disturbed, low lying, sand dune system that was previously leveled, and ranges in elevation from 1.83m to 3.66m AMSL. This zone is near the harbour and

borders Kahului Beach Road to the east. The vegetative cover consists of a heavy growth of soft fiber and woody plants. The dominant species include haole koa (Leucaena leucocephala), growing in thick short stands, castor bean (Ricinus communis), kiawe (Prosopis pallida), and a type of low lying grass. A group of coconut palms (Cocos nucifera), are located near the beach road. Other exotic species of plants are present but in small numbers.

Zone 2 is a broad gently sloping area of coastal dunes which has been subjected to intense modification by heavy equipment. Vegetative cover in Zone 2 has been removed and the sand dune leveled and graded. A live sewer line and a water line transect Zone 2 between Trench 53 of Zone 1 and Trench 1 of Zone 2 (see map 3). Several subsurface trenches indicated evidence of earth-filling activities. This zone gently rises from an elevation of 3.66m AMSL in the east to 12.49m AMSL in the west where Zone 3 begins.

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 activites. 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.

The topography of Zone 4 is very disturbed and fluctuats in elevation. This zone is the furthest area west of Kahului Harbor and borders Kanaloa Road. The area has undergone intense modification by heavy equipment. A steep man-made hill (19.8m AMSL), has been constructed from various types of fill removed from other properties around Maui, and is located to the northeast of the Central Maui Youth Center. A man-made drainage ditch, which flows intermitantly, descends from Kanaloa Road easterly into a low basin between the modified hill and the high dunes of Zone 3. The drainage ditch and the steep hill of filled material was determined to be unsuitable for archaeological testing. Maui Zoological and Botanical Gardens lies to the northwest of Zone 4. Part of a plant nursery erected adjacent to the

Botanical Gardens overlaps onto the right of way of the Central Maui Parkway. The basin has recently been graded and there is very little vegetation, aside from the occasional exotic weed sprouting on the surface.

The remaining vegetative cover of Zone 4 is sparse. The man-made hill is covered sparsely in a low lying grass and haole koa (Leucaena leucocephala). The basin has no vegetative cover and the surface sand is exposed. The banks of the drainage ditch are covered in a thicket of grass sporadically interspersed with kiawe (Prosopis pallida).

Zone 5 covers the entire Papa Extension excluding the southern portion adjacent to Ka'ahumanu Road and the Maui Community College Dormitories. Zone 5 is part of the same high coastal dune range of Zone 3 but, the corridor transects the dune system in a north to south direction. The dune system appears more disturbed in this zone. A refuse pile of organic material and modern trash has been dumped at the base of one of the dunes. Mining of part of the dune range located 18m west and outside of the Maui Road Project corridor has taken place. The vegetative cover in Zone 5 is similar to that of Zone 4, but is less dense. Elevation ranges from 10.9m to 22.0m AMSL, and some of the dunes are steeply sloped.

Zone 6 is located at the southern end of the Papa Extension corridor and crosses over a leveled area landscaped and maintained as a recreational area for the residents of the Maui Community College Dormitories. This area has been heavily impacted by human development and is considered unsuitable for archaeological testing.

Section 3: Historical Background

The subject parcel is part of the Wailuku District and Wailuku Ahupua'a. Wailuku District includes the entire eastern flank 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 and Maalaea Bays (see Map 1). Wailuku Ahupua'a is a relatively large political and economic land unit of Wailuku District, comprising nearly half of its land area. It includes the coastal area of Kahului Bay from Kapukaulua to Paukukalo, all of 'Iao Valley, and the northern half of the isthmus between Haleakala and the West Maui Mountains.

Early references to Wailuku note it as a gathering place and residence of important chiefs and their retinues (I'i 1959:135). The pre-contact history of the ahupua'a indicates that the western portion of the ahupua'a supported the majority of the population and agriculture, because it was moist and had permanent streams. In contrast, the eastern

portion of Wailuku Ahupua'a seems to have been little used in pre-contact times because of its relatively dry, barren condition.

This section details the land use history of the eastern portion of the ahupua'a of Wailuku. The subject parcel is located in the eastern half of this ahupua'a, an area that was little utilized for habitation or agriculture until late in the 19th century when portions of the ahupua'a were put into sugarcane production. For a detailed description of the land use history of the western portion of Wailuku Ahupua'a refer to (Kennedy et al. 1992).

Section 3.1: Pre-European Contact History

In chants recorded by Fornander in the mid-1800's occasional references to Wailuku can be found. Maui place names are listed within the tradition of Lonoikamakahiki, where Wailuku Ahupua'a is numbered tenth, as one of the divisions of Wailuku District. Other placenames listed as divisions of Wailuku include Nuailua, Makaiwa, the uplands of Halehaku, and Waipio; all of which are located on the windward coast of Haleakala, at a considerable distance from the Wailuku District of the late prehistoric period. In several chants, Wailuku is referred to as a locality of flying and sometimes dark clouds, a sheltered and shady valley locale, the place of an iaiki rain, and a "broad plain where councils are held" (Fornander in Silva n.d.:3-7).

In legends, Wailuku is remembered as a burial place of chiefs, and an area of much warfare. In one tradition, Wailuku takes its name from a legendary battle fought between owls and men. A cruel act was committed by a man and the owls punished him by flocking to Wailuku and descending upon him. The battle place is called Wailuku, (literally, "water of destruction")(Pukui-Curtis 1974:179 in Silva n.d.:9).

In another tradition, Wailuku is the name of a chiefess of the ancient past. In the legend of Lepeamoa, Mauinui (the high chief of Maui) challenged his brother-in-law, an Oahu chief, to a cockfight:

> As Mauinui possesses a rooster of extraordinary powers he fully expects to win. At his urging the stakes were set exceedingly high; to the winner belongs the privilege of claiming all property and the life of the opponent. Kakuhihewa, however, is able to enlist the help of two demi-gods, Lepeamoa and Kauilani, and they assure his victory. Kakuhihewa then refuses his right to take Mauinui's life and his island and peace between the dominions of Maui and Oahu are established (Westervelt 1973:204-245, in Silva n.d.:7).

In another story about ancient times, Wakalama, principal chief of the windward side of Maui, lived in Wailuku. He rescued five foreigners from a shipwreck, and took them into his court. One foreigner had an extraordinary sword, and became a captain of Wakalana's warriors. In a battle between Hawaii and Maui, this sword was taken by warriors from Hawaii Island. This sword became known as "the lost knife of Wailuku", and was eventually bartered for the return of the High Chief of Hawaii, captured and held captive in Maui (Kalakaua 1975:177-205).

An early chief of Wailuku, Hua, was known for his wickedness and detested by his people. During a period of severe drought, he died of starvation. When he fell, his people allowed his bones to be bleached in the sun and rattle in the wind. This is the origin of a saying, "The bones of Hua rattle in the sun" (Fornander 1918-19:V:516, in Silva n.d.:8).

In the 16th century two major fresh water fishponds were reportedly constructed near Kahului; Kanaha and Mau'oni. The date for the construction of the ponds is based on a story related by Kamakau (1961:42):

> Keawe-nui-a'Umi sailed from Hilo to Kapu'ekahi in Hana and from Hana to Kahului of Wailuku. There the chief of Hawaii met Kiha-a-Pi'i-lani, ruler of Maui. Kiha-a-Pi'i-lani was building walls of the pond of Mau'oni. A wide expanse of water lay between Kaipu'ula and Kanaha, and the sea swept into Mau'oni.

Fornander (in Walker 1931) suggests that Kiha-a-Pi'i-lani lived around 1550, thus giving the sixteenth century date. The ponds may have been expanded or modified in the early eighteenth century by Ka-pi'i-oho-o-ka-lani, an Oahu high chief, who named the ponds after his children (Summers as quoted in Kikuchi 1973).

The Kanaha Pond is still in existence today and is an important wildlife sanctuary, being a critical habitat for the endangered Hawaiian Stilt. Mau'oni Pond was not noted on a 1903 Hawaiian Government Survey map (Dodge 1885), nor on any subsequent maps examined.

During the seventeenth and eighteenth centuries, a period of frequent warfare within and between Maui, Oahu, and Hawai'i Islands, Wailuku was the center of political and military power on Maui. High Chief Pi'ilani, who had unified the districts of Maui by war, had two sons, Lono-a-Pi'ilani and Kiha-a-Pi'ilani, who fought for political control of the island after the death of their father (Speakman 1978:9).

Two battles fought at Wailuku involved Kiha-a-Pi'ilani. The first was fought in 'Iao Valley, and Kiha-a-Pi'ilani

barely escaped alive. The second battle was fought with the assistance of Hawai'i Island warriors, and Kiha-a-Pi'ilani was victorious, eventually becoming ruler of Maui (Thrum 1923:77-86, in Silva n.d.:9).

Around 1700, one chief, Kekaulike, a descendant of the Pi'ilani chiefs, established through war a powerful and united 'kingdom' on Maui. In 1736 Kekaulike, residing at Kaupo and fatally ill, heard that Hawai'i Island chief Alapa'i was preparing to attack Maui. Kekaulike and his retinue fled in his double hulled war canoe to West Maui where they landed below Kula. The dying king was carried overland to Haleki'i Heiau near Wailuku. His body was burned, his ashes tossed into 'Iao Stream, and his bones were hidden in a cave near Haleki'i Heiau. He was the last ali'i to be interred there (Speakman 1978:13).

Before he died, Kekaulike had designated one of his sons, Kamehameha-nui, as his successor. However, another son, Ka-uki, challenged his half brother and a battle for succession ensued. The major and final battle in this war took place at Pu'unene on the plains of Wailuku just south of Kahului. Ka-uki fought in alliance with the ruling chief of Oahu and although there was a great slaughter on both sides, peace was made and Kamehameha-nui's rule was confirmed. There then ensued a period of peace on Maui for over 30 years (Speakman 1978: 13 & 14).

During the reign of Kamehameha-nui's successor and brother, the powerful King Kahekili (from 1765 to 1790), warfare between Maui and Hawai'i became intense once again. Wailuku was the site of Kalanihale, the royal residence of Kahekili. In the mid 1770's, Kalani'opu'u of Hawai'i marched with his well trained (Alapa) forces towards Wailuku. Kahekili hid his defending troops in the sand dunes above Haleki'i Heiau, where they surprised Kalani'opu'u's warriors. A battle took place seaward of the sand dunes, and the Alapa were slaughtered (Speakman 1978:16-17). An account of this battle was published in "Paradise of the Pacific" in September of 1900. It included a description of Wailuku at that time, received from a native Hawaiian of "considerable age":

> The district was called Nawaieha (the four streams) and was famous throughout the group, not only for the magnificence of Kahekili's court but for the vastness of it products. The shores of Kahului harbor, from Waihee Point to Haiku, were surrounded with the grass huts of the fishermen and of those connected with the innumerable war canoes of the king. Myriads of cocoanut trees lined the beach from Kahakuloa to Wailuku, the trunks of many of which are found in the marshes at Wailuku at this day, the trees having been

destroyed by a conquering army from Hawaii. (Paradise of the Pacific, Sept. 1900, in Silva n.d.:10).

Neither Handy (1940), nor Handy and Handy (1972) mention the Kahului area, or any area in the eastern portion of the ahupua'a, as being major areas for habitation or agriculture.

The Alaloa or 'Long Road' was a paved way that ran around the whole island and was built by Kiha-a-Pi'ilani in 1516 after his conquest and unification of the island. However, between Hamakua and Waiehu the road was located on the beach (Handy & Handy 1972). Thus, there would be no traces of it within this section of the ahupua'a.

The pre-contact history of the ahupua'a indicates that the western portion of the ahupua'a supported the majority of the population and agriculture. The only mention of habitation sites in the eastern portion that could be found is that referring to the fishermen's huts fronting Kahului Bay. Mention of place names in the eastern portion of the ahupua'a is also relatively rare. This pattern could reflect the environmental differences within the ahupua'a. The western portion is relatively moist and has permanent streams, while the eastern portion is drier with no permanent streams.

Section 3.2: Post European Contact History

The post-contact history begins with the arrival of Captain Cook off the north shore of Maui on November 26th, 1778. Cook was returning from his search for the north-west passage after visiting Kaua'i earlier in the year. He first sighted Maui off the Hamakua coast and headed north-west along the coast towards Kahului at a distance of approximately three miles offshore. Cook gave the following description of his encounters near Kahului:

> At Noon the coast extended from S 81 degrees E to N 56 degrees West, a low flat like isthmus bore S 42 degrees W the nearest shore being 3 or 4 Miles distant. ...Seeing some Canoes coming off to us I brought to: as soon as they got a long side many of the people who conducted them came into the Ships without the least hesitation. ... We got from these people in exchange for nails and pieces of iron a quantity of Cuttle fish: fruit and roots they brought very little, but told us they had plenty ashore, as also hogs and fowls. ...Having no doubt that these people would come off with produce the next day, I kept plying off all night and in the Morning stood close in shore. At first but a few people visited us, but towards noon we had the company of a good many who brought with them bread fruit, Potatoes, Tarra or eddy roots, a few plantains and small pigs, all of which they exchanged for Nails and iron

> tools; indeed we had nothing else to give them (Beaglehole 1969: 474-5).

Captain Clerke, the captain of the Discovery, the ship accompanying the Resolution, made the following observations of the encounter:

> One of the Aree's or principal People came on board, and made me a present of 2 small hogs: one of his Attendants had 2 large, long Iron Skewers; I was not master enough of the language to learn the proper history of them, as where he got them ... but its pretty clear from them having them at all, either that their connections do extend to where European exchanges have taken place, or that Europeans have some time or other been in the neighbourhood (Beaglehole 1969:475).

This first day off Maui, "five or six hundred" persons came out to the ships in canoes and began trading. On the second day, Cook brought his ships closer to shore and continued trading. Kahekili had heard from his brother Ka'eo, the ruling Chief of Kaua'i, of Cook's visit ten months earlier to that island; so, when he saw the tall ships approaching, he decided to pay Cook an official visit in his royal canoe. Kahekili, accompanied by ten lesser chiefs in red feather cloaks, approached the Discovery, and were received by Captain Charles Clerke. Reciprocal presents were exchanged in the Captain's cabin, including Kahekili's red and yellow feather (i'iwi and mamo) cloak (Speakman 1978:22-25). The journals of Cook's expedition unfortunately do not give any description of the land in this area.

By 1786 Kahekili controlled Maui, Moloka'i, Lana'i and Oahu. He also had an agreement with Ka'eokulani, the ruler of Kaua'i. In 1790 Kamehameha launched his bid for control of all the Hawaiian Islands from Hawaii Island. He landed at Kahului and joined battle with the ali'i prince, the son of Kahekili who was waiting there. The defenders retreated into 'Iao Valley (Speakman 1978:52-54). It has been reported that the name Kahului means 'the gathering place' and became attached to this area as a result of Kamehameha gathering his forces there (Burns 1991:47).

The battle of Kepaniwai (literally, "damming of the waters"), was a massacre of Maui forces by Kamehameha I and his warriors from Hawai'i. The Maui forces were led by Kalanikapule, son of Kahekili, and the Hawaii forces were accompanied by John Young, Isaac Davis, and a cannon. This was the first battle in Hawai'i in which gun powder was used. During the battle, women, children, and the elderly were sent up the side of 'Iao Valley where they looked down upon the slaughter. After the battle of Kepaniwai, Maui was added to the domain of Kamehameha the Great (Kamakau 1961:148).

The post-contact history of land use in this section of the ahupua'a is the history of the development of the sugar industry. The following account of that history is based on Speakman (1978) except where otherwise referenced.

The first commercial sugar production on Maui had begun at Wailuku in 1828 when two Chinese merchants established the Hungtai Sugar Works. Over the next half century, sugar production continued to develop in the western half of the ahupua'a, mainly centered on Wailuku and Waihe'e. Sugar production did not begin in the eastern portion of the ahupua'a until after the reciprocity treaty between Hawai'i and the United States became effective on September 9th, 1876, and after the arrival of Claus Spreckels. The treaty gave a great boost to sugar prices and production in Hawai'i and within five years exports of sugar had quadrupled. The higher prices allowed expansion of the industry into more marginal drier areas such as the eastern portion of the ahupua'a.

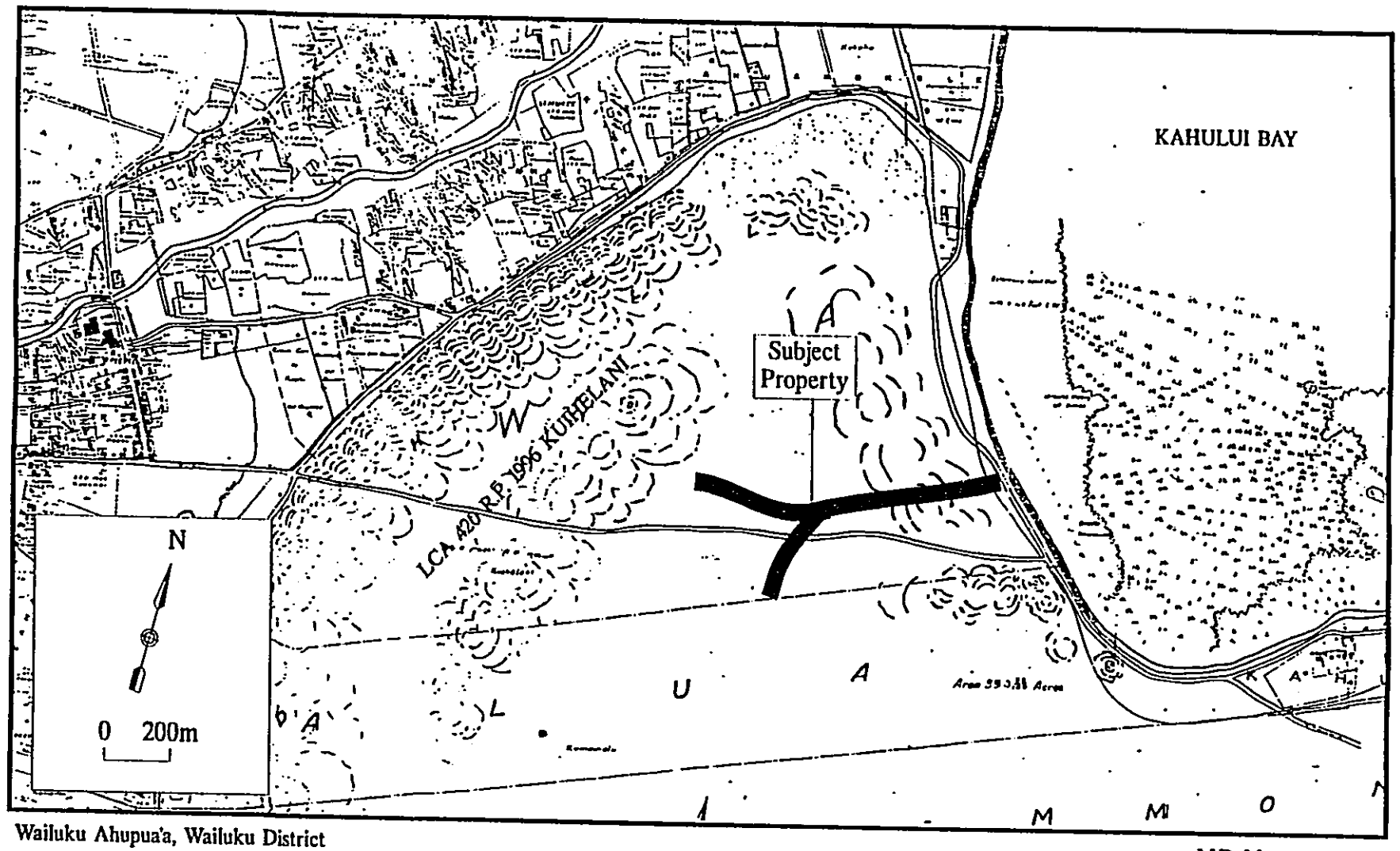
Exclusive ownership of land by the King had ended in 1847. A search of the native and foreign registers and testimonies showed that numerous Land Commission Awards (L.C.A.'s) were awarded in the western portion of the ahupua'a. Portions of two L.C.A.'s were located in this eastern section of the ahupua'a. L.C.A. #7713:23 was awarded to Princess Victoria Kamamalu. This L.C.A. 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. L.C.A. #420 took up the major part of the ili of Owa which was the land north of Kalua and stretched from Wailuku Stream in the west, to Kahului Bay in the east. The subject property is entirely located on this L.C.A. (see Map 4). This L.C.A. was awarded to Kuihelani whose claim derived from Auwae who had been the konohiki. 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. The subject property is located on the eastern end of this L.C.A., and unfortunately no information regarding land use was presented.

South of the subject property, a large portion of land (24,000 acres) stretched from Wailuku in the west to Paia in the east and known as the Ka'a lands, or Wailuku Commons, was designated as crown lands. A description of these lands in the 1860's is contained in Burns (1991:72):

> The land around Puunene was a complete desert, a great, barren stretch of sand and dust spread from Wailuku to Paia, except for a little cattle grazing land around the present location of Spreckelsville.

Another description is given in Baldwin (1915:47):

Map 4: Map of Land Commission Award 420 to Kuihelani



Wailuku Ahupua'a, Wailuku District

source: M.D. Monsarrat 1882

Central Maui was once a bare waste where little existed besides the prickly pear, the razor back hog and the wild indigo.

An 1882 map of Kahului Harbor (Monsarratt 1882) designated the area south of Kahului as 'Wailuku Commons' and showed it to be vacant. Apparently this portion of the ahupua'a was designated as crown lands following the Mahele. The same map showed numerous L.C.A.'s further to the west in the vicinity of Wailuku and 'Iao Valley. The town of Kahului itself, was depicted as consisting of about 20 buildings with E. Bailey and T. Hobron being the only names shown. Bailey was a missionary who had arrived in Maui in 1837, eventually settling in Wailuku, where he was involved in a wide range of activities including the manufacture of sugar. Hobron had set up a cane plantation at Waihe'e in the 1860's and was involved in running a schooner between Kahului and Honolulu. A wharf was also shown on Monsarrat's map.

Spreckels developed a friendship with King Kalakaua, and through him secured purchase and lease, in 1878, 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. Spreckels later used a contested claim to one half of the crown lands of all Hawai'i, which he had purchased from Princess Ruth Ke'elikolani for $10,000, in 1880, as a bargaining tool to get control in fee simple of the Wailuku Commons in 1882 as Grant 3343. He also secured water rights for the northern slope of Haleakela and the right to transport the water to his lands on the isthmus to irrigate the sugar cane. For this purpose he constructed a huge ditch which delivered 60 million gallons of water a day. King Kalakaua dismissed a cabinet which had held up the granting of these rights and in return Spreckels loaned the King $40,000.

In 1882 Spreckels founded the Hawaiian Commercial and Sugar Company (HC&S). Meanwhile, his cane fields on the isthmus were expanding so rapidly that they had outstripped the supply of water from the existing ditch. In the same year he leased water rights from the Waihee Sugar Company and constructed another ditch to bring water from the west Maui mountains to the isthmus. In the course of a few years Spreckels had totally transformed the landscape of Wailuku Commons. A state-of-the-art sugar mill was developed at a site near Spreckelsville and railways developed to bring the cane to the mill.

Concomitant with the development of the sugar industry in the ahupua'a was the rise of Kahului as a major port. As early as 1840 there may have been a small jetty about where the Maui Palms hotel is now located (Burns 1991:47). By the mid-1870's T. H. Hobron was running a schooner, the Ka Moi,

between Honolulu and Kahului (Thomas 1983). Spreckels built a HC&S store, office, and shipping facilities at Kahului around 1877 (Burns 1991:47). In 1879 a small commercial landing was opened in Kahului for the sugar trade (Goodfellow 1991). Soon afterwards, Spreckels' Oceanic Steamship Lines began operating between Kahului and North America. Kahului was by far the major shipping point for the sugar from the Maui plantations. In 1904 Samuel Wilder built the first harbor breakwater wall at Kahului and had part of the bay dredged (Goodfellow 1991). Fill from the dredging was used to form the land on which the main business section now sits (Burns 1991:48). Even in 1914 Kahului was still the only port in Maui where a ship could tie up at a wharf and was therefore the cheapest port on Maui (Thomas 1983:133).

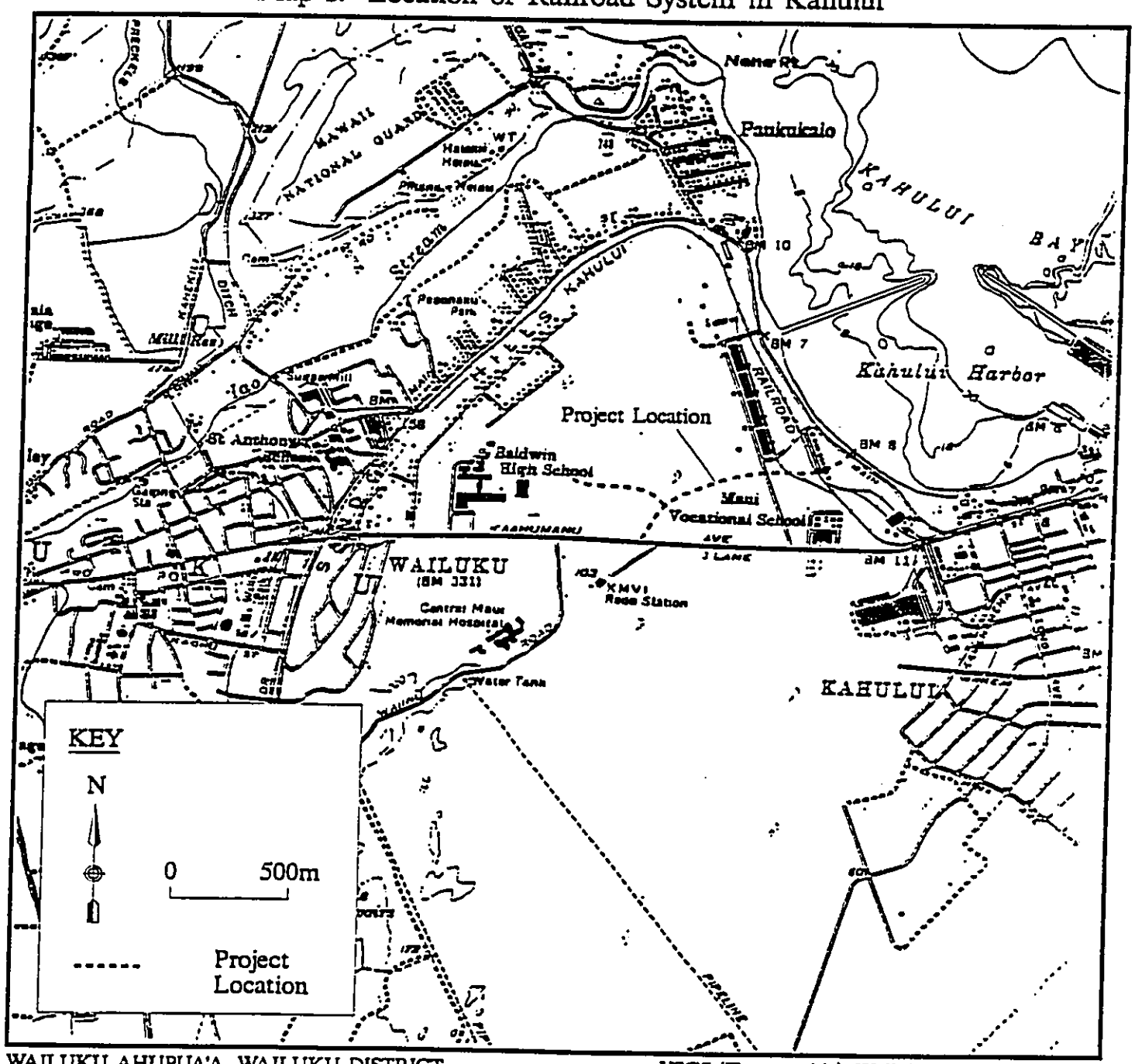
In 1881 the first commercial and passenger railroad in Hawai'i was founded by Thomas Hobron. It ran from Wailuku to Kahului and had its headquarters on the shore of Kahului Bay (Goodfellow 1991). The Kahului Railroad System expanded with the sugar industry over the years and continued its passenger service until 1936 (Schmitt 1977:425). According to (Fredricksen, September 1988, p.8) the railroad remained in commercial service until the mid 1960's when it was dismantled. The track-bed of this rail system traversed a eastern portion of the subject parcel near Kahului Harbor (see Map 5).

An 1885 Hawaiian Government Survey Map which was updated in 1903 (Dodge 1885) depicted the eastern portion of Wailuku Ahupua'a as being Grant 3343 to C. Spreckels. All of this area was designated as HC&S sugar plantation except the area immediately south and west of Kahului. Also shown on this map were schools at Kahului, Pu'unene and south of Spreckelsville; and post offices at Kahului and Pu'unene. A mill was shown at Pu'unene and a reservoir near Pu'unene. The Pu'unene mill was built in 1900 to replace the Spreckelsville mill (Burns 1991:59).

An 1896 map (Howell 1896) of Kahului showed that the town had expanded substantially since Monsarratt's 1882 map but still not as far as the project area. Buildings represented on the 1896 map included a wharf, a school, Kahului Railroad, the Kahului store of H.C.&S.Co., Maui Telephone office, Chinese and Japanese stores, shops, warehouses, a Customs House, a saloon, a fishery, a lumberyard, an office, and the Maui Soda Works. The fishery, Chinese and Japanese stores, school, church, and soda works were all added after the 1882 map (Jackson 1882).

In 1897 friction developed between Spreckels, whose HC&S owned all the land around Kahului Harbor, and Wilder, who owned the Kahului Railroad Company. Spreckels denied the railroad access to the port and Wilder in turn instigated legal proceedings. The situation was not resolved until 1899

Map 5: Location of Railroad System in Kahului



WAILUKU AHUPUA'A, WAILUKU DISTRICT

source: USGS (Topographic); Wailuku Quadrangle 1955

when HC&S, then out of Spreckels control, bought the railroad. In the legal vacuum of these two years a squalid squatter's town sprang up and bubonic plague broke out in 1900. Kahului was burnt to the ground in order to control the plague outbreak. Modern Kahului dates from this time (Burns 1991:48).

The 1922 HTS & USGS Survey Map (Paia and Kihei Quadrangles) shows the area south and west of Kahului as being vacant. Kahului, Pu'unene, and Spreckelsville are the only towns shown. Kahului has expanded since the 1896 map and two breakwaters are shown in the harbor. Throughout the eastern portion of the ahupua'a are scattered 13 sugar camps, many reservoirs and numerous railway lines used for hauling cane. The greatest concentration of camps is around present day Pu'unene with some being designated as Spanish, Portuguese, and Chinese. An alfalfa mill and a dairy are shown about half a mile south-east of Kahului.

In 1898 Spreckels lost control of HC&S, but even today the sugar plantation which he founded is still the principal land use in the area and the largest sugar producer on Maui. In 1942 the Government annexed 3,800 acres at Pu'unene and Kahului for the construction of naval air stations. The Kahului N.A.S. subsequently became the site of the present airport.

According to testimony given by Mr. Jack Crouse in 1992 in a interview with Xamanek Researches on Maui the 18th Service Battalion (U.S.M.C.) built a camp between the Maui Community College campus and Kanaloa Road in 1944. Also a group of Quonset huts was built along Kahului Beach Road by the U.S. Navy, and turned over to Kahului Railroad Company in 1947. These huts were used privately and commercially until they were removed in the 1980's (Fredericksen and Fredericksen 1992: 5).

In 1948 plans were unveiled by HC&S for the development of 'Greater Kahului' which was to occupy the "barren sand hills covered with kiawe" south of the existing town (Burns 1991:49). The goal was to provide the opportunity for company employees to own their own houses and to also sell fee simple lots to the general public to create a balanced and unsegregated community. Kahului has continued to expand since the war as a commercial and residential center.

During the historic period, Kahului has been subjected to a number of tsunami. A 1923 tsunami destroyed the wharf at Kahului Harbor and inflicted $1.5 million damage. An even worse tsunami was experienced in 1946. Other less serious tsunami hit in 1952 and 1957. It would be safe to assume that the area was affected by tsunami in pre-contact times, even though no references to these could be found in the oral history.

Section 4: Previous Archaeology

A number of archaeological surveys have been conducted in the vicinity of the subject parcel and project area. Many of thise surveys have produced limited evidence of indigenous Hawaiian use or culturally siginificant materials. This is surprizing since the nearby coastal resources should have attracted Hawaiians to the area. Also the large sand dunes of the area would seemingly have been desirable for human burials. For a detailed account of archaeological projects in this eastern portion of the Wailuku Ahupua'a see the report (Kennedy et al. 1992).

Two of the archaeological surveys conducted in the Kahului area probably included a portion of the subject property. Xamanek Researches surveyed the land parcel TMK: 3-8-07: 40 & 43 for the expansion of the Maui Community College Campus and Retention Basin. A portion of the corridor for the Maui County Road Project on the subject property included TMK: 3-8-07: 40. Xamanek Researches reported no significant cultural resouces or burials, and concluded that due to severe disturbance from previous construction activities it was unlikely that significant historical resources were present (Fredericksen and Fredericksen 1992a).

Archaeological Consultants of Hawaii, Inc., conducted an inventory survey for the Maui Community Arts and Cultural Center located on property TMK 3-8-07 which lies to the adjacent north and includes a portion of the subject property and survey. No significant cultural resouces were discovered. Kennedy attributed the lack of cultural materials to the prevous leveling of coastal dunes (Kennedy 1990).

The first archaeological project to find significant archaeological artifacts in the Wailuku and Kahului area was reported by a B. P. Bishop Museum survey team in 1971. Site 50-50-04-1172 known as the Lower Main Street Midden Site contained shell midden, charcoal, water worn stones, and three pre-contact type artifacts. These artifacts were identified as a coral file, a possible hammerstone, and the end of a hammerstone (Connoly 1973). This site is located approximately 1/2km northwest of the subject property.

The most significant archaeological find in the nearby coastal Kahului area was recently reported by Xamanek Researches in a December 1992 Inventory Survey and January 1993 Data Recovery Plan for the Nisei Veterans Memorial Center (TMK 3-8-07:123). This property is located approximately 1300m north of the subject property. Xamanek's archaeological project reported three sites. Site 50-50-04-

3119 B produced pre-contact artifacts, shell midden, and a radiocarbon date of 1790 +/-70 RCYBP. The artifacts were identified as a basalt hammerstone, a basalt polishing stone, a basalt flake, and a basalt pecking stone. These artifacts occured in a grey sand deposit which was directly underlain by sterile, yellow, lithified sand. (Fredericksen and Fredericksen 1992b). This type of archaeological find is to be expected from a coastal resource area.

Xamanek Researches reported that Site 50-50-04-3120 produced numerous artifacts, a single human phalange, a pronograde vertabra, bird bone, and shell midden. The artifacts included two pieces of worked bone, two coral files, two opihi shell scrapers, several adze fragments, a coral pestle, an awl, and one unfinished fishhook (Fredericksen and Fredericksen 1993). Again these artifacts are consistent with the expected finds for a coastal region.

Remnants of the old Kahului Railroad System were found and reported by Xamanek Researches for State Site 50-50-04-3112 during their data recovery. Since it was well known that the rail system traversed this property it was expected that this find was possible.

The archaeological survey and research on the property of the Nisei War Memorial Center lead Xamanek Researches to ascertain that:

> this parcel contains the remnants of an ancient sand dune that has remained undisturbed because the Railroad Bed constituted the major use of the parcel, thus protecting the subsurface layers within the dune (Fredericksen and Fredericksen 1993: 2).

They state that this is the last portion of the undisturbed sand dune on the coast of Kahului Bay.

Section 5: Land Use Patterns

The following summary of prehistoric and historic land use patterns in the eastern portion of Wailuku Ahupua'a is based on the mythological, ethnographic, historical, and archaeological data presented above.

While there is an abundance of evidence indicating that the western portion of Wailuku Ahupua'a was an important political, religious, population, and agricultural center in pre-contact times, there is very little similar evidence for the eastern portion of the ahupua'a. The only mythological and ethnographic accounts of the area are the description of Kahului Bay as being ringed by fishermen's huts in the mid-eighteenth century and a battle occurring at Pu'unene around the same time.

The large number of archaeological studies conducted in this section of the ahupua'a have produced little edvidence of intensive use by indigenous Hawaiians in the past. The studies undertaken have centered in three areas; Kahului Airport and surrounding areas, the commercial districts of Kahului and Wailuku, and the Wailuku sand dunes. In none of the three areas have any prehistoric structural remains been found. In the airport area close to the coast, there is evidence of a prehistoric cultural layer on a former beach. This beach, or strand line, is now located several hundred meters inland from the sea, probably due to coastal progradation as a result of rapid beach accretion and dune development. In the Wailuku sand dunes area, human skeletal remains have been found at a number of sites, although no other cultural materials have been found associated with them. In the Kahului coastal area cultural materials associated with coastal resource exploitation have been found, but the findings have been limited.

Several recent studies have attempted to address the question of the paucity of archaeological sites in this area. In the light of the above review, a number of possible reasons can be advanced:

i) pre-contact settlement may have been restricted to the immediate coastal areas by the dryness and sandy soils of much of the interior portion of this section of the ahupua'a.

ii) the lack of structural remains in the sand dune areas could be attributable to the natural absence of basalt building materials. If people were living in these areas, their residences may have been made of less permanent materials.

iii) natural and human disturbances may have hidden or destroyed evidence of occupation, especially in the coastal areas. Much of the current land near the harbor consists of fill dredged from the harbor in historic times. Tsunami may have destroyed or covered evidence of occupation, and the progradation of beaches and the development of dunes may also have covered sites.

Given Xamaneck Researches' recent work, the absence of significant findings in the eastern area of the ahupua'a can probably be attributed to extensive historic disturbances. Their findings, which included an exceptionally early radiocarbon date in cultural association, were discovered in areas which had been protected underneath railway line structures. Given that this railway line extended across the eastern portion of the project site, it was speculated that archaeological sites might still be present in this area.

In post-contact times, the evidence points to limited use of this section of the ahupua'a until the development of the sugar industry. Sugar cane became the dominant crop in this area following the introduction of irrigation in the 1880's. The development of the sugar industry contributed to the development of Kahului as a port and residential area, and the founding of sugar towns such as Pu'unene and Spreckelsville. Sugar was grown everywhere except in the Wailuku sand dunes which extended for approximately eight miles inland from Kahului Bay.

The subject property lies entirely upon L.C.A. #420, although no information is given regarding the eastern portion of this award. Thus, the absence of specified land uses does not inform the current research as to expected finds.

Other land use activites in post-contact times for this section of the Wailuku Ahupua'a involve military activities during World War II. The U.S. Navy built and occupied air fields and camps around the Kahului and Pu'unene area. As noted in the Post Contact History (Section 3.2) oral reports by Jack Crouse indicate that the Marines built a camp in the area between the present Maui Community College Campus and Kanaloa Road.

Activities associated with the Kahului Railroad certainly impacted this section of the ahupua'a. The railroad enabled ease of transportation for people and commercial products adding to the agricultural development (sugar industry) and growth of the Kahului area.

Present land use in the vicinity of the subject property involves construction and development of various projects by the State of Hawaii and County of Maui. At present the Maui Community College campus is in operation and there are various associated modification and construction projects in process. The County of Maui is building the Maui Community Arts and Cultural Center, and this project is presently under construction and should be completed in 1994. The Maui Zoological and Botanical Gardens are complete and open to the public. The Central Maui Youth Center is new and operating as well. The Maui Road Project once completed will allow easy access to all of these developments.

Section 6: Methodology

An archaeological inventory survey with subsurface testing was conducted between March 22 and April 2, 1993. Joseph Kennedy, M.A., was the Principal Investigator. Tina Mangieri, B.A., and Sandra Ireland, B.A., assisted as field supervisors for the project.

The corridor of the Maui County Road Project on the subject property was surveyed and flagged by Richard M. Sato & Assoc., Inc.. Upon arriving at the property the length of the survey corridor was traversed. All station locations and center line pins were located and used as reference points for determining the boundaries and limits of archaeological testing. After establishing the project boundaries and areas unsuitble for testing, a 100% surface survey was conducted. Members of the field crew made pedistrian sweeps, at intervals of 5.0m, in a north to south direction across the proposed corridor for the Maui Central Parkway. Pedestrian sweeps were made in an east to west direction at 3.0m intervals across the proposed route of Papa Extension. The sweeps across the road project were made until 100% of the the surface had been examined.

Portions of the proposed project were determined ineligible for testing. These were the areas that had been previously and severely impacted by heavy machinery and other human development. These areas included: the artificial hillock and drainage ditch in Zone 4, the disturbed coastal area of Zone 1 near Kahului Beach Road and Kahului Harbor, and the western portion of Papa Extension which was impacted by the development of Maui Community College Dormitories. Elimination of the impacted areas of the roadway corridor reduced the area of archaeological survey from 1,410m by 45.7m (4,620 x 150 feet) to 1,310m by 45.7m (4300 x 150 ft).

Given the absence of surface features and historic records to guide the subsurface excavations, it was necessary to adopt a sampling strategy. A grid composed of squares 30m (100 ft) by 30m (100 ft) was superimposed over the field survey map supplied by Richard M. Sato & Assoc., Inc.. The intention of this methodology was to obtain the greatest possible coverage of sampled grid squares. The exact locations of individual test trenches within the grid squares were arbitrarily determined by the field crew. Trench locations were determined by the need to obtain maximum coverage of the Maui Road Project corridor, and a representative sampling of various portions of the different zones on the dunes.

Subsurface testing of the archaeological inventory survey consisted of the mechanical excavation of 54 trenches, averaging 15 meters in length, and placed within the reduced Road Project corridor of 4300 x 150ft. These trenches gave a 100% coverage of the grid squares. The trench locations were mapped using tape and compass from fixed points which appeared on the survey site map. All trench lengths and orientations are plotted to scale Map 3. The trenches range between 1.5 to 3.0m in depth. Depth was limited by stability of the trench walls. The width of the trenches ranged from 90 to 150cm.

At least one archaeologist monitored the excavation of all trenches. A backhoe was employed for the digging of 34 of the trenches. In areas inaccesible to the backhoe a mechanical excavator was employed.

Descriptions were made of the stratigraphy in all trenches. Profiles were drawn of one wall for each trench. Soil samples of strata were subject to laboratory examination for their physical characteristics and Munsell colors. In the event that cultural materials were encountered in a trench, the back fill was screened through 1/4 inch mesh. All significant cultural features would be depicted in at least one profile.

Section 7: Stratigraphy

The sediment layers within each trench were labeled sequentially within each trench. The upper case, roman numerals increase with depth. Sedimentary deposits which were not spatially limited and discontinuous within the trench wall profile were labeled as lens. The trench and stratigraphic descriptions are presented in Table 1.

It was not possible to construct a practical and useful generalized stratigraphic profile for the property. Instead the stratigraphy is summarized within discussions of the topographic zones.

A large percentage of the subject property had been previously disturbed from past and present construction activities, and this affected the stratigraphy of many of the test trenches. Zone 1, Zone 2, and Zone 4 proved to be the most disturbed areas of the subject property. Zone 3 and Zone 5 were areas of the subject property where the large coastal dunes still seemed to be intact. These two zones proved to be less disturbed, and in many of the trenches, a natural layering of soils was present.

Zone 1 was partially impacted from the construction activities at the Maui Community Arts and Cultural Center. The northwest section of this zone was not excavated due to the subsurface presence of a sewer line and a water line transecting the corridor. The eastern section of Zone 1 was not excavated either due to its close proximity to another sewer line and impact from the construction of Kahului Beach Road.

Three trenches were excavated in Zone 1. These trenches were dug in areas least impacted by development and construction activities although, they were located on what appeared to be a mechanically leveled beach dune. The surface of this leveled area was covered in a dense thicket of low haole koa and grass, which suggested recent

disturbance. Each trench exhibited similar subsurface stratigraphy. In the three trenches a dark, loamy sand with dense root matting (Layer I) overlay a thick layer of very fine to fine, grey brown sand (Layer II) (refer to Table 1; see Figure 1). Layer II was homogeneous, and was not banded like some natural deposits on this property.

Zone 2 seemed also to have been mechanically disturbed. All vegetative cover had been removed. All of the trenches excavated exhibited some characteristics of earth-filling activities. Many of the trenches contained a mixture of loamy sand material, the upper depths of which included a scattering of modern trash. Varying sizes and concentrations of basalt rocks were also scattered throughout these loamy sand deposits (refer to Table 1). The presence of these loamy sands at depth in a number of trenches in this zone (Trenches 1, 51, 4, 5, and 6) confirmed the initial field interpretation that this area had been extensively disturbed.

Trench 3 and Trench 51, within Zone 2, were the only test trenches on the property which contained cultural features (see Figures 2 and 3, refer to Section 8). Neither of these two features were considered historically significant.

Zone 3, or the high coastal dunes, appeared to be the least impacted by human activities of all the zones defined on the subject property. The high elevated slopes of the dunes in the eastern section of Zone 3 were probably the least disturbed of all the dune environments. Trenches excavated into these slopes contained deep deposits of very fine, fine, and medium sized, calcareous sands overlayed by a surface layer of very fine loamy sand associated with roots and other organic material. Particularly prominent in most of the trenches (Trenches 9, 10, 14, 35, 32, 36, 34, and 48) was the banding, or layering of different sand sizes and color (see Figure 4 for a representative profile). Of the trenches in this zone, Trench 36 was the only one contaminated by modern trash, and this was present only in the surface layer and did not continue to deeper layers (see Figure 5).

A change in the stratigraphic sequences in Zone 3 occurred in the basin, or trough, between the slopes of two prominent dunes (refer to Table 1, Trenches 44 through 46; see Figure 6 for a representative profile). This basin had been impacted by the development and activities of the Maui Archery Course. Generally, a layer of clay loam or a layer of silty clay was overlaid by sand which was, in turn, overlaid by a surface layer of loamy sand.

A consistent pattern appeared in the stratigraphy near the apex of the dune ridge in the western section of Zone 3 (refer to Table 1, Trenches 37 through 40; see Figure 7).

Cemented, partially lithified, sand interspersed with pockets of fine sand occurred as the surface layer in the trenches located near the ridge. A layer of very fine, weakly cemented sand was present beneath the surficial layer. At the base of the trenches, a layer of fine to medium, loose sand was encountered.

The stratigraphic pattern within Zone 3 suggested that the dunes had not been subject to the disturbances of Zones 1 and 2. The upper dunes, in places, contained thick deposits of sorted sand. The lower basin, or trough, encountered a relatively thin sand deposit overlaying a terrestrially dominated sediment. This terrestrial deposit, whether clay loam or silty clay, was probably the pre-existing sediment, formed prior to the formation of dunes in this area. Of note, in the higher dune is the cementation of the upper sand deposit. It might be expected that this process would occur at greater depth, rather than at the surface, within the dune. However, this apparent anomaly could be explained by the upward percolation of water and the solutes it contains, the evaporation of the water at the surface, and the crystallization of these solutes forming a cemented deposit with the natural sands.

Zone 4 had been severely impacted by the development of Maui Community Youth Center and in consequence, only the eastern portion of this zone was mechanically tested (refer to Table 1, see Figure 8 for a representative profile). Trenches 41 through 42 contained a deep deposit of very fine, compact to cemented, yellowish sand. The layers which overlay this deposit varied between trenches. The variation was probably due to recent filling and grading operations.

Zone 5 contained no clear overall pattern in the stratigraphy (refer to Table 1). As in Zone 3, deep deposits of stratified calcareous sands, ranging in color and particle size, were overlaid by a surface layer of very fine loamy sand. The microbanding in the basal deposits in many of these trenches indicated that they had been naturally deposited. The variations in the upper soil deposits indicated that they had been disturbed during previous developments at the Maui Community College. Modern trash and materials associated with development such as plastic or asphalt occurred in a surface layer of very fine loamy sand for four trenches (Trenches 11, 15, 16 and 19; see Figure 9).

Zone 6, due to the extensive disturbances it had been subject to, was considered unsuitable for subsurface testing.

Section 8: Archaeological Findings

There were no surface features encountered on the subject property. This was expected in areas which had,

TABLE 1: TRENCH DESCRIPTIONS

TRENCH	ELEVATION (meters AMSL)	LENGTH (meter)	LAYER	DEPTH (cm)	MUNSELL	SOIL TYPE
ZONE 1						
52	3.05-3.05	13.0	I	0-25	(10YR 4/2) dark greyish brown	very fine loamy sand; fine to coarse roots heavy root matting; abrupt, wavy boundary
			II	25-150	(10YR 5/2) greyish brown	very fine to fine sand; sparse roots; abrupt, wavy boundary
54	3.05-3.66	9.3	I	0-20	(10YR 3/2) very dark greyish brown	very fine loamy sand; fine to coarse roots heavy root mat; abrupt wavy boundary
			II	20-160	(10YR 5/2) greyish brown	very fine to fine sand
53	3.66-3.66	13.7	I	0-20	(10YR 4/2) dark greyish brown	very fine loamy sand with fine to coarse roots, heavy root mat, abrupt, wavy boundary
			II	20-180	(10YR 5/2) greyish brown	very fine to fine sand
ZONE 2						
1	5.18-5.79	25.2	I	0-80	(7.5YR 3/3) dark brown	very fine to fine loamy sand; abrupt, wavy boundary
			II	80-93	(10YR 2/2) very dark brown	fine loamy sand, 1-3cm subangular basalt inclusions; abrupt, wavy boundary
			III	93-150	(7.5YR 3/3) dark brown	fine loamy sand; medium to coarse roots
51	5.79-6.10	13.0	I	0-60	(7.5YR 3/3) dark brown	very fine loamy sand with gravel fill, plastic, glass, aluminum; clear, wavy boundary
			II	60-130	(7.5YR 4/4) dark brown	fine loamy sand; gradual, wavy boundary
			III	130-150	(7.5YR 3/3) dark brown	fine loamy sand w/ charcoal streak, burned wooden post at maximum depth (Feature 2)
			Lens A	40-60	(7.5YR 3/3) dark brown	very fine to fine loamy sand with scattered charcoal flecking
2	6.40-6.40	12.7	I	0-60	(2.5YR 3/4) dark reddish brown	fine loamy sand; abrupt, wavy boundary
			II	60-80	(5YR 3/4) dark reddish brown	fine sand, weakly cemented; abrupt, wavy boundary
			III	80-165	(10YR 4/6) dark yellowish brown	fine sand
3	6.70-7.32	27.0	I	0-40	(7.5YR 3/3) dark brown	very fine loamy sand; abrupt, wavy boundary
			II	40-160	(5YR 4/6) yellowish red	fine sand
			Feature 1	90-130	(7.5YR 3/4) dark brown	modern bottle pit associated with sandy clay loam

TRENCH	ELEVATION (meters AMSL)	LENGTH (meter)	LAYER	DEPTH (cm)	MUNSELL	SOIL TYPE
ZONE 2						
4	8.23-8.53	17.3	I	0-75	(7.5YR 3/3) dark brown	very fine to fine loamy sand; abrupt, wavy boundary
			II	75-90	(5YR 3/2) dark reddish brown	very fine loamy sand; abrupt, wavy boundary
			III	90-105	(5YR 3/4) dark reddish brown	very fine loamy sand, weakly cemented; abrupt, wavy boundary
			IV	105-130	(7.5YR 3/2) dark brown	fine sandy loam, compacted, 3-9cm subangular to angular basalt inclusions, abrupt, smooth boundary
			V	130-150	(7.5YR 3/3) dark brown	fine sandy loam, weakly cemented
5	8.84-8.84	5.0	I	0-150	(7.5YR 3/3) dark brown	fine sandy loam associated with modern trash
6	8.53-10.36	46.7	I	0-45	(7.5YR 4/6) strong brown	very fine loamy sand, fine to medium roots; abrupt, wavy boundary
			II	45-65	(5YR 3/4) dark reddish brown	very fine to fine loamy sand, medium roots, weakly cemented; abrupt, wavy boundary
			III	65-80	(7.5YR 3/3) dark brown	fine sandy loam with fine to coarse roots; abrupt, wavy boundary; shredded tire
			IV	80-100	(10YR 2/2) very dark brown	very fine sandy clay loam forming clumps with fine to coarse roots; abrupt, wavy boundary
			V	100-150	(7.5YR 3/3) dark brown	very fine loamy sand; fine to coarse roots
7	10.97-12.49	14.0	I	0-150cm	(7.5YR 3/3) dark brown	very fine to fine sand
ZONE 3						
8	14.02-15.84	11.3	I	0-120	(10YR 4/6) dark yellowish brown	very fine to fine sand, cemented; abrupt, wavy boundary
			II	120-155	(7.5YR 3/4) dark brown	very fine sand, weakly cemented; abrupt, broken boundary
			III	155-220	(5YR 5/8) yellow red	fine sand, compact, cemented, microbands
13	14.32-16.46	11.0	I	0-125	(10YR 4/6) dark yellowish brown	very fine loamy sand, fine to coarse roots; abrupt, wavy boundary
			II	125-155	(7.5YR 3/4) dark brown	very fine sand, weakly cemented; abrupt wavy boundary
			III	155-220	(5YR 5/8) yellowish red	fine to medium sand, cemented, microbands

TRENCH ZONE 3	ELEVATION (meters AMSL)	LENGTH (meter)	LAYER	DEPTH (cm)	MUNSELL	SOIL TYPE
9	16.46-16.46	18.7m	I	0-18	(5YR 5/4) reddish brown	very fine loamy sand; medium to coarse roots, heavy root matting; abrupt, wavy boundary
			II	18-55	(7.5YR 6/4) light brown	very fine, compacted sand; abrupt, smooth boundary
			III	55-62	(5YR 5/3) reddish brown	very fine to fine loose sand; compact; abrupt, smooth boundary
			IV	62-72	(5YR 4/2) dark reddish grey	very fine to fine loose sand; compact; abrupt, smooth boundary
			V	72-80	(7.5YR 5/6) strong brown	very fine to fine loose sand, compact; abrupt, smooth boundary
			VI	80-170	(5YR 5/3) reddish brown (7.5YR 5/6) strong brown	very fine to fine, reddish brown, loose sand with alternating <20cm bands of fine to medium ,strong brown, loose sand; abrupt, smooth boundary
10	17.37-18.90	20.3	I	0-40	(5YR 5/3) reddish brown	very fine loamy sand; fine to coarse roots, heavy root matting; abrupt, wavy boundary
			II	40-80	(5YR 6/2) pinkish grey	very fine sand, loose; abrupt, wavy boundary
			III	80-110	(5YR 4/6) yellowish red	very fine sand, weakly cemented; abrupt, wavy boundary
			IV	110-150	(5YR 5/8) yellowish red	fine to medium sand, weakly cemented
31	17.68-18.29	18.4m	I	0-45	(7.5YR 4/2) dark brown	very fine loamy sand; fine to coarse roots, heavy root matting; abrupt, wavy boundary
			II	45-95	(7.5YR 5/2) brown	very fine to fine loose sand; abrupt, wavy boundary
			III	95-190	(7.5YR 5/4) brown	fine loose sand; abrupt, wavy boundary
			IV	190-230	(5YR 5/8) yellowish red	fine to medium, compact, sand
14	20.11-20.11	13.7	I	0-30	(7.5YR 4/2) dark brown	very fine loamy sand with medium to coarse roots; heavy root matting; abrupt, wavy boundary
			II	30-50	(5YR 6/2) pinkish grey	very fine compact sand; abrupt, wavy boundary
			III	50-65	(7.5YR 5/6) strong brown	very fine to fine sand, weakly cemented; abrupt, wavy boundary
			IV	65-120	(10YR 4/4) dark yellowish brown	very fine to fine sand, weakly cemented; abrupt,wavy boundary
			V	120-130	(5YR 4/6) yellowish red	very fine to fine loose sand, abrupt, wavy boundary
			VI	130-160	(7.5YR 5/8) strong brown	very fine loamy sand, weakly cemented, abrupt wavy boundary

TRENCH ZONE 3	ELEVATION (meters AMSL)	LENGTH (meter)	LAYER	DEPTH (cm)	MUNSELL	SOIL TYPE
35	16.46-18.29	14.0	I	0-50	(7.5YR 3/2) dark brown	very fine loamy sand; fine to coarse roots, medium root matting; abrupt, wavy boundary
			II	50-130	(7.5YR 5/2) brown	very fine to fine loose sand; abrupt, wavy boundary
			III	130-150	(5YR 6/2) pinkish grey	very fine to fine loose sand; abrupt, wavy boundary
			IV	150-200	(7.5YR 5/6) strong brown	fine to medium, loose sand; abrupt, wavy boundary
			V	200-220	(5YR 6/2) pinkish grey	fine loose sand; abrupt, wavy boundary
			VI	220-300	(5YR 5/2) reddish grey	fine loose sand
32	17.68-18.29	20.2	I	0-40	(7.5YR 4/2) dark brown	very fine loamy sand; medium to coarse roots, heavy root matting; abrupt, wavy boundary
			II	40-85	(7.5YR 5/2) brown	very fine to fine compact sand, cemented, microbands; abrupt, smooth boundary
			III	85-135	(5YR 6/2) pinkish grey	fine compact sand; abrupt, smooth boundary
			IV	135-185	(7.5YR 5/2) brown	very fine sand, weakly cemented, compact; abrupt, smooth boundary
			V	185-200	(7.5YR 5/8) strong brown	fine loose sand; abrupt, smooth boundary
			VI	200-225	(7.5YR 5/2) brown	fine sand, compact; abrupt, smooth boundary
			VII	225-240	(5YR 5/6) yellowish red	fine to medium sand, compact
36	11.58-18.29	22.5	I	0-40	(7.5YR4/2) dark brown	very fine loamy sand; medium to coarse roots, heavy root matting; clear, wavy boundary beer and soda bottles, metal scraps
			II	40-85	(7.5YR 5/2) brown	very fine to fine sand, compact; abrupt, smooth boundary
			III	85-120	(5YR 6/2) pinkish grey	fine sand, compact, abrupt, smooth boundary
			IV	120-130	(7.5YR 5/8) strong brown	fine loose sand; abrupt, smooth boundary
			V	130-190	(5YR 4/2) dark reddish grey	fine sand, compact; abrupt, smooth boundary
			VI	190-220	(5YR 6/2) pinkish grey	fine sand, compact; abrupt, smooth boundary
			VII	220-250	(5YR 4/6) yellowish red	fine to medium sand, compact

TRENCH ZONE 3	ELEVATION (meters AMSL)	LENGTH (meter)	LAYER	DEPTH (cm)	MUNSELL	SOIL TYPE
34	15.24-15.24	18.0	I	0-50	(7.5YR 4/2) dark brown	very fine loamy sand with medium to coarse roots; clear wavy boundary
			II	50-130	(7.5YR 5/2) brown	very fine to fine sand, compact; abrupt, smooth boundary
			III	130-150	(5YR 5/2) reddish grey	fine sand, compact; abrupt, smooth, boundary
			IV	150-200	(7.5YR 5/8) strong brown	fine sand, compact; abrupt, smooth boundary
			V	200-220	(5YR 4/2) dark reddish grey	fine sand, compact; abrupt, smooth boundary
			VI	220-300	(5YR 6/8) reddish yellow	fine to medium sand, compact
33	13.41-14.60	9.0	I	0-40	(10YR 3/3) dark brown	very fine loamy sand with medium to coarse roots; gradual, wavy boundary
			II	40-150	(10YR 5/4) yellowish brown	very fine sand, loose
49	8.84-9.14	12.8	I	0-25	(7.5YR 3/2) dark brown	very fine loamy sand; medium to coarse roots, heavy root matting; clear wavy boundary
			II	25-150	(10YR 5/3) brown	very fine to fine sand; medium roots; microbands, weakly cemented; abrupt, smooth boundary
			III	150-170	(10YR 5/3) brown	very fine sand, largely cemented
50	8.84-9.14	19.3m	I	0-60	(10YR 3/3) dark brown	very fine silty sand with medium to coarse roots; heavy root matting; clear, wavy boundary
			II	60-150	(10YR 5/4) yellowish brown	very fine to fine sand; medium roots; microbands, weakly cemented, abrupt, smooth boundary
			III	150-180	(10YR 6/4) light yellowish brown	very fine sand, largely cemented
48	8.53-8.84	15.2	I	0-40	(10YR 3/4) dark yellowish brown	very fine loamy sand with medium to coarse roots; heavy root matting; clear, wavy boundary
			II	40-100	(10YR 5/3) brown	very fine to fine sand, weakly cemented, microbands; abrupt, wavy boundary
			III	100-140	(10YR 3/4) dark yellowish brown	fine loamy sand, loose; abrupt, wavy boundary
			IV	140-170	(5YR 4/6) yellowish red	fine loamy sand, loose; abrupt, wavy boundary
			V	170-180	(7.5YR 5/6) strong brown	fine compact sand; abrupt, wavy boundary
			VI	180-190	(7.5YR 6/8) reddish yellow	fine to medium sand, loose

TRENCH	ELEVATION (meters AMSL)	LENGTH (meters)	LAYER	DEPTH (cm)	MUNSELL	SOIL TYPE
ZONE 3						
46	8.23-8.53	11.0	I	0-20	(7.5YR 3/2) dark brown	very fine loamy sand with medium to coarse roots, heavy root root matting; clear, wavy boundary
			II	20- 70	(7.5YR 4/4) dark brown	very fine to fine loamy sand; few coarse roots; abrupt, smooth boundary
			III	70-90	(5YR 4/6) yellowish red	very fine to fine loamy sand, compact; abrupt, smooth boundary
			IV	90-125	(10YR 6/6) brownish yellow	fine to medium sand, loose; abrupt, wavy boundary
			V	125-150	(7.5YR 4/3) dark brown	very fine sandy loam with mineralized coral flecks <9cm; compact
45	7.92-7.92	16.5	I	0-50	(7.5YR 3/2) dark brown	very fine loamy sand with medium roots, medium root matting; abrupt, wavy boundary
			II	50-100	(7.5YR 6/3) light brown	very fine to fine loose sand; abrupt, wavy boundary
			III	100-150	(5YR 2.5/2) dark reddish brown	silty clay, compact
44	7.62-8.84	11.0	I	0-60	(7.5YR 4/4) dark brown	loamy sand with medium to coarse roots; abrupt, wavy boundary
			II	60-110	(10YR 6/3) pale brown	very fine to fine loamy sand; abrupt, wavy boundary
			III	110-120	(5YR 8/1) white	very fine sand, weakly cemented; very abrupt, smooth boundary
			IV	120-160	(5YR 3/3) dark reddish brown	very fine clay loam; compact
47	9.14-10.97	19.0	I	0-60	(7.5YR 4/4) dark brown	very fine loamy sand with medium to coarse roots; abrupt, wavy boundary
			II	i 60-80 ii 60-165	(10YR 6/3) pale brown	very fine to fine sand with coral chunks >10cm associated with coarse roots; abrupt, irregular and broken boundary
			III	i 80-156 ii absent	(10YR 6/6) brownish yellow	fine sand, loose; abrupt, irregular boundary
			IV	156-180 ii 165-180	(10YR 6/6) brownish yellow	very fine to fine sand, moderately cemented
37	12.19-16.46	18.5	I	0-10	(7.5YR 6/6) reddish yellow	fine sand and lithified sand; little to no roots; abrupt, smooth to wavy boundary
			II	10-150	(7.5YR 4/6) strong brown	very fine to fine sand, weakly cemented; abrupt, smooth boundary; microbands
			III	150-250	(7.5YR 5/8) strong brown	fine sand, loose

ZONE 3 CONTINUED TRENCH	ELEVATION (meters AMSL)	LENGTH (meter)	LAYER	DEPTH (cm)	MUNSELL	SOIL TYPE
38	12.19-15.85	20.1	I	0-20	(7.5YR 6/6) reddish yellow	lithified sand and fine sand; abrupt, wavy boundary
			II	20-150	(7.5YR 4/6) strong brown	very fine to fine sand, weakly cemented; abrupt, smooth boundary
			III	150-260	(7.5YR 5/8) strong brown	fine sand, loose
40	15.24-18.90	16.2	I	0-20	(10YR 5/1) grey	lithified sand and fine sand
			II	20-40	(7.5YR 5/2) brown	lithified sand and fine sand
			III	40-200	(7.5YR 5/2) brown	very fine to fine sand, weakly cemented; abrupt, smooth, boundary
			IV	200-300	(7.5YR 5/8) strong brown	fine to medium sand, loose
39	14.93-15.54	8.0	I	0-20	(10YR 5/3) brown	lithified sand and fine sand
			II	20-40	(7.5YR 5/2) brown	lithiified sand and fine sand
			III	40-200	(7.5YR 5/2) brown	very fine sand, compact, weakly cemented; abrupt, smooth boundary
			IV	200-300	(7.5YR 5/8) strong brown	fine sand, loose
ZONE 4						
42	12.80-13.11	14.6	I	0-140	(5YR 4/6) yellowish red	very fine loamy sand; no roots; abrupt, wavy boundary
			II	140-280	(10YR 4/4) dark yellowish brown	very fine sand flecked with dark organic material;medium roots; abrupt, wavy boundary
			III	280-285	(10YR 6/3) pale brown	very fine sand , weakly cemented
41	12.80-12.80	19.0	I	0-75	(10YR 6/3) pale brown	very fine sand; abrupt, wavy boundary
			II	75-90	(10YR 2/1) black	very fine sandy loam; medium to coarse roots; abrupt, wavy boundary
			III	90-130	(5YR 4/6) yellowish red	very fine loamy sand; abrupt, wavy boundary
			IV	130-250	(10YR 4/4) dark yellowish brown	very fine sand; compact
43	12.80-13.10	11.0	I	0-80	(10YR 5/3) brown	very fine loamy sand; clear, smooth boundary
			II	80-140	(5YR 4/3) reddish brown	very fine to fine, loamy sand with medium to coarse roots; abrupt, wavy boundary
			III	140-280	(10YR 5/4) yellowish brown	fine sand; loose; abrupt, boundary
			IV	280-300	(10YR 5/4) yellowish brown	cemented sand

TRENCH ZONE 5	ELEVATION (meters AMSL)	LENGTH (meter)	LAYER	DEPTH (cm)	MUNSELL	SOIL TYPE
11	10.97-12.80	16.3	I	0-50	(7.5YR 3/2) dark brown	very fine loamy sand with modern trash and >5cm subangular basalt inclusions; abrupt, broken boundary
			II	0-50	(10YR 4/4) dark yellowish brown	very fine sand; few, coarse roots; abrupt, wavy boundary
			III	50-100	(7.5YR 5/3) brown	very fine sand, weakly cemented; abrupt wavy boundary
			IV	100-150	(10YR 4/4) dark yellowish brown	very fine, loose sand
12	10.97-12.50	14.7	I	0-40	(7.5YR 3/2) dark brown	very fine loamy sand; fine to medium roots, heavy root matting; clear, wavy boundary
			II	40-110	(7.5YR 5/3) brown	very fine sand; abrupt, wavy boundary
			III	110-150	(7.5 YR 5/3) brown	very fine, sand; weakly cemented
15	10.67-10.67	4.8	I	0-180	(7.5YR 3/2) dark brown	very fine loamy sand with plastic and assorted modern trash; clear, wavy boundary
			II	180-220	(7.5YR 4/4) dark brown	very fine loamy sand; fine to medium roots; abrupt, wavy boundary
			III	220-310	(7.5YR 6/4) light brown	very fine to fine, loose sand; abrupt, wavy boundary
			IV	310-360	(7.5YR 6/4) light brown	very fine to fine, compact, sand; weakly cemented
29	11.58-12.80	13.8	I	0-60	(7.5YR 3/2) dark brown	very fine loamy sand; medium roots, moderate root matting; abrupt, wavy boundary
			II	60-118	(7.5YR 5/3) brown	very fine sand; abrupt, wavy boundary
			III	118-185	(7.5 YR 5/4) brown	very fine, compact, sand; abrupt, wavy boundary
			IV	185-260	(7.5 YR 5/6) strong brown	fine to medium, loose sand
28	11.58-12.19	11.3	I	0-60	(7.5YR 3/2) dark brown	very fine loamy sand with medium roots; abrupt, wavy boundary
			II	60-125	(7.5YR 5/4) brown	very fine, compact sand; abrupt, smooth boundary
			III	125-185	(7.5YR 5/2) brown	very fine, compact sand; abrupt, smooth boundary
			IV	185-260	(7.5YR 6/6) reddish yellow	fine to medium, loose sand

TRENCH	ELEVATION (meters AMSL)	LENGTH (meter)	LAYER	DEPTH (cm)	MUNSELL	SOIL TYPE
ZONE 5						
16	11.28-11.89	8.6	I	0-80	(7.5YR 3/2) dark brown	very fine loamy sand; modern glass sherds, bottle bases
			II	80-120	(7.5YR 4/2) dark brown	very fine loamy sand; fine to medium roots, moderate root matting; abrupt, wavy, boundary
			III	120-230	(7.5YR 6/4) light brown	very fine to fine, loose sand
17	12.80-12.80	17.7	I	0-50	(10YR 3/4) dark yellowish brown	very fine loamy sand with fine to coarse roots; heavy root matting; diffuse, wavy boundary
			I	50-110	(10YR 3/4) dark yellowish brown	very fine loamy sand; no roots; abrupt, wavy boundary
			II	110-180	(7.5YR 6/3) light brown	very fine, compact sand; abrupt, wavy boundary
			III	180-210	(5YR 5/8) yellow red	fine to medium, loose sand
18	13.41-13.41	9.7	I	0-50	(10YR 3/4) dark yellowish brown	very fine loamy sand with medium roots, heavy root matting; diffuse, wavy boundary
			II	50-190	(10YR 3/4) dark yellowish brown	very fine loamy sand with no roots; abrupt, wavy boundary
			III	190-205	(5YR 5/8) yellowish red	fine loose sand; abrupt, wavy boundary
			IV	205-250	(7.5YR 6/3) light brown	fine loose sand; abrupt, wavy boundary
			V	250-280	(5YR 5/8) yellowish red	fine to medium, loose sand
20	13.11-15.85	9.0	I	0-65	(10YR 3/3) dark brown	very fine loamy sand with medium roots, heavy root matting; abrupt, wavy boundary
			II	65-110	(7.5YR 5/2) brown	very fine to fine, loose sand; clear, smooth boundary
			III	110-140	(7.5YR 5/4) brown	very fine to fine sand, weakly cemented; abrupt smooth boundary
			IV	140-200	(5YR 5/8) yellow red	fine to medium sand, weakly cemented
27	14.02-14.02	13.5	I	0-50	(10YR 4/3) dark brown	very fine loamy sand with medium roots, heavy root matting; clear, irregular boundary
			II	50-93	(10YR 5/3) brown	very fine to fine, loose sand; abrupt, wavy boundary
			III	93-200	(7.5YR 5/8) strong brown	fine to medium sand, moderately cemented

TRENCH ZONE 5	ELEVATION (meters AMSL)	LENGTH (meter)	LAYER	DEPTH (cm)	MUNSELL	SOIL TYPE
19	14.02-15.24	14.1	I	0-60	(10YR 4/3) dark brown	very fine loamy sand with medium roots, broken pieces of asphalt; abrupt, wavy boundary
			II	60-130	(10YR 5/3) brown	very fine loose sand; clear, wavy boundary
			III	130-170	(5YR 5/6) yellowish red	fine loose sand
21	13.41-14.63	9.4	I	0-48	(10YR 4/3) dark brown	very fine loamy sand; fine to medium roots, heavy root matting; clear, wavy boundary
			II	48-120	(10YR 5/3) brown	very fine, loose sand; abrupt, wavy boundary
			III	120-180	(5YR 5/6) yellowish red	fine to medium, loose sand
30	16.46-17.68	29.1	I	0-55	(10YR 5/3) brown	very fine loamy sand; fine to coarse roots, heavy root matting; clear, wavy boundary
			II	55-103	(10YR 5/4) yellowish brown	very fine loose sand; abrupt, smooth boundary
			III	103-125	(7.5YR 5/8) strong brown	fine to medium sand; abrupt, smooth boundary
			IV	125-230	(10YR 6/4) light yellow brown (7.5YR 5/8) strong brown	very fine, yellow brown sand, weakly cemented, alternating with 5-10cm bands of strong brown, weakly cemented, fine sand
22	15.24-16.45	10.0	I	0-20	(10YR 4/3) dark brown	very fine loamy sand; fine to medium roots; abrupt, wavy boundary
			II	20-200	(10YR 6/4) light yellow brown (7.5YR 5/8) strong brown	very fine, compact, yellow brown sand alternating with <10cm bands of loose, fine, strong brown sand
23	14.33-18.29	19.4	I	0-55	(10YR 4/3) dark brown	very fine loamy sand with medium to coarse roots; abrupt, wavy boundary
			II	55-300	(10YR 5/3) brown (7.5YR 5/8) strong brown	very fine, compact, brown sand alternating with <10cm bands of loose, fine, strong brown sand
24	15.24-21.37	13.7	I	0-30	(7.5YR 6/3) light brown	very fine sand with lithified sand at apex of slope; abrupt, smooth boundary
			II	30-100	(10YR 6/3) pale brown	very fine sand; weakly cemented; abrupt, smooth boundary
			III	100-300	(10YR 5/3) brown (7.5YR 6/6) reddish yellow	very fine, compact, brown sand alternating with <10cm bands of fine, loose, reddish yellow sand
26	16.46-18.29	5.3	I	0-40	(7.5YR 5/4) brown	very fine loamy sand; abrupt, wavy boundary
			II	40-200	(10YR 5/3) brown (7.5YR 6/6) reddish yellow	very fine, compact, brown sand alternating with <20cm bands of fine, loose, reddish yellow sand

TRENCH ZONE 5	ELEVATION (meters AMSL)	LENGTH (meter)	LAYER	DEPTH (cm)	MUNSELL	SOIL TYPE
25	14.33-15.85	10.6	I	0-200	(7.5YR 4/3) dark brown	very fine loamy sand with medium to coarse roots in top 45 cm; abrupt wavy boundary
			II	200-300	(7.5YR 6/3) light brown (7.5YR 5/8) strong brown	very fine to fine, light brown, compact, sand alternating with <10 cm bands of fine, loose, strong brown sand

KEY TO TABLE 1.

Trench = Trench number
Elevation = Elevation of trench above mean sea level (AMSL) in meters
Length = Length of trench in meters
Layer = Stratigraphical layer of soil from profile of each trench
Depth = Maximum depth below surface in centimeters
Munsell = Nomenclature of soil colors according to the Munsell Soil Color Charts
Soil Type = Description of physical characteristics of soil and layer description including;

1. Size of granular particles of soil
   very fine = <1mm
   fine = 1-2mm
   medium = 2-5mm

2. Textural Properties of Soil
   sand: not sticky, not plastic and loose
   loamy sand: not sticky, not plastic and loose
   sandy loam: not sticky, not plastic, friable and soft
   sandy clay loam: sticky, moderately plastic, firm and slightly hard
   clay loam: sticky, moderately plastic, firm and hard
   silty clay: very sticky, very plastic, firm and hard

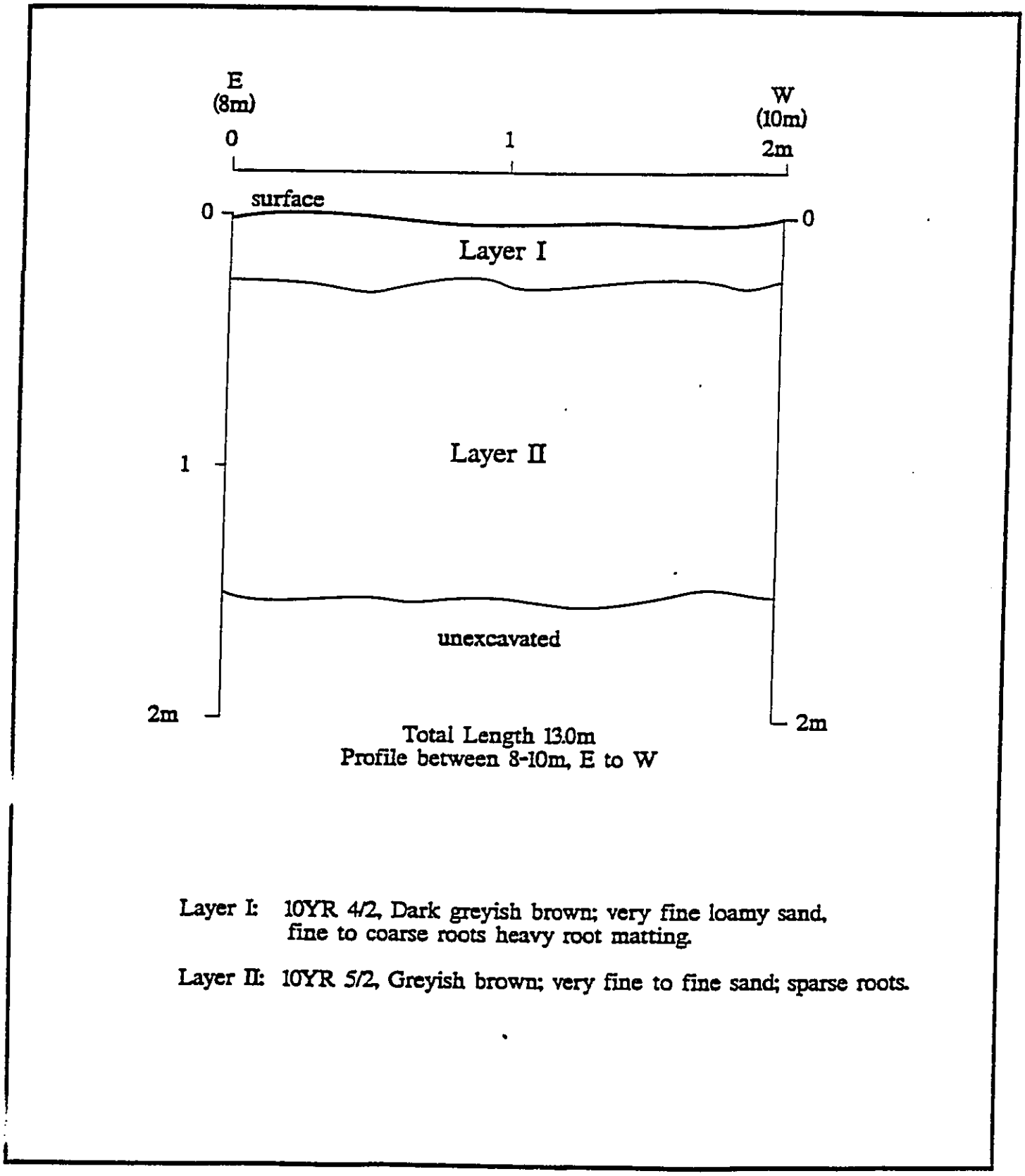
3. Root Size Diameter
   fine = < 0.50cm
   medium = 0.50cm - 5.0cm
   coarse = >5.0cm

4. Distinctness of boundary of soil layer
   very abrupt = < 1mm thick
   abrupt = 1mm - 2.5cm
   clear = 2.5cm -7.5cm
   gradual = 7.5cm - 12.5cm
   diffuse = > 12.5cm thick

5. Topography of boundary
   smooth: nearly a plane
   wavy: pockets with width > depth
   irregular: pockets with depth > width
   broken: discontinuous

6. Microbands: Lens of fine to medium sand interbedded with lens of very fine to fine sand. Sometimes differing in color.

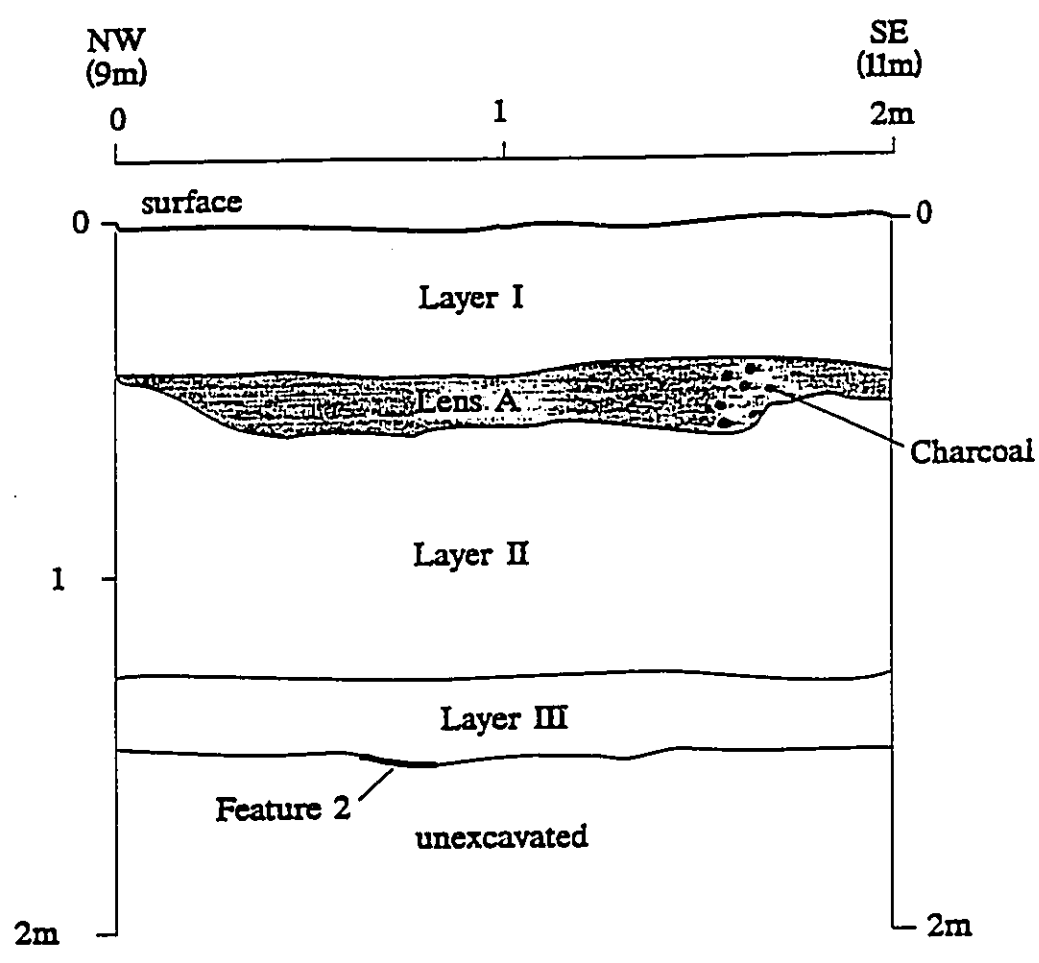
Figure 1: Trench 52, North Face



Layer I: 10YR 4/2, Dark greyish brown; very fine loamy sand, fine to coarse roots heavy root matting.

Layer II: 10YR 5/2, Greyish brown; very fine to fine sand; sparse roots.

Figure 2: Trench 51, Northeast Face



Total Length 13.0m
Profile between 9-11m, NW to SE

Layer I: 7.5YR 3/3, Dark brown; very fine loamy sand with gravel fill, glass, aluminum.

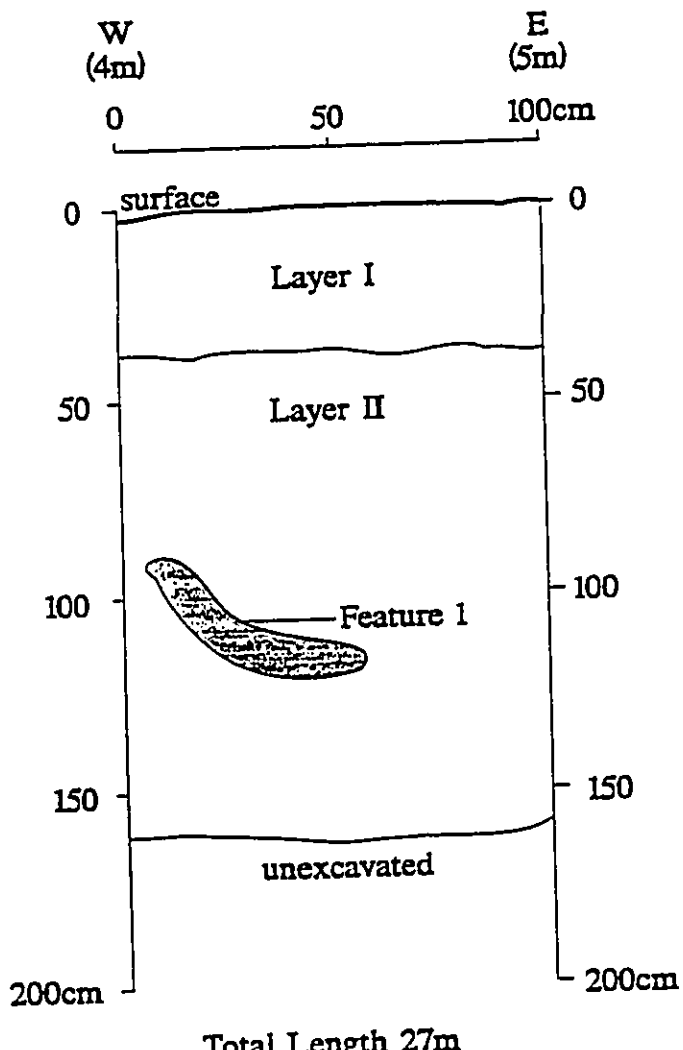
Layer II: 7.5YR 4/4, Dark brown; fine loamy sand.

Layer III: 7.5YR 3/3, Dark brown; fine loamy sand, burned wooden post at maximum depth. (Feature 2)

Lens A: 7.5YR 3/3, Dark brown, very fine to fine loamy sand with scattered charcoal flecking.

Feature 2: Charred wood.

Figure 3: Trench 3, South Face



Total Length 27m
Profile Between 4-5m, W to E

Layer I: 7.5YR 3/3, Dark brown; very fine loamy sand.

Layer II: 5YR 4/6, Yellowish red; fine sand.

Feature 1: 7.5YR 3/4, Dark brown; modern trash pit associated with sandy clay loam.

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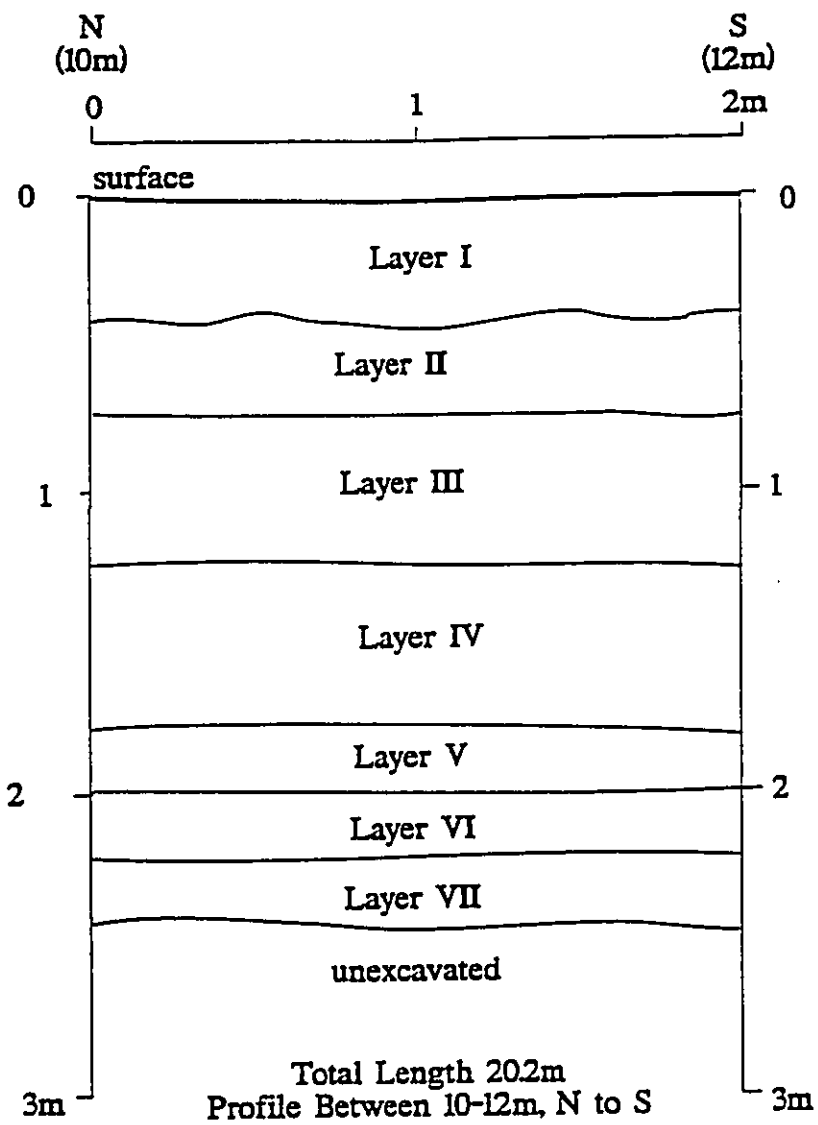
Figure 4: Trench 32. West Face



Total Length 20.2m
Profile Between 10-12m, N to S

Layer I: 7.5YR 4/2, Dark brown; very fine loamy sand; medium to coarse roots, heavy root matting.

Layer II: 7.5YR 5/2, Brown; very fine to fine compact sand, cemented; microbands.

Layer III: 5YR 6/2, Pinkish grey; fine compact sand.

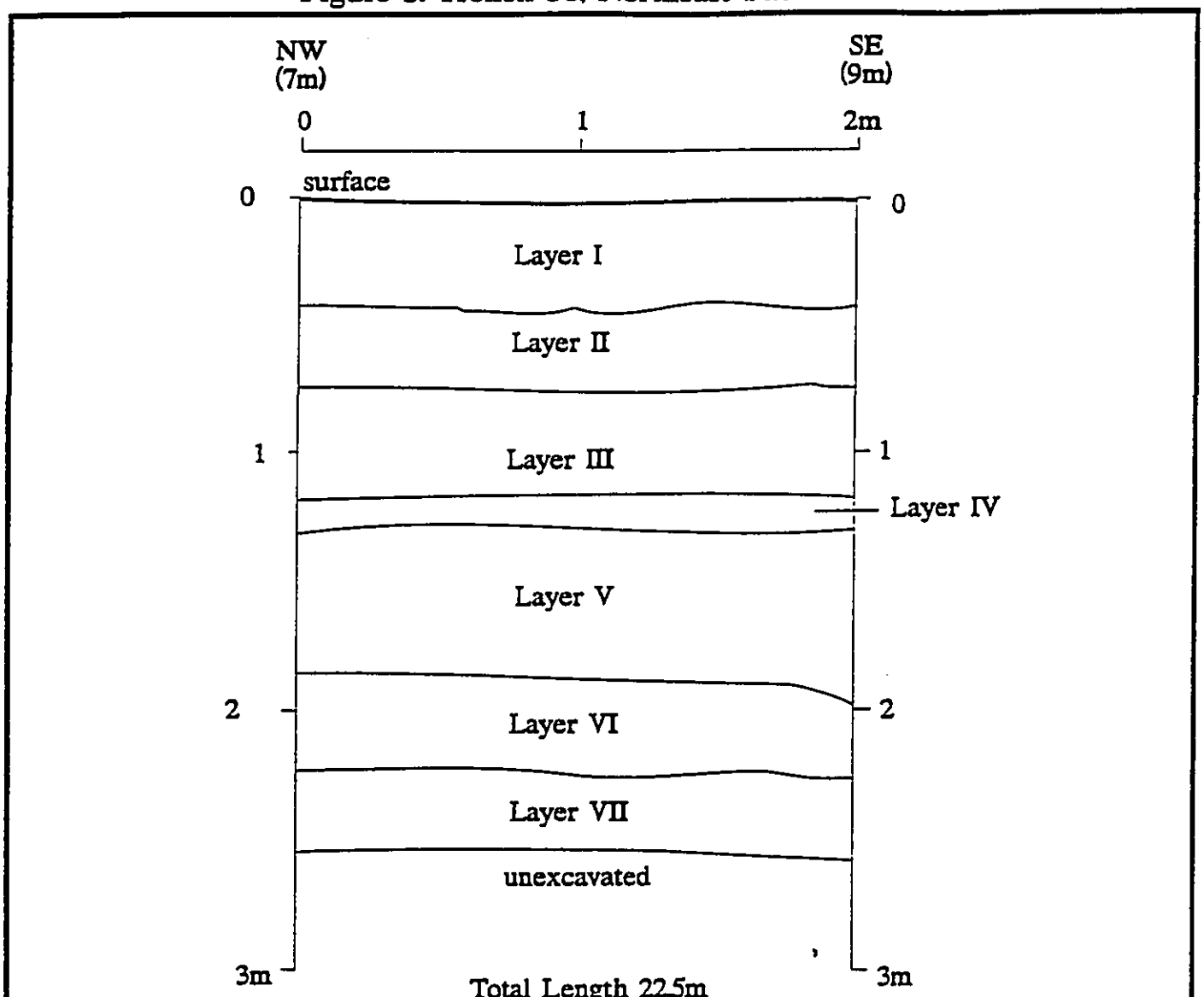
Layer IV: 7.5YR 5/2, Brown; very fine sand, weakly cemented, compact.

Layer V: 7.5YR 5/8, Strong brown; fine loose sand.

Layer VI: 7.5YR 5/2, Brown; fine sand.

Layer VII: 5YR 5/6, Yellowish red; fine to medium sand.

Figure 5: Trench 36, Northeast Face



Total Length 22.5m
Profile Between 7-9m, NW to SE

Layer I: 7.5YR 4/2, Dark brown; very fine loamy sand; medium to coarse roots, beer and soda bottles, metal scraps.

Layer II: 7.5YR 5/2, Brown; very fine to fine sand, compact .

Layer III: 5YR 6/2, Pinkish grey; fine sand.

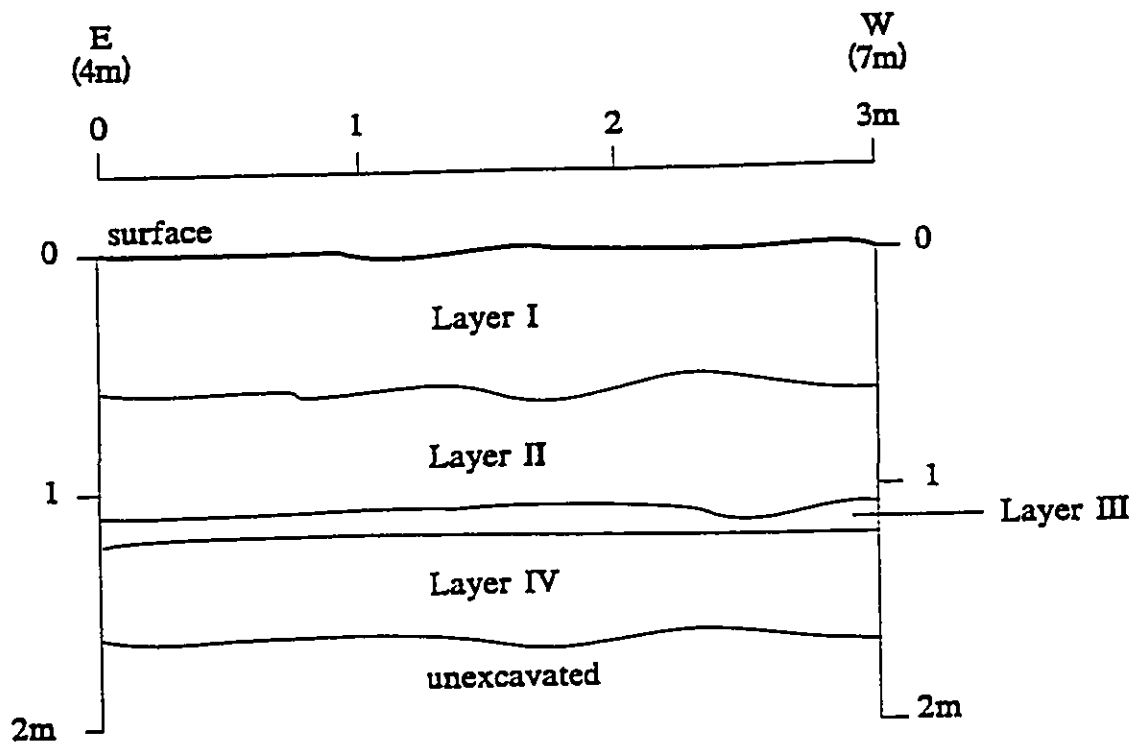
Layer IV: 7.5YR 5/8, Strong brown; fine loose sand.

Layer V: 5YR 4/2, Dark reddish grey; fine sand compact.

Layer VI: 5YR 6/2, Pinkish grey; fine sand, compact.

Layer VII: 5YR 4/6, Yellowish red; fine to medium sand, compact.

Figure 6: Trench 44, South Face



Total Length 11.0m
Profile Between 4-7m, E to W

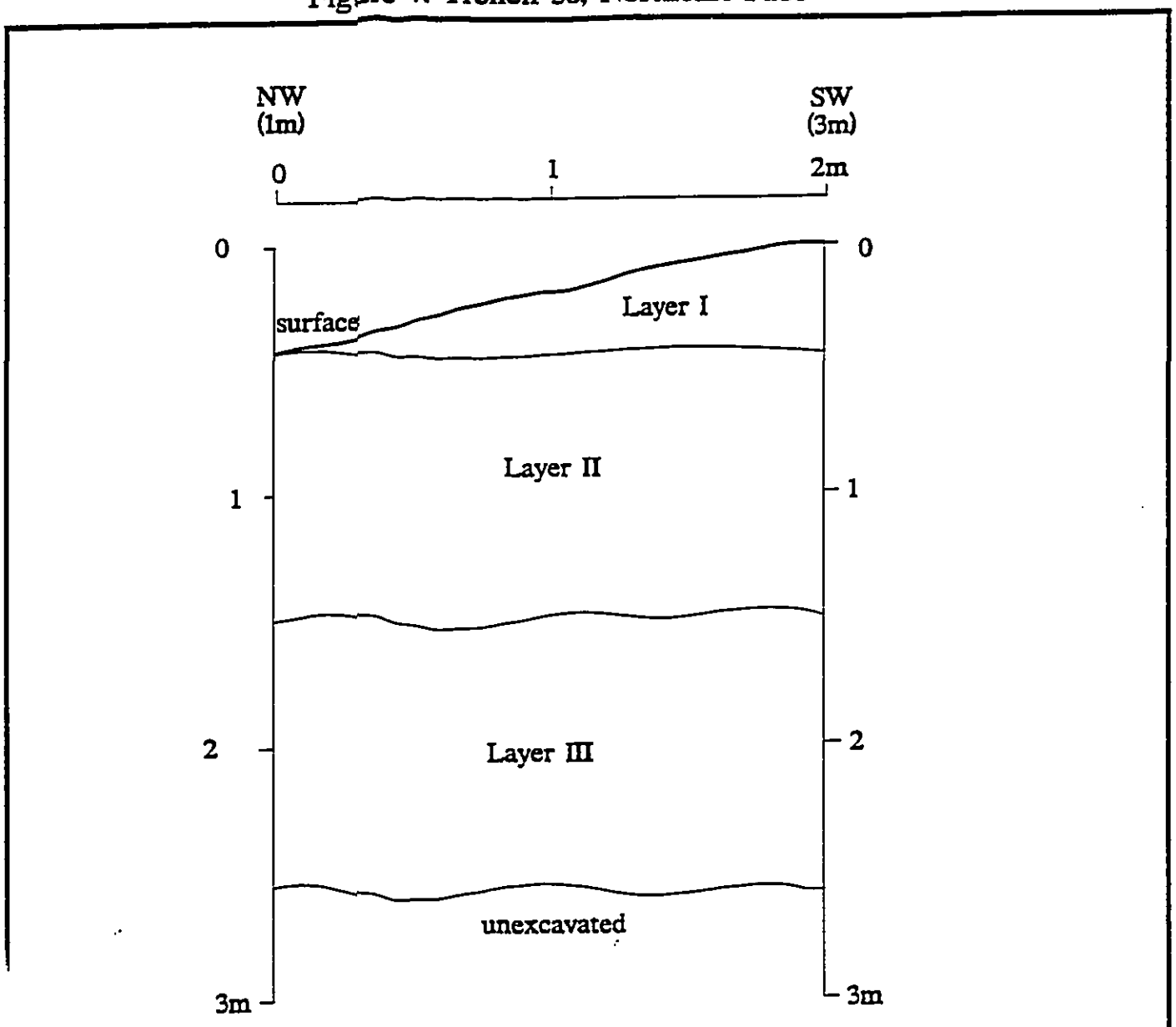
Layer I: 7.5YR 4/4, Dark brown; loamy sand with medium to coarse roots; abrupt, wavy boundary.

Layer II: 10YR 6/3, Pale brown; very fine to fine loamy sand;

Layer III: 5YR 8/1, White; very fine sand, weakly cemented;

Layer IV: 5YR 3/3, Dark reddish brown; very fine clay loam; compact.

Figure 7: Trench 38, Northeast Face



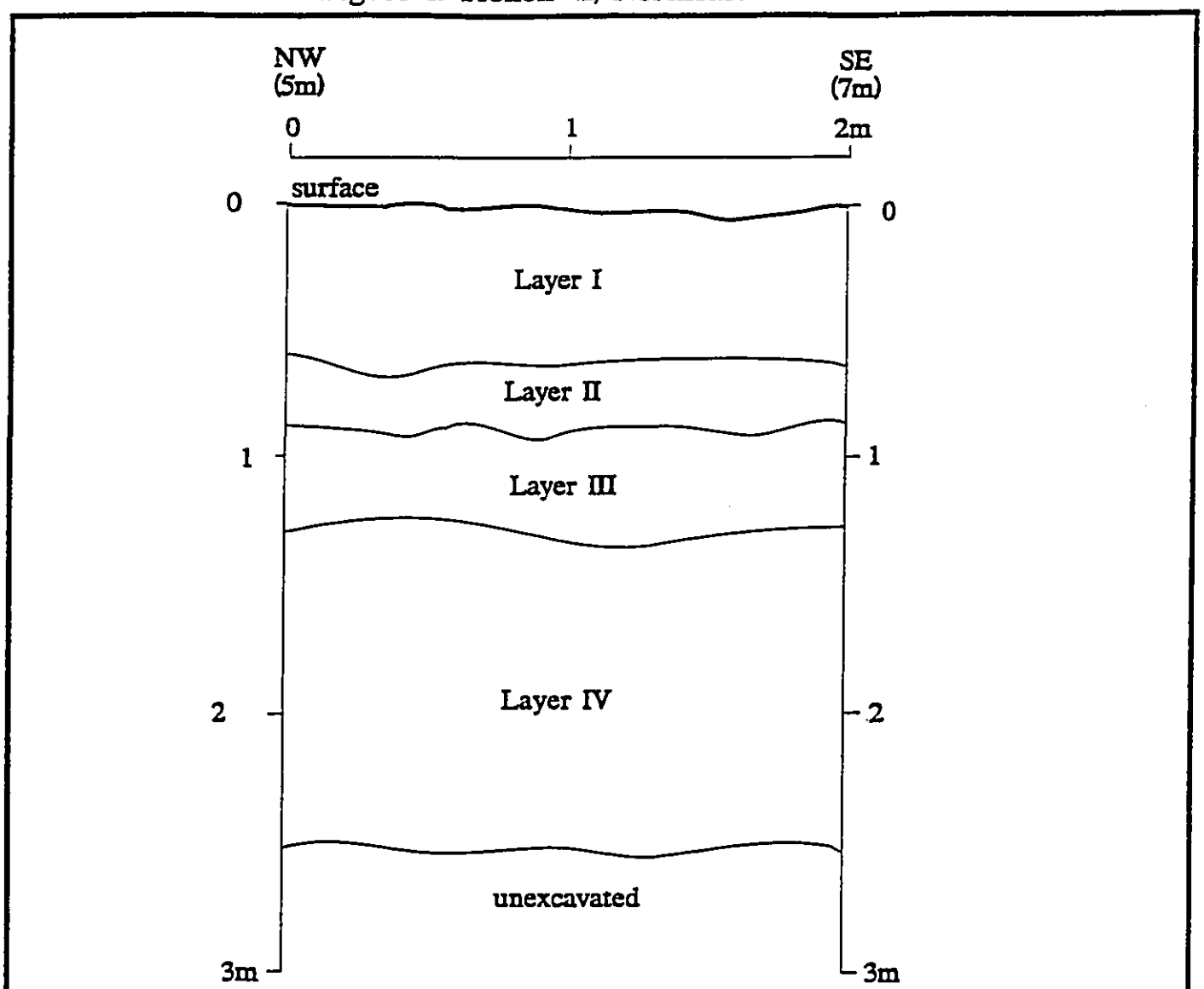
Total Length 20.1m
Profile Between 1-3m, NW to SW

Layer I: 7.5YR 6/6, Reddish yellow; lithified sand and fine sand.

Layer II: 7.5YR 4/6, Strong brown; very fine to fine sand, weakly cemented.

Layer III: 7.5YR 5/8, Strong brown; fine sand, loose.

Figure 8: Trench 41, Northeast Face



Total Length 19.0m
Profile Between 5-7m, NW to SE

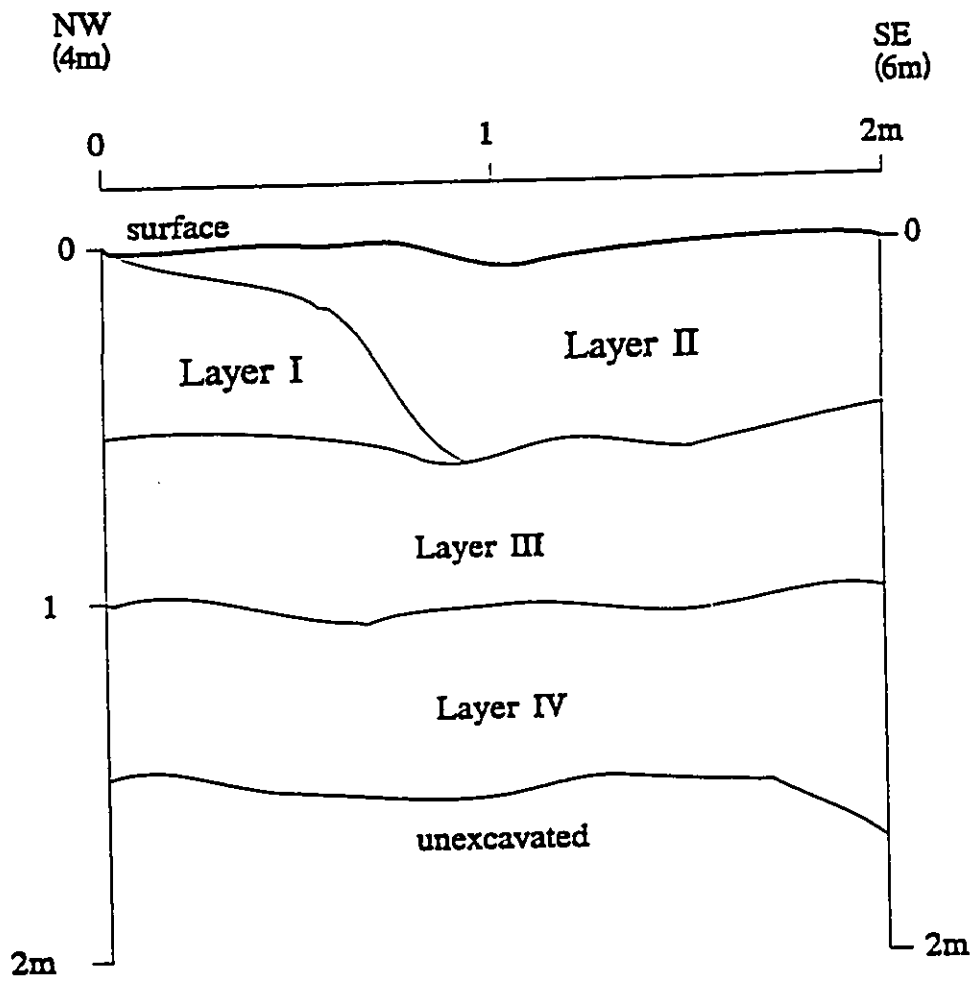
Layer I: 10YR 6/3, Pale brown; very fine sand.

Layer II: 10YR 2/1, Black; very fine sandy loam; medium to coarse roots.

Layer III: 5YR 4/6, Yellowish red; very fine loamy sand.

Layer IV: 10YR 4/4, Dark yellowish brown; very fine sand.

Figure 9: Trench 11, West Face



Total Length 16.3m
Profile between 4-6m, NW to SE

Layer I: 7.5YR 3/2, Dark brown; very fine loamy sand with modern trash and >5cm subangular basit inclusions.

Layer II: 10YR 4/4, Dark yellowish brown; very fine sand; few, coarse roots.

Layer III: 7.5YR 5/3, Brown very fine sand, weakly cemented.

Layer IV: 10YR 4/4, Dark yellowish brown, Very fine, loose sand.

evidently, been previously disturbed by earth moving activities. The large coastal dunes in the western portion of the property, although not seemingly disturbed, did not contain any significant surface finds.

A small number of the test trenches contained a scattering of modern trash, primarily consisting of glass sherds, bits of oxidized metal, and plastic. These trenches were located in areas of the property which seemed disturbed by previous grading and filling activities (Zones 1, 2, and 4). Given the age of this material, and degree of disturbance of its location, it was determined that these artifacts were insignificant to the interest of historic preservation.

Subsurface features encountered during mechanical excavation were few and limited to modern historical deposits. The two features encountered were found in Zone 2 which was one of the most heavily disturbed zones of the five zones tested on the subject property (refer to Section 7).

Feature 1 - Trench 3, Zone 2

Feature 1 consisted of a small pit which contained 25 intact, machine made bottles, associated with copper tubing, oxidized metal in an unidentifiable state, and a large piece of rubber material which encased some of these bottles. The feature occurred at a depth between 70 and 100cmbs in the south face of Trench 3, and 4m from the western terminus of the trench. The pit was approximately 1m long (see Figure 2).

Twenty of the bottles were clear and retained their black, plastic screw top caps. Two modern machine made soda bottles were associated with this feature. All bottles appeared modern and less than 50 years old. Thus, this feature is not significant to the interests of historic preservation.

Feature 2 - Trench 51, Zone 2

Feature 2 was the upper end of a charred wood post or beam, which may have been squared, although this was difficult to ascertain. The charred post or beam was found at the base of Trench 51, at a depth of 150cmbs, and was located within a layer of fine loamy sand (see Figure 3). The base of the post was not exposed, for it extended into the base of the trench which had already been excavated to an unstable depth. A charcoal flecked sediment lens (Lens A) was encountered above this feature. This lens extended for most of the trench length.

The squared shape of this post and its undecomposed state suggested that it was less than 50 years old. In addition, this trench was excavated in Zone 2, which has evidently undergone mechanical disturbance, and thus the position of the post, at the base of the trench, does not necessarily signify an old age of deposition. It would be expected that a wooden post, much older than 50 years, would have decomposed in the aerobic conditions within the sand.

Section 9: Interpretation of Findings

During the current investigations two features were encountered in Zone 2, however, both these features were interpreted to be modern. The lack of significant, surface and subsurface, findings on the subject property was not unexpected given the previous archaeological work conducted in the area. Two surveys conducted on adjacent land did not encounter significant historic sites (Fredericksen and Fredericksen 1992a, Kennedy et al. 1990). The excavations on the property indicated that much of it had been heavily disturbed (Zones 1, 2, and 4). However, the portions of the property which were initially interpreted not to have been disturbed historically, did not contain sites either.

In review, it is possible that the areas initially thought not to have been historically disturbed, may have been eroded. As a result, the upper sediment deposits which may have contained significant materials may have been removed. This interpretation would be supported by the presence of lithified deposits at the surface in Zone 3. The lithified dune, might be expected to have formed at greater depths, as opposed to at the surface, of the dune. Thus, the non-lithified portion of the dune may have eroded; through aeolian action, through mammalian and anthropogenic degradation, or through a combination of these processes.

Dunes are sensitive environments which, after minimal disturbances, can be subject to catastrophic erosion. Given their sensitivity, the activities of people and the animals they domesticate upon the vegetation and the dune deposition could easily have resulted in rapid aeolian erosion initiated by blowouts. A scenario of rapidly eroding dune sand, together with the cultural materials it contains, would explain the lack of archaeologically significant finds in this area. This hypothetical interpretation would most likely apply to post-European arrival times, although it could be applied earlier. The post-European interpretation is supported by Fredericksen and Fredericksen's work further up the coast, where early cultural deposits were encountered beneath an historic railroad bed, but nowhere else on the property (1992b and 1993). Their findings would suggest that

the majority of dune erosion has occurred since the railroad bed protective cover was built in the late nineteenth century.

In summary, the lack of significant archaeological sites on the subject property and its vicinity can probably be attributed to the largely anthropogenic degradation of the dunes in this area, as opposed to the absence of cultural activities having occurred in this area at different times in the past. The dunes have been disturbed directly by mechanical and other, probable, activities, and indirectly by anthropogenically initiated aeolian erosion. Consequently, the sediments which contained archaeologically significant materials have also been removed. It cannot be ruled out that there were no cultural activities in this dune area at any time in the past, although this would seem unlikely.

Section 10: Conclusions

This surface survey with subsurface testing was conducted on a road corridor for the Maui County Road Project. An inventory survey, covering 100% of the subject property, did not identify a significant surface feature. Given the lack of surface findings, the lack of information on the L.C.A. in which the road corridor is located, and the disturbance of the area at which the railroad had crossed the property (Zone 1), there was no archaeological information to guide the subsurface testing. In total, 54 trenches of varying length and depth were excavated across the property. Two features were identified, a trash pit (Feature 1) and a wooden post (Feature 2), but neither were considered significant to the interests of historic preservation.

No significant historic materials were encountered on the road corridor. Future construction activities along this road corridor will have "no effect" on significant historic resources. The developer and land owner should be aware that interment of the dead in sand deposits was a common burial practice among pre-European contact Hawaiians. Thus, even though a human burial was not encountered during the current investigations, it is possible that they are present on the property. In the event that a human burial is encountered during future construction activities, the State Historic Preservation Division and the Maui Island Burial Council should be contacted immediately.

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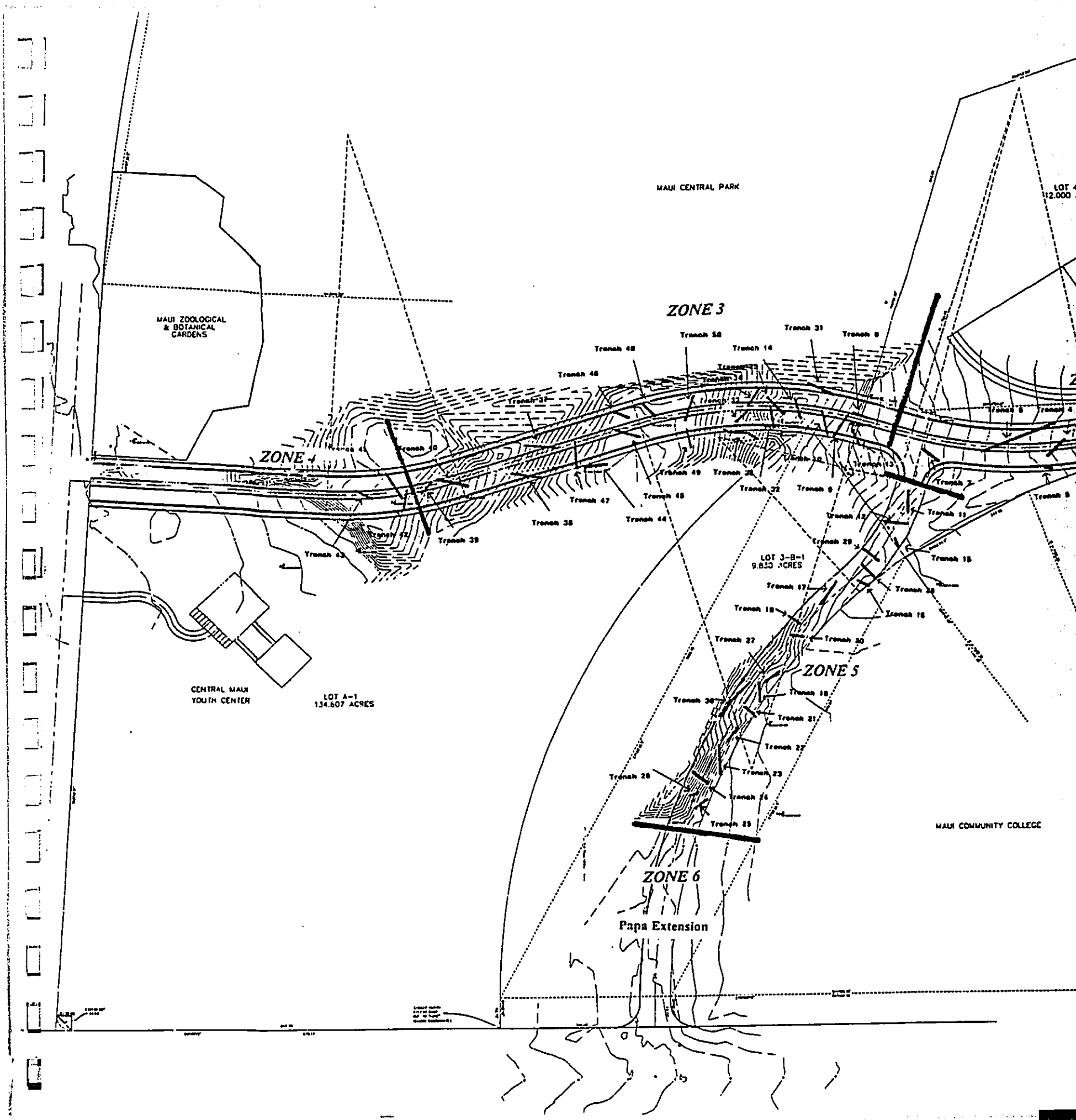
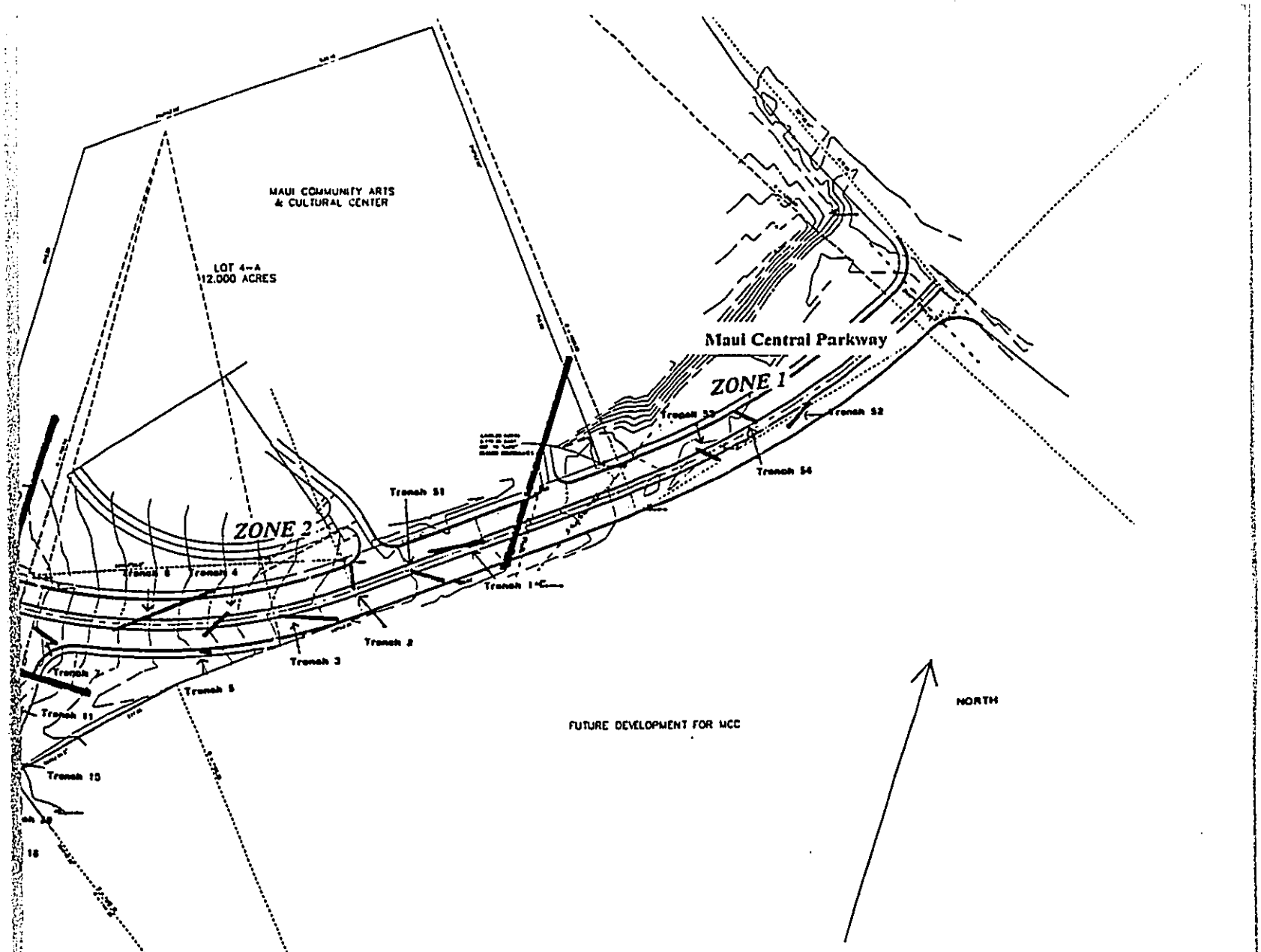

MAUI CENTRAL PARK
MAUI ZOOLOGICAL & BOTANICAL GARDENS
ZONE 1
ZONE 3
ZONE 5
ZONE 6
Papa Extension
Trench 50
Trench 31
Trench 48
Trench 14
Trench 46
Trench 47
Trench 45
Trench 44
Trench 38
Trench 39
Trench 43
Trench 22
Trench 9
Trench 11
Trench 12
Trench 28
Trench 15
Trench 17
Trench 18
Trench 16
Trench 27
Trench 30
Trench 19
Trench 21
Trench 24
Trench 23
Trench 26
Trench 25
LOT 3-B-1
9.830 ACRES
LOT A-1
134.607 ACRES
CENTRAL MAUI YOUTH CENTER
MAUI COMMUNITY COLLEGE



MAP 3: ZONES AND TRENCHES ON SUBJECT PROPERTY

BASED ON ORIGINAL BY RICHARD M. SATO & ASSOC., INC

MARCH 15, 1993

Appendix B

Noise Study

ACOUSTIC STUDY
FOR THE
MAUI CENTRAL PARK MASTER PLAN PROJECT
KAHULUI, MAUI, HAWAII

Prepared for:

MICHAEL T. MUNEKIYO CONSULTING, INC.

Prepared by:

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Honolulu, Hawaii 96816

APRIL 1993

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CHAPTER I. SUMMARY

This study evaluated the potential noise impacts in the immediate vicinity of and attributable to the proposed construction of the South Papa Avenue extension and Parkway within the Maui Central Park complex on the island of Maui, Hawaii. The possible changes in traffic volumes and noise levels along the existing roadways surrounding the Maui Central Park were also investigated.

Existing noise sensitive properties along South Papa Avenue, Kaahumanu Avenue, Kanaloa Avenue, and Kahului Beach Road are not expected to be adversely impacted by the extension of South Papa Avenue and the construction of the new Parkway within the Maui Central Park grounds. The reason for this conclusion is that the traffic volumes and noise levels along the existing roadways are not anticipated to increase significantly as the result of the construction of the two new roadways within the Maui Central Park. A redistribution of traffic volumes among the existing roadways is expected to occur, but the differential volumes and resulting changes in traffic noise levels are anticipated to be 0.5 dB or less, which are considered to be insignificant.

The greatest increase in traffic noise levels are expected to occur within the Maui Central Park complex, along the new extension of South Papa Avenue and along the new Parkway. This is due to the relatively low existing background ambient noise levels within the interior areas of the Maui Central Park which are removed from the existing roadways.

Traffic noise contributions from the new Parkway are predicted to be less than 50 dB at the future Maui Community Arts and Cultural Center, and adverse traffic noise impacts are not expected at that location. Traffic noise levels at the two student dormitory buildings fronting the South Papa Avenue extension are expected to increase by approximately 3 to 15 dB as a result of the South Papa Avenue extension. This degree of increase is considered to be large, but traffic noise mitigation measures are not

required by FHA/HUD or FHWA standards for residences. Traffic noise mitigation measures are not normally required at these dormitories due to the relatively low (60 Ldn or less) traffic noise levels predicted along the new section of South Papa Avenue. The effectiveness of various noise mitigation measures were identified for use if reduction of traffic noise is required in the future.

CHAPTER II. NOISE DESCRIPTORS AND THEIR RELATIONSHIP TO LAND USE COMPATIBILITY

A general consensus has developed for use of the Day-Night Sound Level (Ldn) in describing environmental noise in general, and for relating the acceptability of the noise environment for various land uses. The Day-Night Sound Level 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.

The Ldn descriptor employs a process of averaging instantaneous A-Weighted sound levels as read on a standard Sound Level Meter, which are normally referred to as meter readings in dBA. A brief description of the acoustic terminology and symbols used are provided in **APPENDIX B.** The average noise level during a one hour period is called the hourly equivalent sound level, and is designated as Leq(h) or Leq. The maximum A-Weighted sound level occurring during an intermittent event (or single event) is referred to as the Lmax value. The mathematical product (or integral) of the instantaneous sound level times the duration of the event is known as the Sound Exposure Level, or Lse, and is analogous to the energy of the time varying sound levels associated with the intermittent noise event. Current noise standards and criteria which associate land use compatibility or adverse health and welfare effects with various levels of environmental noise are normally described in terms of Ldn rather than the single event (Lmax or Lse) noise descriptors. The reasons for this are based on the relatively good correlation between the cumulative Ldn descriptor and annoyance reactions of the exposed population. However, at very low levels of environmental noise (55 Ldn or less), other attitudinal variables and biases (besides noise) of the exposed population tend to influence annoyance reactions, and the correlation between annoyance reactions and Ldn levels deteriorates.

TABLE 1, extracted from **Reference 1**, categorizes the various

TABLE 1

EXTERIOR NOISE EXPOSURE CLASSIFICATION (RESIDENTIAL LAND USE)

NOISE EXPOSURE CLASS	DAY-NIGHT SOUND LEVEL	EQUIVALENT SOUND LEVEL	FEDERAL[1] STANDARD
Minimal Exposure	Not Exceeding 55 L_{dn}	Not Exceeding 55 L_{eq}	Unconditionally Acceptable
Moderate Exposure	Above 55 L_{dn} But Not Above 65 L_{dn}	Above 55 L_{eq} But Not Above 65 L_{eq}	Acceptable[2]
Significant Exposure	Above 65 L_{dn} But Not Above 75 L_{dn}	Above 65 L_{eq} But Not Above 75 L_{eq}	Normally Unacceptable
Severe Exposure	Above 75 L_{dn}	Above 75 L_{eq}	Unacceptable

Notes: (1) Federal Housing Administration, Veterans Administration, Department of Defense, and Department of Transportation.

(2) FHWA uses the L_{eq} instead of the L_{dn} descriptor. For planning purposes, both are equivalent if: (a) heavy trucks do not exceed 10 percent of total traffic flow in vehicles per 24 hours, and (b) traffic between 10:00 PM and 7:00 AM does not exceed 15 percent of average daily traffic flow in vehicles per 24 hours. The noise mitigation threshold used by FHWA for residences is 67 L_{eq}.

Ldn levels of outdoor noise exposure with severity classifications. Land use compatibility guidelines for various levels of environmental noise as measured by the Ldn descriptor system are shown in **FIGURE 1.** A general consensus among federal agencies has developed whereby residential housing development is considered acceptable in areas where exterior noise does not exceed 65 Ldn. This value of 65 Ldn is used as a federal regulatory threshold for determining the necessity for special noise abatement measures when applications for federal funding assistance are made.

Federal agencies (HUD and EPA) recognize 55 Ldn as a desirable goal for exterior noise in residential areas for protecting the public health and welfare with an adequate margin of safety (**References 2 and 3**). Although 55 Ldn is significantly quieter than 65 Ldn, the lower level has not been adopted for regulatory purposes by federal agencies due to economic and technical feasibility considerations.

The U.S. Federal Highway Administration (FHWA) uses the Leq or L10 descriptors rather than the Ldn noise descriptor in assessing highway noise impacts and noise mitigation requirements (**Reference 4**). The L10 descriptor represents the noise level exceeded ten percent of the time during the peak traffic hour of interest. The Leq is normally evaluated during the peak traffic hour. For traffic noise levels in the project area, the Leq and Ldn levels are essentially identical (within 1 dB). **TABLE 2**, which was extracted from **Reference 4**, presents the current FHWA Noise Abatement Criteria which are normally applied in evaluations of potential noise impacts on federally-sponsored roadway improvement projects. In general, the 67 Leq threshold for Activity Category B is applied at all residences in the vicinity of these roadway improvement projects. Where use of the 67 Leq threshold would result in a significant increase in background ambient noise levels at residences which are located in quiet communities, the FHWA 57 Leq criteria can be used as a more conservative noise abatement threshold.

LAND USE	YEARLY DAY–NIGHT AVERAGE SOUND LEVEL IN DECIBELS 50 60 70 80 90
Residential – Single Family, Extensive Outdoor Use	
Residential – Multiple Family, Moderate Outdoor Use	
Residential – Multi–Story Limited Outdoor Use	
Transient Lodging	
School Classrooms, Libraries, Religious Facilities	
Hospitals, Clinics, Nursing Homes, Health Related Facilities	
Auditoriums, Concert Halls	
Music Shells	
Sports Arenas, Outdoor Spectator Sports	
Neighborhood Parks	
Playgrounds, Golf Courses, Riding Stables, Water Rec., Cemeteries	
Office Buildings, Personal Services, Business and Proffesional	
Commercial – Retail, Movie Theaters, Restaurants	
Commercial – Wholesale, Some Retail, Ind., Mfg., Utilities	
Livestock Farming, Animal Breeding	
Agriculture (Except Livestock)	
Extensive Natural Wildlife and Recreation Areas	

Compatible

With Insulation per Section A.3

Marginally Compatible

Incompatible

LAND USE COMPATIBILITY
WITH YEARLY DAY–NIGHT AVERAGE SOUND LEVEL
AT A SITE FOR BUILDINGS AS COMMONLY CONSTRUCTED
(Source: American National Standards Institute S12.40–1990)

FIGURE 1

TABLE 2

FHWA NOISE ABATEMENT CRITERIA
[Hourly A–Weighted Sound Level––Decibels (dBA)]

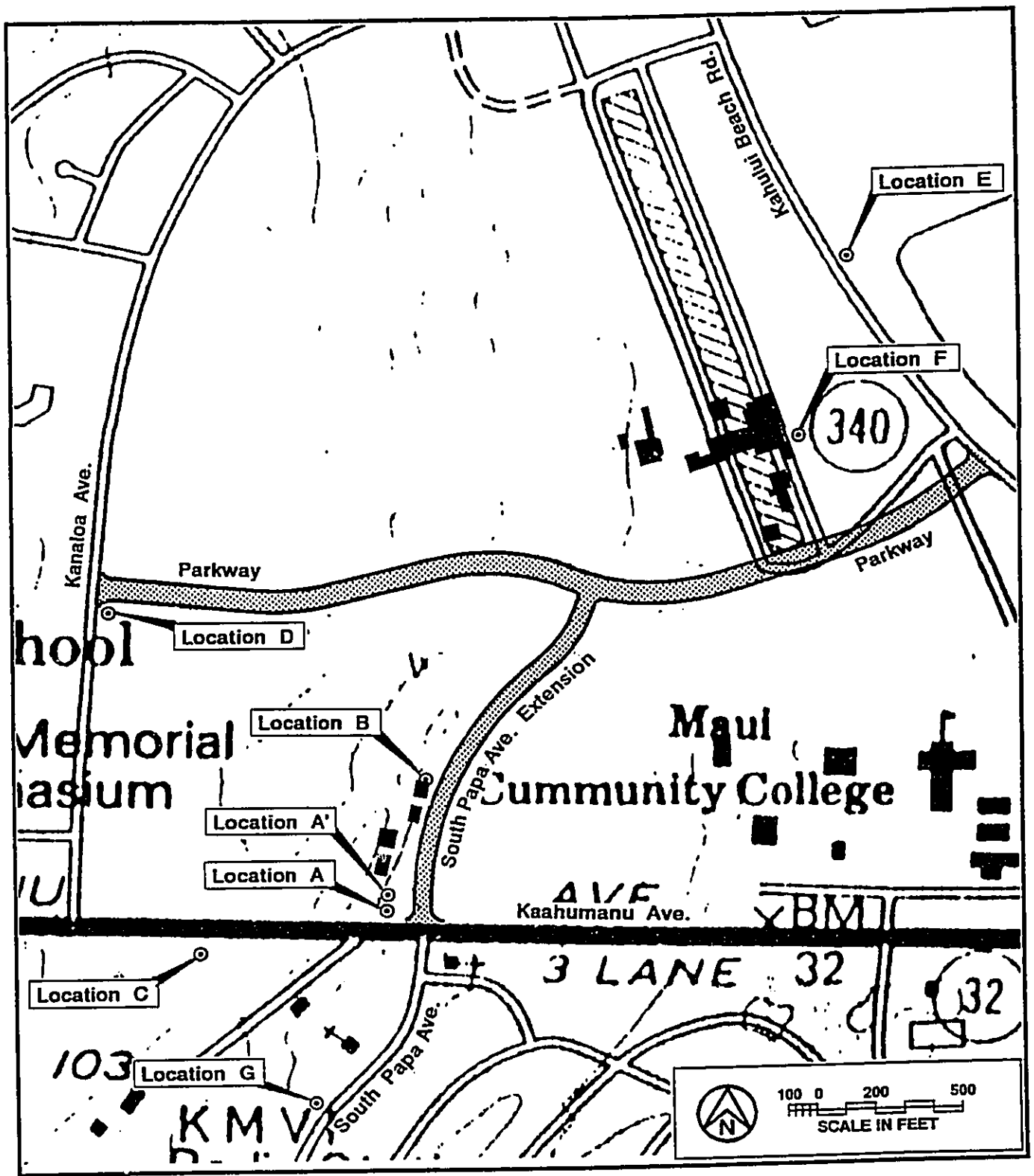
ACTIVITY CATEGORY	LEQ (H)	DESCRIPTION OF ACTIVITY CATEGORY
A	57 (Exterior)	Lands on which serenity and quiet are of extra–ordinary significance and serve an important public need and where the preservation of those qualities is essential if the areas are to continue to serve their intended purpose.
B	67 (Exterior)	Picnic areas, recreation areas, playgrounds, activity sports areas, parks, residences, motels, hotels, churches, libraries, and hospitals.
C	72 (Exterior)	Developed lands, properties, or activities not included in Categories A or B above.
D	------	Undeveloped lands.
E	52 (Interior)	Residences, motels, hotels, public meeting rooms, schools, churches, libraries, hospitals, and auditoriums.

CHAPTER III. GENERAL STUDY METHODOLOGY

Existing traffic noise levels were measured at eight locations in the project environs to provide a basis for describing the existing traffic noise levels and for calibrating the Federal Highway Administration (FHWA) Highway Noise Model. The FHWA model was used to predict the traffic noise levels along the existing and future roadway sections servicing the Maui Central Park environs. The noise measurements were performed during the month of March 1993. The noise measurement Locations A thru G are shown in **FIGURE 2**, and the measurement results are included in **TABLE 3** and **FIGURES 3 thru 10**. **TABLE 3** also includes a comparison of the measured traffic noise levels with predictions of the FHWA Highway Noise Model.

The Federal Highway Administration (FHWA) Traffic Noise Prediction Model (**Reference 5**) was used as the primary method of calculating the existing and future traffic noise levels, with model parameters adjusted to reflect terrain, ground cover, and local shielding conditions. The measured traffic noise levels at Locations A thru G were compared with model predictions to insure that measured and calculated noise levels for the existing conditions were consistent and in general agreement. As indicated in **TABLE 3**, spot counts of existing traffic volume were obtained during the measurement period and were used to generate the Equivalent Sound Level (Leq) predictions shown in the table. The agreement between measured and predicted traffic noise levels was considered to be good and sufficiently accurate to justify use of the highway noise model to formulate the existing and future traffic noise contours.

The potential noise impacts associated with the planned construction of the South Papa Avenue extension and Parkway within the Maui Central Park were examined. Future traffic noise levels for CY 1994 conditions with and without the implementation of the Maui Central Park Master Plan Project were developed along the existing and new roadways in the environs of the park project.



LOCATIONS OF NOISE MEASUREMENT SITES

FIGURE 2

TABLE 3

TRAFFIC AND BACKGROUND NOISE MEASUREMENT RESULTS

LOCATION	Time of Day (HRS)	Ave. Speed (MPH)	--Hourly Traffic Volume-- AUTO	M.TRUCK	H.TRUCK	Measured Leq (dB)	Predicted Leq (dB)
A. 75 FT from the center-line of Kaahumanu Ave. (3/18/93)	0700 TO 0730	44	2,702	41	25	68.2	67.9
A'. 115 FT from the center-line of Kaahumanu Ave. (3/18/93)	1655 TO 1745	39	3,173	19	5	60.7	60.7
B. 550 FT from the center-line of Kaahumanu Ave. (3/18/93)	1040 TO 1113	40	N/A	N/A	N/A	44.1	N/A
C. 100 FT from the center-line of Kaahumanu Ave. (3/18/93)	1400 TO 1500	40	3,532	33	36	64.5	64.3
D. 60 FT from the center-line of Kanaloa Ave. (3/18/93)	1600 TO 1630	40	790	2	0	63.2	62.8

TABLE 3 (CONTINUED)

TRAFFIC AND BACKGROUND NOISE MEASUREMENT RESULTS

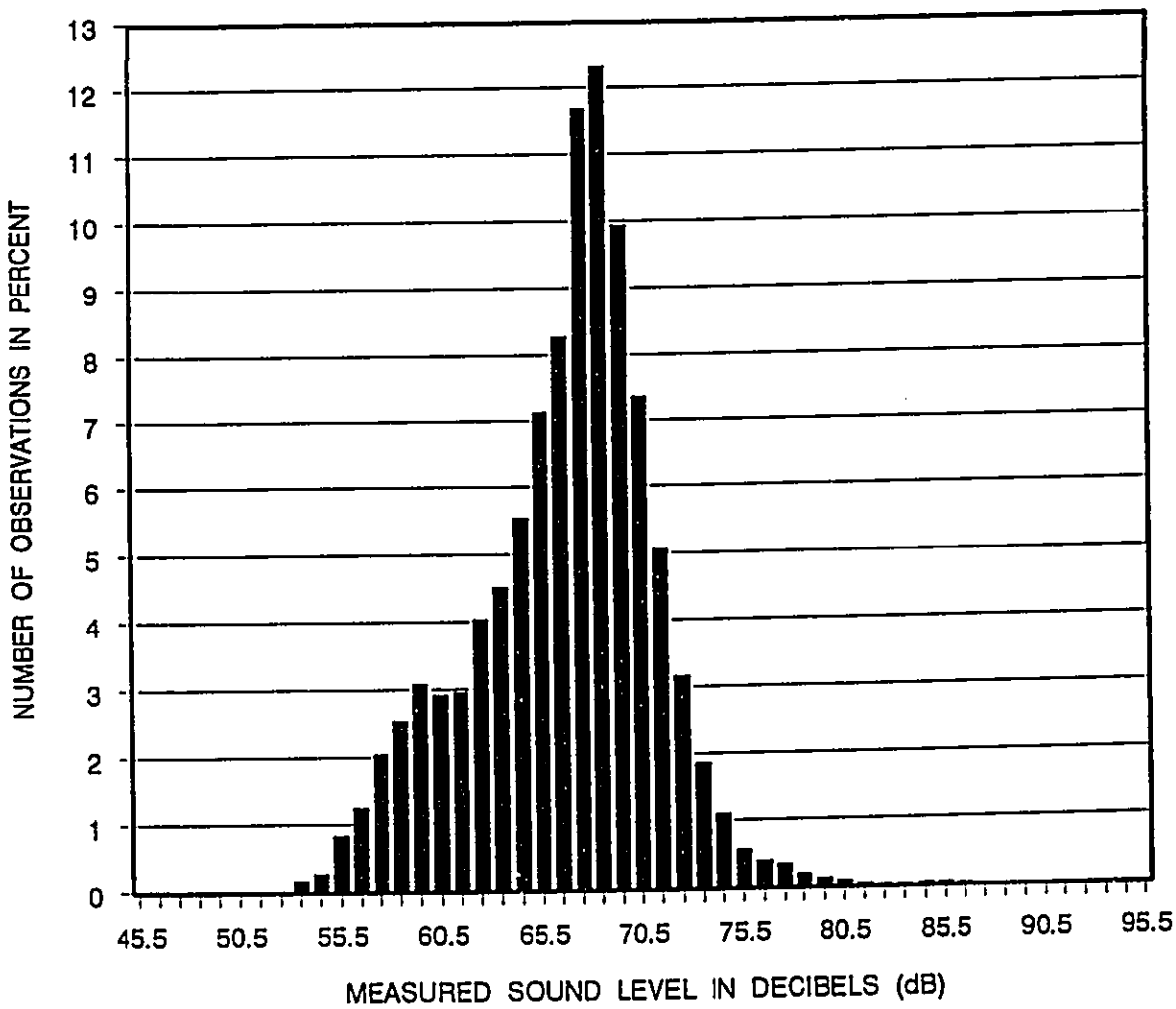
LOCATION	Time of Day (HRS)	Ave. Speed (MPH)	--Hourly Traffic Volume-- AUTO	M.TRUCK	H.TRUCK	Measured Leq (dB)	Predicted Leq (dB)
E. 50 FT from the center-line of Kahului Beach Rd. (3/17/93)	1617 TO 1700	40	2,077	18	11	67.0	67.4
F. 500 FT from the center-line of Kahului Beach Rd. (3/17/93)	2127 TO 2200	40	N/A	N/A	N/A	46.3	N/A
G. 55 FT from the center-line of S. Papa Ave. (3/19/93)	0700 TO 0800	36	1,149	10	11	64.5	64.0

FIGURE 3

HISTOGRAM OF MEASURED SOUND LEVELS AT LOCATION "A"

DATE: MARCH 18, 1993
TIME: 0700–0735 HOURS

METER RESPONSE: FAST



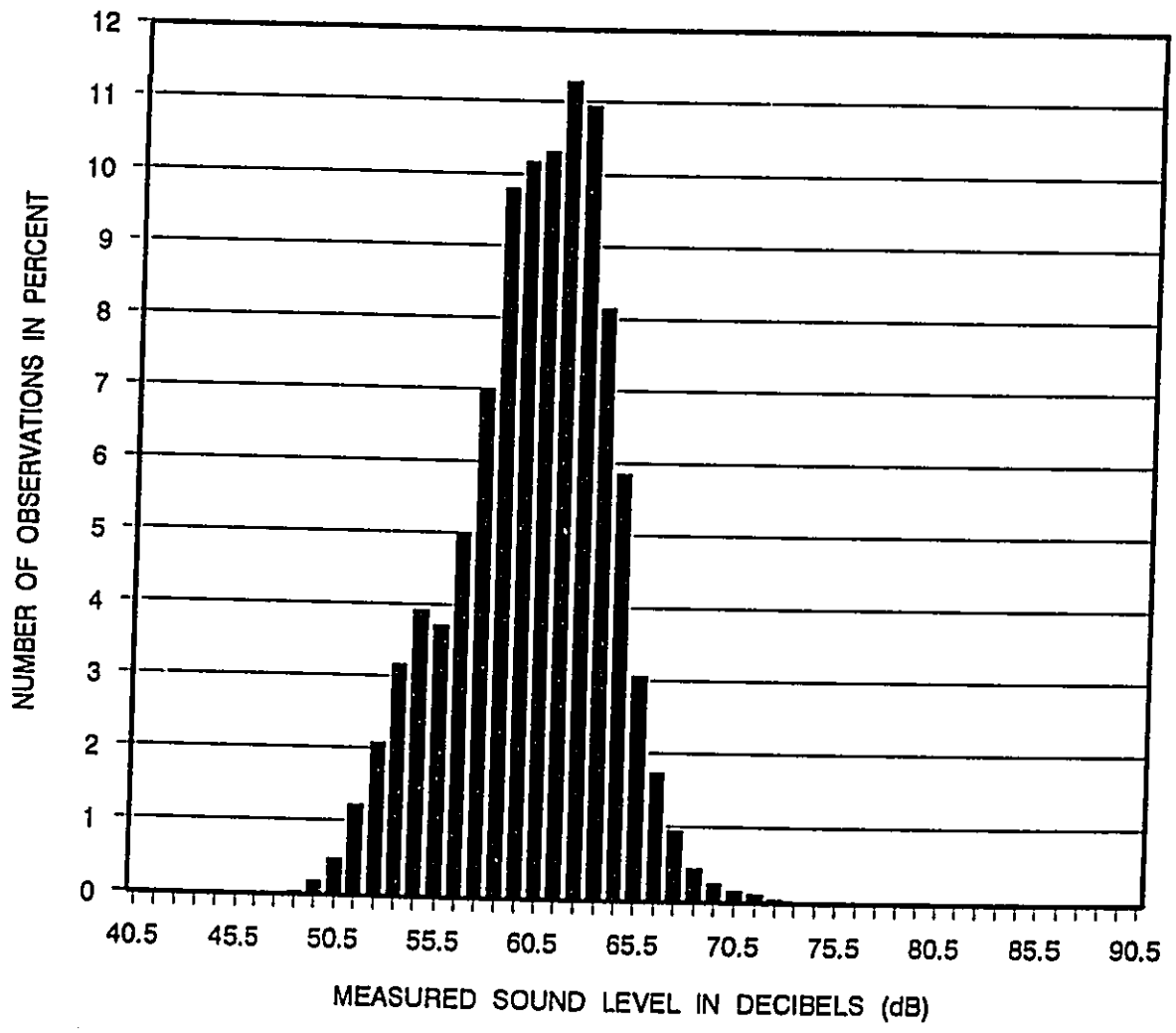
Lmax: 90.8 dBA
L10: 71.0 dBA
L50: 66.5 dBA
Leq: 68.2 dBA
Lmin: 52.4 dBA

FIGURE 4

HISTOGRAM OF MEASURED SOUND LEVELS AT LOCATION "A"

DATE: MARCH 18, 1993
TIME: 1655–1745 HOURS

METER RESPONSE: FAST



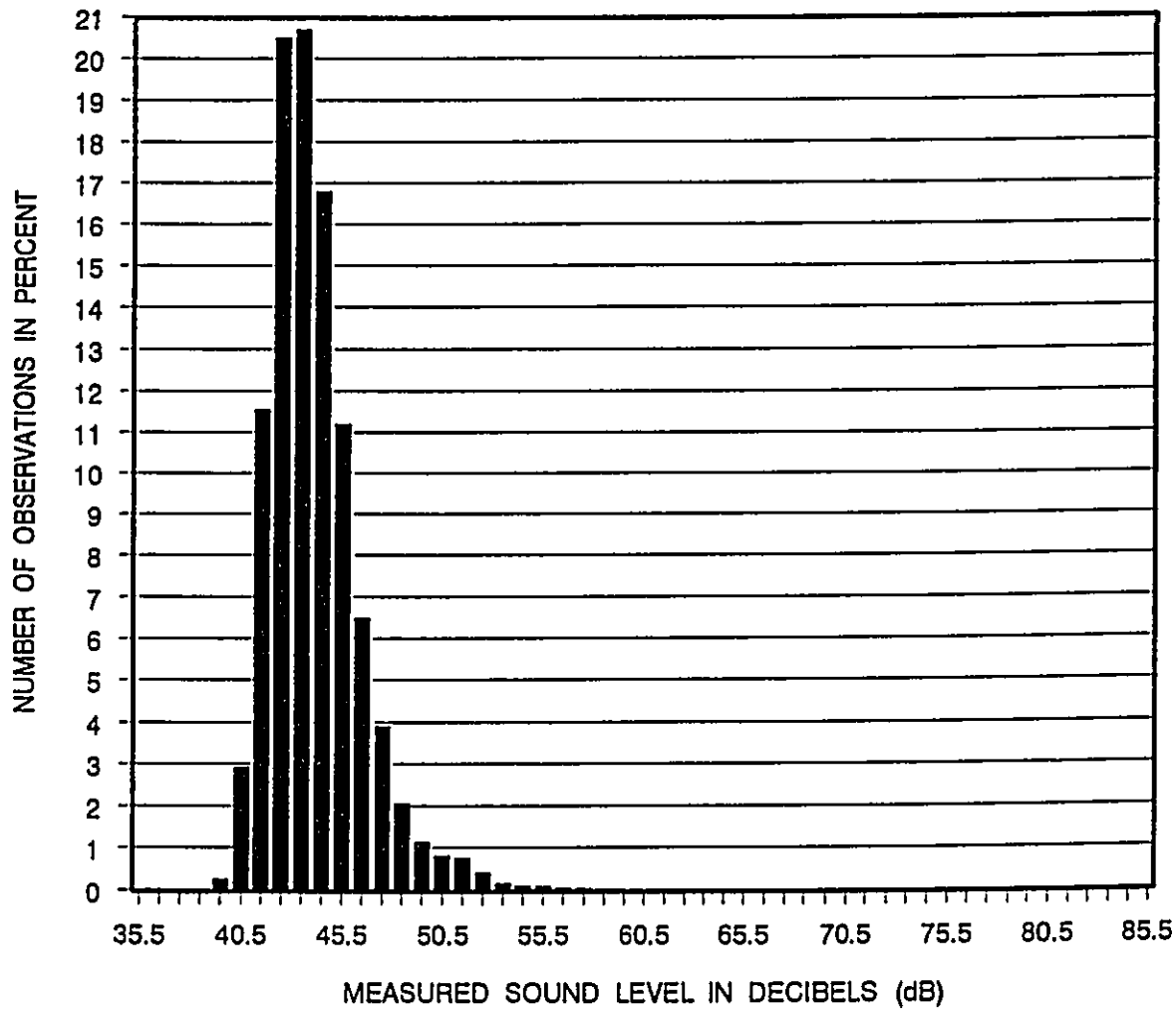
Lmax:	72.1 dBA
L10:	63.5 dBA
L50:	59.5 dBA
Leq:	60.7 dBA
Lmin:	47.7 dBA

FIGURE 5

HISTOGRAM OF MEASURED SOUND LEVELS AT LOCATION "B"

DATE: MARCH 18, 1993
TIME: 1040–1113 HOURS

METER RESPONSE: FAST



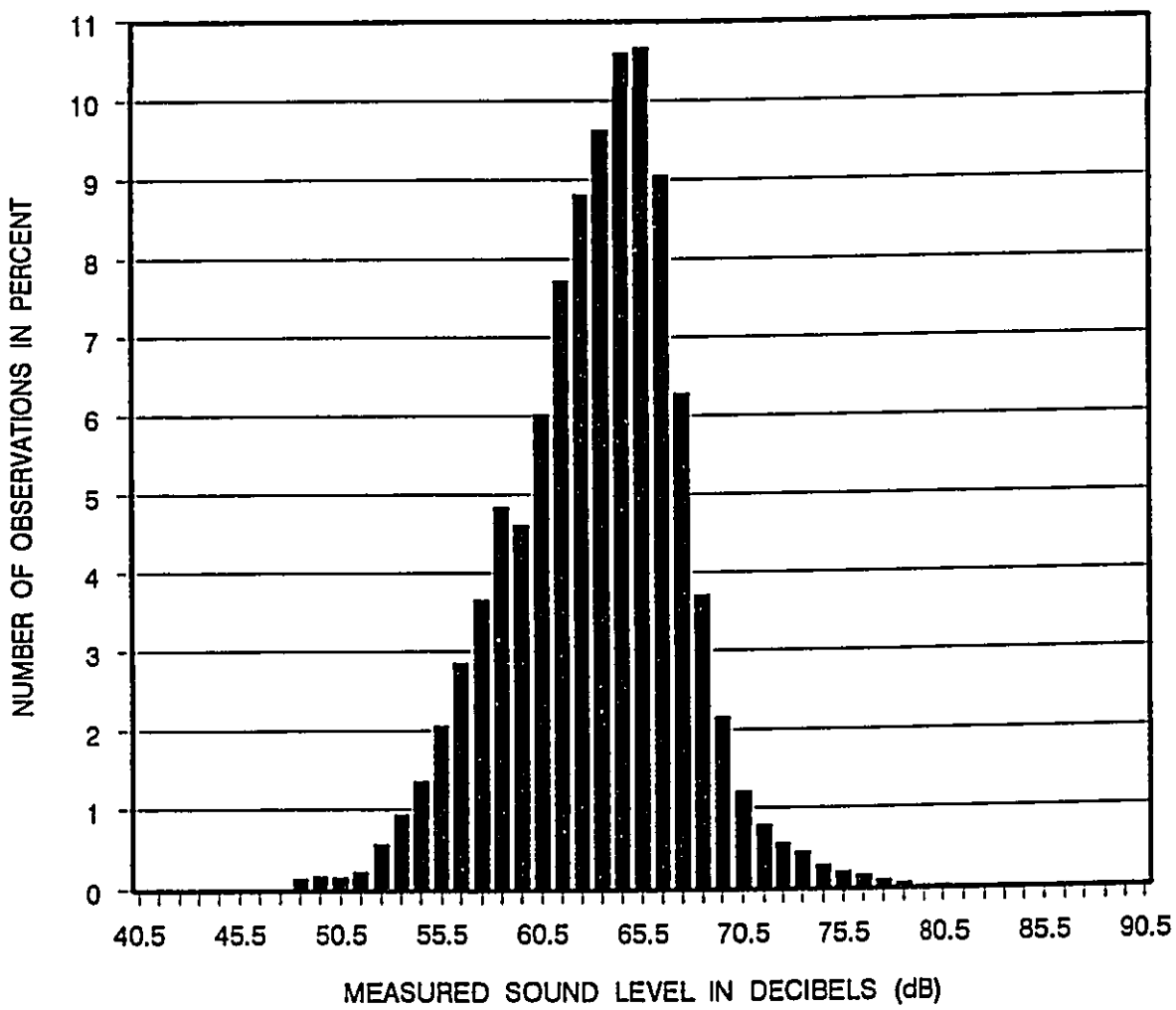
Lmax:	59.1 dBA
L10:	46.0 dBA
L50:	43.0 dBA
Leq:	44.1 dBA
Lmin:	38.6 dBA

FIGURE 6

HISTOGRAM OF MEASURED SOUND LEVELS AT LOCATION "C"

DATE: MARCH 18, 1993
TIME: 1400–1500 HOURS

METER RESPONSE: FAST



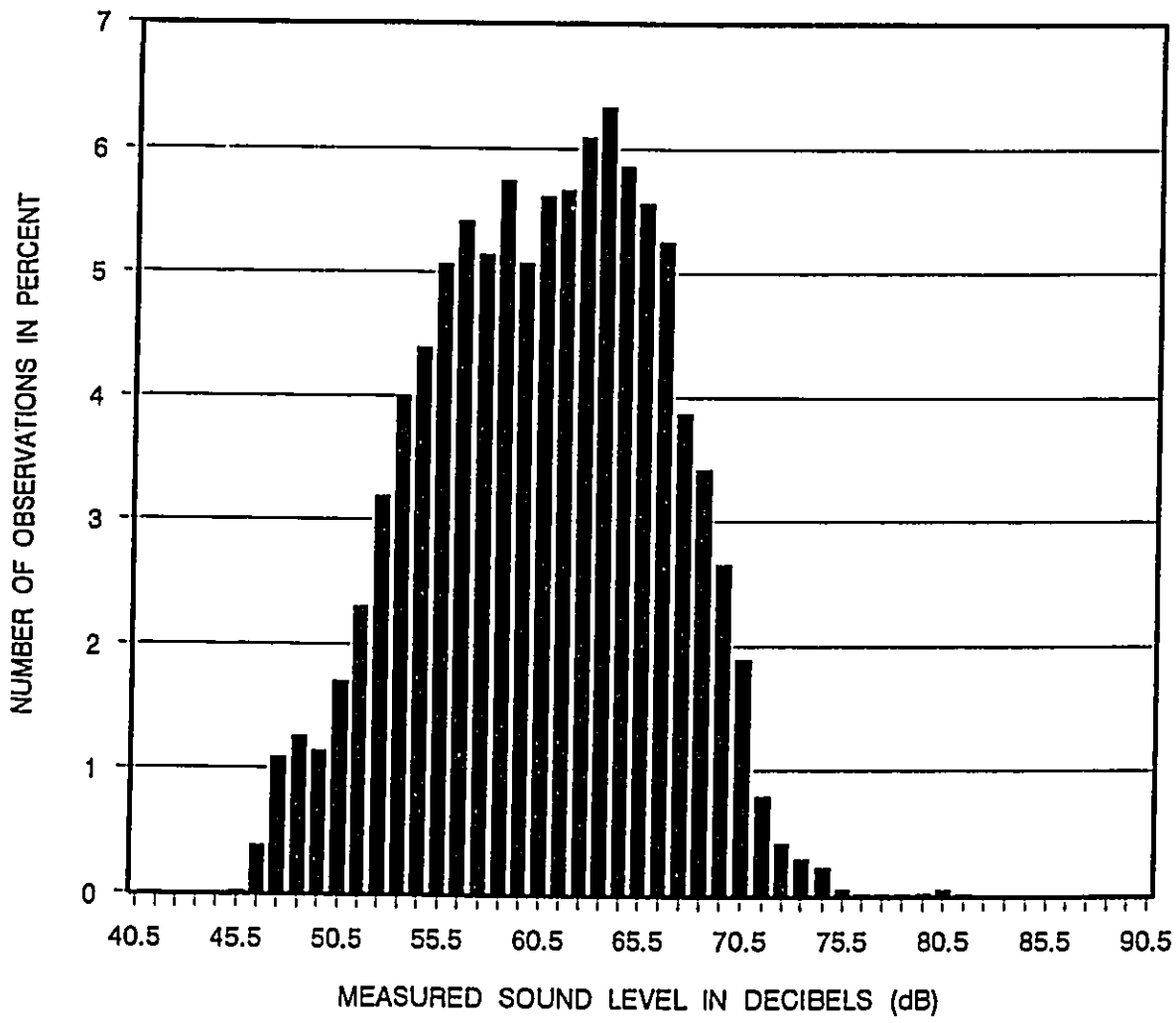
Lmax: 82.8 dBA
L10: 67.0 dBA
L50: 63.0 dBA
Leq: 64.5 dBA
Lmin: 47.1 dBA

FIGURE 7

HISTOGRAM OF MEASURED SOUND LEVELS AT LOCATION "D"

DATE: MARCH 18, 1993
TIME: 1600–1632 HOURS

METER RESPONSE: FAST



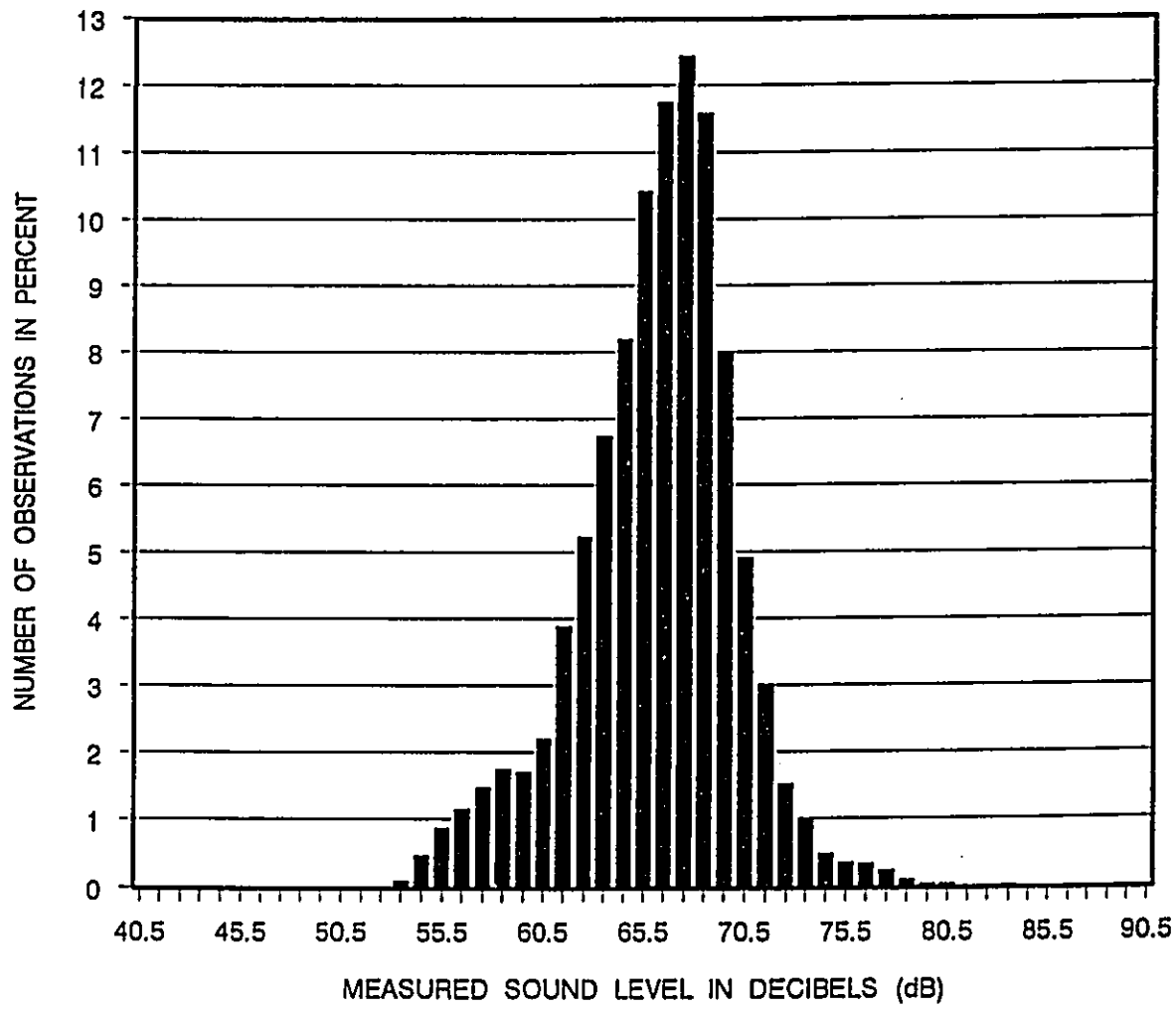
Lmax: 80.7 dBA
L10: 67.0 dBA
L50: 60.0 dBA
Leq: 63.2 dBA
Lmin: 44.8 dBA

FIGURE 8

HISTOGRAM OF MEASURED SOUND LEVELS AT LOCATION "E"

DATE: MARCH 17, 1993
TIME: 1617–1700 HOURS

METER RESPONSE: FAST



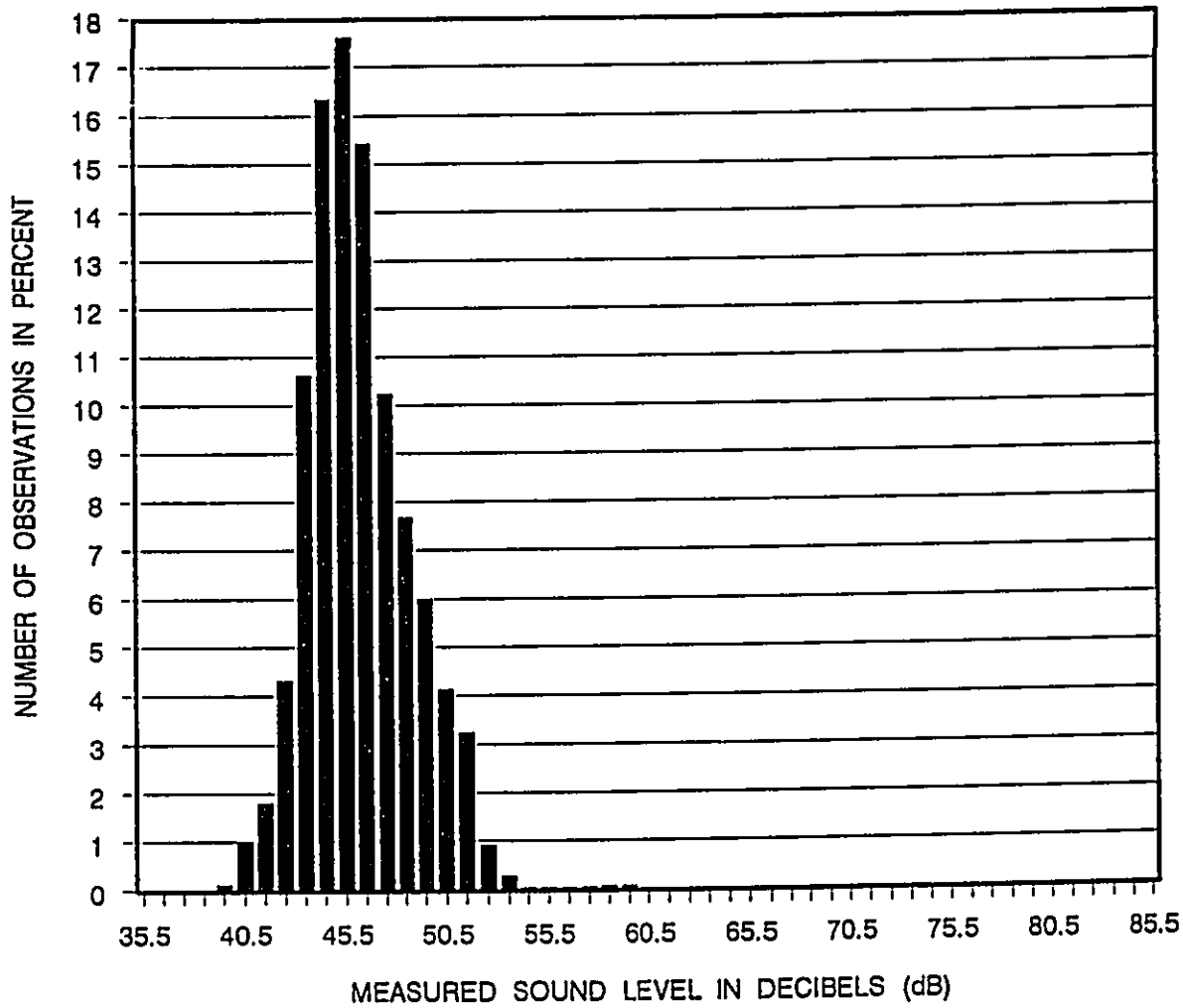
Lmax:	84.6 dBA
L10:	69.5 dBA
L50:	66.0 dBA
Leq:	67.0 dBA
Lmin:	52.2 dBA

FIGURE 9

HISTOGRAM OF MEASURED SOUND LEVELS AT LOCATION "F"

DATE: MARCH 17, 1993
TIME: 2127–2200 HOURS

METER RESPONSE: FAST



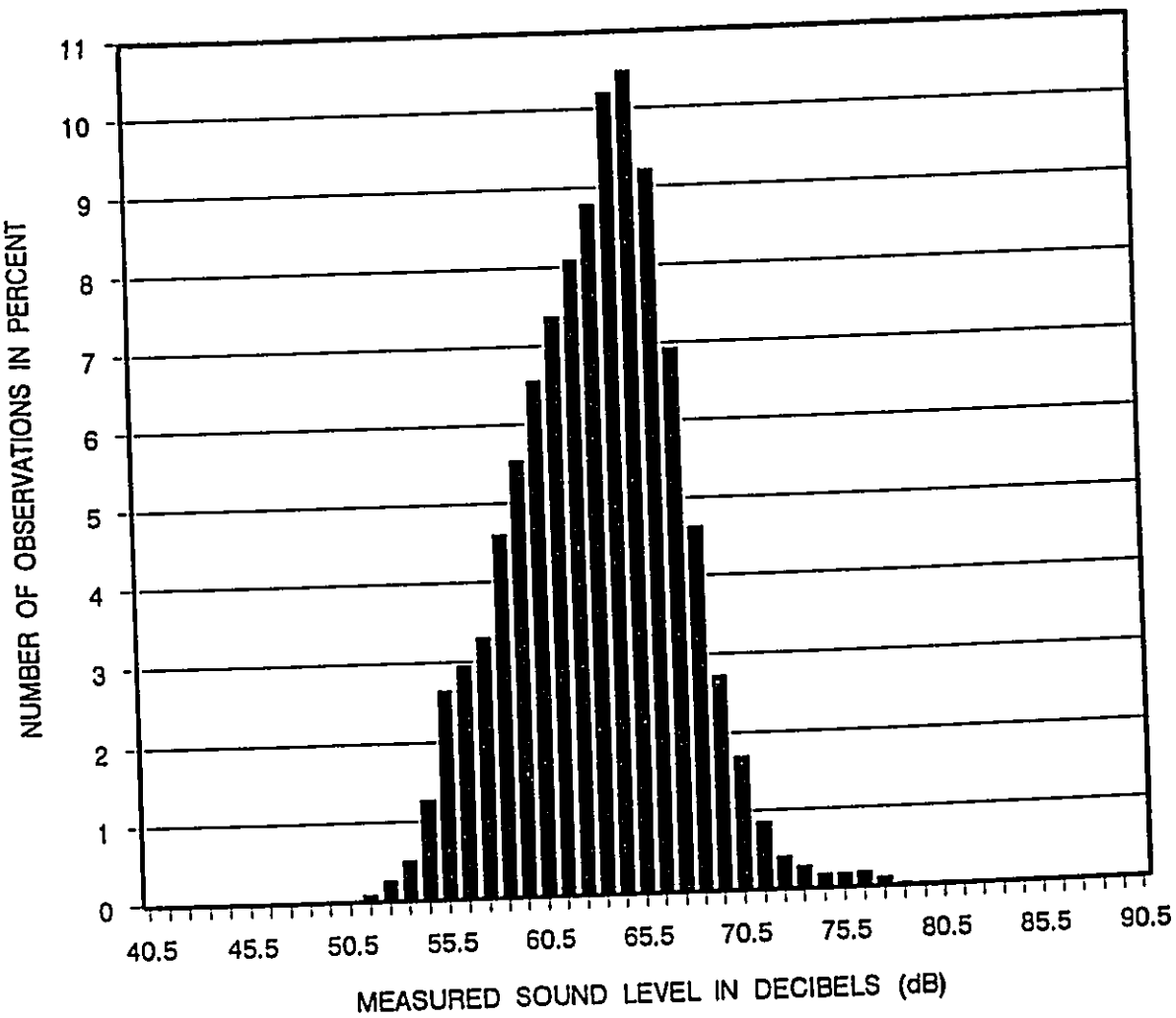
Lmax: 59.2 dBA
L10: 49.0 dBA
L50: 45.0 dBA
Leq: 46.3 dBA
Lmin: 38.8 dBA

FIGURE 10

HISTOGRAM OF MEASURED SOUND LEVELS AT LOCATION "G"

DATE: MARCH 19, 1993
TIME: 0700–0800 HOURS

METER RESPONSE: FAST



Lmax: 79.7 dBA
L10: 67.5 dBA
L50: 63.0 dBA
Leq: 64.5 dBA
Lmin: 50.5 dBA

References 6 and 7 were used to develop the existing (CY 1992) and future (CY 1994) peak hour traffic volumes with and without the project along the roadways surrounding and within the park complex. **References 8 thru 10** and **FIGURES 11 thru 14** were used to estimate the relationships between the AM peak hour Leq's and the 24-hour Ldn's along the roadways of interest. Traffic vehicle mixes along the existing roadways were assumed to be remain constant between CY 1992 and CY 1994. The Day-Night Sound Level (Ldn) noise descriptor was used in addition to the hourly Leq descriptor to evaluate potential traffic noise impacts and to allow for direct comparisons of the existing and future traffic noise levels with the 65 Ldn FHA/HUD noise standard.

The predicted CY 1994 traffic noise levels at noise sensitive receptors in the project environs were evaluated. The predicted future traffic noise levels were compared with existing noise levels as well as with the 65 Ldn FHA/HUD noise abatement criteria to identify specific locations where noise abatement measures might be necessary. These evaluations were performed for near term conditions with and without implementation of the Maui Central Park Project, and did not include evaluations of noise increases due to future traffic growth within the project area. Evaluations of potential noise impacts and possible mitigation measures at the existing Maui Community College student dormitory buildings were also performed due to the anticipated increase in traffic noise from the South Papa Avenue extension.

FIGURE 11

HOURLY VARIATIONS OF TRAFFIC NOISE LEVELS AT 100 FT DISTANCE FROM THE CENTERLINE OF SOUTH PAPA AVE. AT KAAHUMANU AVE. (4/24/91)

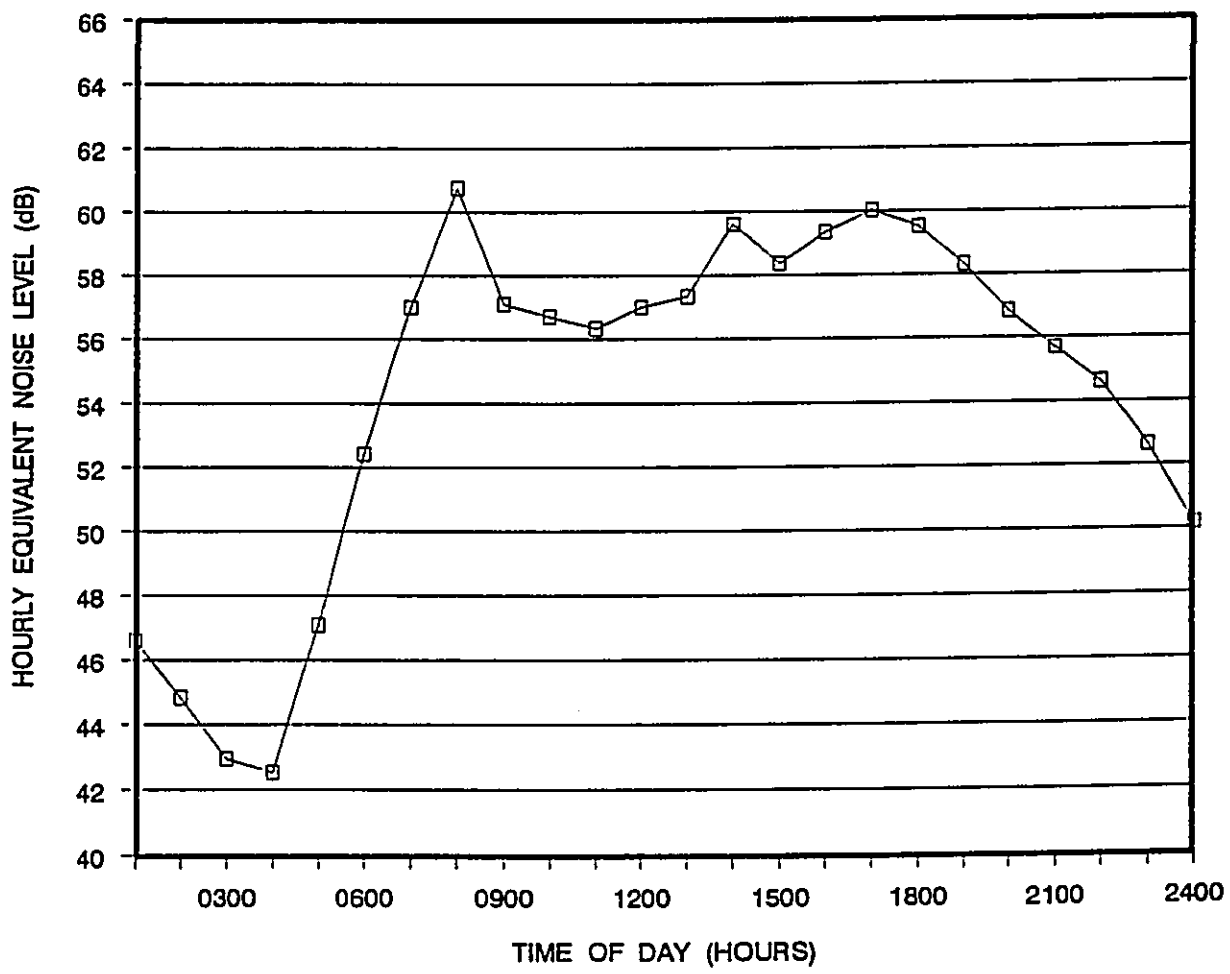


FIGURE 12

HOURLY VARIATIONS OF TRAFFIC NOISE LEVELS AT 100 FT DISTANCE FROM THE CENTERLINE OF KAAHUMANU AVE. AT SOUTH PAPA AVE. (4/24/91)

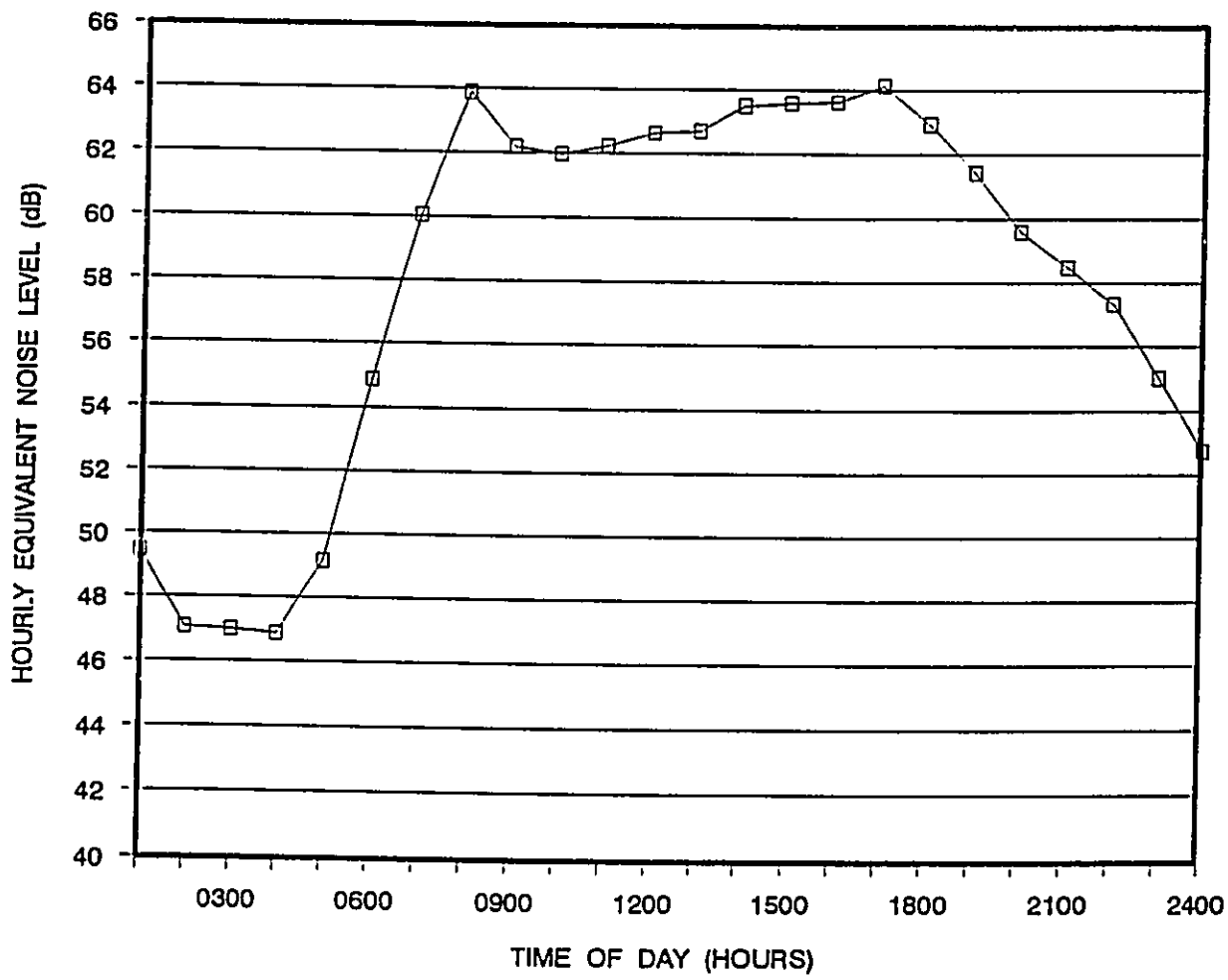


FIGURE 13

HOURLY VARIATIONS OF TRAFFIC NOISE LEVELS AT 100 FT DISTANCE FROM THE CENTERLINE OF KANALOA AVE. AT KAHULUI BEACH RD. (4/24/91)

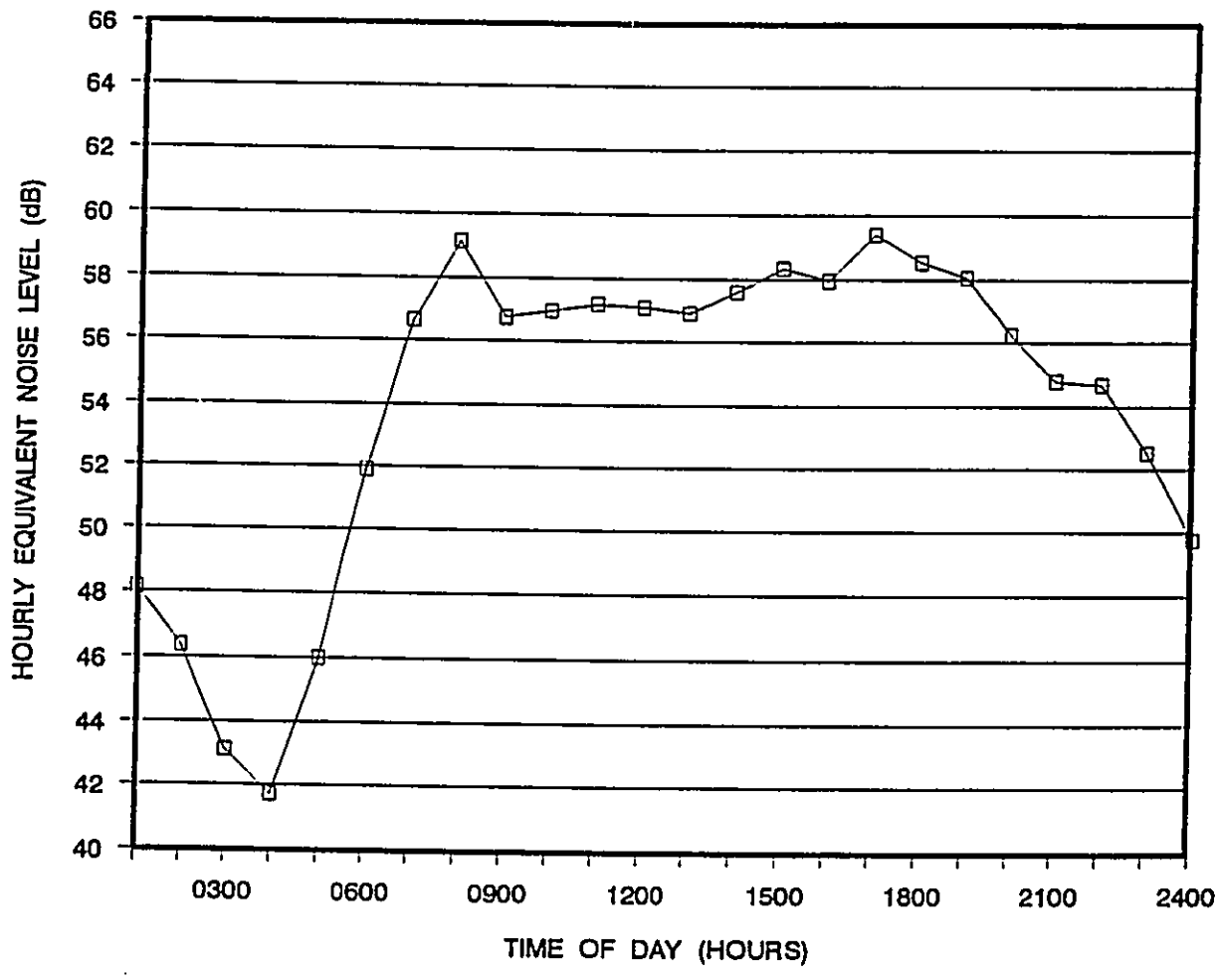
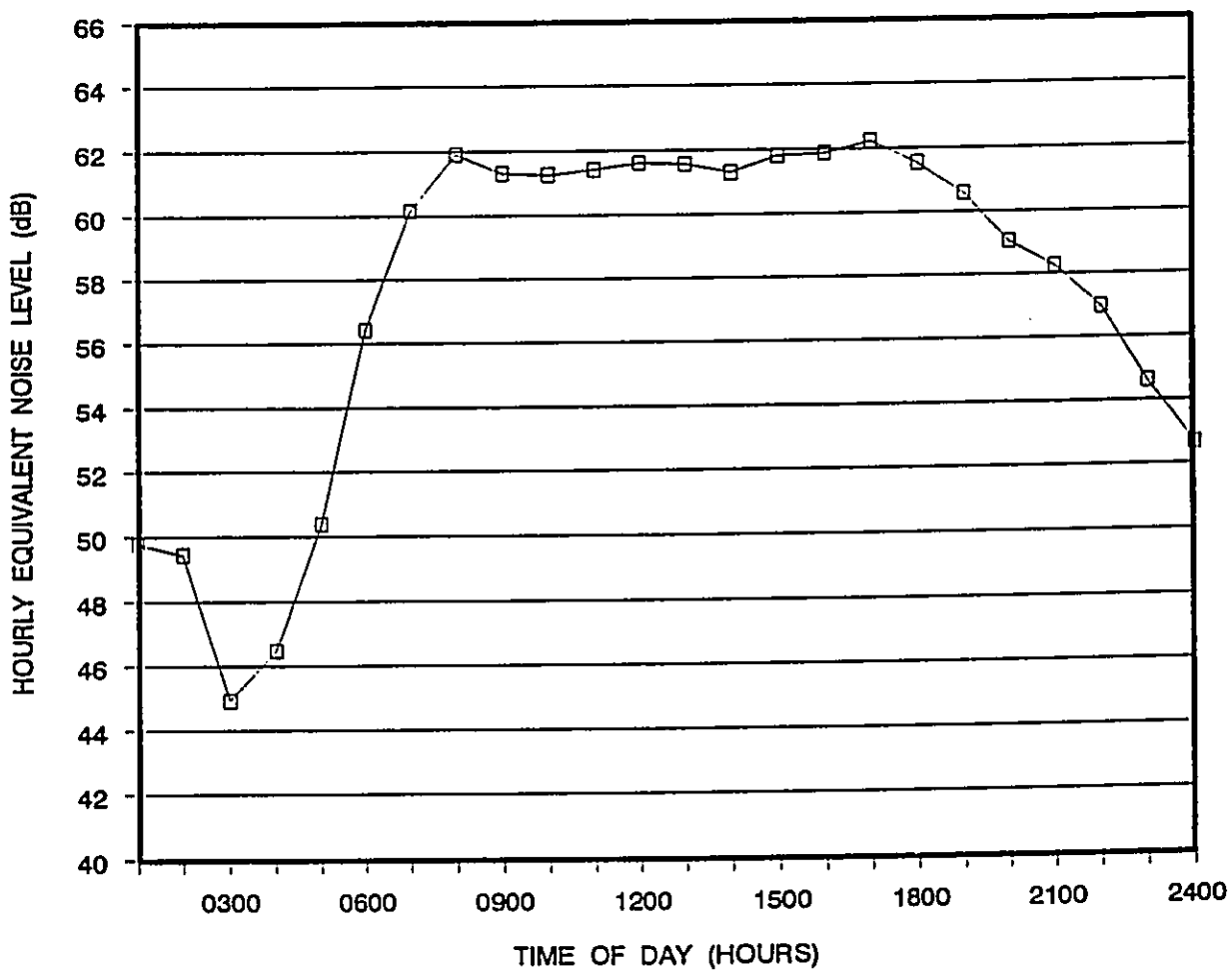


FIGURE 14

HOURLY VARIATIONS OF TRAFFIC NOISE LEVELS AT 100 FT DISTANCE FROM THE CENTERLINE OF KAHULUI BEACH RD. AT KANALOA AVE. (4/24/91)



CHAPTER IV. EXISTING AND FUTURE TRAFFIC NOISE ENVIRONMENT

Existing Traffic Noise Levels. The existing traffic noise levels in the project environs are in the "Moderate Exposure, Acceptable" and "Significant Exposure, Normally Unacceptable" categories along the Rights-of-Way of Kaahumanu Avenue, South Papa Avenue, Kanaloa Avenue, and Kahului Beach Road. Traffic noise levels along the Right-of-Way of a roadway generally represent the worst case (or highest) levels due to the proximity of the Right-of-Way to the traffic noise sources.

Calculations of existing traffic noise levels during the AM peak traffic hour are presented in **TABLE 4.** The hourly Leq (or Equivalent Sound Level) contributions from each roadway section in the project environs were calculated for comparison with forecasted traffic noise levels with and without the implementation of the Maui Central Park Master Plan by CY 1994. The existing setback distances from the roadways' centerlines to their associated 60, 65, and 70 Ldn contours were also calculated as shown in **TABLE 5.** The contour line setback distances do not take into account noise shielding effects from walls or buildings, or the additive contributions of traffic noise from intersecting street sections.

Traffic noise levels at the existing two-story, student dormitory buildings of Maui Community College (between noise measurement Locations A' and B) currently range from approximately 45 to 60 Ldn. Current traffic noise levels at the dormitory buildings are considered to be compatible for residential uses, and are below the FHA/HUD noise abatement standard of 65 Ldn. Existing traffic noise levels at these college dormitory buildings are also less than the FHWA noise abatement standard of 67 Leq.

Existing traffic noise levels at the site of the future Maui Community Arts and Cultural Center buildings (west of noise measurement Location F) currently range from approximately 49 to 51 Ldn. Current traffic noise levels at the cultural center buildings are considered to be compatible for uses such as auditoriums

TABLE 4

COMPARISONS OF EXISTING AND FUTURE
TRAFFIC NOISE LEVELS IN PROJECT ENVIRONS
(AM PEAK HOUR AND 100 FT FROM ROADWAY CENTERLINES)

LOCATION	SPEED (MPH)	VPH	* HOURLY LEQ IN dB @ 100 FT * AUTO	MT	HT	ALL VEH
EXISTING (CY 1992) AM PEAK HR. TRAFFIC:						
Kaahumanu Ave. West of S. Papa Ave.	40	3,278	61.3	52.8	58.1	63.4
Kaahumanu Ave. East of S. Papa Ave.	40	2,577	60.3	51.8	57.0	62.4
S. Papa Ave. S. of Kaahumanu Ave.	36	1,202	58.2	49.4	55.1	60.3
Kahului Beach Rd. S. of Kanaloa Ave.	40	1,885	59.9	51.4	56.7	62.0
Kahului Beach Rd. W. of Kaahumanu Ave.	40	2,222	60.6	52.1	57.4	62.7
Kanaloa Ave. N. of Kaahumanu Ave.	40	792	58.2	49.6	51.9	59.6
Kanaloa Ave. W. of Kahului Beach Rd.	40	731	57.8	49.3	51.6	59.2
FUTURE (CY 1994) AM PEAK HR. TRAFFIC:						
Kaahumanu Ave. West of Papa Ave.	40	3,237	61.3	52.7	58.0	63.4
Kaahumanu Ave. East of Papa Ave.	40	2,539	60.2	51.7	57.0	62.3
S. Papa Ave. S. of Kaahumanu Ave.	36	1,239	58.4	49.6	55.3	60.5
Kahului Beach Rd. S. of Kanaloa Ave.	40	2,010	60.2	51.7	57.0	62.3
Kahului Beach Rd. W. of Kaahumanu Ave.	40	2,217	60.6	52.1	57.4	62.7
Kanaloa Ave. N. of Kaahumanu Ave.	40	617	57.1	48.5	50.8	58.5
Kanaloa Ave. West of Beach Rd.	40	815	58.3	49.8	52.0	59.7
South Papa Avenue Extension	36	400	53.5	44.7	50.4	55.6
New Parkway W. of South Papa Ave.	40	310	54.1	45.6	47.8	55.5
New Parkway E. of South Papa Ave.	40	190	52.0	43.4	45.7	53.4

Note:

The following assumed traffic mix of autos, medium trucks, and heavy vehicles were used for existing and future conditions:

(a) Kaahumanu Avenue and Kahului Beach Road: 98.0% autos, 1.0% medium trucks, and 1.0% heavy trucks and buses.
(b) Kanaloa Avenue and Parkway: 98.5% autos, 1.0% medium trucks, and 0.5% heavy trucks and buses.
(c) South Papa Avenue and Extension: 98.2% autos, 0.9% medium trucks, and 0.9% heavy trucks and buses.

TABLE 5

EXISTING AND CY 1994 DISTANCES TO 60, 65, AND 70 Ldn CONTOURS

STREET SECTION	60 Ldn SETBACK (FT) EXISTING	60 Ldn SETBACK (FT) CY 1994	65 Ldn SETBACK (FT) EXISTING	65 Ldn SETBACK (FT) CY 1994	70 Ldn SETBACK (FT) EXISTING	70 Ldn SETBACK (FT) CY 1994
Kaahumanu Ave. West of S. Papa Ave.	169	167	78	78	36	36
Kaahumanu Ave. East of S. Papa Ave.	144	142	67	66	31	31
S. Papa Ave. S. of Kaahumanu Ave.	105	107	49	50	23	23
Kahului Beach Rd. S. of Kanaloa Ave.	136	142	63	66	29	31
Kahului Beach Rd. W. of Kaahumanu Ave.	152	151	70	70	33	33
Kanaloa Ave. N. of Kaahumanu Ave.	93	79	43	37	20	17
Kanaloa Ave. W. of Kahului Beach Rd.	89	95	41	44	19	21
South Papa Avenue Extension	N/A	51	N/A	23	N/A	11
New Parkway W. of South Papa Ave.	N/A	50	N/A	23	N/A	11
New Parkway E. of South Papa Ave.	N/A	36	N/A	17	N/A	8

Notes:

(1) All setback distances are from the roadways' centerlines.
(2) See TABLE 4 for traffic volume, speed, and mix assumptions.
(3) Setback distances are for unobstructed line-of-sight conditions.
(4) Soft ground conditions assumed along all roadways.
(5) Ldn assumed to be equal to AM Peak Hour Leq along all roadways.

and concert halls.

Future Traffic Noise Levels. Calculations of future (CY 1994) traffic noise levels during the AM peak traffic hour are presented in **TABLE 4** for conditions following completion of the new roadways within the Maui Central Park. The future setback distances from the roadways' centerlines to their associated 60, 65, and 70 Ldn contours were also calculated as shown in **TABLE 5**. The contour line setback distances do not take into account noise shielding effects from walls or buildings, or the additive contributions of traffic noise from intersecting street sections.

The future traffic noise levels along the existing sections of South Papa Avenue, Kaahumanu Avenue, Kanaloa Avenue, and Kahului Beach Road are expected to remain similar to existing levels following completion of the new roadways within the Maui Central Park (see **TABLES 4, 5, and 6**). As indicated in **TABLE 5**, the future setback distances to the 65 Ldn traffic noise contours are predicted to be less than 25 FT from the centerlines of the new roadways. Traffic noise levels along the Rights-of-Way of the new roadways are expected to be in the "Moderate Exposure, Acceptable" noise exposure category.

The greatest increases in traffic noise levels are expected to occur within the Maui Central Park complex, along the new extension of South Papa Avenue and along the new Parkway. This is due to the relatively low existing background ambient noise levels within the interior areas of the Maui Central Park which are removed from the existing roadways surrounding the park. Traffic noise contributions from the new Parkway are predicted to be less than 50 dB at the future Maui Community Arts and Cultural Center, and adverse traffic noise impacts are not expected at that location. Future traffic noise levels at the two student dormitory buildings closest to the South Papa Avenue extension are expected to range from 63 to 60 Ldn, and remain below FHA/HUD and FHWA noise abatement standards.

TABLE 6

CALCULATIONS OF PROJECT AND NON-PROJECT TRAFFIC NOISE CONTRIBUTIONS (CY 1994)

STREET SECTION	NOISE LEVEL INCREASE (Ldn) DUE TO NON-PROJECT TRAFFIC	PROJECT TRAFFIC
Kaahumanu Ave. West of S. Papa Ave.	0.0	-0.1
Kaahumanu Ave. East of S. Papa Ave.	0.0	-0.1
S. Papa Ave. S. of Kaahumanu Ave.	0.0	0.1
Kahului Beach Rd. S. of Kanaloa Ave.	0.0	0.3
Kahului Beach Rd. W. of Kaahumanu Ave.	0.0	0.0
Kanaloa Ave. N. of Kaahumanu Ave.	0.0	-1.1
Kanaloa Ave. W. of Kahului Beach Rd.	0.0	0.5
South Papa Avenue Extension	N/A	60.1
New Parkway W. of South Papa Ave.	N/A	60.0
New Parkway E. of South Papa Ave.	N/A	57.9

CHAPTER V. FUTURE NOISE IMPACTS AND POSSIBLE NOISE MITIGATION MEASURES

Traffic Noise. Existing noise sensitive properties along South Papa Avenue, Kaahumanu Avenue, Kanaloa Avenue, and Kahului Beach Road are not expected to be adversely impacted by the extension of South Papa Avenue and the new Parkway construction within the Maui Central Park grounds. The reason for this conclusion is that the traffic volumes and noise levels along the existing roadways are not anticipated to increase significantly as the result of the construction of new roadways within the Maui Central Park. A redistribution of traffic volumes among the existing roadways is expected to occur, but the differential volumes and resulting changes in traffic noise levels are anticipated to be 0.5 dB or less, which are considered to be insignificant (see **TABLE 6**). For this reason, traffic noise mitigation measures along the existing roadways are not considered necessary.

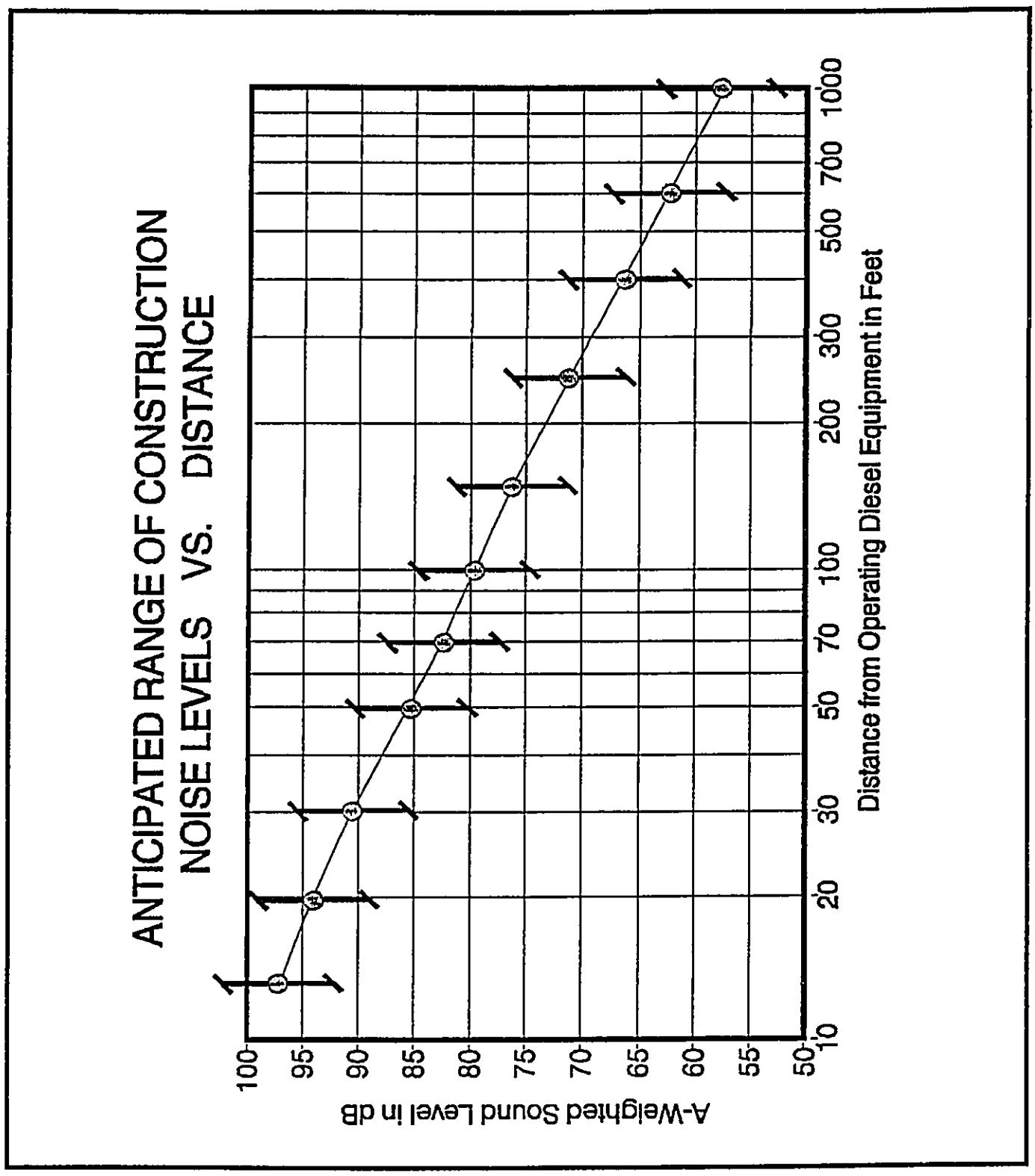
Traffic noise levels at the two student dormitory buildings near Location B (see **FIGURE 2**) are expected to increase by approximately 3 to 15 dB as a result of the South Papa Avenue extension. This degree of increase is considered to be large, but traffic noise mitigation measures are not required by FHA/HUD or FHWA standards for residences. Traffic noise mitigation measures would not normally be required at these dormitories due to the relatively low-to-moderate traffic noise levels predicted along the new section of South Papa Avenue.

If noise mitigation measures are desired in the future, construction of a 6 FT high sound wall between the South Papa Avenue extension and the two dormitory buildings would reduce future traffic noise levels by 5 to 10 dB within the ground floor units of the dormitories, but would not reduce future traffic noise levels within the second floor units. Realignment of the South Papa Avenue Extension by 50 FT east of its current alignment would reduce traffic noise levels by 3 to 4 dB at the dormitories. Lim-

iting traffic speeds to 25 MPH along the South Papa Avenue extension would reduce predicted noise levels by approximately 5 dB at the student dormitory buildings. Closure and air conditioning of the dormitory units is another possible noise mitigation measure. The installation of sound attenuating windows (as was used in the Hale Noho and Skill Village Subdivisions) is another possible noise mitigation measure, but would require reconstruction of the east wall of the two dormitory buildings.

Construction Noise. Audible construction noise will probably be unavoidable during the entire project construction period. The total time period for construction is unknown, but it is anticipated that the actual work will be moving from one location on the project site to another during that period. Actual length of exposure to construction noise at any receptor location will probably be less than the total construction period for the entire project. Typical levels of noise from construction activities (excluding pile driving activity) are shown in **FIGURE 15**. The noise sensitive properties which are predicted to experience the highest noise levels during construction activities on the project site are the existing college student dormitory area adjacent to the South Papa Avenue extension, and the Maui Central Park areas along the proposed Parkway. Adverse impacts from construction noise are not expected to be in the "public health and welfare" category due to the temporary nature of the work and due to the administrative controls available for its regulation. Instead, these impacts will probably be limited to the temporary degradation of the quality of the acoustic environment in the immediate vicinity of the project site.

Mitigation of construction noise to inaudible levels will not be practical in all cases due to the intensity of construction noise sources (80 to 90+ dB at 50 FT distance), and due to the exterior nature of the work (rock breaking, grading and earth moving, trenching, concrete pouring, hammering, etc.). The use of



CONSTRUCTION NOISE LEVELS VS. DISTANCE

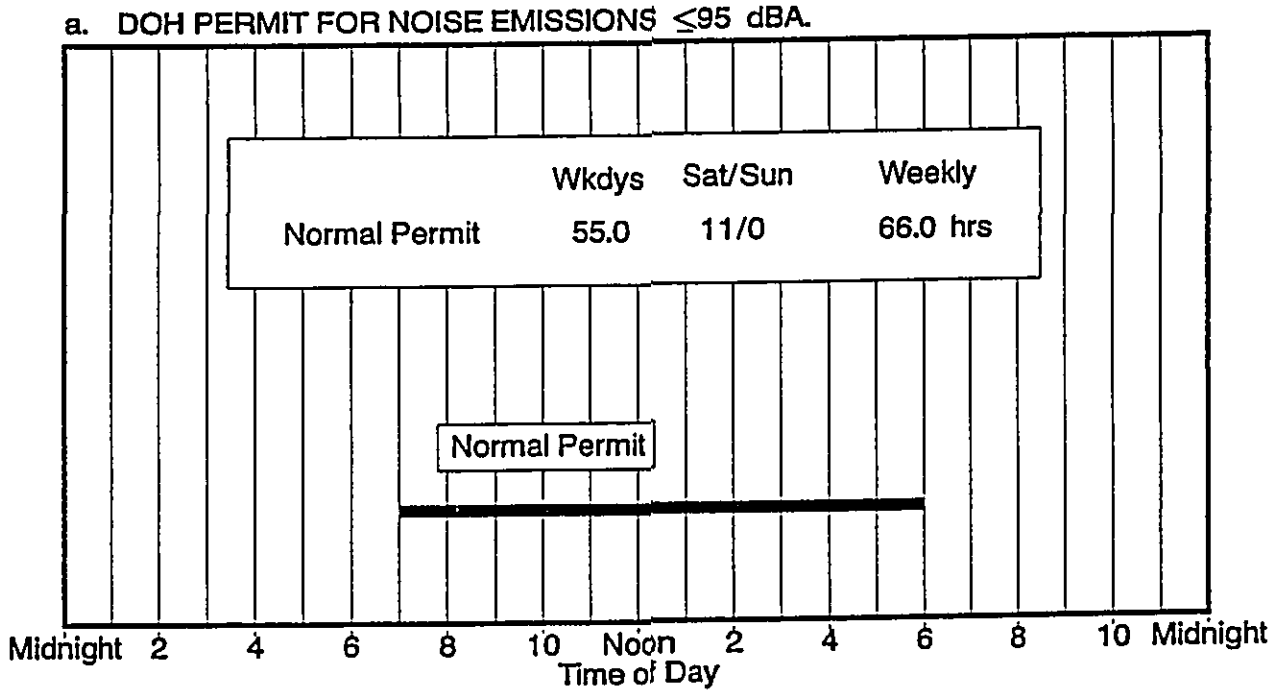
FIGURE 15

properly muffled construction equipment should be required on the job site. The incorporation of State Department of Health construction noise limits and curfew times, which are applicable on the island of Oahu (**Reference 11**), is another noise mitigation measure which can be applied to this project. **TABLE 7** depicts the allowed hours of construction for normal construction noise (levels which do not exceed 95 dB at the project's property line) and for construction noise which exceeds 95 dB at the project's property line. Noisy construction activities are not allowed on holidays under the DOH permit procedures.

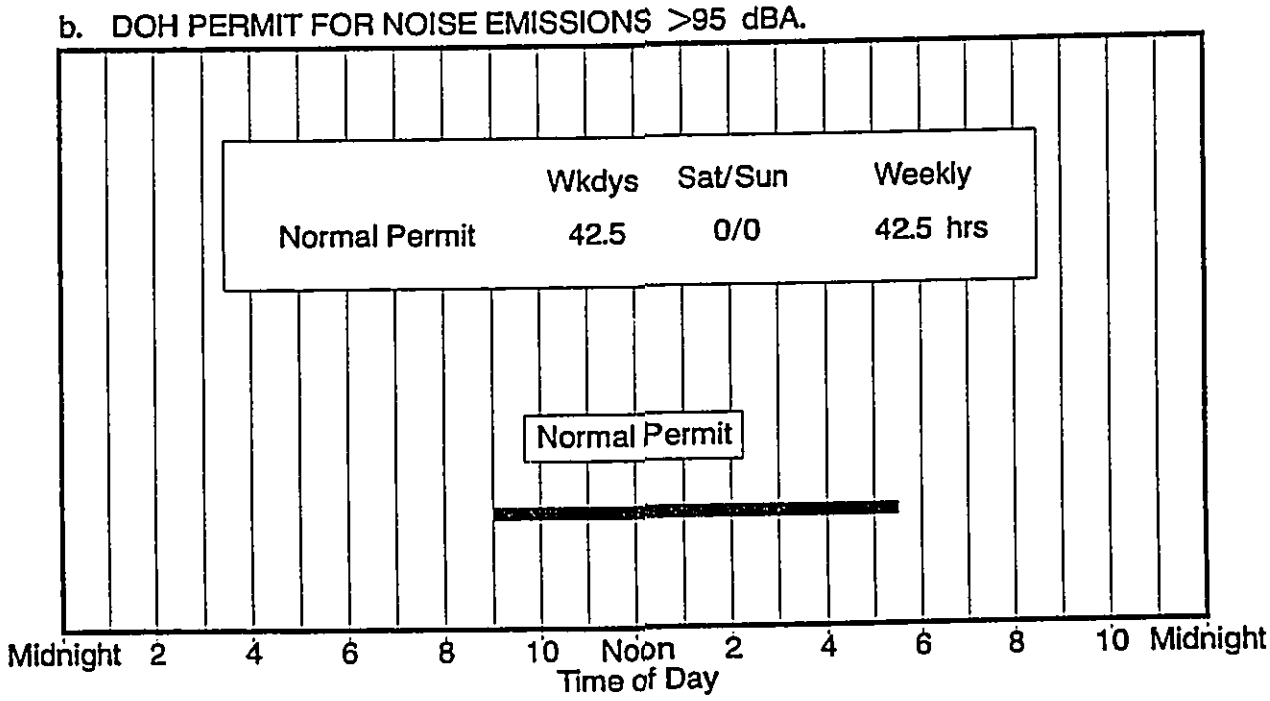
TABLE 7

AVAILABLE WORK HOURS UNDER DOH PERMIT PROCEDURES FOR CONSTRUCTION NOISE

a. DOH PERMIT FOR NOISE EMISSIONS ≤95 dBA.



b. DOH PERMIT FOR NOISE EMISSIONS >95 dBA.



APPENDIX A. REFERENCES

(1) "Guidelines for Considering Noise in Land Use Planning and Control;" Federal Interagency Committee on Urban Noise; June 1980.

(2) "Environmental Criteria and Standards, Noise Abatement and Control, 24 CFR, Part 51, Subpart B;" U.S. Department of Housing and Urban Development; July 12, 1979.

(3) "Information on Levels of Environmental Noise Requisite to Protect the Public Health and Welfare with an Adequate Margin of Safety;" U.S. Environmental Protection Agency; EPA 550/9-74-004; March 1974.

(4) Federal Highway Administration; "Procedures for Abatement of Highway Traffic Noise and Construction Noise;" 23 CFR Chapter I, Subchapter J, Part 772; July 8, 1982.

(5) Barry, T. and J. Reagan, "FHWA Highway Traffic Noise Prediction Model"; FHWA-RD-77-108, Federal Highway Administration; Washington, D.C.; December 1978.

(6) Existing (September 1992) Traffic Counts at Intersections in the Vicinity of Maui Community College; Transmittal from Austin, Tsutsumi & Associates, Inc.; April 22, 1993.

(7) Future (1994) Traffic Assignments for Maui Central Park Master Plan Project; Transmittals from Austin, Tsutsumi & Associates, Inc.; April 24 and 26, 1993.

(8) 24-Hour Traffic Counts, Station 1-G, South Papa Avenue at Kaahumanu Avenue; April 24, 1991; Hawaii State Department of Transportation.

(9) 24-Hour Traffic Counts, Station 1-H, Kaahumanu Avenue at Kanaloa Avenue; April 23, 1991; Hawaii State Department of Transportation.

(10) 24-Hour Traffic Counts, Station 3-G, Kanaloa Avenue at Kahului Beach Road; April 23, 1991; Hawaii State Department of Transportation.

(11) "Title 11, Administrative Rules, Chapter 43, Community Noise Control for Oahu"; Hawaii State Department of Health; November 6, 1981.

APPENDIX B

EXCERPTS FROM EPA'S ACOUSTIC TERMINOLOGY GUIDE

Descriptor Symbol Usage

The recommended symbols for the commonly used acoustic descriptors based on A-weighting are contained in Table I. As most acoustic criteria and standards used by EPA are derived from the A-weighted sound level, almost all descriptor symbol usage guidance is contained in Table I.

Since acoustic nomenclature includes weighting networks other than "A" and measurements other than pressure, an expansion of Table I was developed (Table II). The group adopted the ANSI descriptor-symbol scheme which is structured into three stages. The first stage indicates that the descriptor is a level (i.e., based upon the logarithm of a ratio), the second stage indicates the type of quantity (power, pressure, or sound exposure), and the third stage indicates the weighting network (A, B, C, D, E.....). If no weighting network is specified, "A" weighting is understood. Exceptions are the A-weighted sound level and the A-weighted peak sound level which require that the "A" be specified. For convenience in those situations in which an A-weighted descriptor is being compared to that of another weighting, the alternative column in Table II permits the inclusion of the "A". For example, a report on blast noise might wish to contrast the LCdn with the LAdn.

Although not included in the tables, it is also recommended that "Lpn" and "LepN" be used as symbols for perceived noise levels and effective perceived noise levels, respectively.

It is recommended that in their initial use within a report, such terms be written in full, rather than abbreviated. An example of preferred usage is as follows:

The A-weighted sound level (LA) was measured before and after the installation of acoustical treatment. The measured LA values were 85 and 75 dB respectively.

Descriptor Nomenclature

With regard to energy averaging over time, the term "average" should be discouraged in favor of the term "equivalent". Hence, Leq, is designated the "equivalent sound level". For Ld, Ln, and Ldn, "equivalent" need not be stated since the concept of day, night, or day-night averaging is by definition understood. Therefore, the designations are "day sound level", "night sound level", and "day-night sound level", respectively.

The peak sound level is the logarithmic ratio of peak sound pressure to a reference pressure and not the maximum root mean square pressure. While the latter is the maximum sound pressure level, it is often incorrectly labelled peak. In that sound level meters have "peak" settings, this distinction is most important.

"Background ambient" should be used in lieu of "background", "ambient", "residual", or "indigenous" to describe the level characteristics of the general background noise due to the contribution of many unidentifiable noise sources near and far.

With regard to units, it is recommended that the unit decibel (abbreviated dB) be used without modification. Hence, DBA, PNdB, and EPNdB are not to be used. Examples of this preferred usage are: the Perceived Noise Level (Lpn was found to be 75 dB. Lpn = 75 dB). This decision was based upon the recommendation of the National Bureau of Standards, and the policies of ANSI and the Acoustical Society of America, all of which disallow any modification of bel except for prefixes indicating its multiples or submultiples (e.g., deci).

Noise Impact

In discussing noise impact, it is recommended that "Level Weighted Population" (LWP) replace "Equivalent Noise Impact" (ENI). The term "Relative Change of Impact" (RCI) shall be used for comparing the relative differences in LWP between two alternatives.

Further, when appropriate, "Noise Impact Index" (NII) and "Population Weighed Loss of Hearing" (PHL) shall be used consistent with CHABA Working Group 69 Report Guidelines for Preparing Environmental Impact Statements (1977).

APPENDIX B (CONTINUED)

TABLE I

A-WEIGHTED RECOMMENDED DESCRIPTOR LIST

TERM	SYMBOL
1. A-Weighted Sound Level	L_A
2. A-Weighted Sound Power Level	L_{WA}
3. Maximum A-Weighted Sound Level	L_{max}
4. Peak A-Weighted Sound Level	L_{Apk}
5. Level Exceeded x% of the Time	L_x
6. Equivalent Sound Level	L_{eq}
7. Equivalent Sound Level over Time (T) (1)	$L_{eq(T)}$
8. Day Sound Level	L_d
9. Night Sound Level	L_n
10. Day-Night Sound Level	L_{dn}
11. Yearly Day-Night Sound Level	$L_{dn(Y)}$
12. Sound Exposure Level	L_{SE}

(1) Unless otherwise specified, time is in hours (e.g. the hourly equivalent level is $L_{eq(1)}$). Time may be specified in non-quantitative terms (e.g., could be specified a $L_{eq(WASH)}$ to mean the washing cycle noise for a washing machine).

SOURCE: EPA ACOUSTIC TERMINOLOGY GUIDE, BNA 8-14-78, NOISE REGULATION REPORTER.

APPENDIX B (CONTINUED)

TABLE II

RECOMMENDED DESCRIPTOR LIST

TERM	A-WEIGHTING	ALTERNATIVE[1] A-WEIGHTING	OTHER[2] WEIGHTING	UNWEIGHTED
1. Sound (Pressure)[3] Level	L_A	L_{pA}	L_B, L_{pB}	L_p
2. Sound Power Level	L_{WA}		L_{WB}	L_W
3. Max. Sound Level	L_{max}	L_{Amax}	L_{Bmax}	L_{pmax}
4. Peak Sound (Pressure) Level	L_{Apk}		L_{Bpk}	L_{pk}
5. Level Exceeded x% of the time	L_x	L_{Ax}	L_{Bx}	L_{px}
6. Equivalent Sound Level	L_{eq}	L_{Aeq}	L_{Beq}	L_{peq}
7. Equivalent Sound Level[4] Over Time(T)	$L_{eq(T)}$	$L_{Aeq(T)}$	$L_{Beq(T)}$	$L_{peq(T)}$
8. Day Sound Level	L_d	L_{Ad}	L_{Bd}	L_{pd}
9. Night Sound Level	L_n	L_{An}	L_{Bn}	L_{pn}
10. Day-Night Sound Level	L_{dn}	L_{Adn}	L_{Bdn}	L_{pdn}
11. Yearly Day-Night Sound Level	$L_{dn(Y)}$	$L_{Adn(Y)}$	$L_{Bdn(Y)}$	$L_{pdn(Y)}$
12. Sound Exposure Level	L_S	L_{SA}	L_{SB}	L_{Sp}
13. Energy Average value over (non-time domain) set of observations	$L_{eq(e)}$	$L_{Aeq(e)}$	$L_{Beq(e)}$	$L_{peq(e)}$
14. Level exceeded x% of the total set of (non-time domain) observations	$L_{x(e)}$	$L_{Ax(e)}$	$L_{Bx(e)}$	$L_{px(e)}$
15. Average L_x value	L_x	L_{Ax}	L_{Bx}	L_{px}

(1) "Alternative" symbols may be used to assure clarity or consistency.

(2) Only B-weighting shown. Applies also to C,D,E,.....weighting.

(3) The term "pressure" is used only for the unweighted level.

(4) Unless otherwise specified, time is in hours (e.g., the hourly equivalent level is Leq(1). Time may be specified in non-quantitative terms (e.g., could be specified as Leq(WASH) to mean the washing cycle noise for a washing machine.

Appendix C

Traffic Impact Report

TRAFFIC ASSESSMENT

NEW PARKWAY AND PAPA AVENUE EXTENSION

MAUI CENTRAL PARK

KAHULUI, MAUI

DRAFT

PREPARED FOR

DEPARTMENT OF

PUBLIC WORKS AND WASTE MANAGEMENT

COUNTY OF MAUI

By

Austin, Tsutsumi & Associates, Inc.
Engineers • Surveyors
Honolulu • Hilo • Wailuku, Hawaii

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April 1993

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TRAFFIC ASSESSMENT

NEW PARKWAY AND PAPA AVENUE EXTENSION

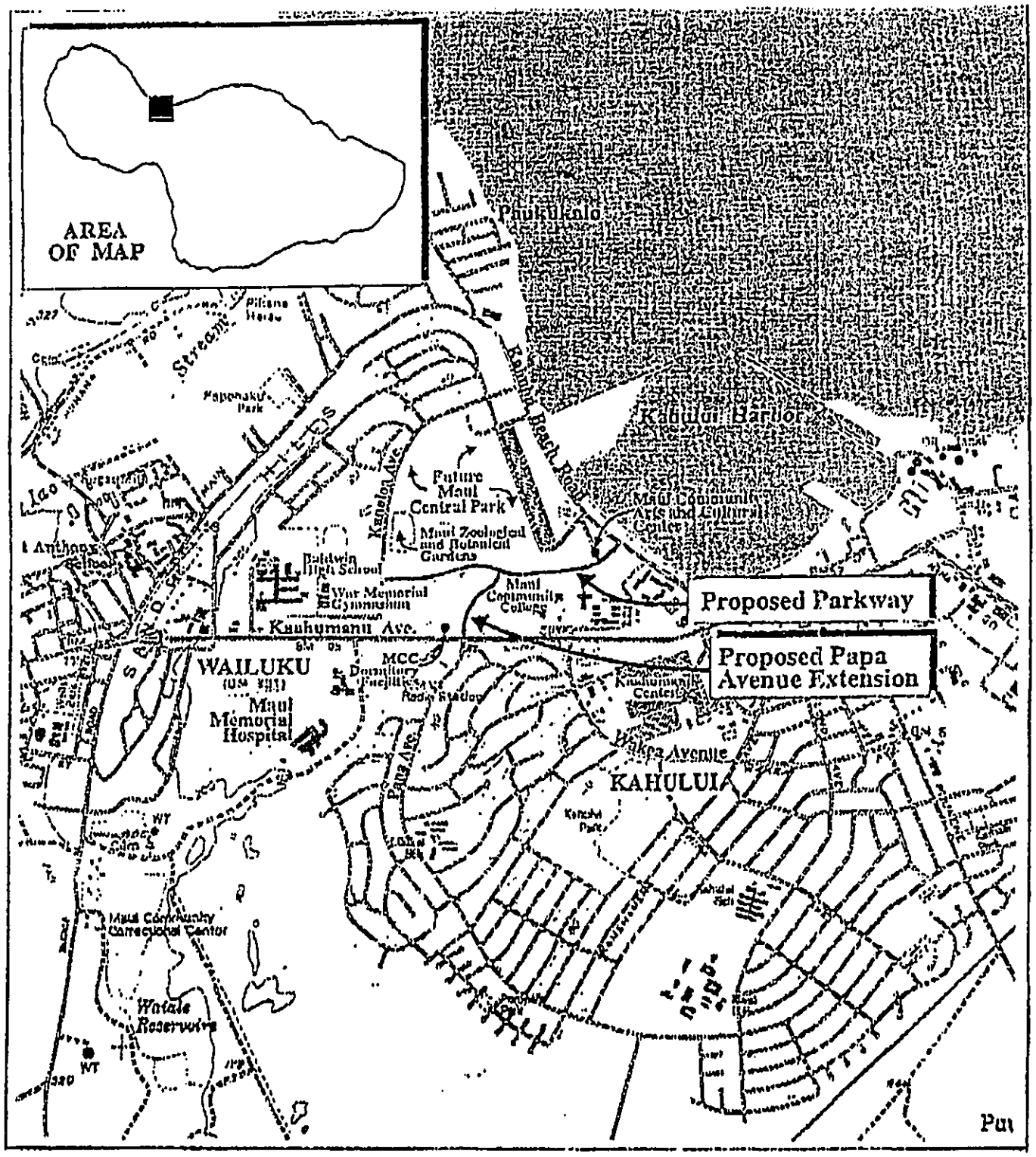
MAUI CENTRAL PARK

I. INTRODUCTION

A. Project Description

The County of Maui proposes to construct the Maui Central Park Parkway and extension of Papa Avenue. Maui Central Park is located in Kahului, Maui and is generally bounded by Kanaloa Avenue on the west, Maui Community College on the south, Kahului Beach Road on the east and an existing residential development on the north. Specifically, the project site is identified as TMK: 3-8-7:Por. 1; and 3-7-1:Por. 2. Exhibit No. 1 shows the location of the project.

The proposed Parkway and the Papa Avenue extension are located along the southern boundary of Maui Central Park. The Parkway will provide a link between Kahului Beach Road and Kanaloa Avenue. It will form a T-intersection with Kahului Beach Road along the northerly edge of Maui Community College and south of the Maui Community Arts and Cultural Center; and it will form a full four-legged intersection with Kanaloa Avenue across from the access driveway to the War Memorial Center parking area.



Papa Avenue will be extended from its present dead end location at the Maui Community College dormitory area to form a T-intersection with the new Parkway, thus providing a link between Kaahumanu Avenue and the Parkway.

The new Parkway will be a four-lane divided roadway with 100-foot wide right-of-way. The Papa Avenue extension will be a standard County 60-foot wide right-of-way collector road.

B. Purpose

This traffic assessment documents the methodology used in developing the traffic distribution resulting from the construction of the proposed roadways and in determining its impact on traffic operations on the existing roadways in the vicinity of the project.

The existing streets impacted by the proposed roadways are Kanaloa Avenue, Kahului Beach Road and Kaahumanu Avenue. The study area limits are defined by the following intersections:

- Kaahumanu Avenue/Kanaloa Avenue/Mahalani Street;
- Kaahumanu Avenue/Kahului Beach Road/Kane Street; and
- Kahului Beach Road/Kanaloa Avenue.

II. EXISTING CONDITIONS

A. Roadways

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

Kaahumanu Avenue is a six-lane, divided State arterial highway. All of the intersections within the study area are controlled by traffic-actuated

traffic signal systems, which are supervised by a master controller for coordinated operations. Each of the intersections is channelized to provide for separate left-turn lanes and right-turn deceleration lanes on the Kaahumanu Avenue roadway approaches to the intersection. The traffic signal systems function on a protected/permissive mode for left-turning vehicles on Kaahumanu Avenue.

Kahului Beach Road is a two-lane, two-way State collector road. It begins at Kaahumanu Avenue and ends at the Lower Main Street/Waiehu Beach Road intersection, about 1200 feet north of the Kanaloa Avenue intersection.

Kanaloa Avenue is a County four-lane collector road between Kaahumanu Avenue and the makai limits of the War Memorial Center area, where it narrows to a wide, two-lane roadway to its intersection with Kahului Beach Road. The Kahului Beach Road/Kanaloa Avenue intersection is controlled by a three-phase, traffic-actuated signal system.

B. Traffic Operations

1. General

Kaahumanu Avenue is the primary arterial highway between Wailuku and Kahului. Major traffic generators that have access off Kaahumanu Avenue within the study area include Kaahumanu Center, Baldwin High School, the Maui Police Department Headquarters, Kaiser Medical Clinic, Maui Memorial Hospital and Maui Community College.

Kanaloa Avenue provides the roadway link between Kaahumanu Avenue and Kahului Beach Road. Traffic utilizing Kanaloa Avenue is generally traveling between Kaahumanu Avenue and the Lower Main Street/Waiehu Beach Road area. Traffic on Kanaloa Avenue is also

generated by the residential area on the north and northwest areas off Kanaloa Avenue and Baldwin High School.

Kahului Beach Road generally carries through traffic between Kaahumanu Avenue and Lower Main Street/Waiehu Beach Road. The Harbor Lights Condominium and the students utilizing the "back" entrance to Maui Community College on Kaihee Place generate commuter traffic onto Kahului Beach Road.

The highway capacity analysis performed for 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 Highway Administration.

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

The definitions for the various Levels of Service are included in the Appendix.

2. Kaahumanu Avenue

During the AM peak period of traffic, Kaahumanu Avenue is congested in the Wailuku bound direction in the study area. The primary cause of the delay on Kaahumanu Avenue is the heavy left-turn demand at Mahalani Street, which often causes the left-turning vehicles to spill over into the Wailuku bound through lane. This causes the through traffic to queue back on Kaahumanu Avenue, which affects the left-turning vehicles from Papa Avenue. This chain reaction impacts operation on Kaahumanu Avenue, especially in the west bound direction.

3. Kanaloa Avenue

Traffic on Kanaloa Avenue experiences delays at the Kaahumanu Avenue intersection and at the Kahului Beach Road intersection. Kanaloa Avenue provides the link from Kahului Beach Road to Kaahumanu Avenue and, therefore, attracts the heavy left-turn demand to south bound Kaahumanu Avenue during both the AM and PM peak periods of traffic.

At the Kahului Beach Road intersection, the left-turning traffic from Kanaloa Avenue has difficulty clearing the intersection, due to the queuing on Kahului Beach Road at the Waiehu Beach Road/Lower Main Street traffic signal.

4. Kahului Beach Road

Traffic is congested, especially during the PM peak hour of traffic, at the Kaahumanu Avenue/Kahului Beach Road/Kane Street intersection. The left-turn traffic demand from Kahului Beach Road exceeds the capacity of the double left-turn movement to east bound Kaahumanu Avenue. Left-turning traffic experiences difficulty in exiting Kaihee Place during the peak periods of traffic due to the high volume of traffic on Kahului Beach Road.

5. Exhibit Nos. 2 and 3 show the existing LOS during the peak hour of traffic.

III. FUTURE IMPROVEMENTS

Proposed improvements to the existing roadways in the study area include the widening of Kahului Beach Road to two lanes in each direction from Kaahumanu Avenue to Waiehu Beach Road/Lower Main Street. Lower Main Street is also proposed to be widened to two lanes in each direction by the County of Maui.

Wakea Avenue, between Kaahumanu Avenue and Kea Avenue, is proposed to be widened by the County to provide two lanes in each direction, with separate turning lanes at the Kaahumanu Avenue intersection.

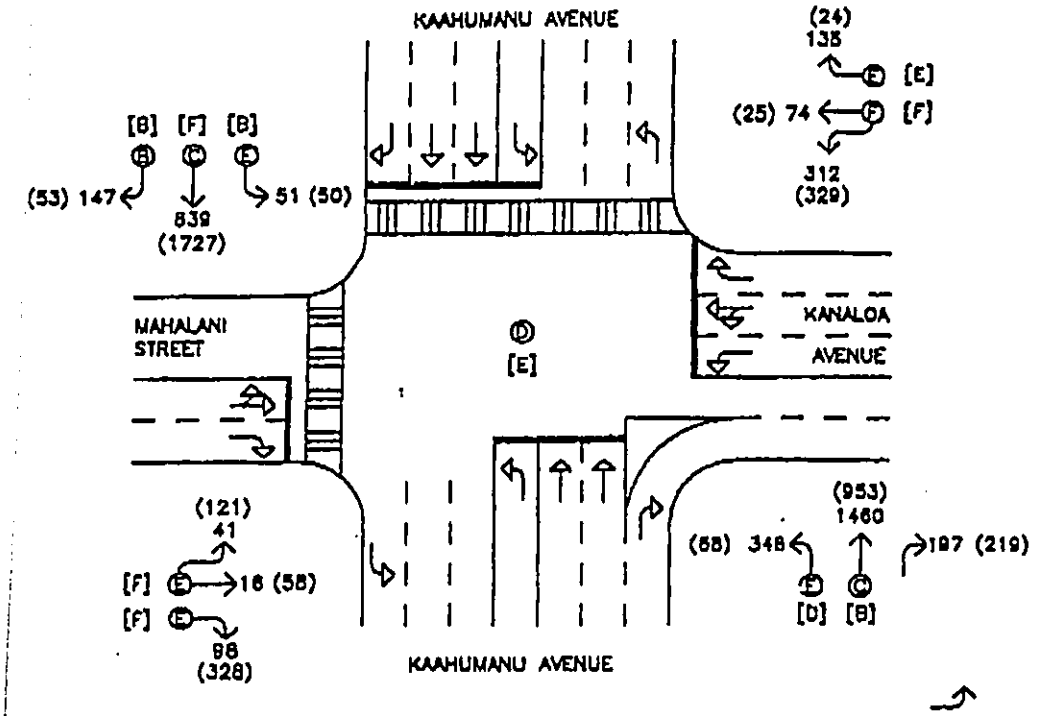
The State Department of Transportation is proposing to lengthen the left-turn storage lane on west bound Kaahumanu Avenue at the Mahalani Street/ Kanaloa Avenue intersection. This improvement will reduce the potential of left-turning vehicles spilling over into the through lane at this intersection.

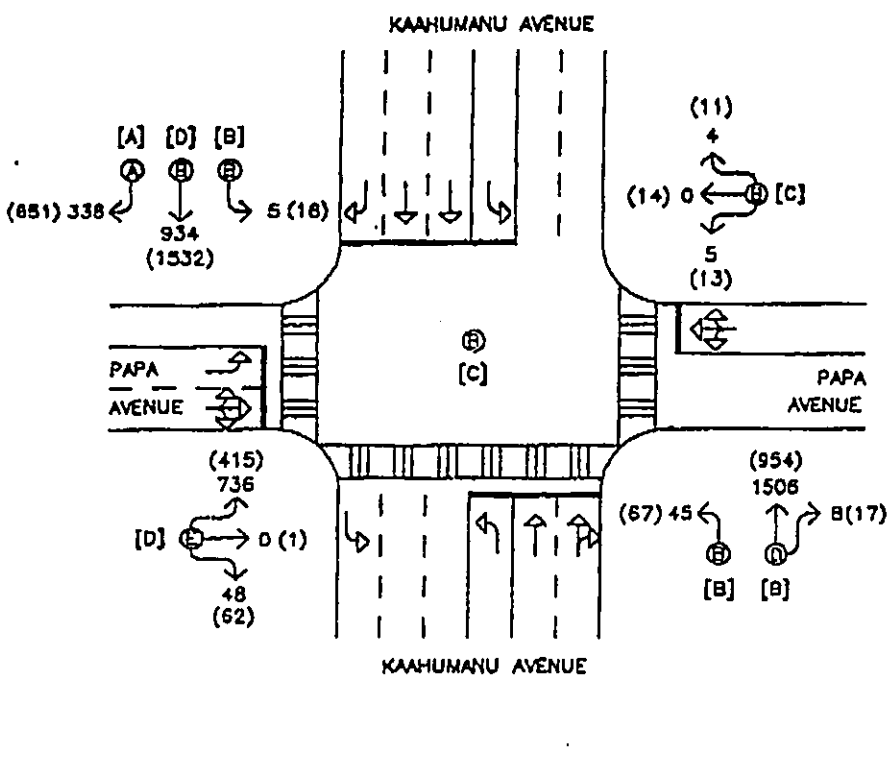
IV. PROPOSED CENTRAL PARK ROADWAY

A. General

The new Parkway will be a divided four-lane roadway with two lanes in each direction and a left-turn storage lane at its intersection with the Papa Avenue extension. The Parkway will consist of a 16-foot wide median, 32 feet of paved traveled way between curbs in each direction, and 10 feet of sidewalk/ landscape area between the curb and right-of-way line.

The Papa Avenue extension will be a two-lane, two-way roadway consisting of 24 feet of pavement and 18 feet of shoulder and landscaped area.



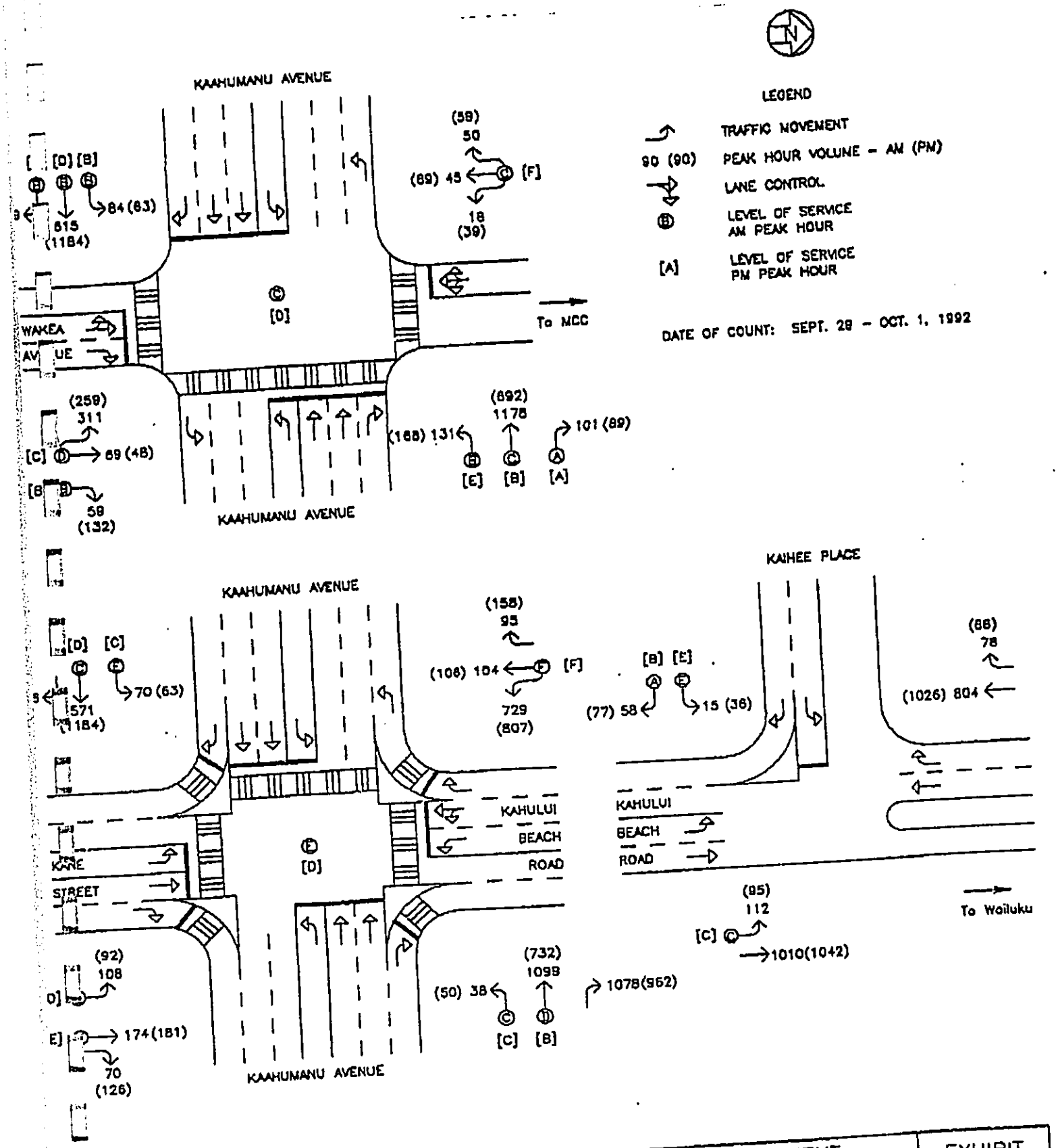


LEGEND

	TRAFFIC MOVEMENT
90 (90)	PEAK HOUR VOLUME – AM (PM)
	LANE CONTROL
Ⓑ	LEVEL OF SERVICE AM PEAK HOUR
[A]	LEVEL OF SERVICE PM PEAK HOUR

DATE OF COUNT: SEPT. 29 – OCT. 1, 1992

ATA AUSTIN, TSUTSUMI & ASSOCIATES, INC. ENGINEERS, SURVEYORS • HONOLULU, HAWAII	TRAFFIC ASSESSMENT MAUI CENTRAL PARK EXISTING AM AND PM PEAK HOUR TRAFFIC	EXHIBIT 2



AUSTIN, TSUTSUMI & ASSOCIATES, INC. ENGINEERS, SURVEYORS • HONOLULU, HAWAII	TRAFFIC ASSESSMENT MAUI CENTRAL PARK EXISTING AM AND PM PEAK HOUR TRAFFIC	EXHIBIT 3

The new Parkway/Kanaloa Avenue intersection will be a four-legged intersection formed with the access driveway to the War Memorial parking area. Left-turn storage lanes will be provided on all approach roadways to the intersection. At the Kahului Beach Road intersection, the new Parkway will form a T-intersection with Kahului Beach Road. The intersection geometrics will provide a left-turn storage lane and deceleration and acceleration lanes.

The roadway project is divided into three phases as follows:

1. Phase I – Four-lane parkway from Kahului Beach Road to the Papa Avenue Extension with completion scheduled in 1994.

2. Phase II – Two lanes, one in each direction, Parkway section from Papa Avenue extension to Kanaloa Avenue and the Papa Avenue Extension with completion scheduled in 1995.

3. Phase III – Construction of the additional lanes of the Parkway to full four-lane divided roadway between Kanaloa Avenue and the Papa Avenue extension with completion scheduled in 1996.

Exhibit No. 4 shows the proposed roadway alignments.

The new roadways, in and of themselves, will not generate new traffic. However, they will cause traffic to redistribute during the peak period of traffic as motorists will utilize these roadways to reduce their delays or travel times. These roadways will also serve to help distribute traffic whenever there are special events at the War Memorial Center or at Maui Central Park and will provide another access to Maui Community College.

B. Traffic Impact

The new roadways will have a positive impact on peak period traffic operations by redistributing traffic and reducing the demands at the

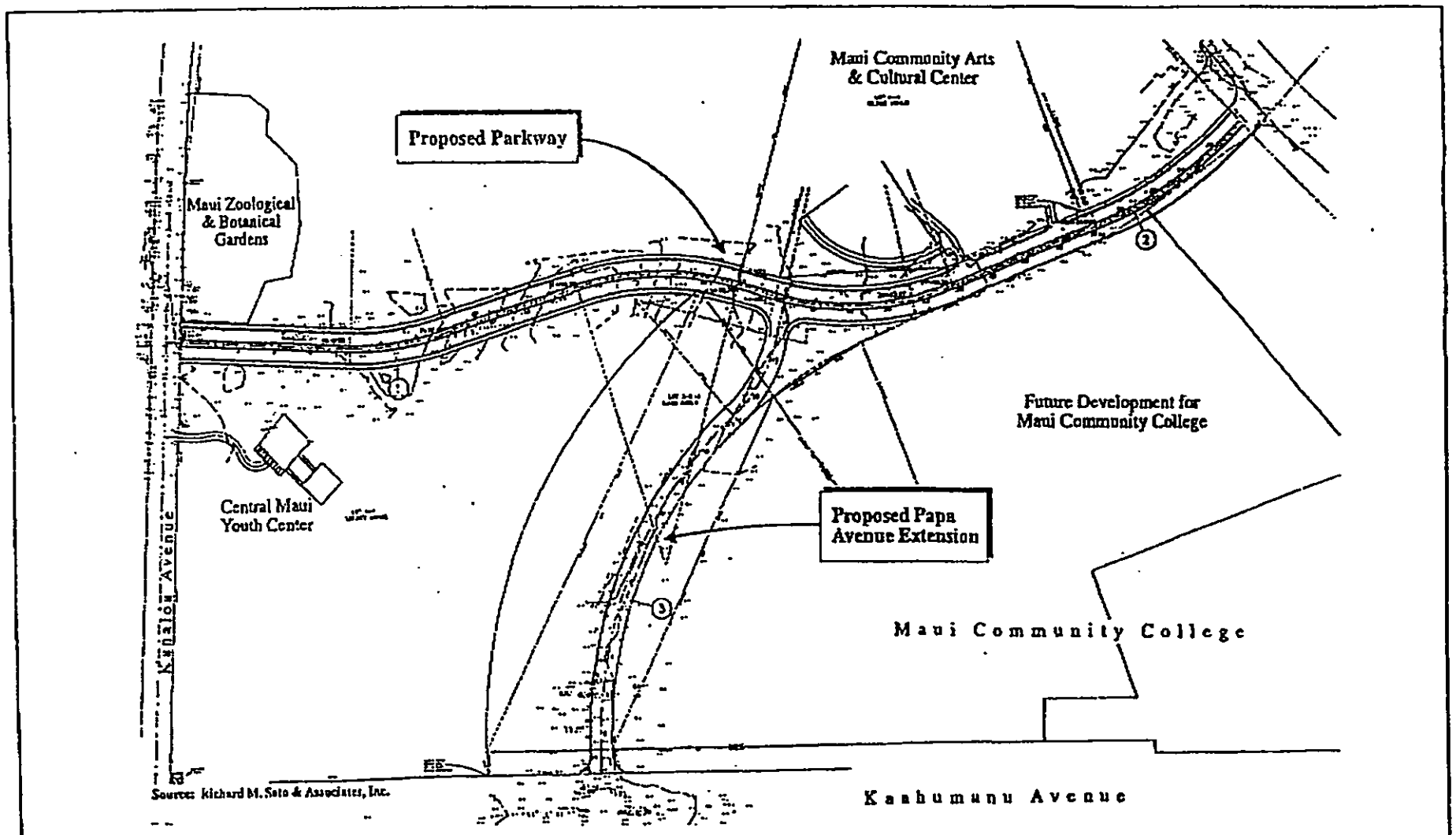


Figure 2 Maui Central Park Parkway and Papa Avenue Extension
Site Plan

NOT TO SCALE

Michael T. Munekiyo Consulting, Inc.
Prepared for: County of Maui, Dept. of Public Works

congested intersections. Motorists will seek what they feel is the "best" route in reducing their delay or travel time.

Exhibit Nos. 5 and 6 show a projected traffic redistribution and the new operating Levels of Service during the peak hours of traffic.

Although traffic will redistribute, the critical intersections between Wailuku and Kahului are still Kaahumanu Avenue/Kanaloa Avenue/Mahalani Street and Kahului Beach Road/Kanaloa Avenue.

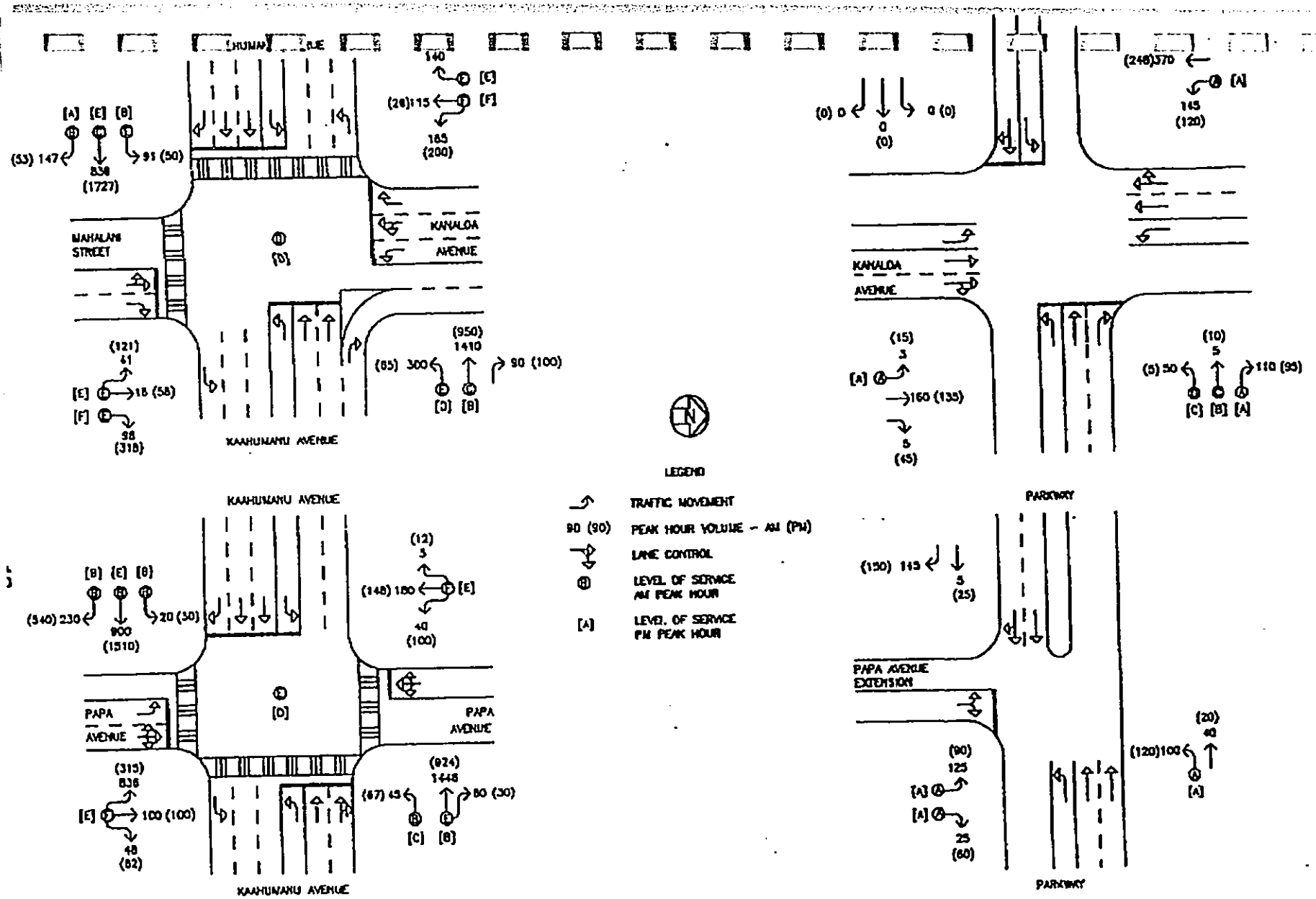
V. CONCLUSIONS AND RECOMMENDATIONS

A. Conclusions

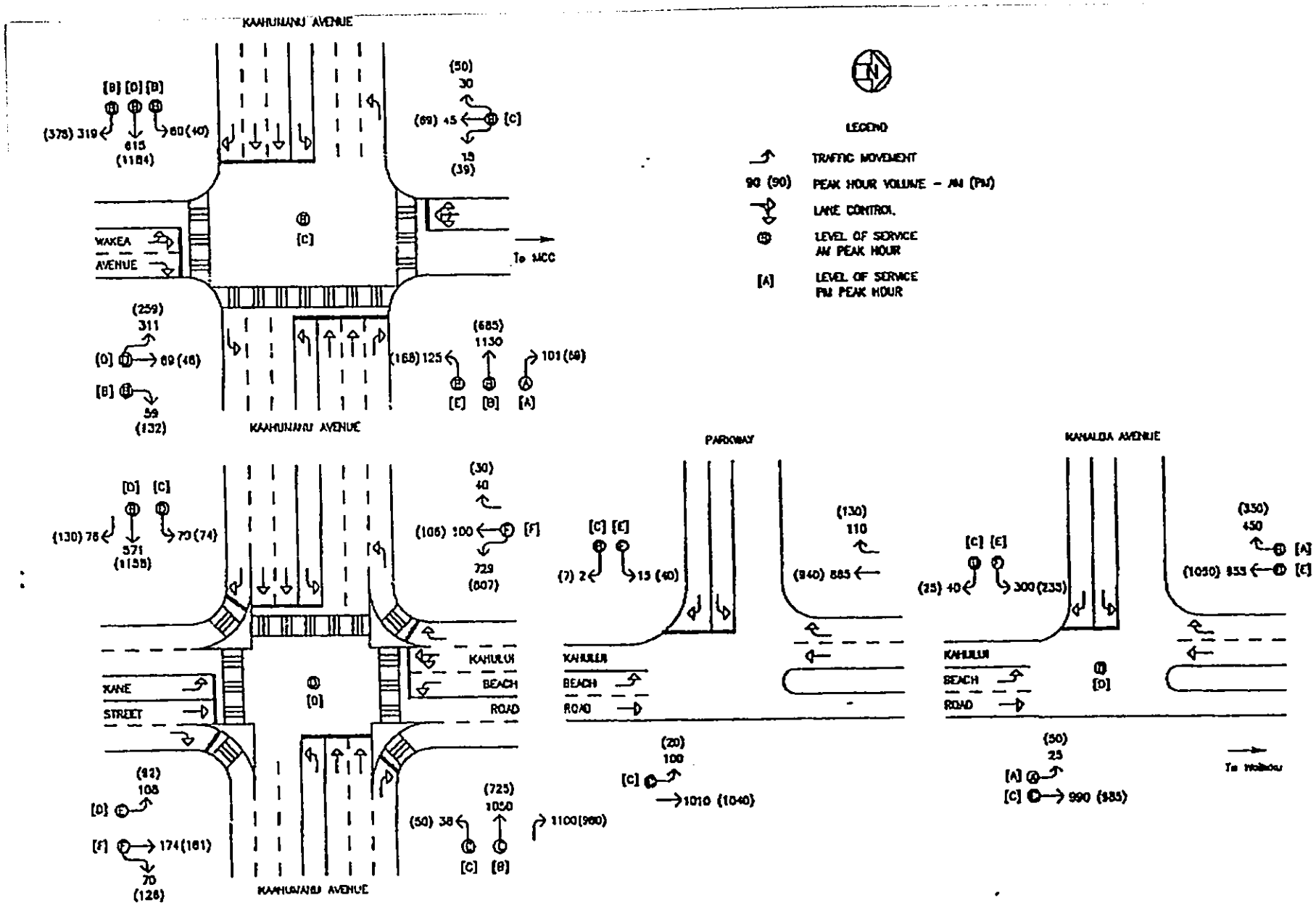
1. The proposed Parkway and Pepa Avenue extension will not adversely impact traffic operations on the existing streets in the vicinity of the project.

2. The new roadways offer motorists alternative routes of getting from point to point in the Kahului area.

3. The critical intersections for travel between Wailuku and Kahului remain the same; i.e., the Kaahumanu Avenue/Kanaloa Avenue/ Mahalani Street intersection and the Kahului Beach Road/Kanaloa Avenue intersection. Until the master planned roadways, by the State Department of Transportation/County of Maui Island-Wide Highway Master Plan are implemented, all traffic between these two population centers must funnel through the two critical intersections.



ATA AUSTIN, TSUTSUMI & ASSOCIATES, INC. ENGINEERS, SURVEYORS • HONOLULU, HAWAII	TRAFFIC ASSESSMENT MAUI CENTRAL PARK PROJECTED AM AND PM PEAK HOUR TRAFFIC	EXHIBIT 5



ATA AUSTIN, TSUTSUMI & ASSOCIATES, INC. ENGINEERS, SURVEYORS • HONOLULU, HAWAII	TRAFFIC ASSESSMENT MAUI CENTRAL PARK PROJECTED AM AND PM PEAK HOUR TRAFFIC	EXHIBIT 6

B. Recommendations

1. The Kaahumanu Avenue/Kanaloa Avenue/Mahalani Street intersection should be improved to provide a double left-turn capability from Kaahumanu Avenue to Mahalani Street, and a longer deceleration/right-turn lane on Kaahumanu Avenue to Kanaloa Avenue. These improvements are required to accommodate existing traffic demand.

2. The Kaahumanu Avenue/Papa Avenue intersection be improved to provide the following:

   a. South bound approach – separate left-turn, through and right-turn lanes. The left-turn storage lane should be a minimum of 200 feet long.

   b. The traffic signal system be modified to provide six-phase operation.

   c. Papa Avenue south of Kaahumanu Avenue be widened to provide two south bound lanes for a distance of 1,000 feet.

   d. The deceleration/right-turn lane of east bound Kaahumanu Avenue be lengthened to 800 feet. A minimum 300-foot long deceleration/right-turn lane be provided on the west bound Kaahumanu Avenue for right turns to Papa Avenue.

   e. These improvements should be implemented with the Phase II work.

3. **New Parkway/Kanaloa Avenue Intersection**

This intersection will be a four-legged intersection by including the access driveway to the War Memorial Center parking area. Kanaloa Avenue at this location should have two through lanes in each direction, left-turn storage lanes and right-turn deceleration lanes. The

side street approaches should provide for a left-turn, through and right-turn lane.

The storage lane lengths should be as follows:

a. Kanaloa Avenue: south bound 180 feet; north bound 100 feet;

b. Parkway - 180 feet;

c. Parking lot - 180 feet; and

d. Deceleration/right-turn - 200 feet.

A five-phase traffic signal system should be implemented with the Phase II work.

4. **Parkway/Kahului Beach Road Intersection**

This T-intersection should provide a separate left-turn lane on Kahului Beach Road with a minimum length of 120 feet. Deceleration and acceleration lanes should be provided on Kahului Beach Road. Conduits for a future traffic signal system should be placed at the time the intersection is constructed. The traffic signal system should be implemented with the Phase II construction.

5. **Parkway/Papa Avenue Extension**

A left-turn storage lane of 100 feet should be provided on the Parkway. A traffic signal system is not warranted at this intersection until traffic volumes increase significantly on the Parkway.

APPENDIX A

LEVEL OF SERVICE (LOS) DEFINITIONS

LEVEL OF SERVICE DEFINITIONS

1. LEVELS OF SERVICE CRITERIA FOR TWO-LANE HIGHWAYS

The highest quality of traffic service occurs when motorists are able to drive at their desired speed, representative of Level of Service A. Almost no platoons of three or more vehicles are observed. Drivers would be delayed no more than 30 percent of the time by slow-moving vehicles. A maximum flow rate of 420 pcph, total in both directions, may be achieved under ideal conditions.

Level of Service B characterizes the region of traffic flow where drivers are delayed up to 45 percent of the time on the average. Service flow rates of 750 pcph, total in both directions, can be achieved under ideal conditions. Above this flow rate, the number of platoons forming in the traffic stream begins to increase dramatically.

Further increases in flow characterize Level of Service C, resulting in noticeable increases in platoon formation, platoon size, and frequency of passing impediment. At high volume levels, chaining of platoons and significant reductions in passing capacity begin to occur. While traffic flow is stable, it is becoming susceptible to congestion due to turning traffic and slow-moving vehicles. Percent time delays are up to 60 percent. A service flow rate of up to 1,200 pcph, total in both directions, can be accommodated under ideal conditions.

Unstable traffic flow is approached as traffic flows enter Level of Service D. The two opposing traffic streams essentially begin to operate separately at higher volume levels. Mean platoon sizes of 5 to 10 vehicles are common, although speeds of 50 mph can still be maintained under ideal conditions. The fraction of no passing zones along the roadway section usually has little influence on passing. Turning vehicles and/or roadside distractions cause major shockwaves in the traffic stream. The percentage of time motorists are delayed approaches 75 percent. Maximum service flow rates of 1,800 pcph, total in both directions, can be maintained under ideal conditions. This is the highest flow rate that can be maintained for any length of time over an extended section of level terrain without a high probability of breakdown.

Level of Service E is defined as traffic flow conditions on two-lane highways having a percent time delay of greater than 75 percent. Passing is virtually impossible

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 oversaturation, i.e., when arrival flow rates 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.

3. LEVEL OF SERVICE CRITERIA FOR UNSIGNALIZED INTERSECTIONS

Level of Service definitions for unsignalized intersections is determined by the reserve or unused capacity of a lane. The potential capacity is determined by the size and frequency in gaps in conflicting traffic that can accommodate the side street demand. The reserve capacity is equal to the potential capacity minus the

under Level of Service E conditions, and platooning becomes intense when slower vehicles or other interruptions are encountered.

The highest volume attainable under Level of Service E defines the capacity of the highway. Under ideal conditions, capacity is 2,800 pcph, total in both directions. Operating conditions at capacity are unstable and difficult to predict. Traffic operations are seldom observed near capacity on rural highways, primarily because of a lack of demand.

As with other highway types, Level of Service F represents heavily congested flow with traffic demand exceeding capacity. Volumes are lower than capacity. Level of Service E is seldom attained over extended sections on level terrain as more than a transient condition; most often, perturbations in traffic flow as Level E is approached cause a rapid transition to Level of Service F.

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.

traffic demand. A lower Level of Service translates into longer side street delay. The Levels of Service criteria are shown in the following table:

Table A-2. Level-of-Service Criteria
for Unsignalized Intersections

Reserve Capacity (PCPH)	Level of Service	Expected Delay to Minor Street Traffic
≥ 400	A	Little or no delay
300-399	B	Short traffic delays
200-299	C	Average traffic delays
100-199	D	Long traffic delays
0- 99	E	Very long traffic delays
< 0	F	Extreme traffic delays

a. South bound approach -- separate left-turn, through and right-turn lanes. The left-turn storage lane should be a minimum of 200 feet.

b. The traffic signal system be modified to provide six-phase operation.

c. Papa Avenue south of Kaahumanu Avenue be widened to provide two south bound lanes for a distance of 1,000 feet.

d. The deceleration/right-turn lane of east bound Kaahumanu Avenue be lengthened to 800 feet. A minimum 300-foot deceleration/right-turn lane be provided on the west bound Kaahumanu Avenue for right turns to Papa Avenue.

e. These improvements should be implemented with the Phase II work.

3. New Parkway/Kanaloa Avenue Intersection

This intersection shall be a four-legged intersection by including the access driveway to the War Memorial Center parking area. Kanaloa Avenue at this location should have two through lanes in each direction, left-turn storage lanes and right-turn/deceleration lanes. The side street approaches should provide for a left-turn, through and right-turn lane.

The storage lane lengths should be as follows:

a. Kanaloa Avenue: south bound 180 feet; north bound 100 feet;

b. Parkway - 180 feet;

c. Parking lot - 180 feet; and

d. Deceleration/right-turn - 200 feet.

A five-phase traffic signal system should be implemented with the Phase II work.

4. Parkway/Kahului Beach Road Intersection

This T-intersection should provide for a separate left-turn lane on Kahului Beach Road of a minimum 120 feet in length. Deceleration and acceleration lanes should be provided on Kahului Beach Road. Conduits for a future traffic signal system should be placed at the time the intersection is constructed. The traffic signal system should be implemented with the Phase II construction.

5. Parkway/Papa Avenue Extension

A left-turn storage lane of 100 feet should be provided on the Parkway. A traffic signal system is not warranted at this intersection until traffic volumes increase significantly on the Parkway.

A five-phase traffic signal system should be implemented with the Phase II work.

4. Parkway/Kahului Beach Road Intersection

This T-intersection should provide for a separate left-turn lane on Kahului Beach Road of a minimum 120 feet in length. Deceleration and acceleration lanes should be provided on Kahului Beach Road. Conduits for a future traffic signal system should be placed at the time the intersection is constructed. The traffic signal system should be implemented with the Phase II construction.

5. Parkway/Papa Avenue Extension

A left-turn storage lane of 100 feet should be provided on the Parkway. A traffic signal system is not warranted at this intersection until traffic volumes increase significantly on the Parkway.

Appendix D

Preliminary Drainage Report Letter (by Sato & Associates)

PRELIMINARY DRAINAGE REPORT LETTER

I. PROJECT LOCATION

The proposed Maui Central Park Parkway and Papa Avenue Extension Project is located in Kahului, Maui, Hawaii, described by TMK: 3-8-7:por 1, por 40, por 117, por 125 and 3-7-1:por 2. The proposed parkway extends from Kanaloa Avenue south of the Maui Zoological and Botanical Gardens west to Kahului Beach Road between Maui Community College and the Maui Community Arts & Cultural Center. An extension of Papa Avenue at the intersection of Kaahumanu Avenue will intersect with the proposed parkway.

II. PROJECT DESCRIPTION

The proposed parkway will be a 4 lane divided parkway with a 16' grassed median. The median will be constructed with standard curbs. The road edge will have standard curb and gutter. A 6' wide concrete sidewalk will be on one or both sides of the parkway with the remaining right-of-way being grassed. The length of the proposal parkway is approximately 3200 feet.

The proposed Papa Avenue extension will be a two lane collector with a 24' wide pavement width within a 60' right-of-way. The length of the Papa Avenue extension is approximately 1500 feet.

The project will be divided into three phases. Phase I involves construction of two lanes of the four lane Parkway from Kahului Beach Road to the entrance of the Maui Community Arts & Cultural Center. Phase II involves extension of two lanes of the parkway to Kanaloa Avenue and construction of the Papa Avenue extension to the parkway. Phase III involves construction of an additional two lanes for the parkway from Kahului Beach Road to Kanaloa Avenue.

III. DRAINAGE

The proposed parkway and Papa Avenue extension site is currently unimproved. The area is vegetated with haole koa, kiawe, and various grasses and low lying shrubs.

The project slopes down in a north east direction from Kanaloa Avenue towards Kahului Beach Road. The area's rolling sand dune hills provides natural depression and areas for storm water ponding and disposal.

Road drainage for the proposed parkway will be collected in catch basins located along the parkway. Phase I drainage will be allowed to outlet through underground culverts beyond the right-of-way and allowed to pond in natural low lying areas.

Phase II construction will include tying in the parkway drainage to the county's proposed master plan drainage system as described in the "Kahului Drainage Master Plan," report by Ronald M. Fukumoto Engineering Inc., May 1992.

IV. CONCLUSION

Due to a minimal increase in drainage runoff anticipated for the proposed roadway construction, the proposed disposal of the phase I drainage waters by ponding in low lying areas and the proposed connection to the county's proposed Master Plan Drainage System in phase II, it is our opinion there will be no significant adverse drainage impacts to the project and surround areas.