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GLENN M. OKIMOTO

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

RECEIVED

IN REPLY REFER TO:

HAR-ED
9723.97

'97 JUN 10 11:03

June 10, 1997

OFFICE OF ENVIRONMENTAL
QUALITY CONTROL

TO: GARY GILL, DIRECTOR
OFFICE OF ENVIRONMENTAL QUALITY CONTROL

FROM: KAZU HAYASHIDA *(Handwritten initials)*
DIRECTOR OF TRANSPORTATION

SUBJECT: FINDING OF NO SIGNIFICANT IMPACT FOR THE KAHULUI HARBOR
STORAGE YARD PAVING AND UTILITY IMPROVEMENTS, KAHULUI
HARBOR, MAUI H.C. 3280 AND BARGE TERMINAL IMPROVEMENTS,
KAHULUI HARBOR, MAUI H.C. 3281 ✓

In accordance with ACT 241, SLH 1992, we have completed the formal Draft Environmental Assessment 30-day review period. We have not received any adverse comments and have provided clarification to OEQC's comments and questions. Therefore, we have determined that these projects will not have any significant environmental effects, and are thus filing a Finding of No Significant Impact (FONSI). Please publish this notice in the June 23, 1997 OEQC Bulletin.

Enclosed are the original and four (4) copies of the FONSI and a completed OEQC Bulletin Publication Form.

Should you have any questions, please have your staff contact Fred Pascua of our Harbors Division at 587-1958.

Enc. Project Description (Disk- Files 3280sum.wpd and 3281sum.wpd - WP 6.0) Please return.

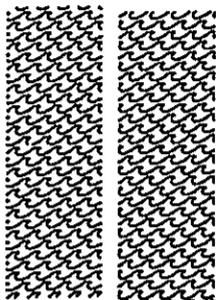
c: Sato and Associates (Loren Lau)
R. T. Tanaka Engineers, Inc. (Kirk Tanaka)

70

1997-06-23-MA-FEA-Kahului Harbor
Terminal Improvements

JUN 23 1997

FILE COPY



**FINAL ENVIRONMENTAL ASSESSMENT
and FINDING OF NO SIGNIFICANT IMPACT
for the**

**BARGE TERMINAL IMPROVEMENTS
KAHULUI HARBOR
Job H.C. 3281**



**STORAGE YARD PAVING AND UTILITY IMPROVEMENTS
KAHULUI HARBOR
Job H.C. 3280**

MAUI, HAWAII

Prepared for:

**STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HARBORS DIVISION
79 SOUTH NIMITZ HIGHWAY
HONOLULU, HAWAII 96813**

Prepared by:

**STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HARBORS DIVISION- DESIGN SECTION
79 SOUTH NIMITZ HIGHWAY
HONOLULU, HAWAII 96813**

in conjunction with:

**SATO & ASSOCIATES, INC.
2046 SOUTH KING STREET
HONOLULU, HAWAII 96826**

and

**R. T. TANAKA ENGINEERS, INC.
871 KOLU STREET, SUITE 201
WAILUKU, HAWAII 96793**

June 1997

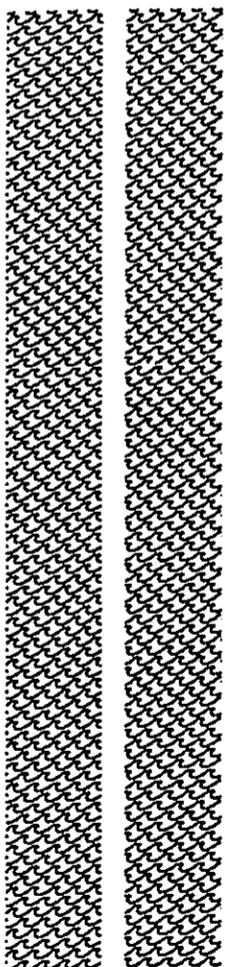


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- C. Botanical Study
- D. U.S. Department of Interior Letter
- E. GANDA/Aki Sinoto Archaeologist Report
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- H. Corp of Engineers Letter
- I. Memorandum of Understanding with Canoe Clubs
- J. Drainage Report H.C. 3280

I

PROJECT OVERVIEW

A. INTRODUCTION

The town of Kahului is a major commercial, industrial, and transportation center on the island of Maui. Located in Kahului, is the Port of Kahului which provides seaborne cargo transit to and from Maui. Refer to **FIGURE 1-1**.

The Port of Kahului is the only deep draft commercial harbor and is the principal transshipment point for seaborne cargo destined for and originating from the island of Maui. Pier 1 accommodates the larger overseas vessels and barges including the sugar ship, Matson barges, and numerous passenger cruise ships including the American Hawaiian Cruise Line. Pier 2 and 3 accommodates barge cargo operators which include Young Brothers, Ltd., Sause Brothers, Hawaiian Cement, GASCO, BHP Petroleum, and Chevron USA. The cargo handling operations within the harbor are congested and often requires customer pick-up and drop-off services to occur in areas where heavy cargo equipment are in operations.

B. DESCRIPTION OF OBJECTIVES AND PROPOSED ACTION

The proposed action will consist of two separately contracted projects and is an agency action by the State of Hawaii Department of Transportation, Harbors Division.

1. Objectives

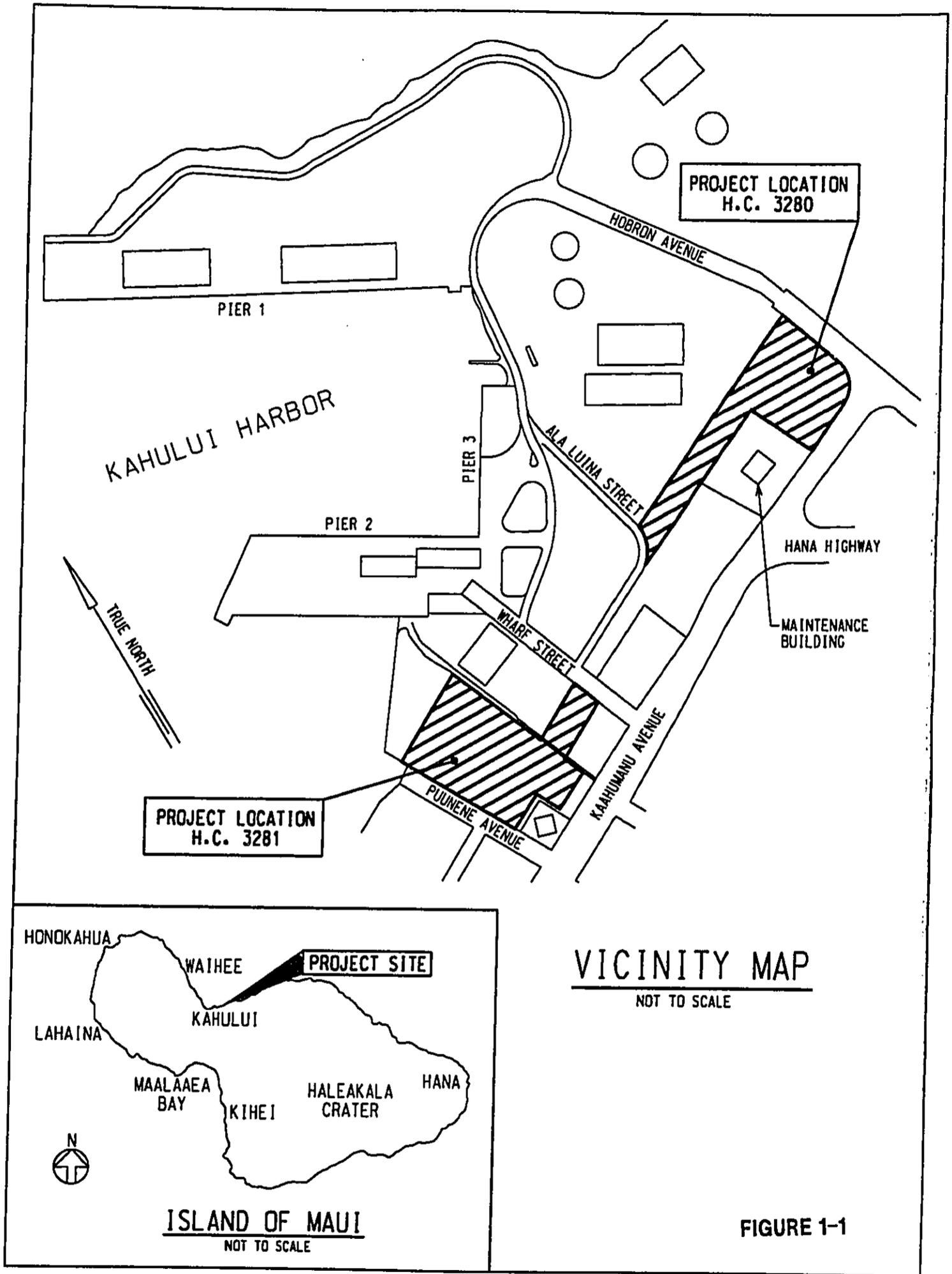
The objectives of the projects are to improve operational efficiency and reduce the heavily congested harbor cargo operations within the Port of Kahului by expansion onto 8.13 acres recently acquired by the State, H.C. 3281, and by paving and lighting 3.3 acres of an existing unpaved storage yard, H.C. 3280. Refer to **FIGURE 1-2** and **FIGURE 1-3**.

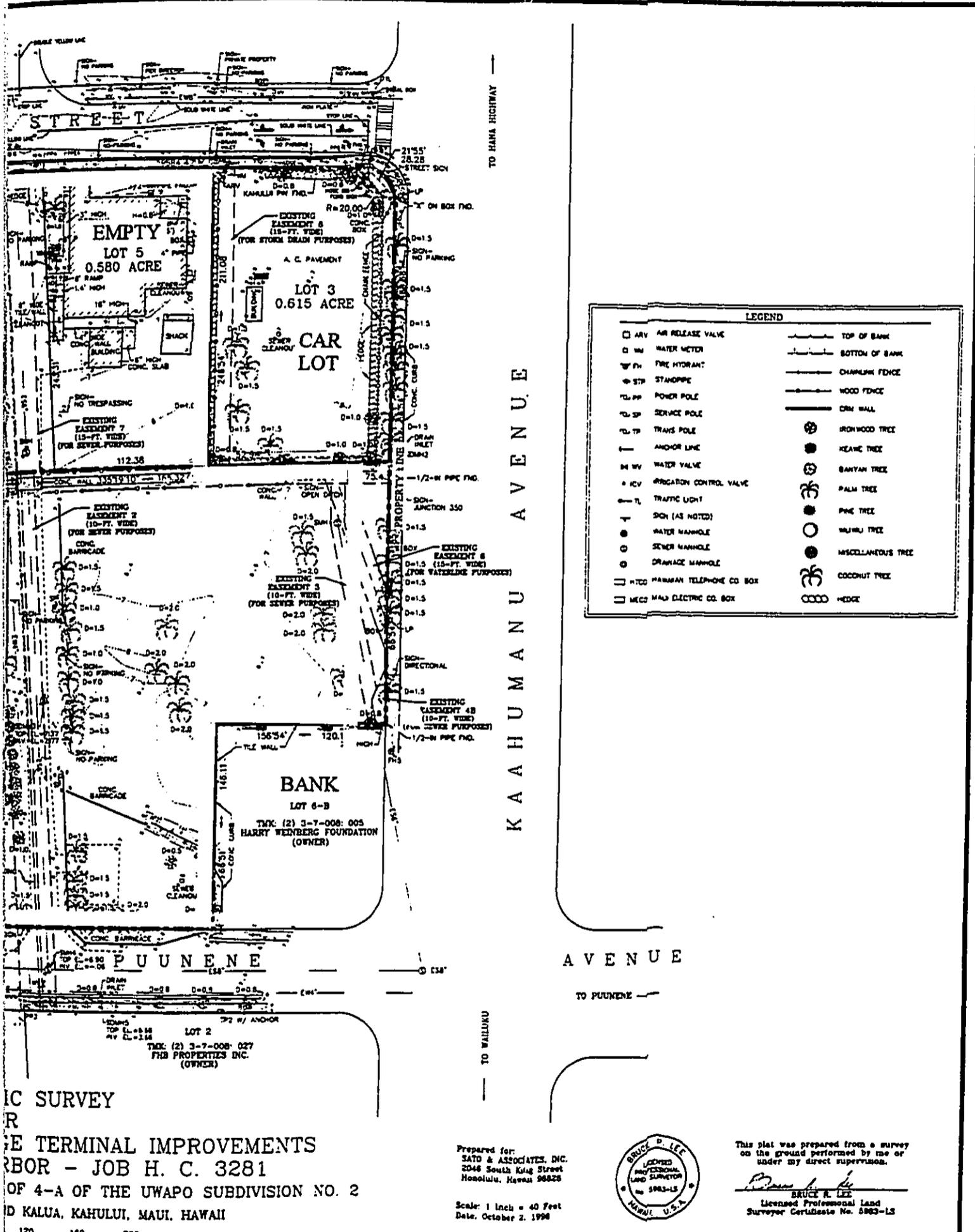
2. Proposed Action

H.C. 3281

The proposed project is to provide interim improvements to portions (4.6 acres) of the 8.13 acres to alleviate and reduce congestion in the harbor area. The interim improvements would provide short term storage of materials and vehicles in transit.

The improvements would include:





IC SURVEY
 R
 E TERMINAL IMPROVEMENTS
 RBOR - JOB H. C. 3281
 OF 4-A OF THE UWAPO SUBDIVISION NO. 2
 D KALUA, KAHULUI, MAUI, HAWAII

Prepared for:
 SATO & ASSOCIATES, INC.
 2048 South King Street
 Honolulu, Hawaii 96825

Scale: 1 inch = 40 Feet
 Date: October 2, 1996



This plat was prepared from a survey
 on the ground performed by me or
 under my direct supervision.

Bruce R. Lee
 BRUCE R. LEE
 Licensed Professional Land
 Surveyor Certificate No. 5963-L3

ND SURVEYORS, INC.
 WAILUKU, MAUI, HAWAII 96793

EXISTING TOPOGRAPHIC MAP

FIGURE 1-2

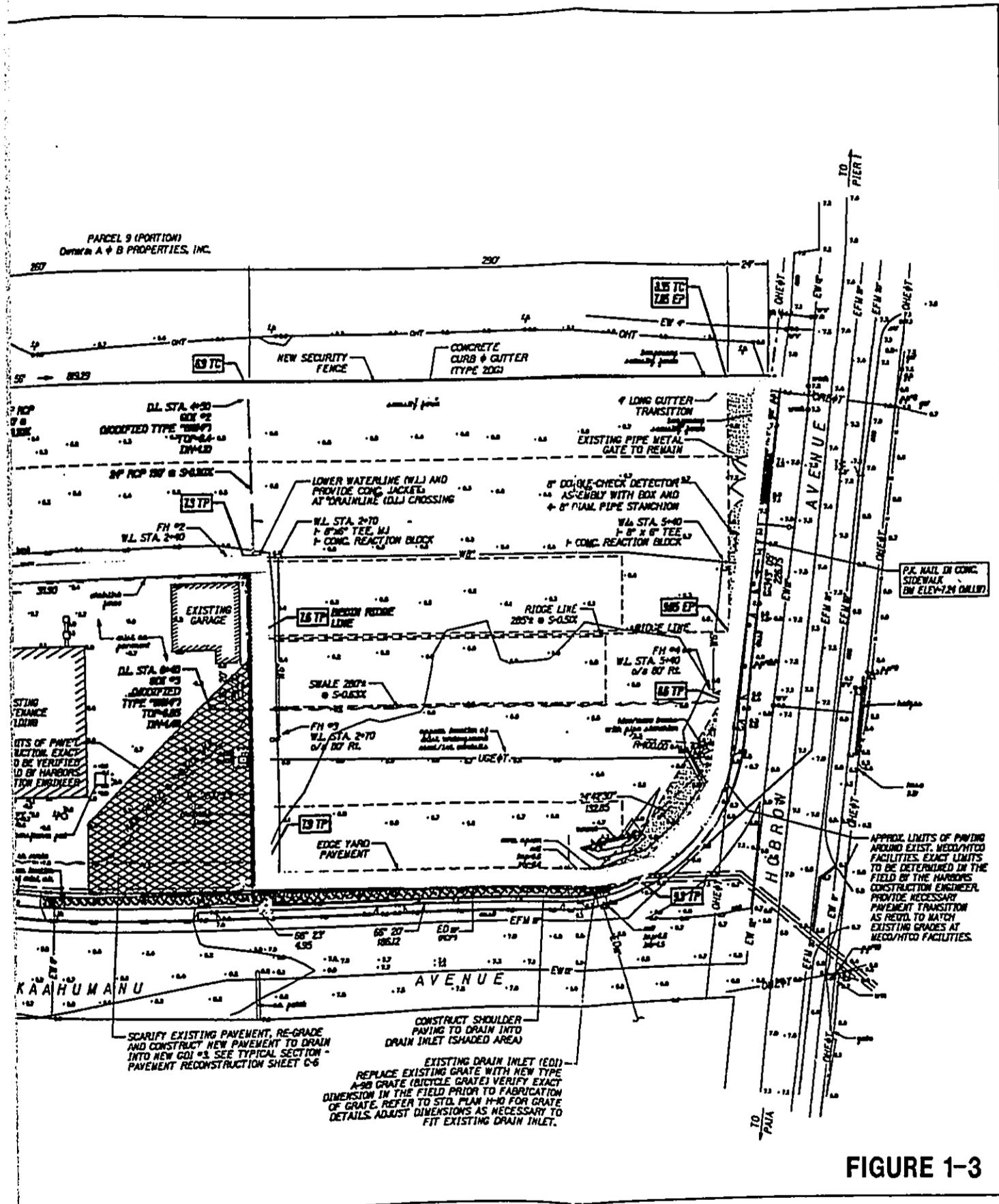


FIGURE 1-3

- Perimeter fencing and landscaping.
- Clear, grub, and install a rock base for the storage area.
- Demolition of the existing buildings formerly occupied by the Maui Meat Company, and two canoe club buildings and related sheds.

H.C. 3280

The proposed action is to provide permanent improvement to 3.3 acres of existing storage yard for shipping containers and automobiles by various shipping companies that bring in cargo via barges into Kahului Harbor on the Island of Maui, Hawaii.

The project will include

- Permanent fencing
- A.C. Paving
- Utilities including drainage, lighting, and domestic and fire waterlines.

C. PARTIES WHO ARE OR MAY BE INVOLVED

1. Applicant

State of Hawaii, Department of Transportation, Harbors Division, 79 S. Nimitz Highway, Honolulu, Hawaii - 96813.

2. Approving Agency

H.C. 3281

State of Hawaii, Department of Transportation
Mr. Kazu Hayashida, Director

H.C. 3280

County of Maui, Department of Water Supply: Construction Plan; Approval

State of Hawaii, Department of Transportation, Highways Division; Permit to Perform work on State Right-of-Way, Permit to connect to Storm Drain System.

3. Agencies Consulted

Prior to the development of plans for each project, the following have been or will be consulted:

H.C. 3281

Federal

- U.S. Army Corps of Engineers (COE)
- Department of the Interior, Fish and Wildlife Services

State of Hawaii

- Department of Transportation (DOT)
- Department Of Land And Natural Resources (DLNR)
- State Historical Preservation Division (DLNR)
- Office of Environmental Quality Control (OEQC)

County Of Maui

- Department of Planning

Others:

- Kahului Harbor User Group
- Maui Electric Company
- GTE Hawaiian Telephone Company
- Alexander & Baldwin, Inc.

H.C. 3280

State of Hawaii:

- Department of Transportation (DOT)
- State Historical Preservation Division (DLNR)
- Office of Environmental Quality Control (OEQC)
- Department of Health (DOH)

County of Maui:

- Department of Planning
- Department of Public Works
- Department of Water Supply
- Office of the Mayor

Others:

- Kahului Harbor User Group
- Maui Electric Company
- GTE Hawaiian Telephone Company
- Alexander & Baldwin, Inc.
- Shell Oil Company
- Texaco Refining and Marketing, Inc.
- BHP Gas Company

II

DESCRIPTION OF PHYSICAL ENVIRONMENT

A. LAND USES

Both project sites are located in Kahului on the north side on the island of Maui. The specific sites are described below.

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The site is approximately eight acres and is bordered by Wharf Street, Kaahumanu Avenue, Puunene Avenue, and Kahului Harbor. The site is relatively level with elevations ranging from five to nine feet above mean lower low water.

The following businesses and or organizations utilize or have utilized the project site. Refer to **FIGURE 1-2**.

A commercial irrigation pipe business operates on Lot 1. A used car sales business operates on Lot 3. The Maui Meat Company previously operated from buildings on Lot 5. These buildings have been vacated and are empty. Two canoe clubs (Hawaiian Canoe Club and the Na Kai Ewalu Canoe Club) are located at the north portion of Lot 6-A, adjacent to the shoreline. The remaining area of Lot 6-A is vacant. The businesses and organizations utilizing the project site are on month to month revocable permits. The two canoe clubs are in the process of relocating their activities to a nearby parcel.

Activities adjacent to the project site includes financial banking, food and beverage services, shopping centers, and the Port of Kahului harbor operations. Refer to **APPENDIX A: TMK Maps**.

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The site is approximately 3.3 acres and is bordered by A & B Properties, Inc. to the north, Hobron Avenue to the east, Kaahumanu Avenue and the existing Harbor maintenance facility to the south and Ala Luina Street to the west.

Lands surrounding the project site are presently used for commercial and heavy industrial type activities and owned by the State Department of Transportation and A & B, Inc.. Harbor support operations also exists in the surrounding areas. The site is presently used by cargo carriers for staging of automobiles and other cargo brought into Kahului Harbor. Refer to **APPENDIX A: TMK Maps**.

B. ROADWAY

H.C. 3281

Kaahumanu Avenue is a six-lane divided highway which connects to Hana Highway and the Wailuku area. Kaahumanu Avenue provides the primary access and egress from the project site via Wharf Street and Puunene Avenue. Wharf Street and Puunene Avenue are two-lane roadways.

Concrete curb, gutters, and sidewalks are provided along Wharf Street. Kaahumanu Avenue has a concrete curb and gutter with a landscaped strip, but a sidewalk is not provided. Puunene Avenue is an asphaltic concrete paved roadway without concrete curb or sidewalk.

Routing of Maui County's proposed future Northshore Greenway Bikeway Plan is within the Port of Kahului and in the vicinity of the project site. A routing option being considered locates the bikeway along Wharf Street and continues to Kaahumanu Avenue. Bikeway routing and width has not yet been finalized by the various community and governmental agencies. The bikeway width along Wharf Street is approximately 15 feet and 29 feet wide along Kaahumanu Avenue.

H.C. 3280

Ala Luina Avenue is a two lane roadways which connects Hobron Avenue (Pier 1 Area) and Wharf Street (Pier 2/3 Area) . Ala Luina Avenue and Hobron Avenue provides the two access and egress routes from the project site. The major roadway system which these roadways service is Kaahumanu Avenue which is a six-lane divided highway connecting Hana Highway and the Wailuku area.

Hobron Avenue and Kaahumanu Avenue fronting the project site includes sidewalks, concrete curb, and gutters. An established buffer landscaping strip, exists between Kaahumanu Avenue and the project site.

C. CLIMATE

Both Projects

Kahului area average temperatures vary from approximately 72 to 75 degrees Fahrenheit with variations from approximately 10 to 20 degrees Fahrenheit. The high temperatures usually occurs during August and the lowest temperatures in January.

Climate at the project sites are typical of the Kahului region, receiving

approximately 20 inches of annual rainfall, as it lies on the northerly side of the Island. Heavy rainfall usually occurs during December through February with June through August being the driest periods.

Tradewinds in the Kahului area are from the north and northeast directions and average between 8 to 18 miles per hour. Sustained winds between 25 to 35 miles per hour occur approximately one third of the time.

The average humidity varies from approximately 77% in January to 71% in July. The tradewinds usually prevents discomfort caused by the high humidity conditions.

D. WATER, AIR, AND NOISE QUALITY

Both Projects

Kahului Harbor is classified as Class II waters under the State Department of Hawaii Department of Health regulations, Title 11, Chapter 54 - Water Quality Standards. No fresh water streams or significant springs enter the harbor. However, some fresh water enters into the harbor from seepage from the inland basal groundwater body and storm water runoff from the vicinity which outfalls at the project site.

Tradewinds pattern in the Kahului area normally minimize the potential for air quality problems. Levels of particulate matter increases during periods of agricultural burnings. The State Department of Health monitors the air quality in Kahului with sampling stations. In most cases, the sampling data did not exceed the State's air quality standards.

The project sites are adjacent to heavily utilized roadways, commercial and industrialized areas. The roadway traffic, and harbor operations contribute to the generally high level of ambient noise. Harbor related trucks, loaders, and other mechanical equipment may operate throughout the day and into the night when loading or off loading ships and/or barges.

E. FLOOD AND TSUNAMI ZONE

Both Projects

The Kahului area and adjacent coastal areas have been affected by wave action, high surf and tsunamis. Flooding occurs within Kahului and primarily consists of inundation of streets and low-lying areas. Flooding is a continuing problem to the local businesses and residents. The flooding appears to be caused by inadequate drainage facilities to accommodate storm water runoff.

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The National Flood Insurance Rate Map (FIRM) for this area of the island designates the project site as being within Zone V23, indicating areas of 100-year coastal flood. Refer to **FIGURE 2-1**.

H.C. 3280

The FIRM for this area of the island designates the makai two-thirds of the site within Zone A4, areas of 100 year flood and the mauka one-third of the site within Zone C, areas of minimal flooding. Refer to **FIGURE 2-1**.

F. TOPOGRAPHY AND SOILS

H.C. 3281

The site is relatively level, sloping gently in the westerly direction. Ground elevations generally range approximately between six to nine feet.

The United States Department of Agriculture Soils Conservation Service's Soil Survey soil classification of the site is described as "Fill Land (Fd)". It appears that the area may have been filled with dredging material or soil excavation. Refer to **FIGURE 2-2**.

The onsite soil is grayish brown silty sand. The silty sand was generally encountered from ground surface to about twenty feet below the surface. The soil graded to a gray color below the water level and was mixed with gravel, cobbles, and coral fragments. The silty sand was in a medium dense to dense condition with only occasional looser sections.

Groundwater was encountered at depths ranging from approximately two to five feet below existing grade. Variation in the depth to groundwater can be expected due to tidal fluctuations.

H.C. 3280

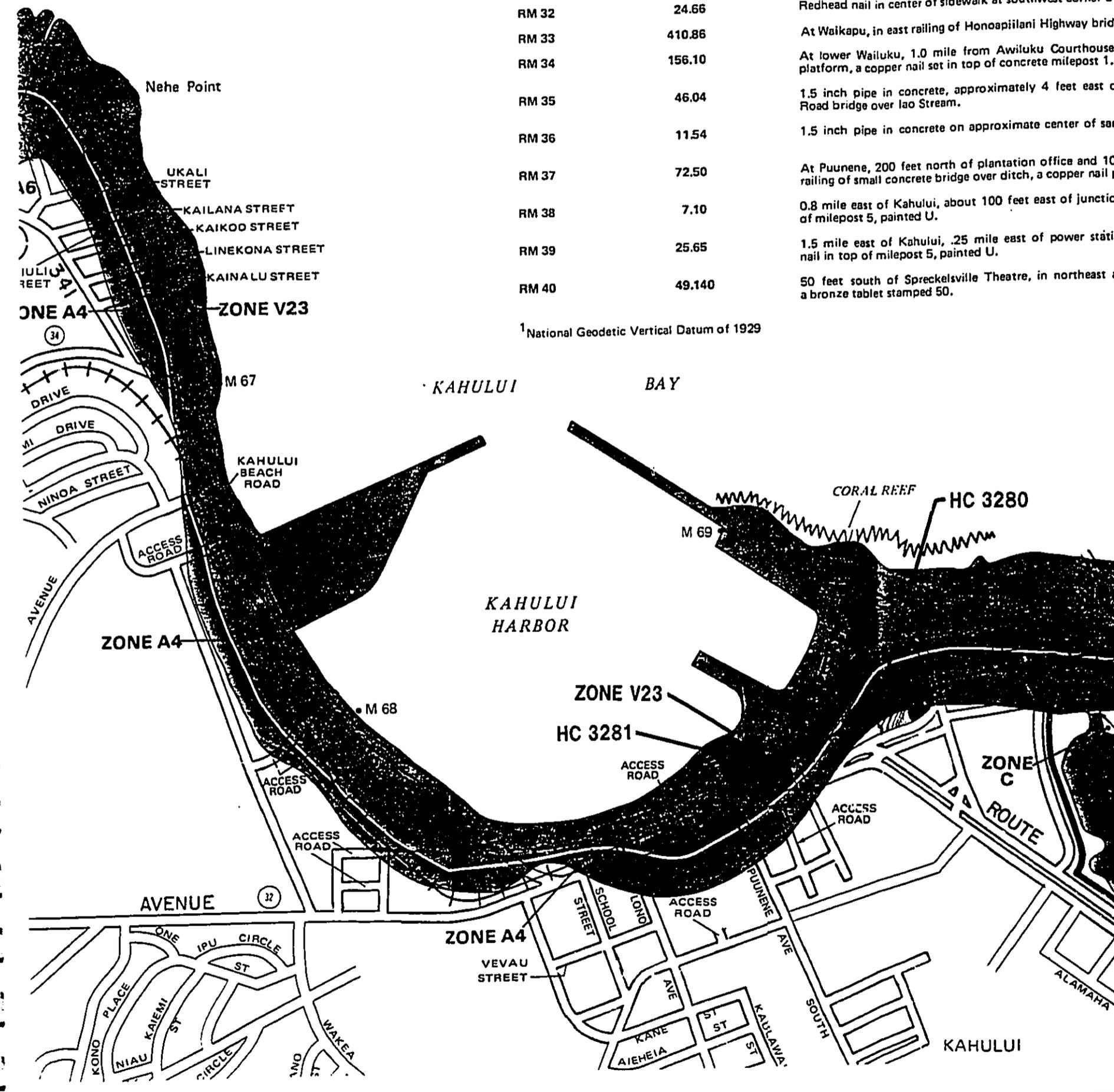
The United States Department of Agriculture Soil Conservation Service's Soil survey classifies the site as "Fill Land (Fd)". This type of soil is characterized as areas filled with material from dredging and from soil excavations. Refer to **FIGURE 2-2**.

The existing topography of the site generally slopes in a makai to mauka direction toward Kaahumanu Avenue at an average slope of 0.4 percent. The existing elevations on the site range from 7.2 feet at areas adjacent to Ala Luina Street and Hobron Avenue to 5.6 feet adjacent to Kaahumanu Avenue. Refer to **FIGURE 1-3** and **APPENDIX B: Soils Report**.

ELEVATION REFERENCE MARKS

REFERENCE MARK	ELEVATION IN FT. (NGVD) ¹	DESCRIPTION OF MARK
RM 31	331.066	At Wailuku, on south side of courthouse steps, a bronze nail
RM 32	24.66	Redhead nail in center of sidewalk at southwest corner of lot
RM 33	410.86	At Waikapu, in east railing of Honoapiilani Highway bridge
RM 34	156.10	At lower Wailuku, 1.0 mile from Awiluku Courthouse, on concrete platform, a copper nail set in top of concrete milepost 1.0
RM 35	46.04	1.5 inch pipe in concrete, approximately 4 feet east of road bridge over Iao Stream.
RM 36	11.54	1.5 inch pipe in concrete on approximate center of road
RM 37	72.50	At Puunene, 200 feet north of plantation office and 100 feet east of railing of small concrete bridge over ditch, a copper nail
RM 38	7.10	0.8 mile east of Kahului, about 100 feet east of junction of milepost 5, painted U.
RM 39	25.65	1.5 mile east of Kahului, .25 mile east of power station, nail in top of milepost 5, painted U.
RM 40	49.140	50 feet south of Spreckelsville Theatre, in northeast corner of lot, a bronze tablet stamped 50.

¹ National Geodetic Vertical Datum of 1929

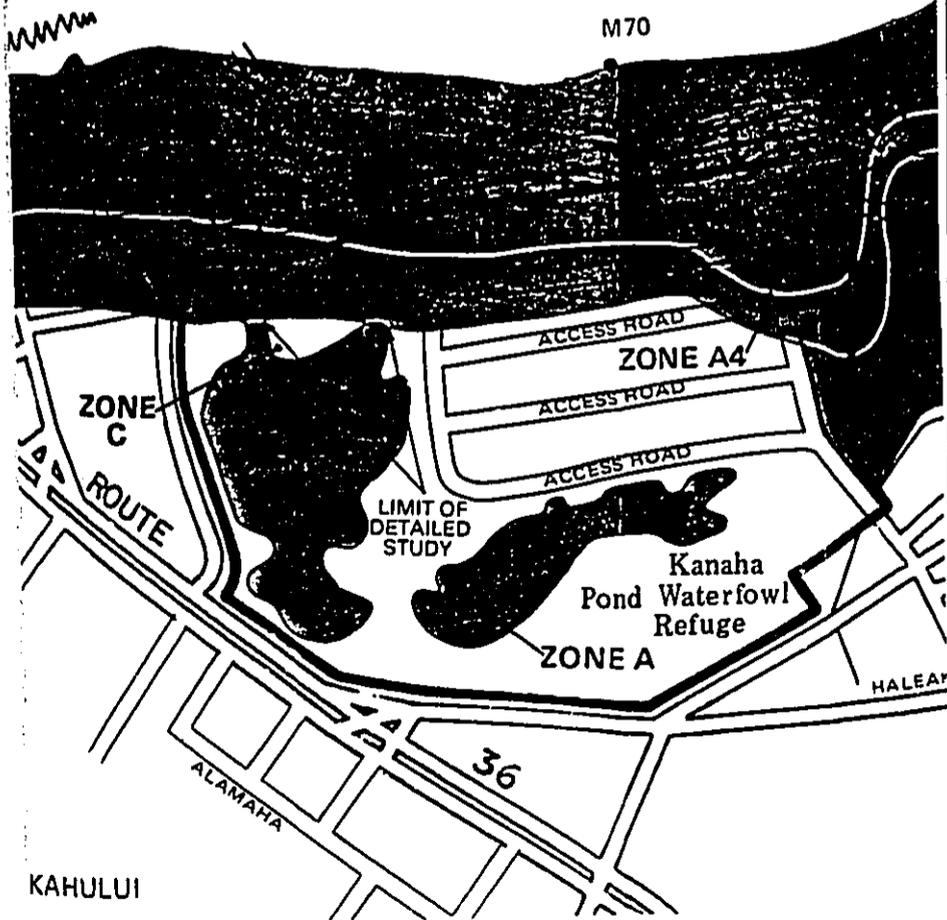


LOCATION REFERENCE MARKS

DESCRIPTION OF LOCATION

- side of courthouse steps, a bronze tablet stamped 31, set in concrete foundation.
- of sidewalk at southwest corner of Market Street bridge over Iao Stream.
- ling of Honoapiilani Highway bridge over Waikapu Stream, a copper nail.
- 0 mile from Awiluku Courthouse on south side of road at gate to railroad station set in top of concrete milepost 1.
- rate, approximately 4 feet east of guardrail at southwest corner of Waiehu Beach stream.
- rate on approximate center of sand and rock mound on east side of Iao Stream.
- north of plantation office and 100 feet southeast of railroad station, in top of south bridge over ditch, a copper nail painted 73.
- ui, about 100 feet east of junction of Kula Road and railroad, a copper nail in top U.
- ui, .25 mile east of power station, on south side of Haleakala Highway, a copper 5, painted U.
- ckelsville Theatre, in northeast abutment of concrete bridge over railroad tracks, 150.

HC 3280



PACIFIC

NATIONAL FLOOD INSURANCE PROGRAM

FIRM
FLOOD INSURANCE RATE MAP

MAUI COUNTY, HAWAII

PANEL 190 OF 400
(SEE MAP INDEX FOR PANELS NOT PRINTED)

COMMUNITY-PANEL NUMBER
150003 0190 D

MAP REVISED:
MARCH 16, 1995



FIGURE 2-1

Federal Emergency Management Agency

G. FLORA AND FAUNA

H.C. 3281

Vegetation in the area consisted of landscape planting and common, widespread weedy species. A few native plants are also on the project site.

Avifauna observed at the site included the house sparrow, common mynah, and doves. The brown rat and the Norway rat are also known to frequent the area.

No endangered species are known to inhabit the area, although a half-mile east of the project site is a State Wildlife Sanctuary Kanaha Ponds provide habitat for the endangered Hawaii Stilt (*Himantopus mexicanus knudseni*) and Hawaiian coot (*Fulica americana alai*).

Refer to **APPENDIX C** Char & Associates January 1997 Botanical Resources Assessment Study and **APPENDIX D** United States Department of the Interior Fish and Wildlife Service 18 October 1996 letter.

H.C. 3280

There is no indication of any rare or endangered plants associated with the property. Other than two (2) large coconut trees in the existing storage yard area and a row of small areca palm trees fronting the yard along Kaahumanu Avenue, there exists no vegetation within the proposed project site.

Due to the nature of the existing use of the property, there is no indication of any rare or endangered species of animal associated with this property.

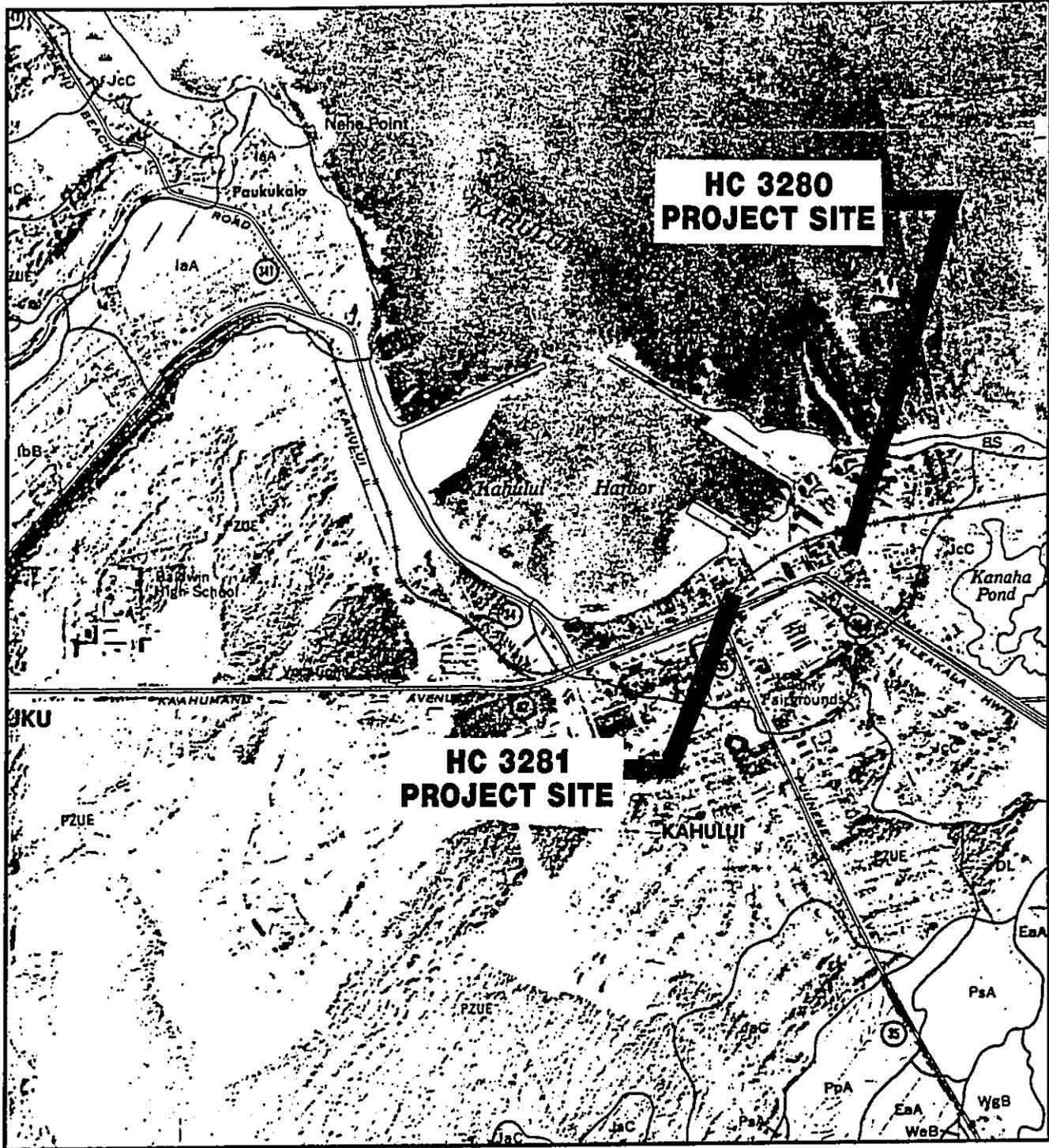
H. HISTORICAL AND ARCHAEOLOGICAL RESOURCES

H.C. 3281

An archaeological inventory survey was conducted in September 1996 and included surface survey and excavation of eleven backhoe trenches. No surface cultural remains were identified. Two trenches contained isolated historic remain and a pit feature was encountered in one of the trenches. A charcoal sample of the pit feature is being processed for radiocarbon dating. Archaeological monitoring during grading and other construction-related excavation activities is recommended. Refer to **APPENDIX E**.

H.C. 3280

Except for a subsurface brick building foundation in the storage yard site (SIHP 50-50-04-3504), there were no archaeological features discovered by the State Historic Preservation Division (SHPD) of the Department of Land &



SOILS MAP

SCALE: 1 in. = 2,000 ft.

Source: Soil Survey of Islands of
 Kauai, Oahu, Maui, Molokai and Lanai,
 State of Hawaii, August 1972

Figure 2-2

Natural Resources. A set of design plans is being reviewed by SHPD and their recommendations will be observed. Prior to construction of the storage yard, data recovery work, if necessary, approved by the State Historic Preservation Division, will be completed. Refer to **APPENDIX F**.

The State Historic Preservation Officer and the County of Maui will be informed immediately should any archaeological features be discovered during grading. Grading operations will then not continue until clearance from the State and County is received.

I. UTILITIES

H.C. 3281

A 12" water main runs below Wharf Street and taps into a 12" water main below Kaahumanu Avenue. A 4" water line within a 15' wide easement runs from Wharf Street to Puunene Avenue, and connects to a 4" water line below Puunene Avenue. A 8" water line within a 15' wide water easement crosses the south-east corner of Lot 6-A adjacent to Kaahumanu Avenue.

A 6" sewer line within a 10' wide easement is located below Second Street and runs from Wharf Street to Puunene Avenue, and connects to an 8" sewer line below Puunene Avenue. A 6" sewer line within a 10' wide easement also crosses the south-east corner of Lot 6-A adjacent to Kaahumanu Avenue.

Electrical and telephone services are provide by overhead distribution lines along Kaahumanu Avenue, Wharf Street, and Puunene Avenue.

H.C. 3280

A 4" water line runs through a northwestern section of the yard which services Kahului Trucking and A&B offices in adjacent lots. There are no sewer improvements within the project area and the project site is located in an area presently served by Maui Electric Company, and Hawaiian Telephone Company.

J. STORM DRAINAGE

H.C. 3281

A 6' by 4' concrete box culvert and a 6' by 7' open concrete storm drainage channel runs in a south/north direction within a 15' wide easement from Kaahumanu Avenue to the ocean between Wharf Street and Puunene Avenue. The drainage channel drains portions of the Kahului business district and residential areas approximately 510 acres. Another 15' storm drain easement is

located on the north side of Lot 3 and runs from Wharf Street to the concrete drainage channel.

H.C. 3280

Storm runoff from the existing storage area site generally sheet flows toward Kaahumanu Avenue where it ponds and is intercepted by a grated inlet along Kaahumanu Avenue. It is then conveyed via a series of 18" to 60" drainlines to the ocean.

III DESCRIPTION OF PROJECT CHARACTERISTICS

A. SITE PLAN

H.C. 3281

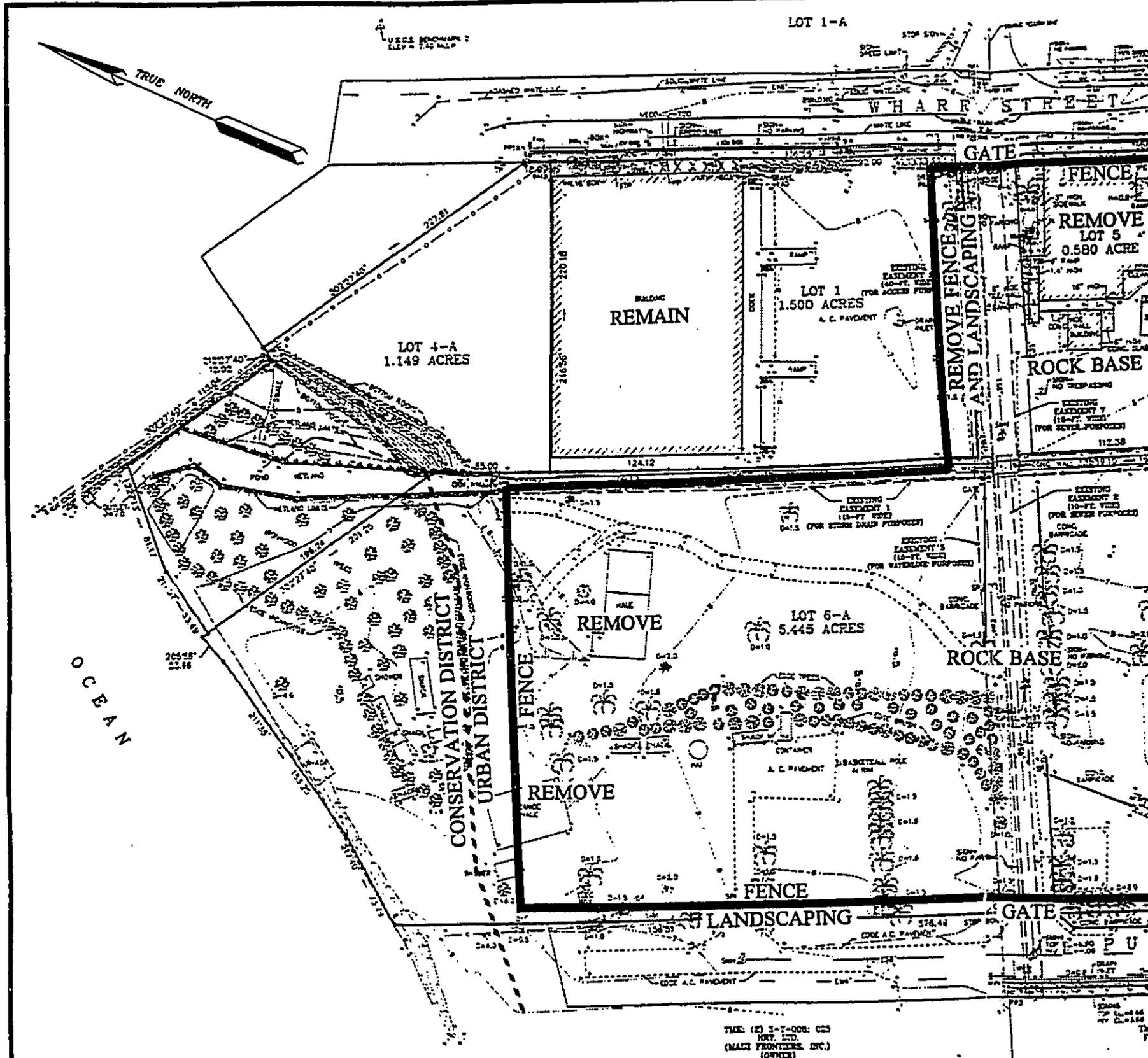
Improvements, proposed within this project, will occur on Lots 5 and 6-A, which is approximately 6.02 acres. Two buildings and one shack are located on Lot 5. These structures are unoccupied, but were previously occupied by the Maui Meat Company. Two buildings and seven shacks are located on Lot 6-A. These structures provide storage and recreational facilities to the Hawaiian Canoe Club and the Na Kai Ewalu Canoe Club. The remaining site areas include graded and ungraded areas of maintained lawn and isolated stands of palm and ironwood trees. A small wetland area is located at the north end of Lot 6-A where the open concrete drainage canal outlet drains to the harbor. Refer to **FIGURE 3--1** and **Appendix H**. The proposed project will not intrude on the wetland area. Based on discussion with the Army Corp of Engineers, provisions will be incorporated to prevent runoff from entering this area. **FIGURE 3-1** shows the proposed development site relative to existing roads.

The project site is within the Urban District as designated by the Land Use Commission of the State of Hawaii..

H.C 3280

Improvements proposed within this project will occur on a portion of tax map key parcel (2) 3-7-10:02 which is approximately 3.3 acres. No buildings are located within the project area. **FIGURE 1-1** shows the proposed development site relative to existing roads. The existing site is covered with broken A.C. pavement and gravel and is surrounded by a temporary chain link fence for security.

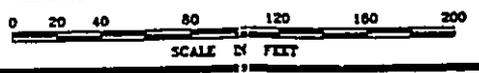
The property is located within the Urban District as designated by the Land Use Commission of the State of Hawaii.



NOTES:

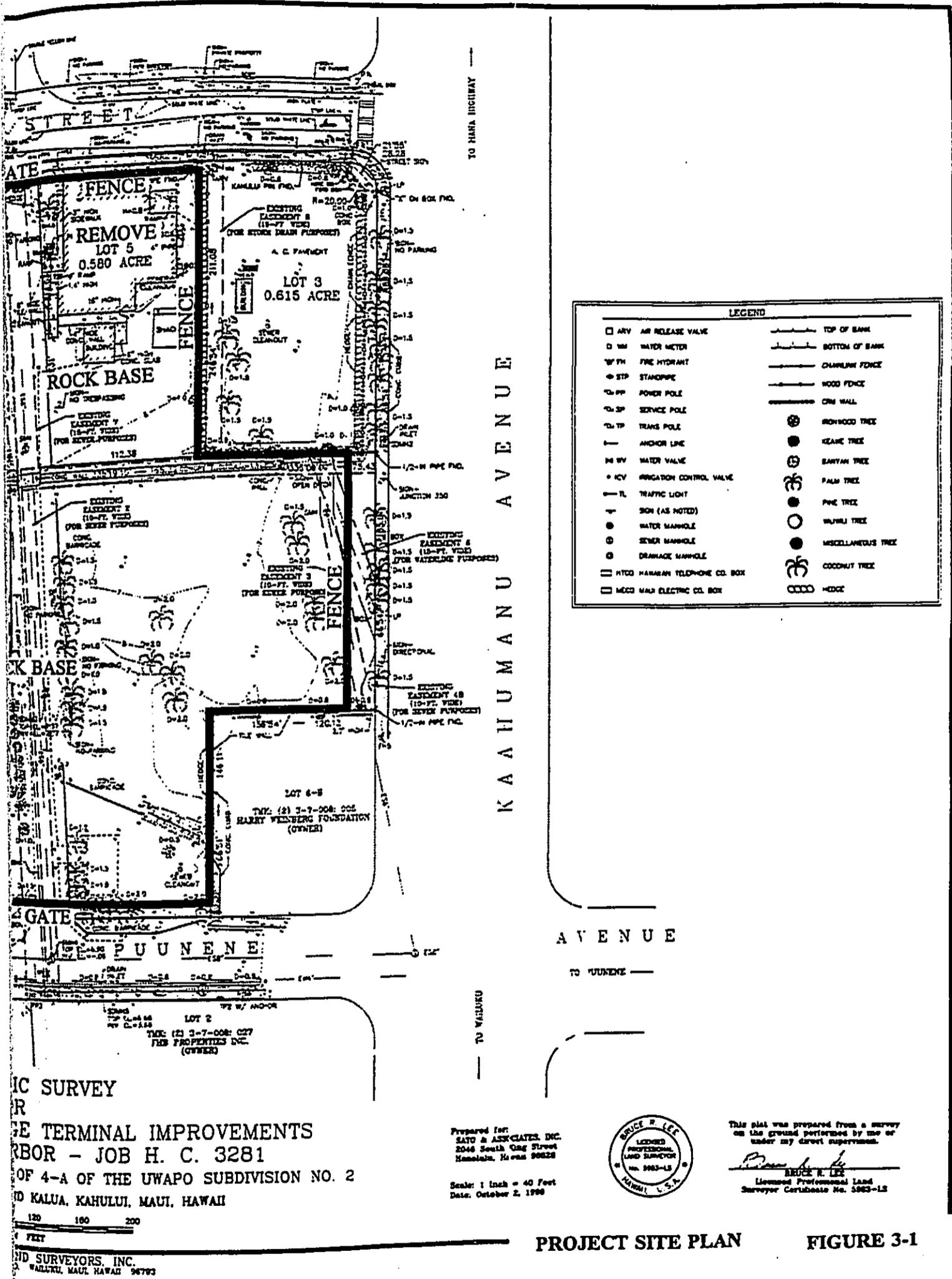
1. Azimuths and coordinates shown herein refer to Government Survey Triangulation Station "LXXX", designated thus "A".
2. Owners of adjoining land parcels taken from Tax Map records.
3. Elevations shown are at Mean Lower Low Water. Benchmark Elevation = 7.4

TOPOGRAPHIC SURVEY
FOR
DOT-HARBORS DIVISION BARGE TERMINAL I
- KAHULUI HARBOR - JOB H
AFFECTING LOTS 1, 3, 5, 6-A AND PORTION OF 4-A OF THE U
SITUATED AT WAILUKU COMMONS AND KALUA, KAHULUI, MA



TDC (2) 3-7-008: 001, 003 POR 004 AND 008

NEWCOMER - LEE LAND SURVEYORS, INC.
 1498 LOWER MAIN STREET, SUITE 0, WAILUKU, MAUI HAWAII 96793



IC SURVEY
 R
 E TERMINAL IMPROVEMENTS
 RBOR - JOB H. C. 3281
 OF 4-A OF THE UWAPO SUBDIVISION NO. 2
 D KALUA, KAHULUI, MAUI, HAWAII

Prepared for:
 SATO & ASSOCIATES, INC.
 2048 South King Street
 Honolulu, Hawaii 96822

Scale: 1 inch = 40 feet
 Date: October 2, 1990



This plot was prepared from a survey on the ground performed by me or under my direct supervision.

Bruce R. Lee
 BRUCE R. LEE
 Licensed Professional Land Surveyor
 Certificate No. 5063-LS

120 160 200
 FEET

LAND SURVEYORS, INC.
 WAILUKU, MAUI, HAWAII 96793

B. IMPROVEMENTS

H.C. 3281

The improvements will provide temporary storage space for cargo and vehicles in transit. Storage is temporary and may vary from several days to several weeks.

Lot 1

- Improvements limited to removal of fencing and landscaping along Lot 5 to allow access to Lot 5.

Lot 3

- Improvements limited to a security fence along the open ditch and along Lot 5.

Lot 5

- Remove the three empty buildings.
- Install a security fence from the open concrete ditch fencing, along Lot 3 and Wharf Street, which would then connect to existing fencing at Lot 1. A gate would be provided at the north end of Lot 5. Fencing along Wharf Street would be 15 feet from the concrete curb to accommodate a future bikeway.
- Grade the lot and install a rock base.
- Existing fence and landscaping between Lot 1 and 5 would be removed to allow access between the two lots.

Lot 6-A

- Remove two buildings and some of the shacks.
- Install a security fence along a portion of the north end of the site from the open concrete ditch to Puunene Avenue, around the inside perimeter of Lot 6-B, along the south side at Kaahumanu Avenue, and connect to the open concrete ditch fencing. A gate would be provided at Puunene Avenue. Fencing along Kaahumanu Avenue would be 29 feet from the concrete curb to accommodate a future bikeway.

Improvements would occur within the Urban District and approximately 20 feet mauka of the wetland area. The improvements described above would effect approximately 4.6 acres.

H.C. 3280

The proposed improvements include the construction of an asphalt paved

storage and parking area on approximately 3.3 acres of land at the corner of Hobron and Kaahumanu Avenues identified as a portion of Parcel 2 of Tax Map Key: (2) 3-7-10. The improvements will provide temporary storage space for overflow cargo and vehicles in transit.

Appurtenant to this paving are drainage and fire protection improvements and lighting for both security and for working at night. Additional security improvements include the installation of perimeter fencing Refer to **FIGURE 3-2**.

The primary purpose of these proposed improvements are to provide Kahului Harbor with much needed additional cargo and vehicle storage capabilities.

C. LANDOWNERSHIP

H.C. 3281

TMK: 3-7-08: Lots 1, 3, 5, and 6-A are owned by the State of Hawaii.

H.C. 3280

TMK: 3-7-10:02 portion is owned by the State of Hawaii.

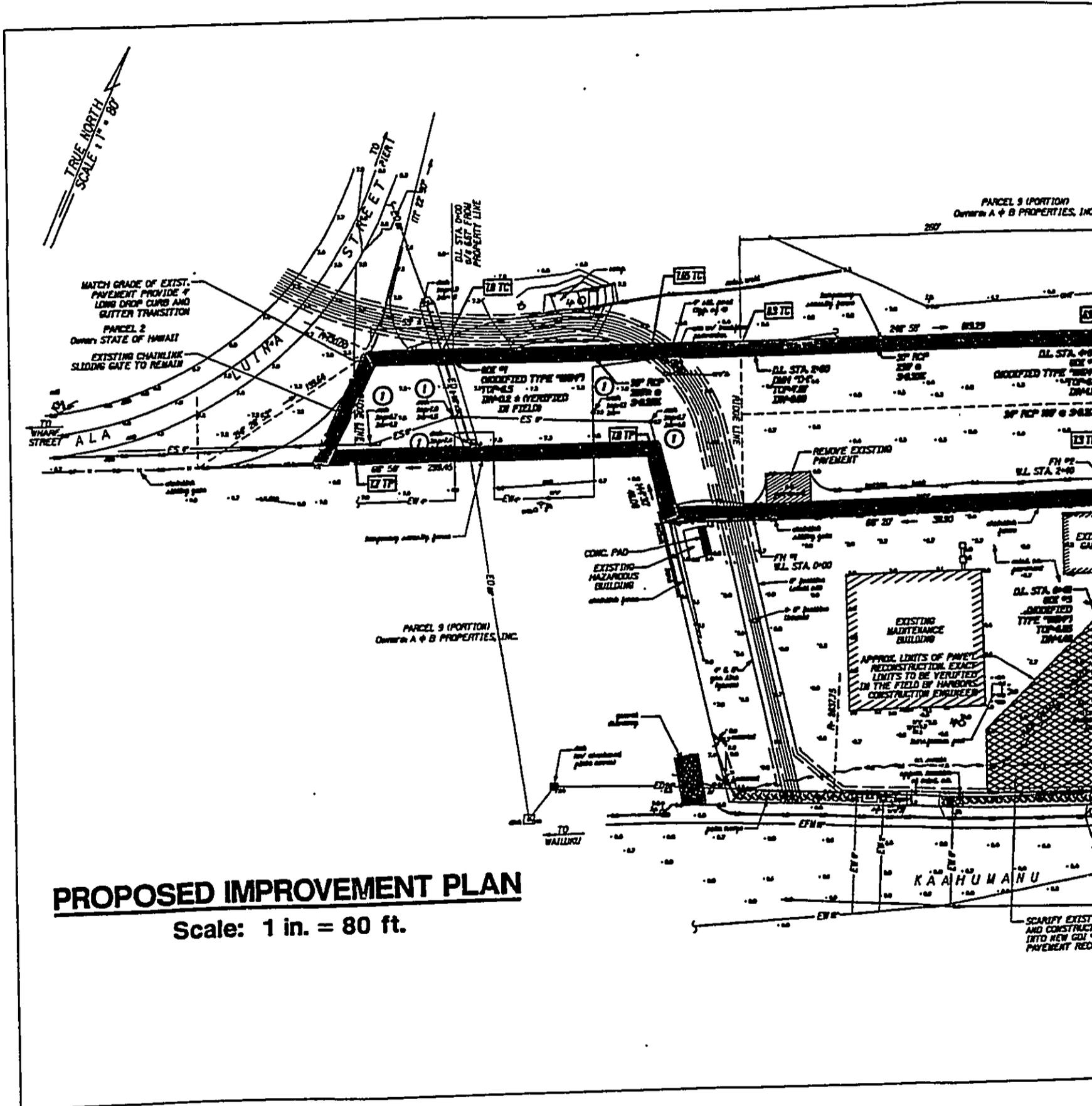
D. PERMITS AND APPROVALS REQUIRED

H.C. 3281

1. Federal: None required.
2. State of Hawaii: None required.

H.C. 3280

1. Federal: None required.
2. State of Hawaii: Department of Transportation, Highways Division
Permit to Perform work on State Right-of-Way
Permit to Connect to Storm Drain System
3. State of Hawaii: Department of Health, Clean Water Branch
NPDES General Permit Notice of Intent for Construction Dewatering
4. County: Department of Water Supply:
Construction Plan Approval



PROPOSED IMPROVEMENT PLAN
 Scale: 1 in. = 80 ft.

SCAFFRY EXIST
 AND CONSTRUCT
 INTO NEW COI
 PAVEMENT RECO

IV POTENTIAL IMPACTS AND PROPOSED MITIGATION MEASURES

A. LAND USES

The cumulative impact of both projects to land use is minimal.

H.C. 3281

Impact to the existing land uses is minimal since:

- Current commercial irrigation pipe business operations of Lot 1 will be relocated to another site during the later part of 1997. The existing building will remain to facilitate harbor storage operations.
- Current used car sales business will continue on Lot 3.
- No business operates on Lot 5.
- The Hawaiian Canoe Club and the Na Kai Ewalu Canoe Club were notified of the improvement plans. The canoe clubs will relocate to another site prior to site improvements on Lot 6-A. The State of Hawaii has previously established an agreement with the canoe clubs and has allowed the canoe clubs to remain on Lot 6-A on a month to month basis. Refer to APPENDIX I.

H.C. 3280

The storage yard is not occupied by any lease tenants. Impact to the existing land uses is minimal since the area will continue to be used for overflow storage of cargo and vehicles for Harbor users.

B. ROADWAYS

H.C. 3281

Impact to the surrounding roadway system would be minimal since the movement of cargo and vehicles would occur within the harbor area.

The adjacent roadways will experience short periods of increase traffic due to construction related activities. However, the traffic increase will be minimal and intermittent. All applicable safety precautions will be adhered to for the safety of motorists and pedestrians.

H.C. 3280

Impact to the surrounding roadway system would be minimal since the movement of cargo and vehicles would occur basically during overflow periods.

No serious traffic problems are anticipated during the construction phase since

the activity will be confined within the proposed project site. Minor traffic inconvenience may be experienced along Hobron Avenue and Ala Luina Street. All applicable safety precautions will be adhered to for the safety of motorists and pedestrians.

C. WATER, AIR, AND NOISE QUALITY

Both Projects

During the construction of the projects, there will be an increase in noise, dust, and internal combustion engine emissions. These impacts will last no longer than the construction phase and can be mitigated by proper construction techniques, adherence to generally accepted construction practices and compliance with OSHA Standards, State Air, Noise and Water Quality Regulations. Emissions from internal combustion engines will dissipate quickly in the open area. Waterwagons and sprinklers will be used to control dust resulting from construction activities. The proposed project site will be kept moist after working hours and on weekends, if necessary. These State regulated requirements will be stated in the construction plans and specifications.

Noise from construction equipment will be kept within the limits permitted by the State, County and OSHA regulations. Construction activities will be restricted to daylight hours between 6:00 a.m. and 6:00 p.m. No work will be permitted at night except to complete work activities that would endanger the health and safety of the community if left undone.

Upon completion of the construction of this project, the existing uses of the area will remain unchanged. Therefore, long-term air and water quality will also remain unchanged.

Only short-term impacts associated with noise will be encountered as described earlier. The proposed use of the site will basically remain unchanged, so long-term impacts will be non-existent.

Therefore, these increases of noise, dust, and internal combustion engine emissions will be minimal and intermittent.

D. SOILS

H.C. 3281

The soils at the site are described as fill land (Fd) by the United States Department of Agriculture. Soils erosion is anticipated to be minimal. A

National Pollutant Discharge Elimination System (NPDES) Permit is not required since the site improvements does not exceed five acres. However, an Erosion Control Plan will be prepared to ensure that construction related debris, including construction related soils erosion, is prevented from entering the drainage channel, wetland, and ocean. No adverse environmental impact is anticipated due to soil erosion.

H.C. 3280

The soils at the site are described as fill land (Fd) by the United States Department of Agriculture. The existing topography of the site ponds excess runoff within the property along Kaahumanu Avenue and the existing ground is stabilized by its topping of A.C. pavement and gravel. The contractor will be required to keep the graded areas moist by means of waterwagons or temporary sprinkler systems and to have all exposed areas paved, grassed or landscaped immediately upon completion of finished grading. A NPDES General Permit Notice of Intent for construction dewatering will be obtained. No adverse environmental impact is anticipated due to soil erosion.

E. FLORA AND FAUNA

Both Projects

No significant cumulative impact on plant life is anticipated as a result of the proposed projects. There are no rare or endangered species of plants on the site, nor are there favorable conditions for such species.

F. HISTORICAL AND ARCHAEOLOGICAL RESOURCES

H.C. 3281

No impact is anticipated to historical and archaeological resources since none are in close proximity to the project site.

The State Historic Preservation Officer and the County of Maui will be informed immediately should any archaeological features be discovered during grading. Grading operations will then not continue until clearance from the State is received.

H.C. 3280

Except for a subsurface brick building foundation in the storage yard site, Historic Site 3504, (SIHP 50-50-04-3504), there were no archaeological features discovered by the State Historic Preservation Division of the Department of Land & Natural Resources. Refer to **APPENDIX F. Historic**

Site 3504 is not likely to be disturbed since the area will be filled and paved over. There is also no planned excavation at the historic site.

Any utility placement is designed to avoid the area of possible archaeological significance. Trench excavation for utility and drainage systems will be monitored by an archaeologist.

An approved archaeological monitoring plan will be implemented during construction. The plan outlines protecting, recovering, and other monitoring procedures for artifacts discovered during construction. Refer to **APPENDIX G.**

The State Historic Preservation Officer and the County of Maui will be informed immediately should any archaeological features be discovered during grading. Grading operations will then not continue until clearance from the State is received.

G. UTILITIES

H.C. 3281

The proposed improvements do not include any permanent utility improvements which would have long lasting impact on the project area.

H.C. 3280

The proposed storage yard will not generate effluent, thus, completion of this project will not have an impact on sewage disposal in the area.

Other than for fire protection, the proposed project does not have the need for domestic water service. Thus, minimal impact is anticipated.

H. STORM DRAINAGE

H.C. 3281

All graded areas will allow sheet flow off the site similar to the existing conditions. Since the area is flat, the crush rock finish will continue to allow drainage to occur. Runoff from the site is not expected to increase from the current conditions.

A silt fence and/or combination silt fence/construction barrier will be installed at the project limits to minimize debris or silt from leaving the project site and from entering the shoreline area and streets during construction. During the construction period, the contractor will be required to provide and maintain a

silt fence and/or gravel berm to prevent construction related debris material from leaving the construction site and entering the wetland areas. Thus, long-term drainage impacts will be non-existent.

H.C. 3280

Storm runoff from the existing storage area site generally sheet flows toward Kaahumanu Avenue where it ponds and is intercepted by a grated inlet along Kaahumanu Avenue. It is then conveyed via a series of 18" to 60" drain lines to the ocean. This project will result in all graded areas being paved or permanently landscaped. Long-term grading impacts will be non-existent.

The completion of the project will result in an increase in runoff due to the increased paved area. Proposed improvements to the existing drainage system in the area will, however, be able to handle said additional runoff and alleviate the existing ponding condition at the corner of Kaahumanu Avenue and Hobron Avenue. Refueling and maintenance of vehicles at the storage yard is not anticipated; therefore, the possibility of oil entering the drainage system is not expected. Washing of oil with water that flows into the drainage system is prohibited through Department of Transportation, Harbors Division, Hawaii Administrative Rules, Section 19-42-126 (Littering or polluting land areas prohibited) and Section 19-42-127 (Littering or polluting of water prohibited). Refer to APPENDIX J.

V

ALTERNATIVE ACTIONS

Both Projects

A No Action alternative for both projects would deny increased efficient use of needed and available land for maritime purposes. This alternative is not a preferred alternative due to the fact that upon development of the proposed storage yard, much needed container storage will be available for users of Kahului Harbor. That action would be contrary to the State Transportation 2010 Master Plan for Kahului Harbor.

VI

FINDINGS AND CONCLUSION

Both Projects

Both projects involve minor improvements to State lands adjacent to Kahului Harbor to provide additional temporary and permanent storage area for materials and vehicles in transit. The projects will improve operational efficiency and relieve the congested harbor cargo operations within the Port of Kahului. No cumulative significant adverse effects on the environment are anticipated. The projects will not:

- Involve an irrevocable commitment to loss or destruction of any natural or cultural resources, except for the labor and materials related to the construction of this project.

Other than the brick building foundation located within the storage yard (H.C. 3280) there are no natural or cultural resources associated with either project sites. The State Historic Preservation Division recommendations have been and will continue to be attentively

followed. If any archaeological sites are discovered, the appropriate agencies will be consulted during construction.

- Conflict with the State's long-term environmental policies, goals, or guidelines.

The proposed projects will be compatible with the surrounding uses of the area.

- Substantially affect public health and safety.

The proposed projects are not expected to cause any detrimental effect on the well-being of the public. There are minimal impacts to public safety as a result of this project. During the construction phase the Contractor will be responsible for the safety of the public affected by his operations.

- Substantially affect the economic or social welfare of the community or State.

The proposed development will provide short-term employment during the period of construction. Most or all of these short-term impacts will affect the contractors and material suppliers that will be involved in this project. However, the completion of the storage yard and temporary storage yard is not expected to affect the area's economic or social welfare.

- Involve a substantial degradation of environmental quality.

The proposed projects do not involve activities that will lower the existing quality of the environment in the area.

- Substantially affect any rare, threatened or endangered species of flora

- Substantially affect any rare, threatened or endangered species of flora or fauna or habitat.

No endangered species of flora or fauna are known to exist within the project sites.

- Detrimently affect air or water quality or ambient noise levels.

There will be no long-term effects on air quality due to the proposed project. Short-term impacts on air and water quality, as well as noise, will occur during the construction period, but will be mitigated by normal construction practices and will be regulated and imposed within the plans and specifications.

- Is individually limited but cumulatively has considerable effect upon the environment or involves a commitment for larger actions.

The proposed projects do not have considerable effect upon the environment. Therefore an EIS is not being considered and a negative declaration is anticipated.

VII

REPRODUCTION OF COMMENTS ON THE DRAFT EA AND RESPONSES

Both Projects

All written comments received on the draft EA during the review period have been reviewed and carefully considered.

The comment letter received is reprinted on the following page. Substantive comments have been marked and responses to each comment follow the letter in which the comment appears. Sections which required revision are addressed in each response.

BENJAMIN J. CAYETANO
GOVERNOR



DIRECTOR'S OFFICE
DEPT. OF
TRANSPORTATION

MAY 15 9 43 AM '97

1/3 97. 1015

GARY GILL
DIRECTOR

STATE OF HAWAII
OFFICE OF ENVIRONMENTAL QUALITY CONTROL

235 SOUTH BERETANIA STREET
SUITE 702
HONOLULU, HAWAII 96813
TELEPHONE (808) 586-4185
FACSIMILE (808) 586-4186

May 12, 1997

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

Dear Mr. Hayashida:

Subject: Draft Environmental Assessment for the Kahului Harbor
Storage Yard Paving and Utility Improvements & Barge
Terminal Improvements, Maui.

Thank you for the opportunity review the subject document. We have
the following questions and comments.

1. Please describe the details of the mitigation measures to
prevent runoff from entering into the wetland area.
2. The environmental assessment indicates that storm runoff from
the existing storage area sheetflows towards Kaahumanu Avenue
where it ponds. The ponding situation is likely to worsen
after the site is paved. What measures will be taken to
improve the drainage situation? Please also describe measures
that will be taken to prevent used oil and other contaminants
from entering the nearby ocean.
3. Please describe the measures that will be taken to preserve
the historically significant subsurface brick building
foundation located within the storage yard.

Should you have any questions, please call Jeyan Thirugnanam at
586-4185. Mahalo.

Sincerely,

Gary Gill
Director

c: R.T. Tanaka Engineers
Sato & Associates

MAY 15 8 19 AM '97
HARBOR DIVISION

RESPONSE TO OEQC COMMENTS DATED MAY 12, 1997

Response to Office of Environmental Quality Control (OEQC)

Response to Item 1: Prevent Runoff from Entering into the Wetland Area:

The construction documents will require the contractor to maintain existing drain conditions to the wetland after completion of construction. During the construction period, the contractor will be required to provide and maintain a silt fence or gravel berm to prevent construction related debris material from leaving the construction site.

Response to Item 2:

a. Drainage Ponding at the West Side of Kaahumanu/Hobron Avenue Intersection:

The ponding condition will be eliminated upon completion of the project since the area will be filled such that runoff will flow into the yard's internal drainage system. Likewise, runoff from the existing maintenance yard will also be collected by the yard's internal drainage system. The text in section IV - H has been revised to address these comments.

b. Used Oil and Other Contaminants:

The text in section IV-H has been revised to address these concerns.

Response to Item 3: Preservation of Subsurface Brick Foundation:

The subsurface brick foundation at Historic Site 3504 (SIHP 50-50-04-3504) is not likely to be disturbed since the area will be filled and paved over. There is no planned excavation at the historic site. An archaeological monitoring plan will be implemented during construction. Trench excavation for utility and drainage systems will be monitored by an Archaeologist. The plan also outlines procedures for protecting, recovering, etc. should there be any artifact discovered during construction. The plan has been included as Appendix G.

VIII REFERENCES

Revised Environmental Impact Statement for Bulkhead and Other Improvements at Kahului Harbor, Kahului, Maui, Job H.C. 3046, February 1977 - State of Hawaii Department of Transportation Harbors Division.

2010 Master Plan for Kahului Harbor, January 1989 - State of Hawaii Department of Transportation Harbors Division.

Kahului Inter-Island Facility Highway Conditions, July 1994 - Julian Ng, Inc.

Kahului Inter-Island Cargo Facility Concept Plan Phase I, October 1994 (Draft) - Frederic R. Harris, Inc.

Kahului Inter-Island Cargo Facility Site Access Considerations, October 1994 - Julian Ng, Inc.

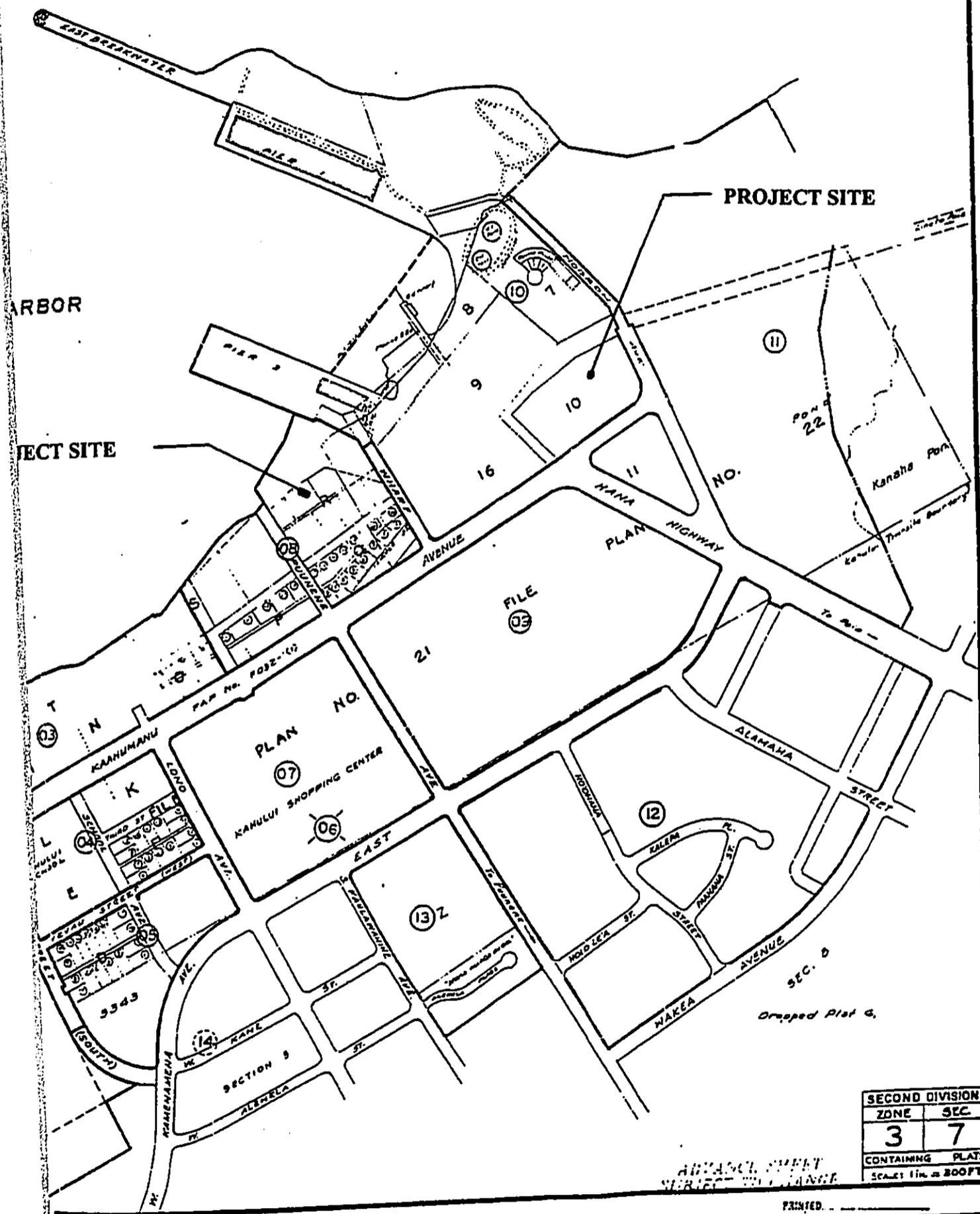
Master Plan Update for Kahului Harbor, November 1994 - State of Hawaii Department of Transportation Harbors Division and Kahului Harbor Task Force.

Kahului Harbor Drainage Master Plan, October 1995 (Draft) - Austin, Tsutsumi & Associates, Inc.

Kahului Inter-Island Cargo Facility Master Plan Phase 2, May 1996 (Draft) - Frederic R. Harris, Inc.

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Appendix A
TMK Maps



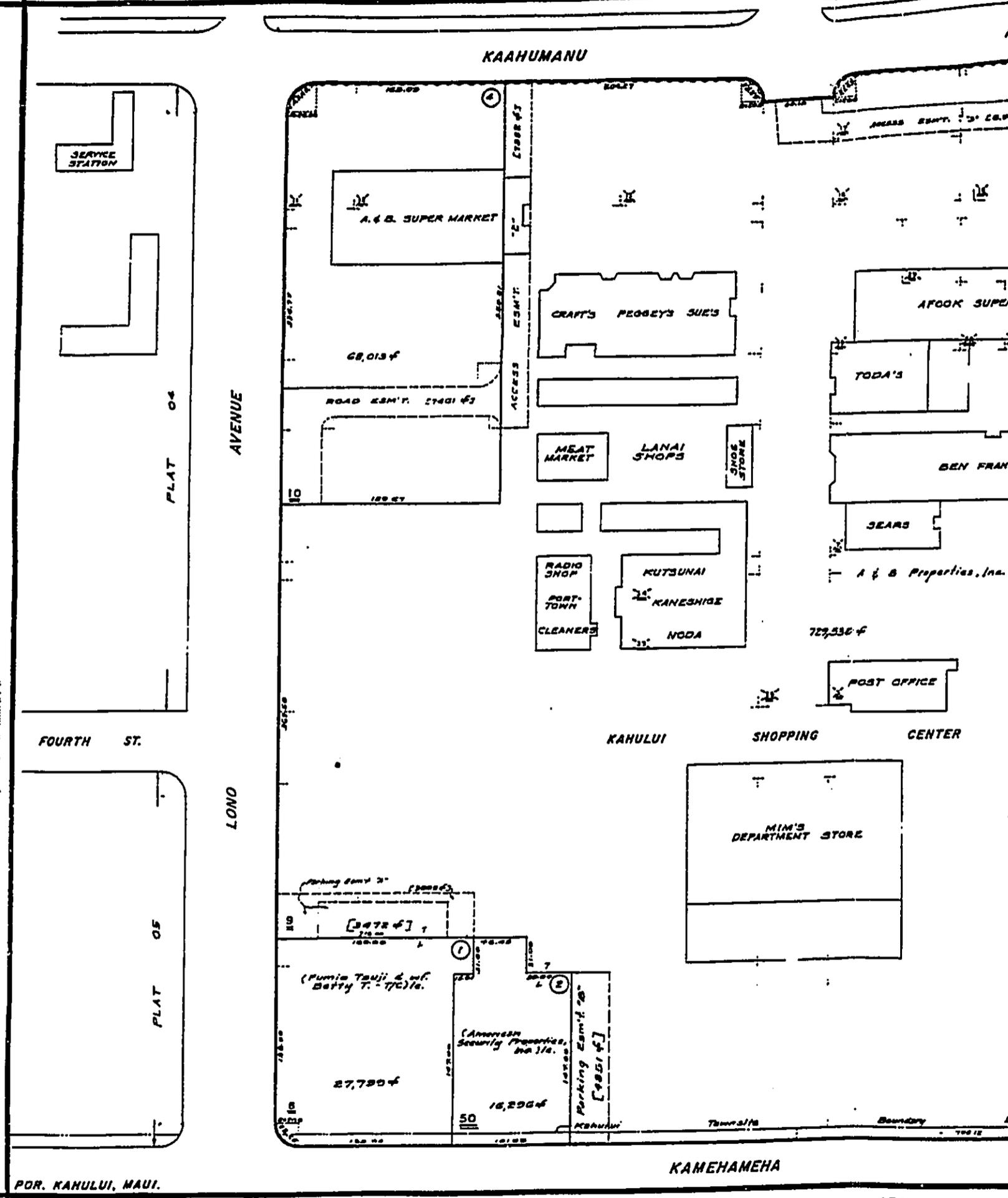
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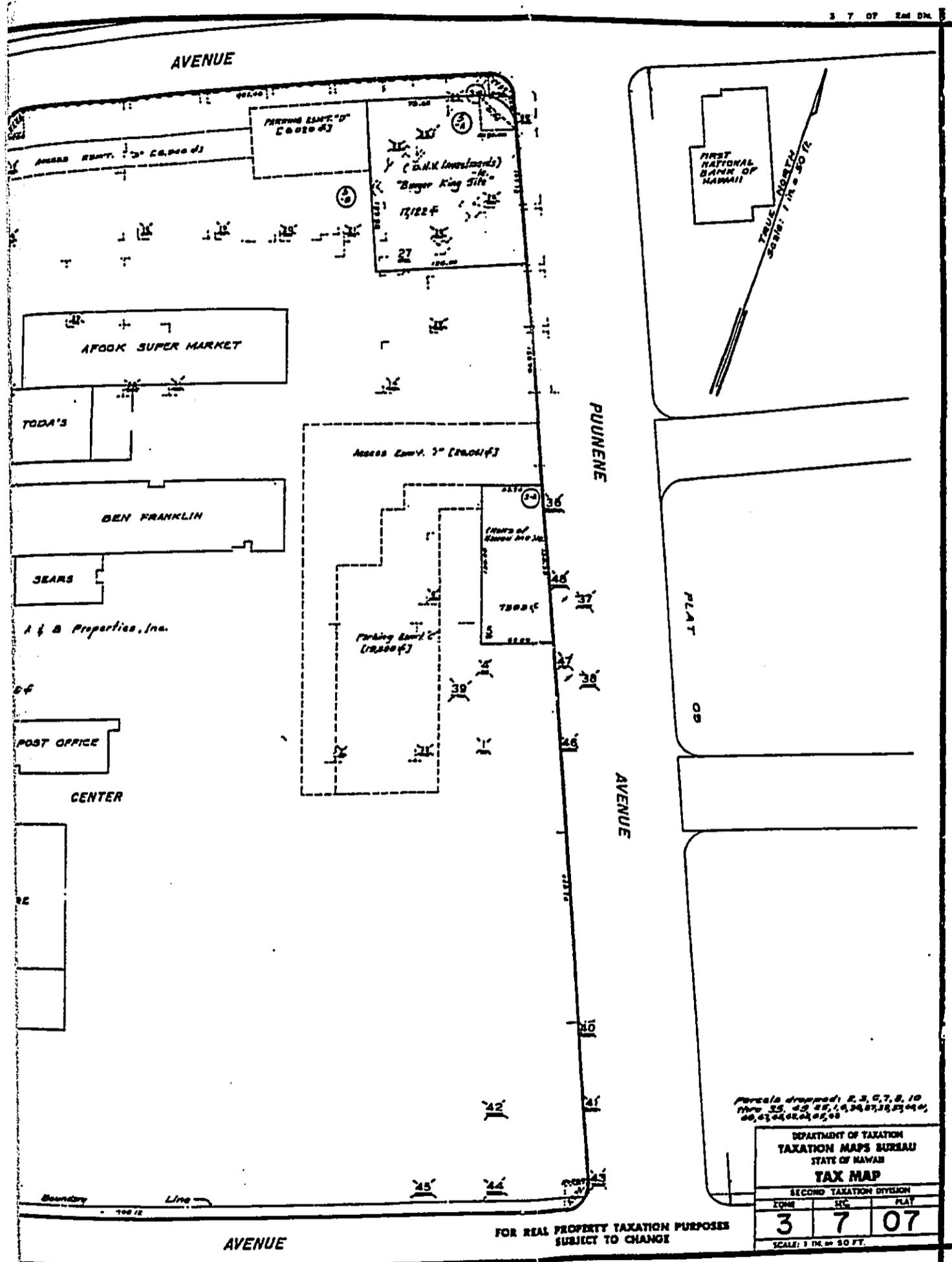
ADVANCE SHEET
 SUBJECT TO CHANGE

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Map No. 1014

Revised December 11, 1961 by J.L.S.
SOURCE: Terrestrial Maps Bureau
BY: H.A.B. D.S.C. DATE: January 12, 1934

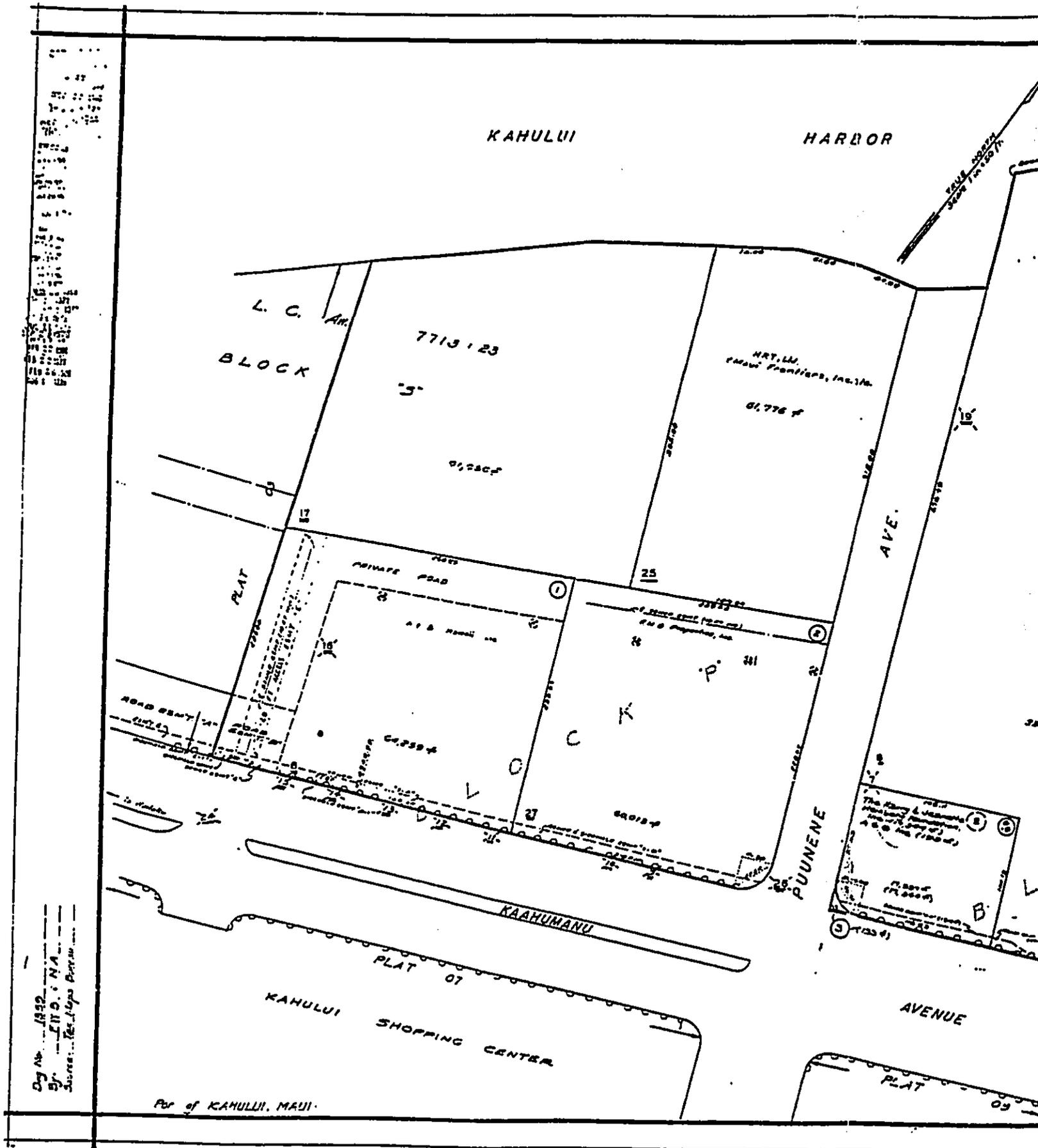




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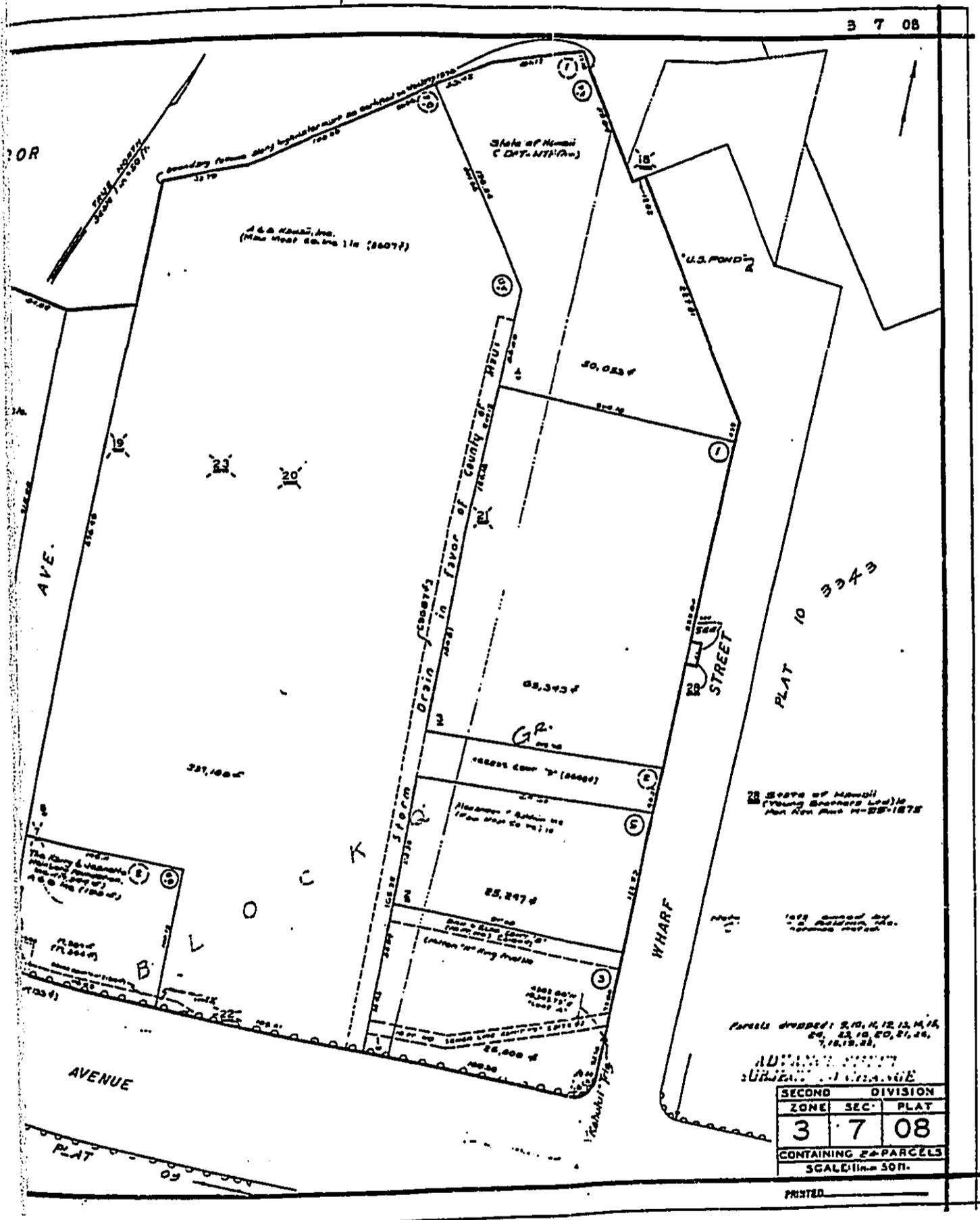
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TAXATION MAPS BUREAU		
STATE OF HAWAII		
TAX MAP		
SECOND TAXATION DIVISION		
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FOR REAL PROPERTY TAXATION PURPOSES
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 Survey: 1852-1000

Part of KAHULUI, MAUI.



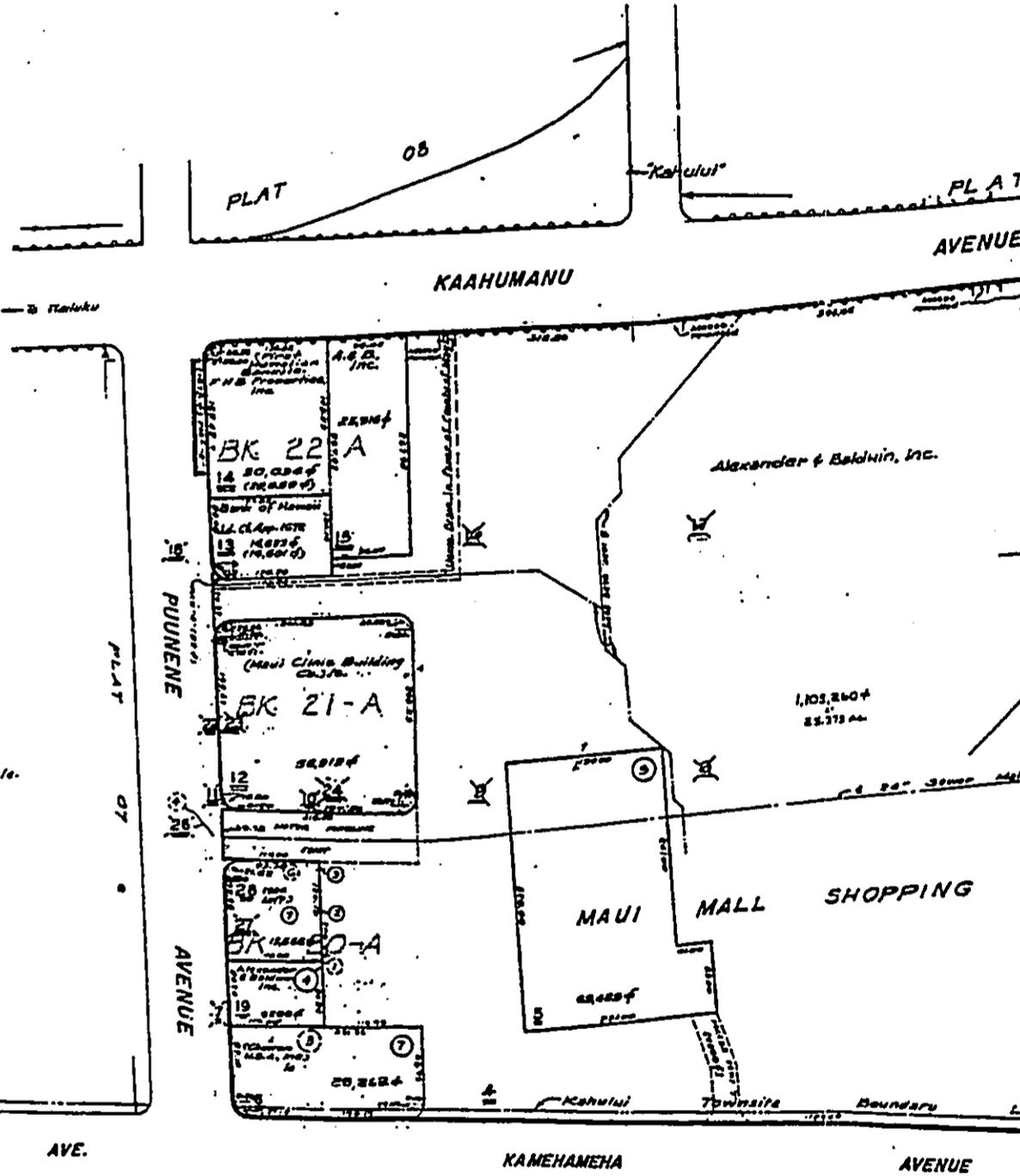
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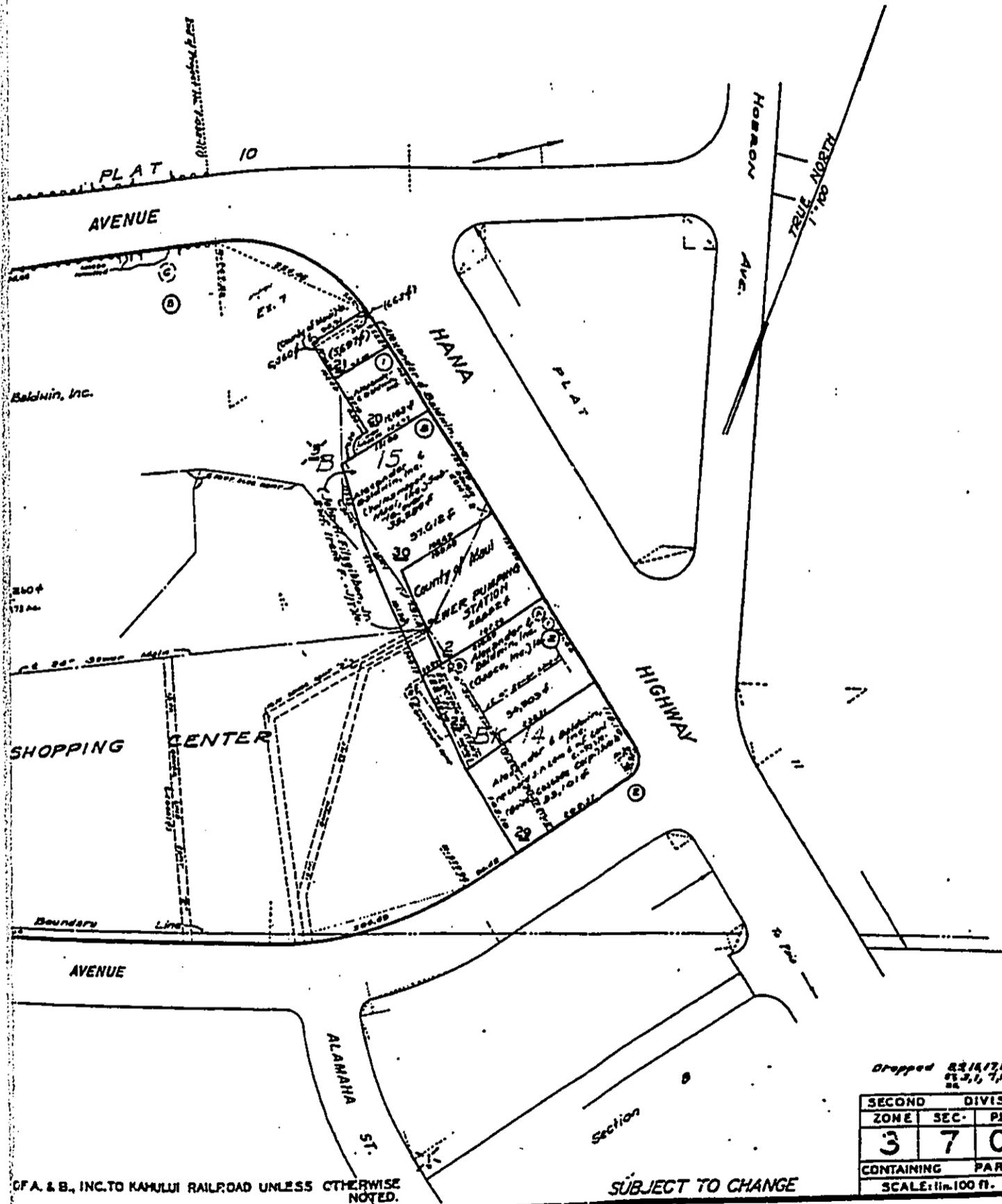
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Orig. No. 1860
 By: N.A.
 Source: 1860 Maps Bureau

Part of KAHULUI, MAUI



NOTE: ALL PARCELS HELD UNDER LEASE OF A. & B., INC. TO KAHULUI



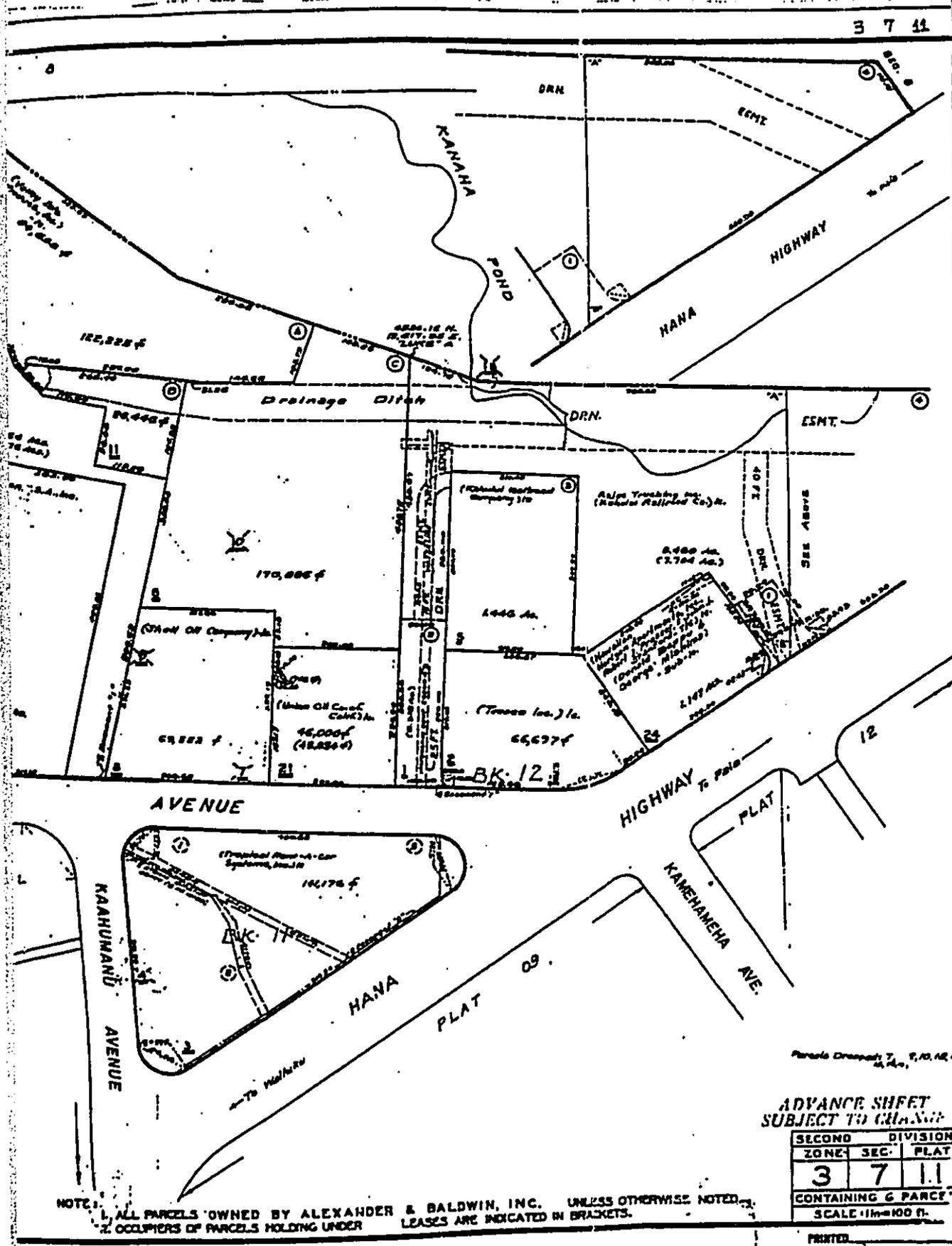
OF A. & B., INC. TO KAHULUI RAILROAD UNLESS OTHERWISE NOTED.

SUBJECT TO CHANGE

Dropped 2/16/70, 2/22/70
2/23/70, 7/1/70
2/2

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ADVANCE SHEET
SUBJECT TO CHANGES

SECOND DIVISION	
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CONTAINING 6 PARCELS	
SCALE 1/4"=100 FT.	

NOTE: 1. ALL PARCELS OWNED BY ALEXANDER & BALDWIN, INC. UNLESS OTHERWISE NOTED.
2. OCCUPIERS OF PARCELS HOLDING UNDER LEASES ARE INDICATED IN BRACKETS.

PRINTED

Appendix B
Soils Report
H.C. 3280

REPORT
SOILS INVESTIGATION

PROPOSED STORAGE YARD
KAHULUI HARBOR
KAHULUI, MAUI, HAWAII
TMK: 2-3-7-10: 07

for

R. T. TANAKA ENGINEERING, INC.

Project No. M-2686-F
September 13, 1996



99-1255 Waiua Place
Area. Hawaii 96701
Phone: (808) 488-0433
Fax: (808) 488-9535

335 Hoonana Street
Building 7, Unit O
Kahului, Maui, Hawaii 96732
Phone: (808) 877-3789
Fax: (808) 871-1592

99-1255 WAIUA PLACE, AIEA, HAWAII 96701

(808) 488-0433 FAX (808) 488-9535

September 13, 1996
Project No. M-2686-F

R. T. Tanaka Engineering, Inc.
871 Kolu Street, Suite 201
Wailuku, Maui, Hawaii 96793

Attention: Mr. Kirk T. Tanaka

Gentlemen:

The attached report presents the results of a soils investigation for the proposed Kahului Harbor storage yard parking lot in Kahului, Maui, Hawaii.

A summary of the findings is as follows:

- 1) The subsurface conditions at the site were explored by excavating five (5) test pits to depths of 2 to 4.5 feet below existing grade, and drilling one (1) test boring to a depth of 10 feet.

At Boring 1, dense, gray GRAVEL was found to a depth of 1 feet, followed by dense, tan brown silty SAND to a depth of 3 feet. Below the silty SAND, moderately dense, tan gray SAND was found to a depth of 5 feet. From a depth of 5 feet to the final depth of the boring at 10 feet, the soil was probed and found to be moderately dense.

At Test Pit 1, dense, gray brown GRAVEL was found to a depth of 1.25 feet, followed by moderately dense, light yellow brown SAND to the final depth of the test pit at 4.5 feet.

At Test Pit 2, dense, gray GRAVEL was found to a depth of 1.25 feet, followed by stiff, brown SILT to a depth of 1.5 feet. Below the SILT, moderately dense, tan brown SAND was found to the final depth of the test pit at 3.5 feet.

At Test Pit 3, dense, gray GRAVEL was found to a depth of 1.5 feet, followed by dense, tan brown to white SAND to the final depth of the test pit at 3.5 feet.

At Test Pit 4, dense, gray GRAVEL was found to a depth of 0.33 feet, followed by moderately stiff, brown SILT to a depth of

R. T. Tanaka Engineering, Inc.
September 13, 1996
Page Two

0.66 feet. Below the SILT, moderately dense, tan white SAND was found to the final depth of the test pit at 3 feet.

At Test Pit 5, dense, gray GRAVEL was found to a depth of 0.75 feet, followed by stiff, brown SILT to a depth of 1 foot, followed by moderately dense, tan brown SAND to the final depth of the test pit at 2 feet.

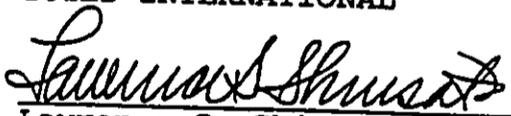
- 2) Groundwater was encountered in Boring 1 at 3 feet, in Test Pit 2 and 3 at 3.5 feet, and in Test Pit 4 at 2.75 feet at the time of the investigation.
- 3) At the time of this investigation, no traffic data was available. For the proposed WB-50 loading and assuming 100-stalls, the recommended flexible pavement section is 3 inches of asphaltic concrete, and 8 inches base course. If the site is to be filled, the fill material should have a CBR value equal to or greater than the existing subgrade material.

Details of the findings and recommendations are presented in the attached report.

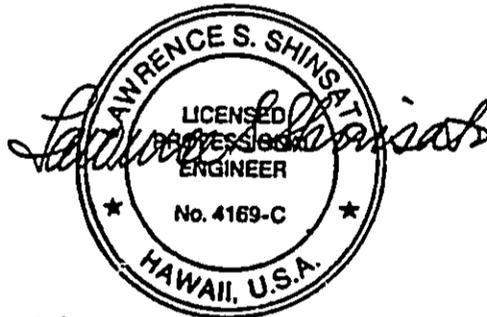
This investigation was made in accordance with generally accepted engineering procedures and included such field and laboratory tests considered necessary for the project. In the opinion of the undersigned, the accompanying report has been substantiated by mathematical data in conformity with generally accepted engineering principles and presents fairly the design information requested by your organization. No other warranty is either expressed or given.

Respectfully submitted,

SOILS INTERNATIONAL


Lawrence S. Shinsato, P.E.
Vice-President

LSS:BHH:bh



This work was prepared by me or under my supervision.

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INTRODUCTION

This investigation was made for the purpose of obtaining information on the subsurface conditions from which to base recommendations for pavement design for the proposed storage yard parking lot at the Kahului Harbor in Kahului, Maui, Hawaii. The location of the site, relative to the existing streets and landmarks, is shown on the Vicinity Map, Plate 1.

SCOPE OF WORK

The services included excavating 5 test pits to depths of 2 to 4.5 feet, drilling 1 test boring to a depth of 10 feet, obtaining samples of the underlying soils, performing laboratory tests to determine pertinent engineering properties of the representative soil samples, and performing an engineering analysis to determine foundation design parameters. The following information is provided for use by the Architect and/or Engineer:

1. General subsurface conditions, as disclosed by the explorations.
2. Physical characteristics of the soils encountered.
3. Recommendations for placement of fill and backfill.
4. Pavement design.

PLANNED DEVELOPMENT

From the information provided, the project will consist of constructing a paved parking lot at the existing 2.8 acre gravel

parking lot. The parking lot will be used as a storage facility for "Matson" type containers. No buildings will be constructed on the proposed site.

SITE CONDITIONS

Surface

The property, at TMK: 2-3-7-10: 02, is located on the east side of Kahului Harbor. At the time of the site investigation, the site was covered with gravel.

The site is almost level. The existing elevations range between +5' and +7' throughout the site.

Subsurface

The subsurface conditions at the site were explored by excavating five (5) test pits to depths of 2 to 4.5 feet, and drilling one (1) test boring to a depth of 10 feet. The locations of the explorations are shown on the Plot Plan, Plate 2. Detailed logs of the explorations are presented in the Appendix to this report.

At Test Pit 1, dense, gray brown GRAVEL was found to a depth of 1.25 feet, followed by moderately dense, light yellow brown SAND to the final depth of the test pit at 4.5 feet.

At Test Pit 2, dense, gray GRAVEL was found to a depth of 1.25 feet, followed by stiff, brown SILT to a depth of 1.5 feet. Below the SILT, moderately dense, tan brown SAND was found to the final depth of the test pit at 3.5 feet.

At Test Pit 3, dense, gray GRAVEL was found to a depth of 1.5 feet, followed by dense, tan brown to white SAND to the final depth of the test pit at 3.5 feet.

At Test Pit 4, dense, gray GRAVEL was found to a depth of 0.33 feet, followed by moderately stiff, brown SILT to a depth of 0.66 feet. Below the SILT, moderately dense, tan white SAND was found to the final depth of the test pit at 3 feet.

At Test Pit 5, dense, gray GRAVEL was found to a depth of 0.75 feet, followed by stiff, brown SILT to a depth of 1 foot, followed by moderately dense, tan brown SAND to the final depth of the test pit at 2 feet.

Groundwater was encountered in Boring 1 at 3 feet, in Test Pit 2 and 3 at 3.5 feet, and in Test Pit 4 at 2.75 feet at the time of the investigation.

From the USDA Soil Conservation Service "Soil Survey of the Islands of Kauai, Oahu, Maui, Molokai and Lanai, State of Hawaii", the site

is located in an area designated as Fill land (Fd). This land type consists of areas filled with bagasse and slurry from sugar mills. A few areas are filled with material from dredging and from soil excavations. Generally, these materials are dumped and spread over marshes, low-lying areas along the coastal flats, coral sand, coral limestone, or areas shallow to bedrock (USDA, 1972, p. 31, Plate 99).

Geology

The site is located on the northwesterly flank of the Haleakala Volcano. The development of the island above sea level is believed to have occurred between later Pliocene and Pleistocene time (approximately 1 and 12 million years ago). Haleakala was built over three rift zones that trend north, southwest and east. These rift zones are studded with large cinder cones. The lava flows making up the main mass of the mountain is known as the Honomanu volcanic series which consist of thin-bedded pahoehoe and aa lava flows. Above the Hononamu volcanics is the Kula volcanic series which consist of thicker andesitic aa flows. Most of the lava flows dip about 12 degrees. Along the southwest and east rift zones only, the volcano is capped with the Hana volcanic series (Stearns, 1966).

CONCLUSIONS AND RECOMMENDATIONS

Pavement Design

Laboratory California Bearing Ratio (CBR) tests were performed on

two representative samples of the existing subgrade material. The results were as follows:

Test Pit 1, Sample at 1.5':	
Molded Dry Density:	93.6 pcf
Molded Moisture Content: (before)	9.1%
(after)	22.4%
CBR at 0.1" penetration	27.8
Swell (10-pound surcharge)	0%
Test Pit 3, Sample at surface:	
Molded Dry Density:	136.9 pcf
Molded Moisture Content: (before)	5.7%
(after)	8.7%
CBR at 0.1" penetration	55.0
Swell (10-pound surcharge)	0%

At the time of this investigation, no traffic data was available. For design of the pavement section, the following parameters were used:

Traffic load:	WB-50 traffic (large semi-trailers: 12-kip tractor front axle load, 34-kip rear tractor axle load, and 34-kip rear trailer axle load)
Terminal Serviceability:	2.5
Design Life:	20 years
Equivalent Single Axle Load:	1,800,000 (based on 100-stalls with each stall being used 1 time per day)
Subgrade Strength Value:	CBR = 27

Using the above data, the recommended pavement section is as follows:

Flexible Pavement

- 3 inches asphaltic concrete
- 8 inches untreated base course gravel (UTB)

Rigid Pavement

- 7 inches portland cement concrete
- 4 inches untreated base course gravel (UTB)

If the site is to be filled, the fill material should have a CBR value equal to or greater than the existing subgrade material. If not, a modification to the recommended pavement will be required.

The base course gravel, subbase, and top 6 inches of subgrade shall be compacted to at least 95 percent of the maximum dry density as determined by the ASTM D1557-91 test procedure.

All material quality and compaction requirements for the pavement section shall be in accordance with the State of Hawaii, Department of Transportation, "Standard Specifications for Road, Bridge and Public Works Construction," dated 1994.

Slopes

Cut and fill slopes shall not exceed 2 horizontal to 1 vertical for slopes exposing soil.

Exposed slopes shall be covered as soon as practical after construction to minimize erosion.

Fill slopes shall be constructed by either overfilling and cutting back to compacted soil, or the slope shall be track-rolled.

Site Preparation and Grading

It is recommended that the site be prepared in the following manner:

1. In areas to receive fill and beneath pavement areas, the surface shall be cleared and grubbed of all vegetation, weeds, brush, roots, stumps, rubbish, debris, soft soils, and other deleterious material. These shall be removed from the site.
2. The exposed surface shall then be scarified to a depth of 6 inches, moisture conditioned to near optimum moisture content (ASTM D-1557) and then compacted to at least 95 percent of the maximum dry density. If soft areas are encountered, these areas shall be removed to firm material and the resulting depression shall be filled with properly compacted fill.

If compaction of the subgrade is hindered by wet/loose soils near or at the groundwater level, placement of geotextile (AMOCO 4553 or similar) with an additional 12 inches of subbase material shall be added to the pavement section.

3. Fill and backfill material shall consist of soil which is free of organics, debris and expansive clayey material. The material shall be less than 3 inches in greatest dimension. Imported structural fill and backfill material shall have a plasticity index less than 20 if the material contains more than 15% fines (passing the #200 sieve).

The on-site SAND, silty SAND, and GRAVEL are suitable for use as structural fill provided they meet the maximum size requirements stated above. The on-site SILT is not suitable for use as structural fill.

4. Fill and backfill shall be placed in lifts not exceeding 8 inches in loose thickness. Prior to placing, the material shall be aerated or moistened to near optimum moisture content (ASTM D1557-91 test procedure).

Where fill is placed on existing ground that is steeper than 5 horizontal to 1 vertical, the existing ground surface shall be benched into firm soil as the fill is placed.

5. Each layer of structural fill and backfill (under and 3 feet beyond the edges of pavements) shall be thoroughly compacted to at least 95 percent of the maximum dry density as determined by

the ASTM D1557-91 test procedure. All other fill and backfill shall be compacted to at least 90 percent relative compaction (ASTM D1557-91).

6. Drainage shall be provided to minimize ponding of water adjacent to or on pavement areas. Ponded areas shall be drained immediately or water pumped out without damaging adjacent structures and property. If water accumulation softens the subgrade materials, the affected soils shall be removed and replaced with properly compacted fill.

INSPECTION

During the progress of construction, so as to evaluate compliance with the design concepts, specifications and recommendations contained in this report, a representative from this office should be present to observe the following operation:

1. Site preparation.
2. Placement of fill and backfill.

REMARKS

The conclusions and recommendations contained herein are based on the findings and observations made at the exploration locations. If conditions are encountered during construction which appear to differ from those disclosed by the explorations, this office shall be notified so as to consider the need for modifications.

This report has been prepared for the exclusive use of R. T. Tanaka Engineering, Inc. and their respective design consultants. It shall not be used by or transferred to any other party or to another project without the consent and/or thorough review by this facility. Should the project be delayed beyond the period of one year from the date of this report, the report shall be reviewed relative to possible changed conditions.

Samples obtained in this investigation will deteriorate with time and will be unsuitable for further laboratory tests within one (1) month from the date of this report. Unless otherwise advised, the samples will be discarded at that time.

- o o o -

The following are included and complete this report:

Vicinity Map ----- Plate 1

Plot Plan ----- Plate 2

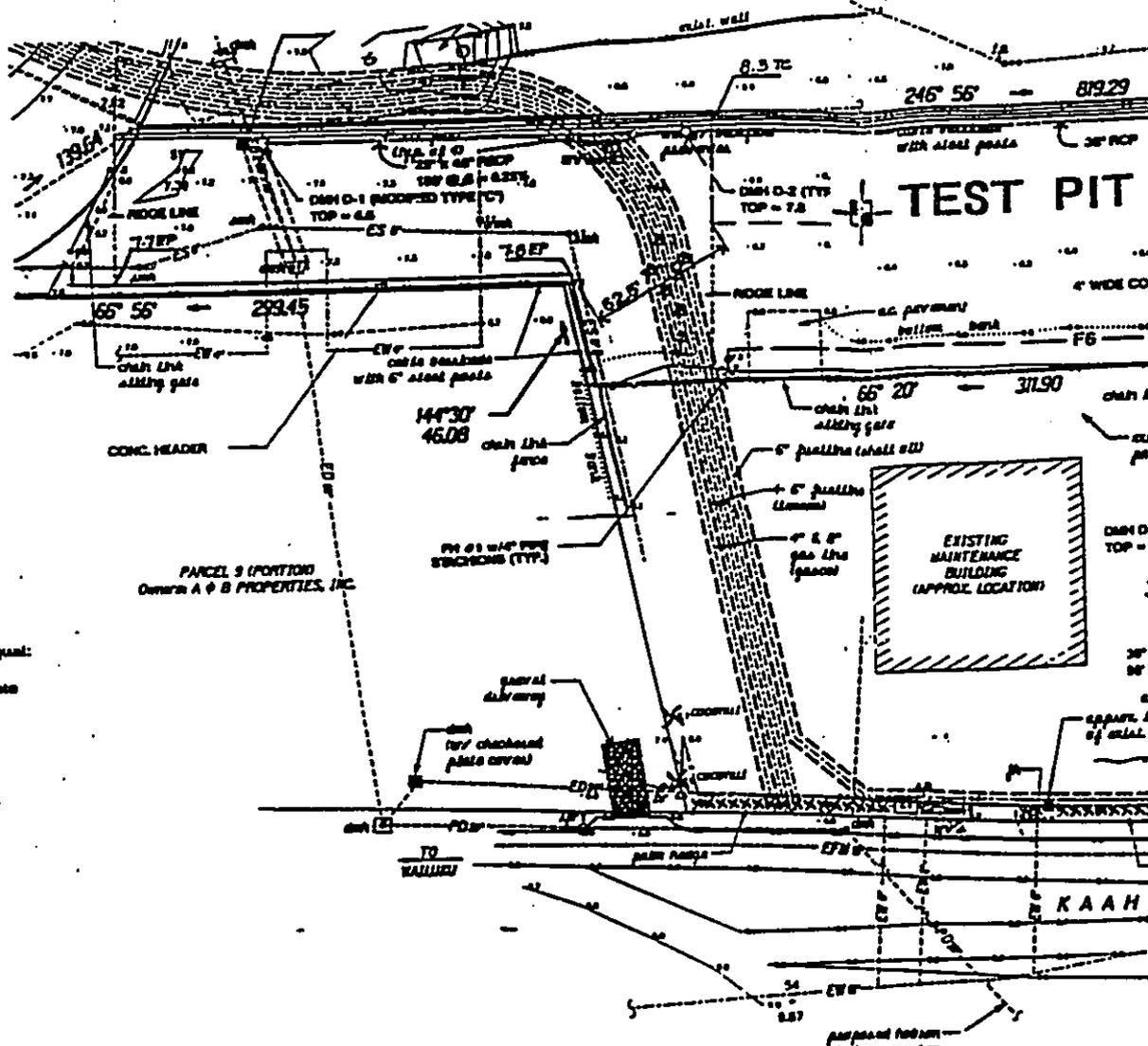
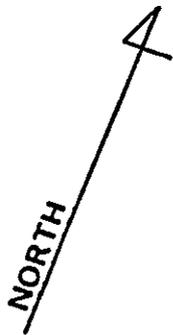
Appendix

Field Investigation

Laboratory Testing

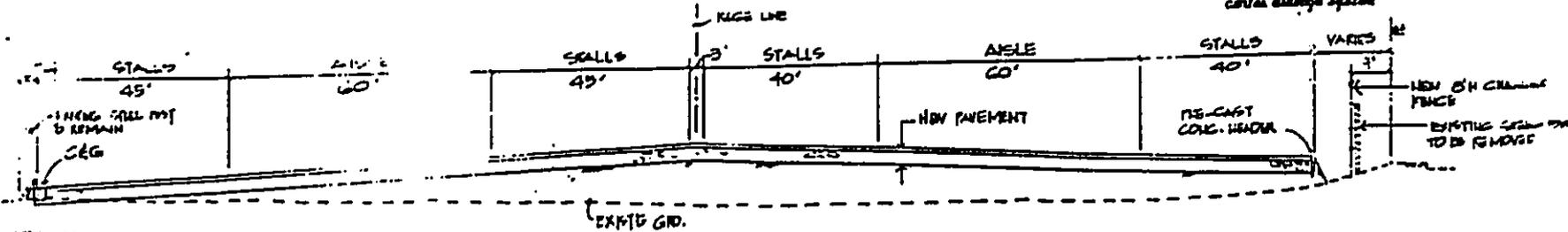
Logs of Explorations

Results of Laboratory Tests

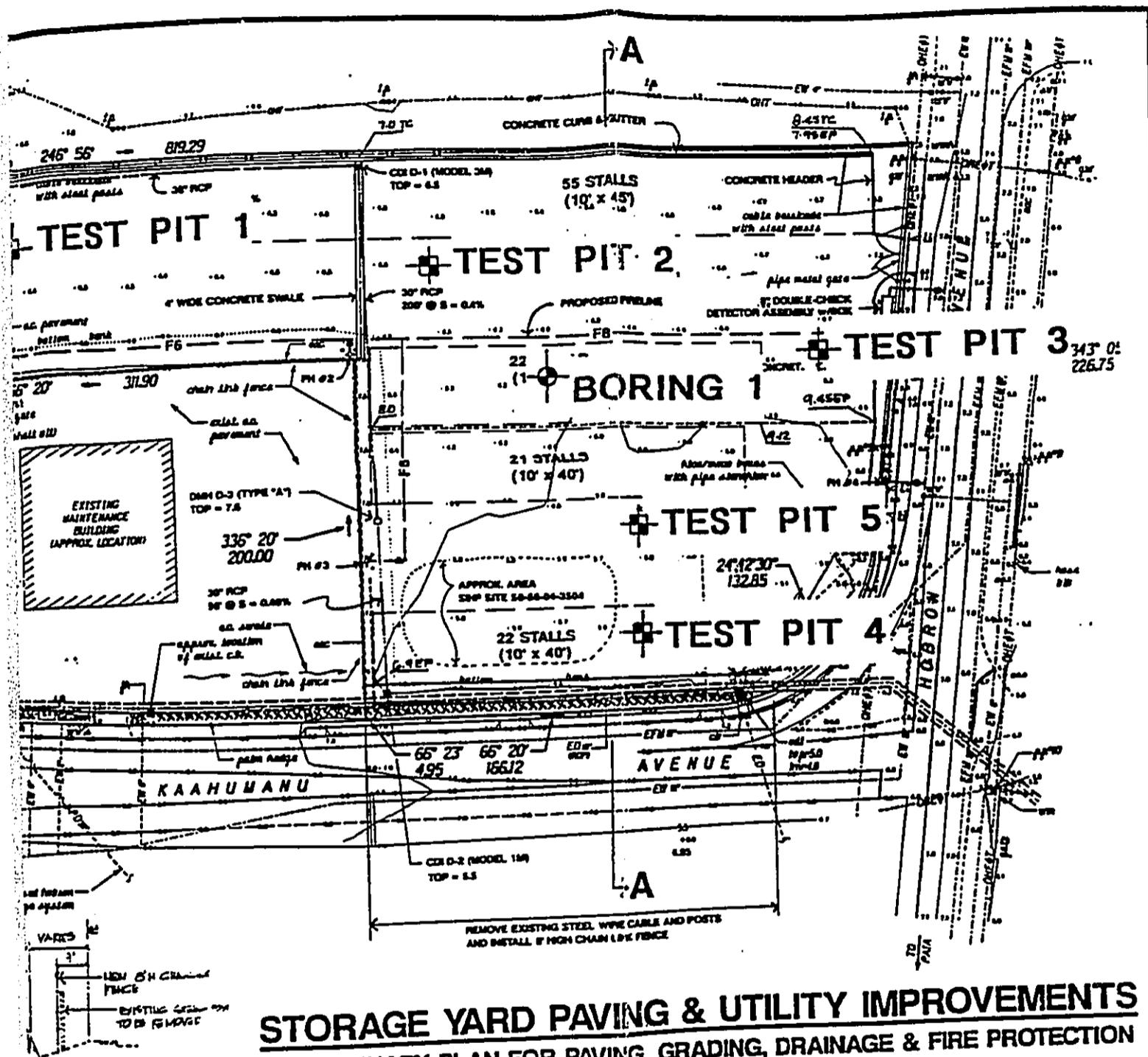


NOTES:

1. Ref. Standards/Details:
 - a. Dept. of Transportation, Highways Division:
 - Type "A" and "C" Drain Manhole
 - Type 2DG Curb & Gutter
 - Type 3D Pre-Cast Concrete Curb (Concrete Header)
 - b. Santa Rosa Cast Products Company or Approved Equal:
 - Concrete Drop Inlets with Heavy Duty Frame and Grate
 - Model 1M (3' x 3' - L.D.)
 - Model 3M (3' x 4' - D.D.)
 - c. Water System: DWS Standard Details
2. Existing drainlines and utilities as shown are approximate.



SECTION A-A
N.T.S.



STORAGE YARD PAVING & UTILITY IMPROVEMENTS
 PRELIMINARY PLAN FOR PAVING, GRADING, DRAINAGE & FIRE PROTECTION
 KAHULUI HARBOR, MAUI
 JOB NO. H.C. 3280
 AUGUST 5, 1996

PLOT PLAN		
SCALE: 1"=80'	APPROVED BY:	DRAWN BY
DATE: AUG., 1996		REVISED
KAHULUI HARBOR STORAGE YARD		
SOILS INTERNATIONAL PROJECT NO. M-2686-F		Plate 2

APPENDIX

FIELD INVESTIGATION AND LABORATORY TESTING

FIELD INVESTIGATION

General

The field investigation consisted of performing explorations at the locations shown on the Plot Plan. The method used for the exploratory work is shown on the respective exploration log. A description of the various method or methods used is presented below.

Test Borings Using Truck-Mounted Drilling Equipment

Truck-mounted borings are drilled using a gas-powered drilling rig. The hole is advanced using continuous flight augers, wash boring and/or NX coring.

Auger drilling is used in soils where caving does not occur. The augers are 4-1/2 inch diameter continuous helical flight augers with the lead auger having a head equipped with changeable cutting teeth. Soil cuttings are brought to the surface by the continuous flights. After the bore hole is advanced to the required depth and cleaned of cuttings by additional rotation of the augers, the augers are retracted for soil sampling or in-situ testing.

In soils where caving of the bore hole occurs, the hole is advanced by wash boring or hollow-stem augering. Wash boring consists of advancing steel casing by rotary action and water pressure to flush the soil from the casing. The lead section of the casing is equipped with a carbide or diamond casing bit. After the casing has been advanced to the required depth, soil samples are obtained through the inside of the casing. Hollow-stem drilling consists of advancing the hole with 7-5/8 inch outside diameter and 4-1/4 inch inside diameter augers. The leading drill bit is connected to drilling rods through the central portion of the auger. At the required sampling depth, the interior drill rods and lead bit are removed, and the soil sample is taken by driving a sampler through the "hollow" section of the augers.

Coring is used for hard formations such as rock, coral or boulders. The core barrel, consisting of a 5-foot long double tube, hardened steel barrel with either a carbide or diamond bit, is attached to drilling rods and set on the hard formation. The core barrel is advanced through the formation by rotation of the core barrel. Water is used to flush out the cuttings. Upon completion of the core run, the sample is removed from the core barrel and inspected. The total core recovery length and the sum of all intact pieces over 4-inch in length are measured. The length of core recovery divided by the length of the core run is the recovery ratio. The combined length of the 4-inch or longer pieces divided by the length of core run is the Rock Quality Designation (RQD). The values provide an indication of the quality of the formation.

Test Borings Using Portable Drilling Equipment

In areas inaccessible to truck-mounted equipment, portable drilling equipment is used to drill the test boring. The boring is advanced by either 1) continuous drive sampling or by 2) using a small gas-powered drill rig with continuous flight augers, wash boring or NX coring.

Soil samples are obtained with a tripod and cathead assembly using soil sampling methods described below.

Test Pits Using Excavators/Hopto

Test pits are excavated using a hopto or backhoe. Material excavated from the pit and the sides and bottom of the pit are visually inspected and a continuous log of the hole is kept.

Explorations Using Hand Tools

In inaccessible areas requiring only shallow explorations, borings and test pits are made using hand equipment. Borings are drilled using hand augers. Test pits

are excavated using hand tools. Cuttings from the boring and/or pit are inspected and visually classified.

Soil Sampling

Relatively undisturbed samples of the underlying soils are obtained from borings by driving a sampling tube into the subsurface material using a 140-pound safety hammer falling from a height of 30 inches. Ring samples are obtained using a 3-inch outside diameter, 2.5 inch inside diameter steel sampling tube with an interior lining of one-inch long, thin brass rings. The tube is driven approximately 18 inches into the soil and a section of the central portion is placed in a close fitting waterproof container in order to retain field conditions until completion of the laboratory tests. Standard Penetration Test (SPT) values and disturbed soil samples are obtained with a 2-inch (outside diameter) split-barrel sampler instead of the 3-inch sampler. The number of blows required to drive the sampler into the ground is recorded at 6-inch intervals. The blow count for the last 12-inches is shown on the boring logs.

From test pit excavations, undisturbed samples are retained from cohesive type soil formations and disturbed bulk samples are retained from friable and cohesionless soil formations.

The soil samples are visually classified in the field using the Unified Soil Classification System. Samples are packed in moisture proof containers and transported to the laboratory for testing.

LABORATORY TESTING

General

Laboratory tests are performed on various soil samples to determine their engineering properties. Description of the various tests are listed below.

Unit Weight and Moisture Content

The in-place moisture content and unit weight of the samples are used to correlate similar soils at various depths. The sample is weighed, the volume determined, and a portion of the sample is placed in the oven. After oven-drying, the sample is again weighed to determine the moisture loss. The data is used to determine the wet-density, dry-density and in-place moisture content.

Direct Shear

Direct shear tests are performed to determine the strength characteristics of the representative soil samples. The test consists of placing the sample into a shear box, applying a normal load and then shearing the sample at a constant rate of strain. The shearing resistance is recorded at various rates of strain. By varying the normal load, the angle of internal friction and cohesion can be determined.

Consolidation Test

Consolidation tests are performed to obtain data from which time rates of consolidation and amounts of settlement may be estimated. The test is performed by placing a specimen in a consolidation apparatus. Loads are applied in increments to the circular face of a one (1) inch high sample. Deformation or changes in thickness of the specimen are recorded at selected time intervals. Water is introduced to or allowed to drain from the sample through porous disks placed against the top and bottom faces of the specimen. The data is then used to plot a stress-volume strain curve which is used in estimating settlement.

Expansion Test - Ring Swell

Expansion tests are performed on clayey soils to determine the expansion potential of the sample. The test is performed using either a remolded or relatively undisturbed field sample. The sample is placed in an expansion apparatus with a one (1) psi surcharge. The sample is saturated and the change in vertical height is recorded. The initial moisture content is varied (field moisture or air-dried) to determine the variation in expansion potential with moisture changes. The data is used to determine the expansion potential of the soil.

Classification Tests

The soil samples are classified using the Unified Soil Classification System. Classification tests include sieve and hydrometer analysis to determine grain size distribution, and Atterberg Limits to determine the liquid limit, plastic limit and plasticity index.

California Bearing Ratio Test

California Bearing Ratio (CBR) tests are performed on materials to determine the bearing strength of the soil for determination of pavement sections. The sample is compacted into a 6-inch diameter mold in 5 equal layers. Each layer is compacted with a 10-pound hammer falling from a height of 18-inches, with each layer receiving 56 blows. The mold is then placed in a water bath for 4-days and the vertical swell is measured under a surcharge weight of 10 pounds. After the soaking period, the sample is placed in a CBR apparatus that has a 3-square inch penetrometer. The penetrometer is pressed vertically into the soil at constant strain and the loads required to press the penetrometer are recorded. A plot of the load-strain relationship is made to determine the CBR value.

Maximum Dry Density/Optimum Moisture Content

The maximum dry density and optimum moisture content of the material is determined in accordance with the ASTM D1557-78 test procedure. The sample is compacted into a mold in 5 equal layers using a 10 pound hammer falling from a height of 18 inches. The diameter of the mold is either 4-inches or 6-inches depending on the proportion of gravel in the sample. The sample is compacted at various moisture contents to develop a compaction curve for the soil. The curve is usually bell-shaped with a peak indicating the maximum dry density and optimum moisture content.

Penetrometer Test

Penetrometer tests are performed on clayey soils to determine the consistency of the material and an approximate value of the unconfined compressive strength.

Torvane

Torvane tests are used to determine the approximate undrained shear strength of clayey soils. The torvane apparatus consists of a torque device with a small diameter plate that has vanes situated perpendicular to the plate. The vanes are pushed into the soil and torque is applied until failure occurs. The torque required to cause failure is converted to approximate undrained strength of the soil.

LOG OF BORING NO. 1

EQUIPMENT USED: SIMCO 2400 Drilling Rig

DATE DRILLED: 8-13-96

ELEVATION: +6.2'

DEPTH OF BORING (FT.): 10

DEPTH TO GROUNDWATER: 3'

DEPTH (FT.)	GRAPHIC SYMBOL	UNIFIED SOIL CLASSIFICATION	DESCRIPTION	SAMPLE	BLOWS/FOOT	COLOR	MOISTURE	CONSISTENCY	DRY DENSITY (PCF)	MOISTURE CONTENT (% OF DRY WT.)	PENETROMETER (TSF)	TORVANE STRENGTH (TSF)
0		GW-GM	GRAVEL; with sand and fines			gray	sl. moist	dense				
1		SM	silty SAND (calcareous, medium grained)			tan brown	moist					
2					56				82	16.3		
3		SP	SAND; few gravel, trace fines		30	tan gray		mod. dense	83	25.0		
4												
5		PROBE	PROBE		19							
6					16							
7					10							
8					15							
9					14							
10			END OF BORING									
11												
12												
13												
14												

PROJECT NAME: KAHULUI HARBOR STORAGE YARD

PROJECT NO.: M-2686-F



PLATE

3

LOG OF TEST PIT NO. 1

ELEVATION: +6.5'

EQUIPMENT USED: Ford 555C Backhoe

DEPTH OF TEST PIT (FT.): 4.5

DATE EXCAVATED: 8-21-96

DEPTH TO GROUNDWATER: N/A

DEPTH (FT.)	GRAPHIC SYMBOL	UNIFIED SOIL CLASSIFICATION	DESCRIPTION	SAMPLE	COLOR	MOISTURE	CONSISTENCY	DRY DENSITY (PCF)	MOISTURE CONTENT (% OF DRY WT.)	PENETROMETER (TSF)	ATTERBERG LIMITS			
											LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	
0		GW-GM	GRAVEL; with sand and fines		gray brown	moist	dense							
2		SP	SAND (coarse grained, calcareous); few gravel - CBR Value at 0.1" penetration = 27.8		light yellow brown		mod. dense		7.0					
4			END OF TEST PIT											
6														
8														
10														
12														
14														

PROJECT NAME: KAHULUI HARBOR STORAGE YARD

PROJECT NO.: M-2686-F



PLATE

4

LOG OF TEST PIT NO. 2

ELEVATION: +6.5'

EQUIPMENT USED: Ford 555C Backhoe

DEPTH OF TEST PIT (FT.): 3.5

DATE EXCAVATED: 8-21-96

DEPTH TO GROUNDWATER: 3.5'

DEPTH (FT.)	GRAPHIC SYMBOL	UNIFIED SOIL CLASSIFICATION	DESCRIPTION	SAMPLE	COLOR	MOISTURE	CONSISTENCY	DRY DENSITY (PCF)	MOISTURE CONTENT (% OF DRY WT.)	PENETROMETER (TSF)	ATTERBERG LIMITS			
											LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	
0		GW-GM	GRAVEL; with sand and fines		gray	moist	dense							
		ML	SILT		brown		stiff		4.50					
2		SP	SAND; few gravel		tan brown		mod. dense							
4			END OF TEST PIT											
6														
8														
10														
12														
14														

PROJECT NAME: KAHULUI HARBOR STORAGE YARD

PROJECT NO.: M-2686-F



PLATE

5

LOG OF TEST PIT NO. 3

ELEVATION: +6.5'

EQUIPMENT USED: Ford 555C Backhoe

DEPTH OF TEST PIT (FT.): 3.5

DATE EXCAVATED: 8-21-96

DEPTH TO GROUNDWATER: 3.5'

DEPTH (FT.)	GRAPHIC SYMBOL	UNIFIED SOIL CLASSIFICATION	DESCRIPTION	SAMPLE	COLOR	MOISTURE	CONSISTENCY	DRY DENSITY (PCF)	MOISTURE CONTENT (% OF DRY WT.)	PENETROMETER (TSF)	ATTERBERG LIMITS		
											LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX
0		GW-GM	GRAVEL; with sand and fines -- CBR Value at 0.1" penetration = 55.0		gray	moist	dense		4.6				
2		SP	SAND; few gravel		tan brown white								
4			END OF TEST PIT										
6													
8													
10													
12													
14													

PROJECT NAME: KAHULUI HARBOR STORAGE YARD

PROJECT NO.: M-2686-F



PLATE

6

LOG OF TEST PIT NO. 4

ELEVATION: +5.5'

EQUIPMENT USED: Ford 555C Backhoe

DEPTH OF TEST PIT (FT.): 3

DATE EXCAVATED: 8-21-96

DEPTH TO GROUNDWATER: 2.75'

DEPTH (FT.)	GRAPHIC SYMBOL	UNIFIED SOIL CLASSIFICATION	DESCRIPTION	SAMPLE	COLOR	MOISTURE	CONSISTENCY	DRY DENSITY (PCF)	MOISTURE CONTENT (% OF DRY WT.)	PENETROMETER (TSF)	ATTERBERG LIMITS			
											LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	
0	[Symbol: Dotted pattern]	GW-GM	GRAVEL: with sand and fines		gray	moist	dense							
			SILT		brown		mod. stiff							
		ML SP	SAND: few gravel		tan white		mod. dense							
2														
4			END OF TEST PIT											
6														
8														
10														
12														
14														

PROJECT NAME: KAHULUI HARBOR STORAGE YARD

PROJECT NO.: M-2686-F



PLATE

7

LOG OF TEST PIT NO. 5

ELEVATION: +5.8'

EQUIPMENT USED: Ford 555C Backhoe

DEPTH OF TEST PIT (FT.): 2

DATE EXCAVATED: 8-21-96

DEPTH TO GROUNDWATER: N/A

DEPTH (FT.)	GRAPHIC SYMBOL	UNIFIED SOIL CLASSIFICATION	DESCRIPTION	SAMPLE	COLOR	MOISTURE	CONSISTENCY	DRY DENSITY (PCF)	MOISTURE CONTENT (% OF DRY WT.)	PENETROMETER (TSF)	ATTERBERG LIMITS			
											LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	
0		GW-GM	GRAVEL; with sand and fines		gray	moist	dense							
		ML	SILT		brown		stiff							
		SP	SAND; few gravel		tan brown		mod. dense							
2			END OF TEST PIT											
4														
6														
8														
10														
12														
14														

PROJECT NAME: KAHULUI HARBOR STORAGE YARD

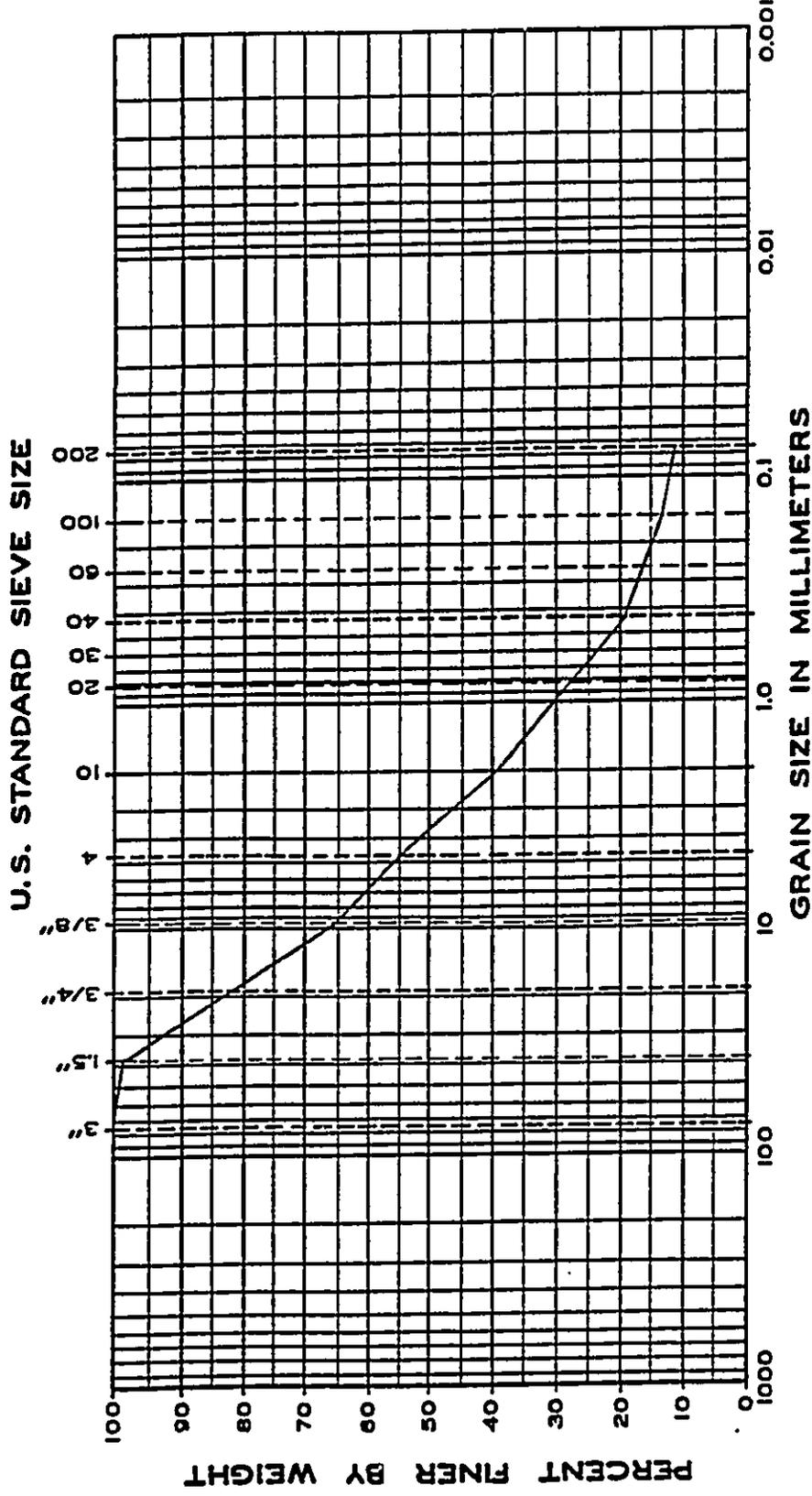
PROJECT NO.: M-2686-F



PLATE

8

GRAIN SIZE DISTRIBUTION



LOCATION	DEPTH	GROUP SYMBOL	GRAVEL			SAND			SILT OR CLAY			ATTERBERG LIMITS		
			COARSE	FINE	CO	MEDIUM	FINE	MOISTURE CONTENT	LL	PL	PI			
TP-3, S-1	0'	GW-GM	GRAVEL; with sand and fines			CLASSIFICATION			4.9%					
KAHALUI HARBOR STORAGE YARD												PROJECT NO. M-2686-F		
SOILS INTERNATIONAL												PLATE 9		

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Appendix C
Botanical Study

BOTANICAL RESOURCES ASSESSMENT STUDY
DOT - HARBORS DIVISION BARGE TERMINAL IMPROVEMENTS, PHASE I
KAHULUI HARBOR, ISLAND OF MAUI

by

Winona P. Char
CHAR & ASSOCIATES
Botanical Consultants
Honolulu, Hawai'i

Prepared for: SATO & ASSOCIATES, INC.

January 1997

BOTANICAL RESOURCES ASSESSMENT STUDY
DOT - HARBORS DIVISION BARGE TERMINAL IMPROVEMENTS, PHASE I
KAHULUI HARBOR, ISLAND OF MAUI

INTRODUCTION

The State Department of Transportation (DOT), Harbors Division, proposes to improve its Kahului barge terminal facilities. Phase I of the project includes a warehouse cargo shed analysis (Ota building); clearing, grading, and aggregate base paving of approximately 8 acres for cargo storage yard facility operations; and demolition of the Maui Meat Building facility. An Environmental Assessment document will be prepared to address the proposed improvements.

The project site is bounded by Kahului Harbor to the north, Wharf Street to the east, Ka'ahumanu Street to the south, and Pu'unene Avenue to the west. Portions of the site are in active use. Lot 1 contains the Ota building which houses the Maui Vegetable Growers Cooperative and Dels Farm Supply. Lot 3 and a portion of Lot 6-A is used by Valley Isle Motors and Kitagawa Auto. The remaining portion of Lot 6-A is used for recreational purposes; there are several canoe storage sheds on the lot.

A survey of the botanical resources found on the proposed project site was conducted on 04 December 1996. The primary objectives of the survey were to provide a description of the vegetation on the site and to search for threatened and endangered species as well as rare and vulnerable plants.

DESCRIPTION OF THE BOTANICAL RESOURCES

The plant names used in the following discussion follow the most recent treatment of the Hawaiian flora by Wagner et al. (1990) for the naturalized plants and St. John (1973) for the cultivated plants.

Only Lot 6-A, the recreational area, supports open expanses of vegetation. Lot 1 contains the Ota building and asphalt pavement. Landscape plantings are restricted to the perimeter of the lot and consists of a hedge of Natal plum (Carissa macrocarpa) shrubs along the concrete ditch to the west and plantings of various shrubs and trees such as ironwood (Casuarina equisetifolia), coconut (Cocos nucifera), etc., around the rest of the lot. The vegetation on Lot 5 is largely mowed lawn with a hedge of red hibiscus (Hibiscus rosa-sinensis cultivar) along the side facing Lot 3. The Valley Isle Motors site (Lot 3) is asphalt pavement with landscape plantings along the periphery. The portion of Lot 6-A bordering Ka'ahumanu Avenue is a dirt and coral-lined area used as a new car lot by Kitagawa Auto. A few rows of coconut trees are found on the car lot and a red hibiscus and naupaka hedge is found bordering the adjacent parcel containing Pioneer Federal Bank.

The portion of the Lot 6-A containing the recreational area and the canoe sheds is largely mowed lawn consisting of Bermuda grass (Cynodon dactylon) and St. Augustine grass (Stenotaphrum secundatum) along with several weedy herbaceous species. There are several scattered patches of taller buffel grass (Cenchrus ciliaris) and green panicgrass (Panicum maximum var. trichoglume) on stony areas or small piles of dirt and rubble which are infrequently maintained. These weedy patches also support low shrubs of koa haole (Leucaena leucocephala), guava (Psidium

guajava), and pluchea (Pluchea symphytifolia), as well as plants of 'uhaloa (Waltheria indica), Spanish needle (Bidens pilosa), nutgrass (Cyperus rotundus), hairy spurge (Chamaesyce hirta), smooth rattlepod (Crotalaria pallida), etc.

A large hedge composed primarily of polinalina or vitex shrubs (Vitex trifolia), 15 to 18 ft. tall, runs through the middle of the property. Other plants found scattered among the vitex shrubs include shrubs of Christmas berry (Schinus terebinthifolius) and koa haole, and trees of kiawe (Prosopis pallida) and kou (Cordia subcordata). Ironwood and a few false kamani (Terminalia catappa) trees as well as naupaka (Scaevola sericea) and Indian pluchea (Pluchea indica) shrubs are found by the small pond where the drainage ditch empties into the harbor. On the sandy beach fronting the harbor, there are a few low mats of the beach morning glory or pohuehue (Ipomoea pes-caprae).

A row of ironwood trees is found along the seaward edge of the property. Other plantings found on this portion of Lot 6-A include Norfolk pine (Araucaria heterophylla), coconut and date (Phoenix sp.) trees, milo (Thespesia populnea), Tropic coral (Erythrina variegata cv. "Tropic coral"), Chinese banyan (Ficus microcarpa), sea grape (Coccoloba uvifera), etc.

DISCUSSION AND RECOMMENDATIONS

The site proposed for the barge terminal improvements has been urbanized for a long time. Thus, the vegetation consists largely of landscape plantings and common, widespread weedy species. There are a few native plants on the study site. These are: milo, 'uhaloa, pohuehue, and naupaka. These natives are all indigenous species, that is, they are native to the Hawaiian Islands and

also elsewhere throughout the Pacific and/or tropics. Two plants originally of Polynesian introduction, the coconut and kou, are found on the site. These species were brought to the Hawaiian Islands by the early Polynesian settlers prior to Western contact, that is, Cook's discovery of the islands in 1778.

None of the plants found during the field survey is a listed, proposed, or candidate threatened and endangered species; nor is any plant a species of concern (U.S. Fish and Wildlife Service 1996). None of the plants is considered rare or vulnerable (Wagner *et al.* 1990).

Given the findings above, the proposed barge terminal improvements, Phase I, should not have any significant negative impacts on the botanical resources found on the site or within the general region. There are no botanical reasons to impose any restrictions, impediments, or conditions to the development of the site. However, it is recommended that wherever possible, the existing shrubs and trees, especially the coconuts, milo, naupaka, and kou, be transplanted and "reused" in landscaping the new facilities. This would save on landscaping costs and also preserve native and Polynesian-heritage plants.

LITERATURE CITED

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- U.S. Fish and Wildlife Service. 1996. U.S. Fish and Wildlife Service species list by Federal status - as of 11/07/ 1996, Plants. Unpublished list. Pacific Islands Ecoregion Office, Honolulu.
- Wagner, W.L., D.R. Herbst, and S.H. Sohmer. 1990. Manual of the flowering plants of Hawai'i. 2 vols. University of Hawai'i Press and B.P. Bishop Museum Press, Honolulu. B.P. Bishop Museum Special Publication 83.



United States Department of the Interior

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phone: 808-541-3441; fax: 808-541-3470

OCT 18 1996

In Reply Refer To: CAR

Loren G.S. Lau
Project Manager
Sato & Associates
2046 S. King St.
Honolulu, Hawaii 96826

Re: Barge Terminal Improvement - Phase I
Kahului Harbor, Kahului, Maui, Hawaii

RECEIVED

OCT 21 1996

SATO & ASSOC., INC.

Dear Mr. Lau:

The U.S. Fish and Wildlife Service (Service) has received your September 16, 1996, letter requesting a list of federally listed (or proposed for listing) endangered or threatened species or critical habitat that are in the project area, which may be affected by the project. The proposed project includes providing a rock base area for trailer storage, demolition of an existing building (Maui Meat Co.), and fencing and landscaping.

The Service has reviewed the maps provided with your request and pertinent information in our files, including maps prepared by The Nature Conservancy's Hawaii Natural Heritage Program and the Service's National Wetland Inventory maps. To the best of our knowledge, there are no endangered or threatened species directly within the project area.

In addition, the Service offers the following recommendations to minimize the degradation of water quality and impacts to marine fish and wildlife resources during the proposed project:

- a. All construction-related materials should be placed or stored in ways to avoid disturbance to the marine environment;
- b. All construction-related materials should be free of pollutants;
- c. No contamination of the marine environment (trash or debris disposal etc.) should result from construction activities;

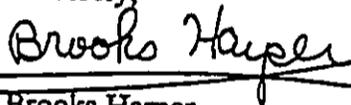
Barge Terminal Improvement - Phase I
Kahului Harbor, Kahului, Maui, Hawaii

- d. A contingency plan to control accidental spills of petroleum products should be developed. Absorbent pads and containment booms should be stored on-site to facilitate the clean-up of petroleum spills;
- e. Turbidity and siltation in the marine environment from project activities should be avoided by the construction of an effective berm around the construction site.

If the proposed project will result in increased usage of the harbor or increased traffic from other areas (either neighbor islands or outside the State of Hawaii), an expanded list of the Maui island species of federal concern may be warranted in view of the Service's concern regarding new introductions of non-native species.

The Service appreciates the opportunity to comment. If you have any questions regarding these comments, please contact Program Leader for Interagency Cooperation, Margo Stahl or Botanist Christa Russell at 808/541-3441.

Sincerely,



Brooks Harper
Field Supervisor
Ecological Services

cc: State Dept. of Transportation, Harbors Division

**ARCHAEOLOGICAL INVENTORY SURVEY OF
THE BARGE TERMINAL IMPROVEMENT PROJECT AT
KAHULUI HARBOR, KAHULUI, WAILUKU, MAUI
JOB H.C. 3281
(TMK 3-7-8: 1, 2, 3, 4, and 6)**

Revised March 1997



GANDA

***Garcia and Associates
Consultants in Cultural and Natural Resources***

In Association with Aki Sinoto Consulting

ARCHAEOLOGICAL INVENTORY SURVEY OF THE
BARGE TERMINAL IMPROVEMENT PROJECT AT KAHULUI HARBOR,
KAHULUI, WAILUKU, MAUI
JOB H.C. 3281
(TMK 3-7-8: 1, 2, 3, 4, and 6)

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Revised March 1997

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ABSTRACT

Garcia and Associates, Inc., in association with Aki Sinoto Consulting, conducted an archaeological inventory survey of the barge terminal improvement project at Kahului Harbor, Kahului, Maui Island (TMK 3-7-8: 1, 2, 3, 4, and 6). Field work, conducted between 9-12 September 1996, included a surface survey and excavation of 11 backhoe trenches.

No surface cultural remains were identified during the survey. Two trenches (Trench 2 and Trench 8) contained isolated historic remains, consisting of one complete brown beer bottle and one white porcelain fragment. Both artifacts were recovered from the backfill. A pit feature (Feature 1) was encountered in Trench 10. One charcoal sample from this feature was submitted to Beta Analytic for radiocarbon dating.

No further archaeological work is recommended. However, due to the probability of encountering cultural remains in sand dunes and below the water table, archaeological monitoring during any grading or other construction-related excavation activities is recommended.

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INTRODUCTION

At the request of Sato and Associates, Inc., Garcia and Associates (GANDA) in association with Aki Sinoto Consulting, conducted an archaeological inventory survey of the Barge Terminal Improvement Project area (Job H.C. 3281) at Kahului Harbor in Kahului, Maui (Fig. 1). The objective of the current study was to locate and record any significant cultural resources present within the project area, make initial site significance assessments, and provide recommendations for mitigation of potential adverse effects to these resources as a result of construction activities. Field work was conducted between 9-12 September 1996 by Francis J. Eblé, B.A., and Kimberly Wade, B.A., of GANDA. Jeffrey Pantaleo, M.A., served as the Principal Investigator for this project.

The following report includes background information on: the location and environment of the project area; relevant historical information; and previous archaeological research in the area. It also includes information outlining field and laboratory methods and results of field investigations. The final section of the report will summarize the results and discuss them in terms of how they may relate to previous use and settlement of the area and natural landscape evolution. Recommendations for future treatment of the project area in regards to cultural resource management are also presented.

PROJECT LOCATION

The eight acre, Barge Terminal Improvement Project area (TMK 3-7-8:1-4, and 6) at Kahului Harbor is located on the windward coast of Maui in Wailuku *ahupua'a*, Wailuku District, Maui Island (Fig. 2). It is bounded on the north by the sea, south by Ka'ahumanu Avenue, west by Pu'unēnē Street, and east by Wharf Street. A portion of the project area lies within the boundaries of the historic Kahului District (50-50-04-1607).

ENVIRONMENT

The isthmus of Maui was formed of the convergence of volcanic material from the Haleakalā and West Maui volcanoes and by subsequent erosion and natural processes. During the Pleistocene, fluctuations of sea level deposited sand on the isthmus of Maui.

Soils

The USDA Soil Conservation Service conducted a soil survey of the islands of Kaua'i, O'ahu, Maui, Moloka'i and Lāna'i to classify the types of soil present on the islands (Foote et al. 1972:2). One soil type, Fill Land, is present in the project area. This type is described as:

...areas filled with bagasse and slurry from sugar mills. A few areas are filled with material from dredging and from soil excavations. Generally, these materials are dumped and spread over marshes, low-lying areas along the coastal flats, coral sand, coral limestone, or areas shallow to bedrock, areas filled with bagasse and slurry from sugar mills (Foote et al. 1972:31).

Rainfall and Vegetation

Annual average rainfall in Kahului is 20-30 inches (Armstrong 1983:56). Vegetation in the area consists of coconut palms (*Cocos nucifera*), maintained grass, and isolated stands of ironwood trees fronting the beach (Fig. 3).

HISTORY

Kahului, literally translated as "the winning" (Pukui et al. 1981:67), is situated in the *ahupua'a* of Wailuku in the traditional district of Na Wai 'Eha. The name Na Wai 'Eha, meaning "the Four Streams," refers to the streams of the valleys of Waihe'e, Waiehu, Wailuku ('Īao), and Waikapū. The 'Īao Stream drains into Kahului Bay. Before European contact the stream served to irrigate taro *lo'i* and terraces that extended well up into 'Īao Valley. After European contact, much of the land that was used for taro cultivation was converted for sugar cane cultivation. Many of the terraces were adapted to market crops by Japanese and Portuguese farmers. Much of the higher elevation terraces were covered with guava thickets (Handy and Handy 1972:496-497).

East of the current project area is Kanahā Fishpond (State Historic Site 50-50-05-1783). It is said to have been built by Chief Kiha-a-Pi'ilani (translated as "child of Pi'ilani"), brother-in-law of 'Umi, who lived during the sixteenth century. Kamakau, a missionary-educated Hawaiian historian born in 1815, writes:

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'ilani, ruler of Maui. Kiha-a-Pi'ilani was building the 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. The two chiefs met and greeted each other with affection (Kamakau 1961:42).



Facing SE



Facing NW

Figure 3. Pictures of the project area.

This passage suggests that the two ponds, Kanahā and Mau'oni, were constructed, or at least modified, over four hundred years ago. At present Kanahā Fishpond has been designated a State Wildlife Sanctuary. At one time nearly 500 *ae'o* (*Himantopus mexicanus knudseni*) were counted here in addition to many other species of bird (Pukui et al. 1981:83).

During Kamehameha's campaign to unify all the islands of Hawai'i under his rule, the principal military encounter on Maui occurred at Wailuku. Regarding this encounter, Kamakau makes the following reference to Kahului:

The bay from Kahului to Hopukoa was filled with war canoes. For two days there was constant fighting in which many of the most skillful warriors of Maui took part, but Kamehameha brought up the cannon, Lopaka, with men to haul it and the white men, John Young and Isaac Davis to handle it; and there was a great slaughter (Kamakau 1961:148).

John Papa Ii, another missionary-educated Hawaiian born in 1800, writes of the ending of the battle: "When all were ready to leave, the sands were covered with the canoes of the Hawai'i warriors from Kahului to Paia" (Ii 1959:11).

The historic period in Hawai'i begins with the first documented European contact with the islands. This event occurred in 1778 during Captain James Cook's exploration in the Pacific.

The isthmus between Haleakalā and West Maui contains rich and well developed soils suited for crop cultivation. Historically this region supported one of the largest sugar cane plantations in the world.

Sugar cane cultivation in Hawai'i became a highly profitable endeavor following the passing of a reciprocity treaty with the United States in 1876. The treaty allowed unrefined Hawaiian sugar to enter into the United States duty free. The sugar cane industry on Maui intensified under the auspices of Claus Spreckels, who came to Hawai'i from San Francisco. Spreckels leased land from the government and bought large tracts of land along the isthmus of Maui. He obtained water rights needed to build a large irrigation ditch to provide water for crops. It is believed by many that much of what Spreckels acquired was obtained through bribery of King Kalākaua and through artifice (Daws 1968:227). A plantation located east of Kahului was named Spreckelsville.

With the success of the sugar industry came the development of rail systems for transporting cane from field to the harbor and for passenger transportation (Hungerford 1963:3).

The majority of the commercial railroads built in Hawai'i consisted of narrow gauge (36 inches) tracks. Several of the private sugar cane rails were of even narrower gauge (Hungerford 1963:5).

In August of 1876, King Kalākaua signed "An Act to Promote the Construction of Railways" (Hungerford 1963:3). In 1879, Thomas Hobron founded the Kahului Railroad Company, the first railroad in Hawai'i that provided passenger service between Kahului and Wailuku (Hungerford 1963:3). This railroad maintained a track to Kahului, which extended through Spreckelsville, in addition to having rails to Wailuku and to the sugar mill at Pu'unēnē. The Kahului station was located in the vicinity of Hobron Point to the southeast of the current project area (Fig. 4). The railroad was sold in 1886 to the Wilder Steamship Company, and it became a subsidiary of the Hawaiian Commercial and Sugar Company in 1899 (Stroup 1967:45). The Kahului Railroad operated until 1963.

Kahului Harbor is an artificially constructed feature. In the following excerpt, Stroup describes the history of its creation:

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

In 1904, the Kahului Railroad Company (KRRCo.) began construction of the port of Kahului:

At its own expense (the Kahului Railroad Co.) built a rubble mound breakwater, 1,800 feet long. In the lee of the breakwater it dredged an 11 1/2-acre basin and installed moorings and buoys. A small dredger plant was erected on a lighter to eliminate shoaling up near the wharf capable.

Total cost of these preliminary improvements was \$197,081.23. The company spent an additional \$136,008.61 for facilities, including a wharf capable of berthing vessels up to 1,000 tons.

The new pier was open to the public on equal terms. Larger ships were loaded and discharged by lighters, as before; but these operations no longer suffered interruptions in the time of storm, as had frequently been the case in the port's breakwater days (Stroup 1967:46).

In 1910, KRRCo. began construction of the Claudine wharf under license from the Territory of Hawai'i with the understanding that the terminal eventually would be turned over to the territorial government. The wharf was in fact purchased by the Territory in 1924 (Stroup 1967:46). Stroup continues in regards to the evolution of Kahului Harbor from 1910 on:

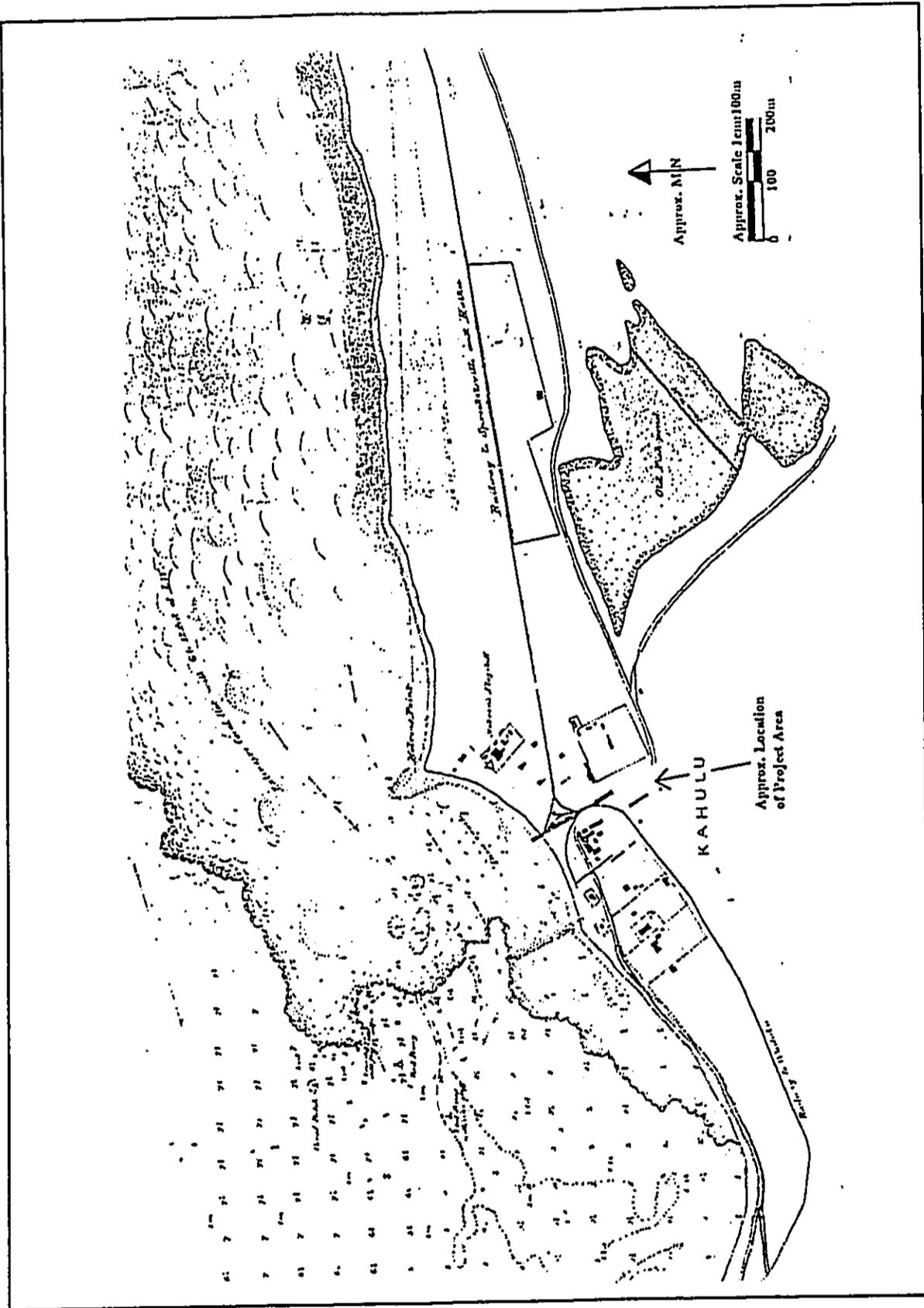


Figure 4. Approximate location of the project area and the Kahului Railroad. Taken from Alexander's 1881 map of Kahului (Reg. 1326).

In that same year Kahului Harbor and breakwater were deeded by KRRCo. to the Federal Government. With the way thus open to the U.S. Corps of Engineers, Congress appropriated \$150,000 for extension of the East Breakwater 2,000 feet and for additional dredging work. Subsequent authorizations resulted in construction of the West Breakwater, in later extension of both breakwaters and in enlargement of the harbor basin.

...Federal improvements to Kahului Harbor were completed by the corps of Engineers, in 1931 and provided a 35-foot deep and 600-foot wide entrance channel; a harbor basin 35 feet deep, 2,000 feet long and 1,450 feet wide; and the east and west break waters protecting the harbor.

In 1961, the harbor basin was enlarged to its present area of 2,400 feet long and 2,050 feet wide (Stroup 1967:46).

The Army Corps of Engineers continues to make efforts to protect the breakwaters from storms, wave action and tidal waves.

PREVIOUS ARCHAEOLOGY

Winslow Walker of Bishop Museum conducted an extensive archaeological survey on the island of Maui from October 1928 to August 1929. He completed an entire circuit of the island and made trips also to Pu'u Kukui, the summit of West Maui, and Haleakalā. As a result of this survey, Walker listed approximately 230 *heiau* sites on Maui. Of these *heiau*, three were reported in the vicinity of the current project area. These consist of Poaiwa Heiau at Kapukualua, Malaihakoa Heiau at Paukūkalo, and Papanēnē Heiau. All of these *heiau*, however, were recorded as being completely destroyed (Walker 1931).

Theresa Donham conducted an archaeological inventory survey for PHRI of the 4.6-acre Maui Palms Hotel site in Kahului. The survey consisted of a surface inspection and hand-powered auger coring. The surface survey identified one area of exposed cultural remains. These remains were interpreted as being from the late twentieth century and included glass, ceramics, metal, marine shell, and butchered faunal skeletal remains. Subsurface testing, which consisted of 40 auger cores, revealed cultural remains in 16 loci. However, these remains appear to have been secondary fill deposits and not significant for information content, interpretive value, or cultural value (Donham 1990).

Susan Goodfellow conducted an archaeological survey for PHRI of the VIP Foodservice Warehouse site located less than 1 mile east of the current project area. The project consisted

of intensive survey and limited subsurface testing including the excavation of 24 backhoe trenches. No archaeological sites were identified during the excavation. A subsurface deposit in the western portion of the project area was identified as an alluvial deposit (Goodfellow 1991).

David Welch conducted archaeological subsurface testing for IARII in preparation for the proposed Kanahā Beach Park addition and the Kahului Transient Apron. Testing consisted of the excavation of 82 trenches. No significant archaeological remains were encountered during this investigation; however, information about the prehistoric environment was gathered (Welch 1991).

Welch contended that by the fourteenth century AD, a marsh had developed in the inland portion of the project area. The marsh was formed by seaward beach progradation and the formation of a berm, where a shallow lagoon and marsh formed behind. Pollen analysis revealed the presence of species likely to be found in marshes and along marsh edges. The presence of microforaminifera and brackish water gastropods indicated that the marsh was open to sea water influxes (Welch 1991:65).

Welch concluded that Kanahā and Mau'oni fishponds were created at the west end of the marsh. Evidence from this study suggested that additional, smaller ponds may also have been present. Evidence also indicated that the marsh was still present at 450 BP and that, at least in remnant form, the marsh continued into historic times (Welch 1991:65). Informants have stated that the marshes were present in the airport area until World War II.

Xamanek conducted an archaeological inventory survey for the parking lot and retention basin on the Maui Community College campus in Kahului. The project area is situated adjacent to Kahului Bay. The survey included subsurface testing. No cultural remains were uncovered during the backhoe excavations. In addition, previous archaeological work in the area revealed no cultural materials and a lack of any signs of coastal sand dunes that may have been present in the immediate area. Remains of the World War II, 18th Service Battalion, USMC base camp, were noted during this study, but was assessed as not significant due to it being less than 50 years old at the time (Fredericksen and Fredericksen 1992a).

Xamanek conducted an inventory survey of a parcel of land in preparation of the construction for the Nisei Veterans Memorial Center. Work consisted of a surface survey and subsurface testing. The parcel is located on the coast, along the western boundary of Kahului Harbor from Kahului Beach Road to the intersection of Waiehu Beach Road. Sites 50-50-04-

3112, 50-50-04-3119A, 50-50-04-3119B, and 50-50-04-3120 (see Fig. 1) were recorded during this survey (Fredericksen and Fredericksen 1992b).

Site 3112 consisted of remnants of the Kahului Railroad, which was built in the 1880's and discontinued in 1963. Site 3119A consisted of a concentration or deposit of historic refuse beneath the surface vegetation. Site 3119B consisted of two layers (Layers 3 and 4) of subsurface deposits representing prehistoric habitation or use. Both layers contained midden, artifacts, and possible *imu* stones. In addition, Layer 4 contained an adze fragment, a basalt hammerstone, two basalt polishing stones, a basalt flake, and a basalt "pecking" stone. A carbon sample yielded a calendric date range of 90-230 AD (1790±70 years BP). Site 3120 exhibited a buried midden deposit that possibly represents a subsurface prehistoric deposit (Fredericksen and Fredericksen 1992b).

Xamanek conducted an archaeological inventory of a 10-acre parcel of land for the Maui Central Park Parkway. This investigation consisted of surface survey and 23 mechanically excavated test trenches. No significant cultural remains were identified (Fredericksen and Fredericksen 1994).

Archaeological Consultants of Hawaii, Inc., conducted an inventory survey for the Maui County Road Project located west of the subject project area. This study included a surface survey, 34 backhoe trenches, and 20 trenches excavated by a mechanical excavator. No significant cultural remains were identified (Kennedy et al. 1993).

In the early 1990's, Bishop Museum conducted archaeological test excavations at four previously identified sites in the proposed Maui Lani Development area in Kahului. Sites T1, T2, and T3 were assessed by the museum as possessing no archaeological significance. Site T4 contained the disarticulated skeletal remains of minimally three individuals. This site, assigned State of Hawai'i archaeological site number 50-50-04-2797 (see Fig. 1), is considered significant under National Register Historical Places Criteria A and D, and also under State Historical preservation Criterion E for its traditional cultural value (Rotunno-Hazuka et al. 1994).

Aki Sinoto Consulting conducted surface survey and supplemental subsurface testing in Maui Lani Development Phases 1 and 1A, and at Site 50-50-04-2797, in Wailuku Ahupua'a, Wailuku District, Maui. Sixty-eight backhoe trenches, 2 shovel scrapes, and 1 manual trench were excavated in Phase 1A; 10 backhoe trenches were excavated in Phase 1; 12 backhoe trenches were excavated at Site 2797 (Sinoto and Pantaleo 1995).

A total of six previously unrecorded human burials were identified during this study. No pattern of traditional interment of the dead based on preference for topographic features was identified (Sinoto and Pantaleo 1995).

Scientific Consultant Services, Inc. (SCS), conducted an inventory survey of a parcel of land located southwest of the current project area. The parcel contained a sand dune that yielded the majority of the cultural remains including both of the burials recovered during this project. This investigation included a surface survey and six stratigraphic trenches, resulting in the identification of Sites 50-50-04-3924 and 50-50-04-3925 (Burgett and Spear 1995).

Site 3924 consisted of two pre-contact Hawaiian burials and a thin cultural layer at the northern end of the site. This layer contained marine shell, an edge altered flake, small waterworn stones, six basalt flakes, six pieces of volcanic glass, one chert flake and small fragments of coal (Burgett and Spear 1995:23).

Site 3925 consisted of two primary cultural layers, three very narrow, restricted cultural layers, five pit features, and a probable post mold (Burgett and Spear 1995:25). Two radiocarbon dates, 340 ± 70 and 410 ± 50 BP, were obtained from this site (Burgett and Spear 1996:16).

SCS also conducted an inventory survey located northwest of the Kahului Harbor project area. This area also contained sand dunes. This study consisted of 13 shovel probes and 1 controlled test unit. Site 50-50-04-4004, a cultural layer remnant of a once more extensive cultural deposit interpreted as the remains of a temporary habitation area, was encountered during testing (Burgett and Spear 1996:27). A radiocarbon date of 400 ± 50 years BP was obtained from this site, and was similar to dates from Site 3925 (Burgett and Spear 1996).

SCS conducted archaeological monitoring of trench excavations for the 18-inch sewer pipeline project located southwest of Kahului Harbor. Three sites were identified during this project: Site 50-50-04-4005, a previously disturbed human burial; Site 50-50-04-4067, an isolated hearth; and Site 50-50-04-4068, a cultural layer that includes 13 pre-contact burials and 21 habitation features (Dunn and Spear 1995).

Site 4067, a pre-contact cooking fire feature, was excavated and produced a radiocarbon date of 330 ± 70 years BP.

In addition to the trench excavated for the 18-inch pipeline, six shovel probes were excavated to identify the extent of Site 4068. A charcoal sample recovered from one of these shovel probes yielded a date of 240 ± 40 years BP (Dunn and Spear 1995:5).

Francis Eblé conducted an inventory survey for BioSystems Analysis, Inc., of the Hobron Triangle located less than half a mile southeast of the subject project area. In addition to the surface survey, 16 trenches were excavated by a backhoe. An alluvial deposit similar to the deposit identified by Goodfellow, as described above, was recorded. No significant cultural remains were discovered (Eblé 1996).

SETTLEMENT PATTERN

Background information indicates that taro was traditionally cultivated in the area around the project area and Wailuku. The presence of Kanahā and Mau'oni fishponds indicates the practice of aquaculture. In addition, it is probable that habitation sites related to the exploitation of marine resources were present along the coast.

According to the Bishop Museum report:

It is likely that permanent settlements in Wailuku *ahupua'a* were situated in coastal areas where the majority of the known *heiau* were situated. These settlements likely would have existed in close proximity to these religious structures, which themselves were situated overlooking fishponds, sheltered bays, and other coastal areas rich in marine resources. 'Iao Valley, where irrigated pondfields have been recorded, was possibly another focus of settlement in the pre-Contact period. This agricultural resource, as well as the Mau'oni and Kanaha Fishponds, were likely considered as sources of wealth to be protected and maintained by Maui chiefs (Rotunno-Hazuka 1994:25-26).

Historic period remains, including those associated with railroad and harbor activities, are indicated on historic maps of the vicinity.

SITE EXPECTABILITY

The historic sugar industry had a far reaching impact on the island of Maui. In the immediate coastal area of the isthmus where the current project area is located, the majority of prehistoric cultural remains appear to have been extensively impacted. The development of a rail system, modification of the harbor, and the extensive cultivation of sugar cane all adversely impacted the cultural remains.

Cultural remains from the prehistoric period may include midden; artifacts; charcoal concentrations; and human skeletal remains. The remnant dunes are potential areas of high sensitivity for the presence of both prehistoric and early historic human burials. Historic period remains may include structural remains and refuse deposits associated with activities related to the harbor, sugar cultivation, and the railroad.

SCOPE OF WORK

The current investigation included the following tasks:

1. historic and archaeological literature search;
2. coordination with the State Historic Preservation Division of the Department of Land and Natural Resources (SHPD/DLNR) and the State Division of Harbors, Department of Transportation;
3. systematic surface survey;
4. backhoe-assisted, subsurface testing;
5. laboratory analysis; and
6. data synthesis, report write-up, and production.

METHODS

The entire project area was systematically covered by walking uniform transects and making closer inspections of selected areas.

After a review of historic maps of the area, a testing strategy was formulated in coordination with SHPD/DLNR that focused on areas where historic features may be encountered during excavation. Two portions of the project area, occupied by a meat packing facility (TMK 3-7-8: 2) and a used car lot (TMK 3-7-8: 1), were not tested due to the presence of buildings that restricted access and to avoid disruption of business activities.

Testing consisted of a total of 11 trenches excavated by a backhoe. All trenches were excavated to sterile soil. In several trenches, a gasoline-powered water pump was employed to keep the water level down to permit deeper excavation and examination of the trench walls. The excavation of all trenches were conducted under the direct supervision of the archaeologists.

Trench profiles were examined for presence of cultural remains. Profiles of each trench were described in detail, photographed, and illustrated. All trenches were plotted on a plan map of the parcel provided by the client. Representative profile drawings and photographs are included in this report.

All artifacts encountered during test excavations were collected for transport to GANDA's laboratory in Kailua, O'ahu for processing. Black-and-white 35mm photographs that were taken in the field were processed for inclusion in the report. All field notes, sketches, pertinent sample material and artifacts are repositied at the GANDA office in Honolulu.

RESULTS OF INVENTORY

A complete surface survey was undertaken, and a total of 11 backhoe trenches were excavated in selected areas (Fig. 5). No surface remains were discovered. Cultural remains were encountered in three of the trenches.

RESULTS OF SURVEY

The southeast portion of the project area consisted of a sand and gravel surface car lot, and the northern portion of the project area was beach sand. The remaining surface area included maintained lawn and isolated stands of palm and ironwood trees. No surface cultural remains were identified during the survey.

SUBSURFACE TESTING

A total of 11 backhoe trenches, all measuring 1 m wide and 3 m long, were excavated, ranging in depth from 1.07 m to 2.1 m (Table 1).

Cultural remains were observed in Trenches 2, 8, and 10. Trench 2 yielded a white porcelain fragment that was recovered from the backdirt pile. Trench 8 contained a complete bottle that was recovered from the backdirt pile. Trench 10 contained a pit feature (Feature 1).

The following summaries provide brief information on each trench including depth below ground surface at termination, depth below ground surface where the ground water/capillary zone was encountered, presence/absence of any cultural evidence, and nature of the exposed stratigraphy. Detailed soil descriptions are included in the appendix.

Trench 1

Trench 1, oriented 70° magnetic and 1.07 m deep, was located in the southwest corner of the project area. Six layers were revealed during testing, including two 20-cm layers of brown sand overlying four layers of dark gray sand. Layer V, 80-96 cm below surface, consisted of 70 percent waterworn basalt pebbles. Ground water was encountered at 68 cm below surface. Excavation of Trench 1 was terminated at 1.07 m below surface (Fig. 6).

Trench 2

Trench 2, oriented 63° magnetic and 1.61 m deep, was located midway along the western boundary of the project area. Six layers were revealed during testing, including three layers of

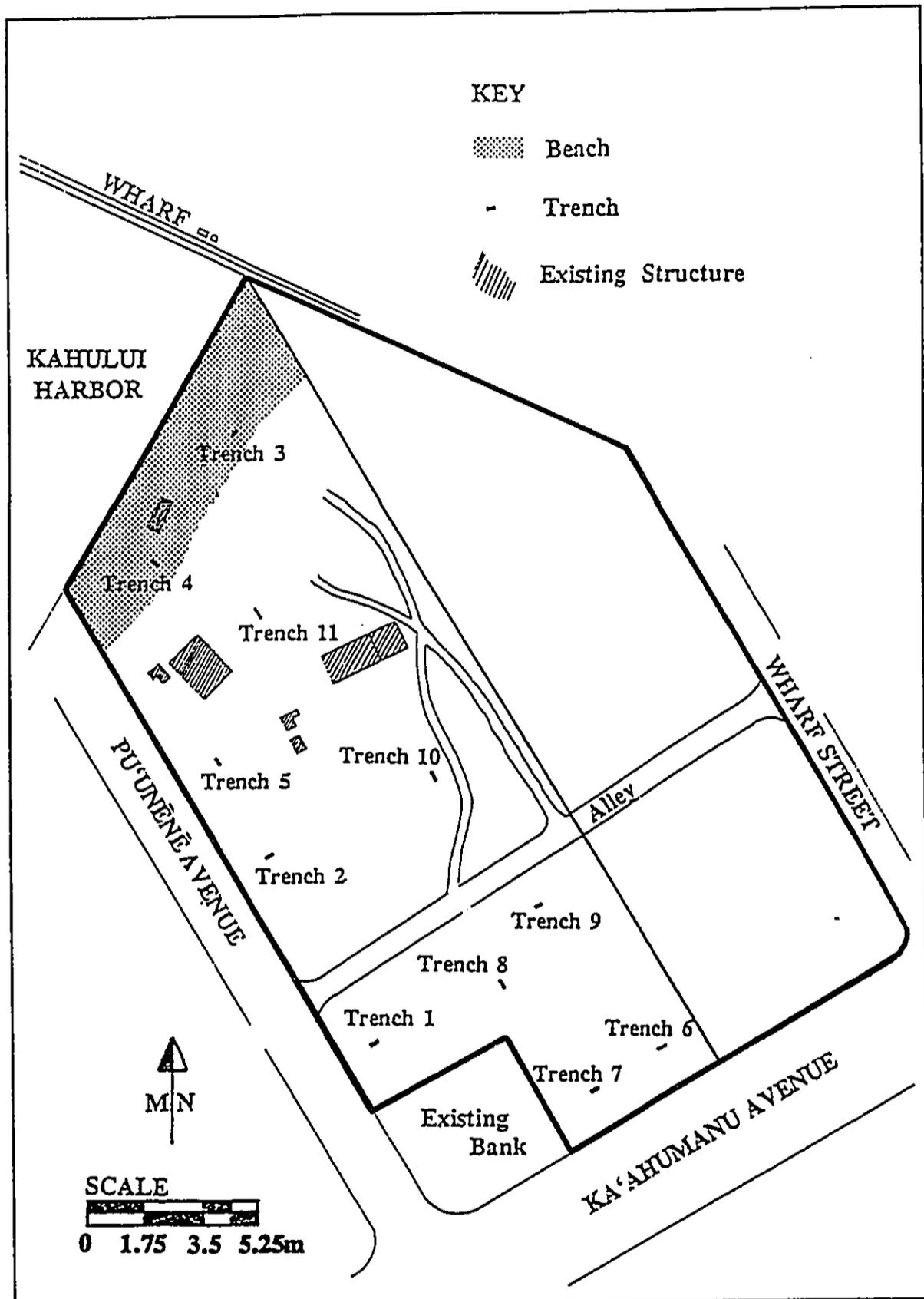


Figure 5. Map of project area and trench locations.

Table 1. Summary of Trench Excavations

Trench	Dimensions (L × W × D m)	Soil Layers	Cultural Material
1	3 × 1 × 1.07	I, II, III, IV, V, VI	None
2	3 × 1 × 1.61	I, II, III, IV, V, VI	1 white porcelain fragment
3	3 × 1 × 1.6	I, II, III, IV, V, VI	None
4	3 × 1 × 1.46	I, II, III, IV, V, VI	None
5	3 × 1 × 2.1	I, II, III, IV, V, VI, VII	None
6	3 × 1 × 1.74	I, II, III, IV, V, VI	None
7	3 × 1 × 1.9 ^a	I, II, III, IV	None
8	3 × 1 × 1.77	I, II, III, IV	1 brown glass bottle
9	3 × 1 × 1.6	I, II, III, IV	None
10	3 × 1 × 1.8	I, II, III, IV, V, VI	1 pit feature (Feature 1)
11	3 × 1 × 2	I, II, III, IV	None

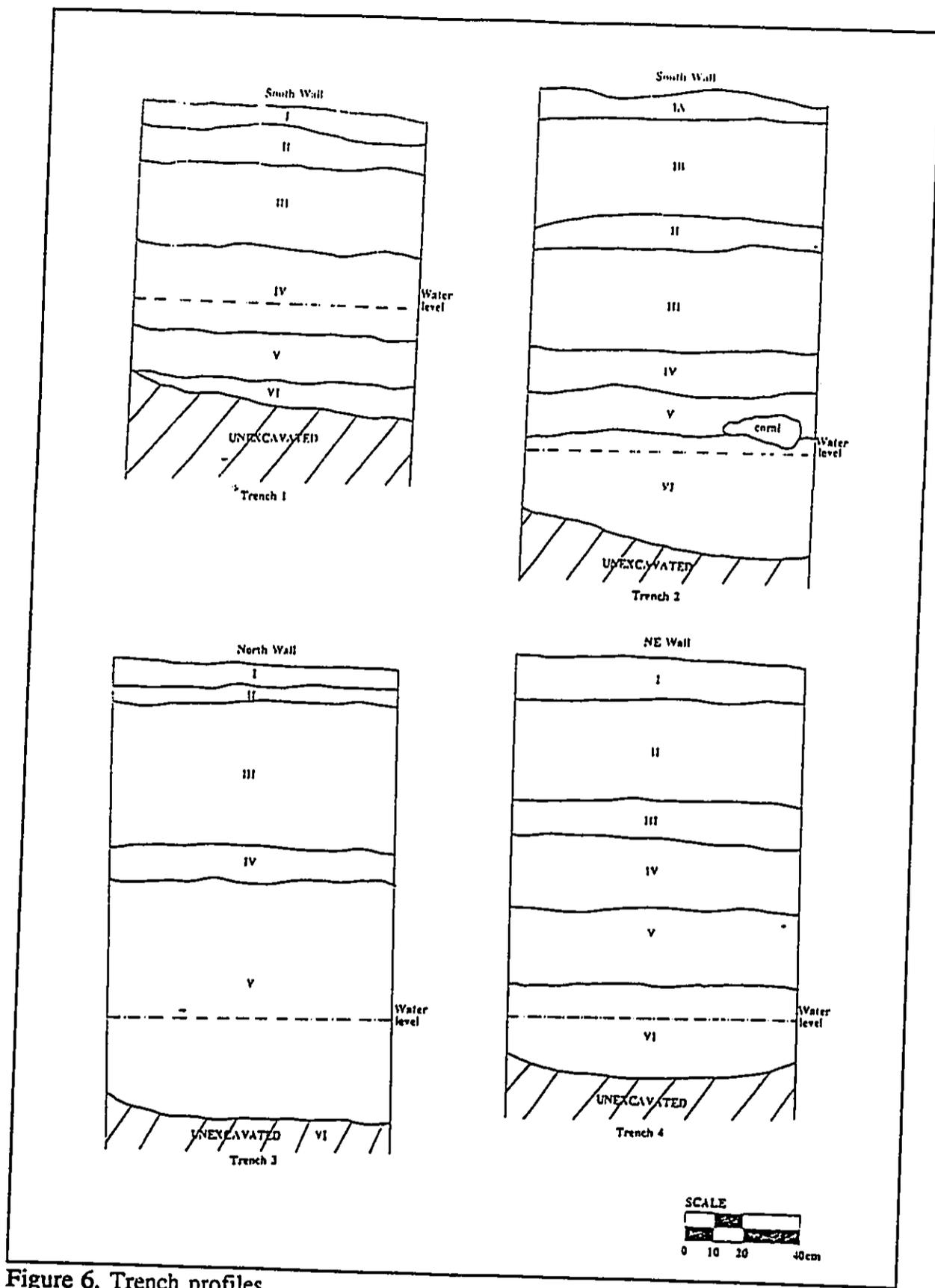


Figure 6. Trench profiles.

brownish sand to 90 cm below surface. This overlaid three layers of dark gray sand containing varying percentages of waterworn basalt pebbles. A fragment of white porcelain was recovered from the backdirt. Ground water was encountered at 1.25 m below surface. Excavation of Trench 2 was terminated at 1.61 m below surface (Figs. 6 and 11).

Trench 3

Trench 3, oriented 190° magnetic and 1.6 m deep, was located along the coast at the northeast corner of the project area. Six layers were revealed during testing, ranging in color from pale brown to dark gray. Ground water was encountered at 1.25 m below surface. Excavation of Trench 3 was terminated at 1.6 m below surface (Fig. 6).

Trench 4

Trench 4, oriented 130° magnetic and 1.46 m deep, was located along the coast at the northwest corner of the project area. Six layers were revealed during testing, including three layers of pale brown and dark grayish brown sand. This overlaid two layers of dark grayish sand consisting of 15 percent waterworn basalt pebbles and a layer of light grayish-brown sand. Ground water was encountered at 1.25 m below surface. Excavation of Trench 4 terminated at 1.46 m below surface (Figs. 6 and 7).

Trench 5

Trench 5, oriented 328° magnetic and 2.1 m deep, was located along the western boundary of the project area. Seven layers were revealed during testing, including four layers of brown and gray sand. This overlaid three layers (Layers V, VI, and VII) of dark gray sand containing waterworn basalt pebbles. Layer V consisted of 70 percent waterworn basalt pebbles; Layer VI consisted of 5-10 percent waterworn basalt pebbles; and Layer VII consisted of 40 percent waterworn basalt pebbles. Ground water was encountered at 1.6 m below surface. Excavation of Trench 5 was terminated at 2.1 m below surface (Fig. 8).

Trench 6

Trench 6, oriented 230° magnetic and 1.74 m deep, was located in the southeast corner of the project area. Six layers were revealed during testing, including three layers of sand fill. This overlaid a 10-cm-thick layer of clay loam fill. Two natural sand layers (Layers V and VI), ranging from 90 cm to 1.74 m below surface, were encountered. Layer VI consisted of 5-10 percent waterworn basalt pebbles. Ground water was encountered at 1.5 m below surface. Excavation of Trench 6 was terminated at 1.74 m below surface (Fig. 8).



Figure 7. Trench 4 - NE Wall Profile

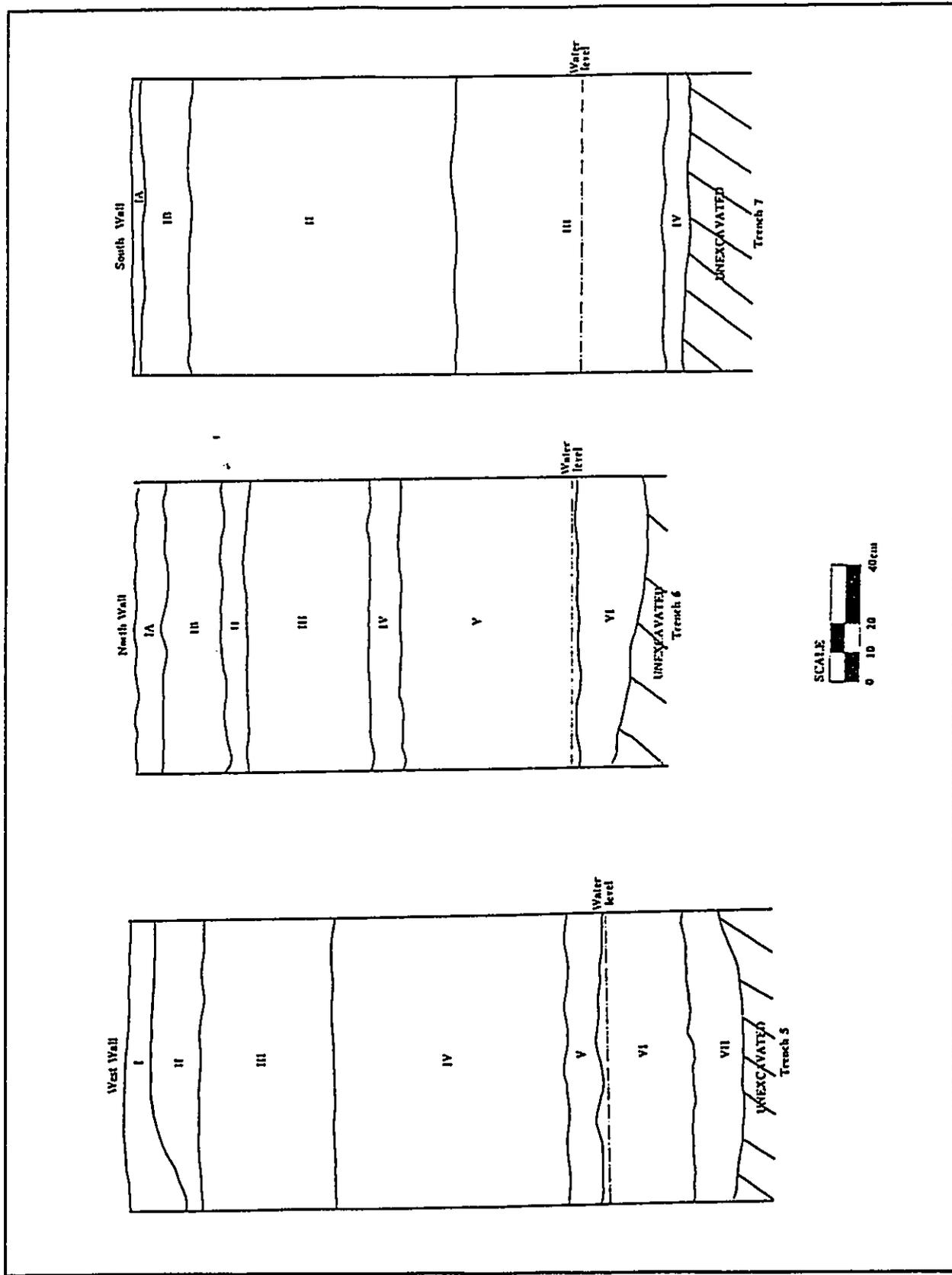


Figure 8. Trench profiles.

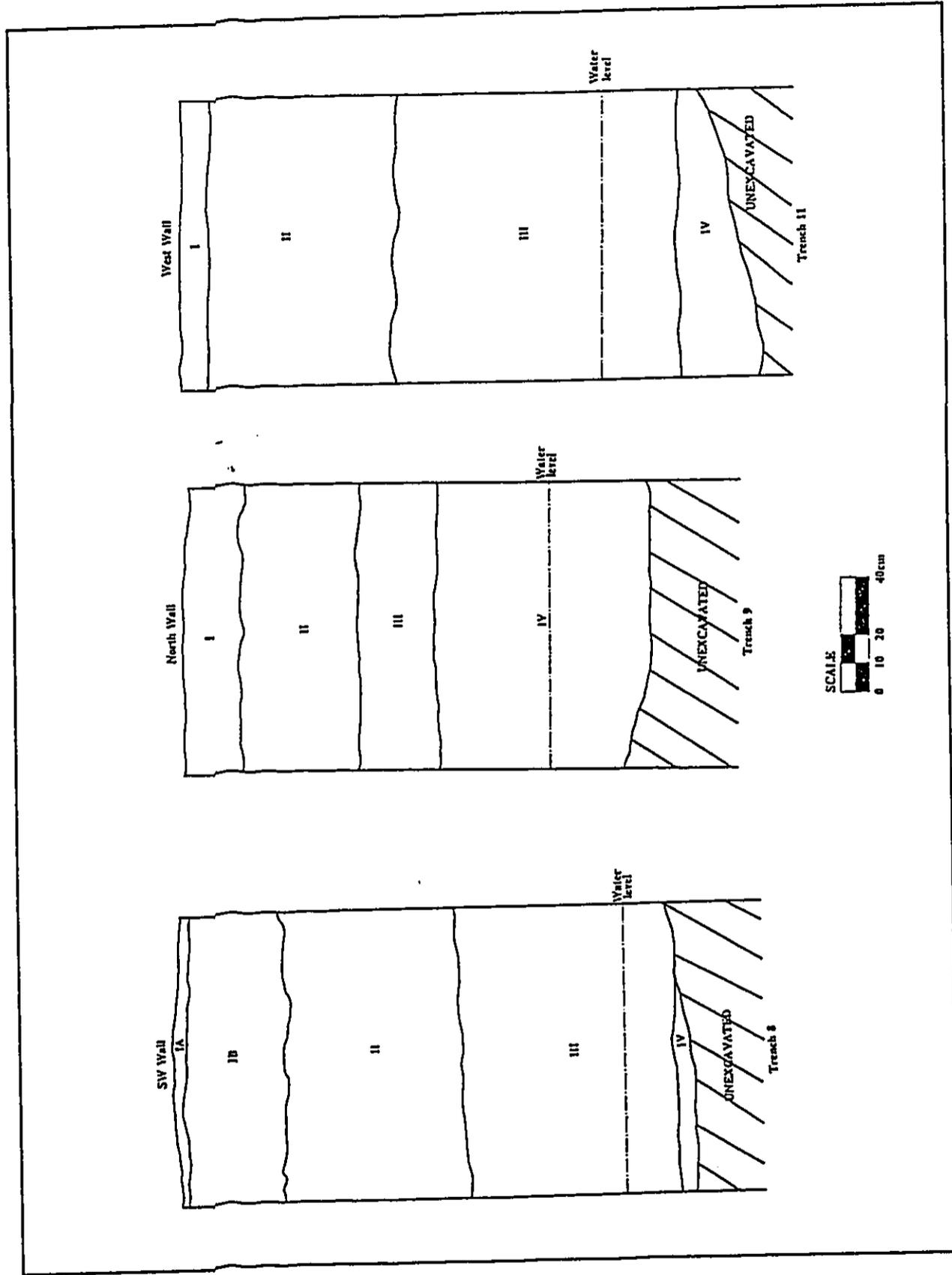


Figure 9. Trench profiles.

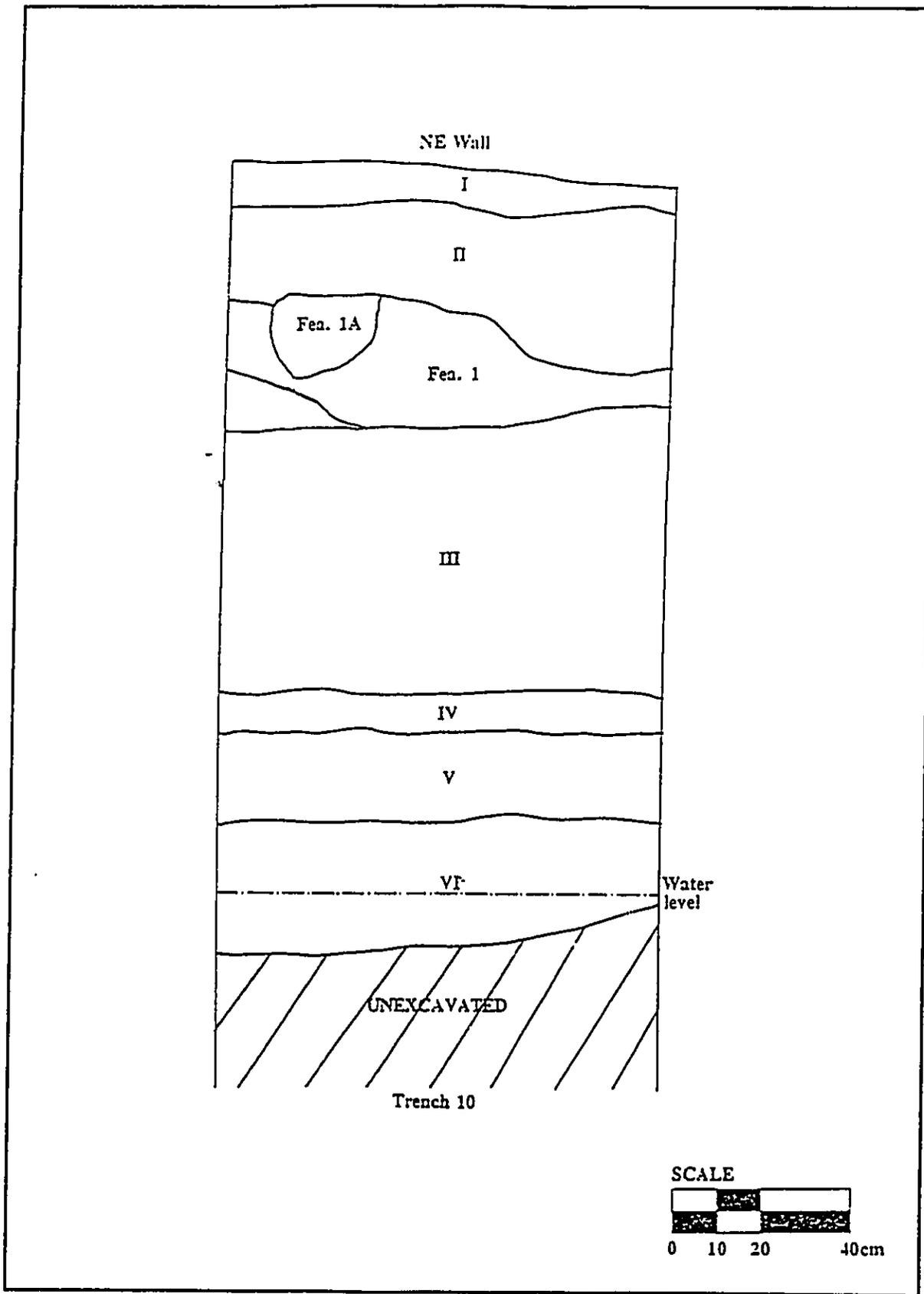
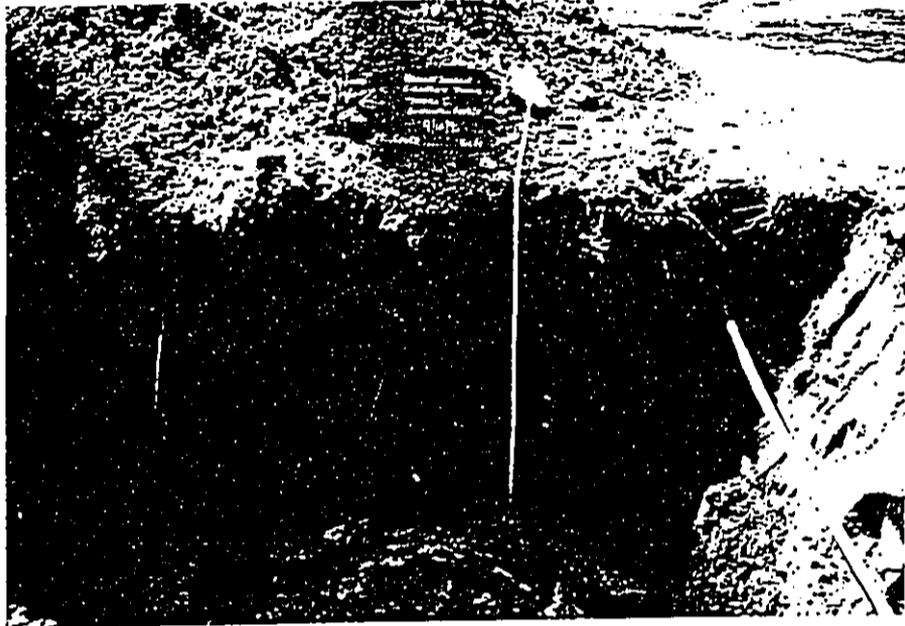


Figure 10. Trench 10 profile, NE wall.



Trench 2 - South Wall Profile



Trench 10 - NE Wall Profile

Figure 11. Pictures of Trench profiles.

Trench 7

Trench 7, oriented 45° magnetic and 1.9 m deep, was located in the southwest corner of the project area. Four layers were revealed during testing, including three layers of brown sand overlying an approximate 10-cm-thick layer (Layer IV) of dark gray sand consisting of 20 percent waterworn basalt pebbles. Ground water was encountered at 1.52 m below surface. Excavation of Trench 7 was terminated at 1.9 m below surface (Fig. 8).

Trench 8

Trench 8, oriented 326° magnetic and 1.77 m deep, was located in the south-central portion of the project area. Four layers were revealed during testing, ranging in color from dark brown to dark gray. A complete brown glass beer bottle was recovered from the backdirt. Ground water was encountered at 1.53 m below surface. Excavation of Trench 8 was terminated at 1.97 m below surface (Fig. 9).

Trench 9

Trench 9, oriented 230° magnetic and 1.6 m deep, was located in the south along the eastern boundary of the project area. Four layers were revealed during testing, including a 20-cm-thick (Layer I) of silty loam containing an abundance of gravel used to surface the parking lot. Layers II and III were dark grayish sandy loam and silty sand, respectively. Layer III extended to a depth of 88 cm below surface and overlaid a layer of dark grayish brown sand consisting of 5-10 percent waterworn basalt pebbles. Ground water was encountered at 1.26 m below surface. Excavation of Trench 9 was terminated at 1.6 m below surface (Fig. 9).

Trench 10

Trench 10, oriented 160° magnetic and 1.8 m deep, was located in the central portion of the project area. Six layers were revealed during testing, including two layers of dark grayish brown sand. This overlaid four layers of dark grayish sand consisting of varying percentages of waterworn basalt pebbles. Feature 1, a pit feature, was identified in Layer II. This probable fire pit consisted of charcoal and a sparse amount of marine shell. A dense concentration of charcoal (Feature 1A) was found associated with the pit. Ground water was encountered at 1.66 m below surface. Excavation of Trench 10 was terminated at 1.8 m below surface (Figs. 10 and 11). Due to compounded ground disturbance in the area, the charcoal sample was not submitted for dating.

Trench 11

Trench 11, oriented 320° magnetic and 2 m deep, was located in the central portion of the project area. Four layers were revealed during testing, ranging in color from light olive brown to dark gray. Ground water was encountered at 1.25 m below surface. Excavation of Trench 11 was terminated at 2 m below surface (Fig. 9).

ARTIFACTS

Two historic period artifacts consisting of a brown glass bottle and a white porcelain fragment were collected during excavations.

The complete bottle made of brown glass was recovered from the backdirt pile of Trench 8. This bottle, measuring 23.95 by 6.66 cm, has two seams, a royal crown finish, and a concave, embossed base.

The white porcelain fragment was recovered from the backdirt pile of Trench 2. This sherd, measuring 10.72 by 4.52 cm, probably represents a fragment from a sink or basin.

DISCUSSION

No significant cultural remains were identified in the project area. Eleven backhoe trenches were excavated to determine presence/absence of subsurface cultural remains. Cultural remains were encountered in Trenches 2, 8, and 10. Basal sand deposits containing percentages of waterworn basalt pebbles were observed in Trenches 1, 2, 4, 5, 6, 7, 9, and 10. These alluvial deposits are similar to the deposits identified by Goodfellow (1991) and Eblé (1996).

Cultural remains from Trench 2 consisted of a white porcelain fragment. Cultural remains from Trench 8 consisted of one complete bottle made of brown glass.

Cultural remains from Trench 10 consisted of a charcoal stained area (Feature 1). This feature was associated with Layer II and identified by an area of dark staining in the trench side wall. Staining was a result of a concentration of charcoal. An area within Feature 1 contained higher concentration of charcoal and appeared darker. This small area was designated Feature 1A. Because Feature 1 occurred near the ground surface, it is most likely related to a recent cooking fire or pit.

Background information and previous archaeological research in the Kahului area have indicated the following:

- extensive compounded disturbance took place in the area during the historic period in response to the needs of the sugar industry (including the installation of a railroad system);
- the historic modification of Kahului Harbor has resulted in a higher water table. Due to this change, older prehistoric remains may now exist below the water table;
- prior to the advent of sugar there is evidence of extensive taro cultivation in the region, which extended into the 'Īao Valley;
- isolated burials may occur in the vicinity of the current project area due to the presence of sand dune remnants;
- the extensive modification of the coastal area during the development of Kahului Harbor probably disturbed or destroyed evidence of prehistoric remains (Fredericksen and Fredericksen 1992b);
- in the Kanahā and Mau'oni fishpond area, a marsh was developed by the sixteenth century AD, which permitted seaward beach progradation (Welch 1991:65); and

- Kanahā and Mau'oni fishponds were created along the western portion of this marsh (Welch 1991:65), and that there may have been additional smaller ponds in the area.

Additionally, the findings of this study provide a stratigraphic overview for this locale. It has been determined that partially disturbed, naturally deposited layers of dune sand overlie alluvial deposits of silty sand containing waterworn basalt pebbles. The presence of overlying fill material along the mauka area closer to Ka'ahumanu Street, apparently resulted from modern development of the area.

RECOMMENDATIONS

The results of the current inventory survey indicate that the potential for significant cultural remains is minimal in the project area. Therefore, further data recovery procedures appear not to be warranted prior to construction. However, due to the possibility of intact cultural deposits, isolated pockets of historic artifacts, and human skeletal remains in the remnant dune and possibly below the water table, archaeological monitoring is recommended during any construction related ground altering activities. The scope and duration of monitoring will be specified in a monitoring plan to be approved by the State Historic Preservation Division (SHPD) of the Department of Land and Natural Resources.

During the background check, the Maui Meat Company facility was found to be over 50 years old and eligible for consideration as a historic property. However, prior to the current inventory survey, documentation and evaluation were completed and the property was deemed no longer significant by the SHPD.

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APPENDIX

APPENDIX
SUMMARY OF TRENCH EXCAVATIONS

Trench 1

Layer	Depth (cm)	Thickness (cm)	Boundary	Texture	Structure	Consistence	Color	Root	Rock	Contents	Notes
I	0-10	10	clear, wavy	silty sand	structure-less, very fine crumb/grain	very friable, non-sticky, non-plastic	7.5 YR 4/3 brown	-	-	-	fill
II	10-21	10	clear, smooth	silty sand	structure-less, very fine crumb/grain	very friable, non-sticky, non-plastic	7.5 YR 4/2 brown	0	0	0	-
III	21-51	30	clear, smooth	silty sand	structure-less, very fine crumb/grain	very friable, non-sticky, non-plastic	7.5 YR 4/1 dark gray	micro-med., common	0	0	-
IV	51-80	30	clear, smooth	silty sand	structure-less, very fine crumb/grain	very friable, non-sticky, non-plastic	10 YR 4/1 dark gray	0	0	0	-
V	80-96	15	clear, smooth	silty sand	structure-less, very fine crumb/grain	very friable, non-sticky, non-plastic	10 YR 4/1 dark gray	0	70% water-worn pebbles	0	-
VI	96-107	10	BOE	silty sand	structure-less, very fine crumb/grain	very friable, non-sticky, non-plastic	10 YR 4/2 dark grayish brown	0	0	0	-

Trench 2

Layer	Depth (cm)	Thickness (cm)	Boundary	Texture	Structure	Consistence	Color	Root	Rock	Contents	Notes
IA	0-10	10	abrupt, smooth	-	-	-	-	-	-	-	surface
IB	10-47	35	clear, wavy	silty sand	structure-less, very fine crumb/ grain	very friable, non-sticky, non-plastic	7.5 YR 3/2 dark brown	0	0	0	-
II	47-56	10	clear, wavy	silty sand	structure-less, very fine crumb/ grain	very friable, non-sticky, non-plastic	7.5 YR 4/2 brown	0	0	0	-
III	56-90	35	clear, smooth	silty sand	structure-less, very fine crumb/ grain	very friable, non-sticky, non-plastic	10 YR 3/2 very dark grayish brown	0	0	0	-
IV	90-106	15	clear, wavy	silty sand	structure-less, very fine crumb/ grain	very friable, non-sticky, non-plastic	10 YR 4/1 very dark gray	0	70% water-worn basalt pebbles	0	-
V	106-120	15	clear, wavy	silty sand	structure-less, very fine crumb/ grain	very friable, non-sticky, non-plastic	10 YR 4/1 very dark gray	0	notable decrease in basalt	0	-
VI	120-161	30	BOE	silty sand	structure-less, very fine crumb/ grain	very friable, non-sticky, non-plastic	10 YR 4/2 dark grayish brown	0	30% water-worn basalt pebbles	0	-

Trench 3

Layer	Depth (cm)	Thickness (cm)	Boundary	Texture	Structure	Consistence	Color	Root	Rock	Contents	Notes
I	0-10	10	clear, wavy	sand	structure-less, very fine crumb/grain	very friable, non-sticky, non-plastic	10 YR 6/3 pale brown	micro-fine, few	0	0	-
II	10-16	5	clear, smooth	silty sand	structure-less, very fine crumb/grain	very friable, non-sticky, non-plastic	10 YR 3/3 dark brown	micro-med., few	0	0	-
III	16-67	50	clear, wavy	silty sand	structure-less, very fine crumb/grain	very friable, non-sticky, non-plastic	7.5 YR 5/3 brown	micro-med., few	0	0	-
IV	67-78	20	clear, wavy	silty sand	structure-less, very fine crumb/grain	very friable, non-sticky, non-plastic	10 YR 4/2 dark grayish brown	micro-med., very few	0	0	-
V	78-160	80	BOE	silty sand	structure-less, very fine crumb/grain	very friable, non-sticky, non-plastic	10 YR 4/1 very dark gray	0	0	0	-
VI	BOE	BOE	BOE	silty sand	structure-less, very fine crumb/grain	very friable, non-sticky, non-plastic	10 YR 4/2 dark grayish brown	-	-	-	only visible at BOE

Trench 4

Layer	Depth (cm)	Thickness (cm)	Boundary	Texture	Structure	Consistence	Color	Root	Rock	Contents	Notes
I	0-15	15	clear, smooth	sand	structure-less, very fine crumb/ grain	very friable, non-sticky, non-plastic	10 YR 6/3 pale brown	micro-fine, few	0	0	-
II	15-51	35	clear, smooth	silty sand	structure-less, very fine crumb/ grain	very friable, non-sticky, non-plastic	10 YR 4/2 dark grayish brown	micro-med., few	0	0	-
III	51-66	15	clear, wavy	sand	structure-less, very fine crumb/ grain	very friable, non-sticky, non-plastic	7.5 YR 6/3 pale brown	0	0	0	-
IV	66-89	25	clear, wavy	sand	structure-less, very fine crumb/ grain	very friable, non-sticky, non-plastic	10 YR 4/2 dark grayish brown	0	15% water-worn basalt cobbles, pebbles	0	-
V	89-114	25	clear, wavy	sand	structure-less, very fine crumb/ grain	very friable, non-sticky, non-plastic	10 YR 4/1 very dark gray	0	15% water-worn basalt cobbles, pebbles	0	-
VI	114-146	30	BOE	sand	structure-less, fine crumb/ grain	very friable, non-sticky, non-plastic	10 YR 6/2 light grayish brown	0	0	0	-

Trench 5

Layer	Depth (cm)	Thickness (cm)	Boundary	Texture	Structure	Consistence	Color	Root	Rock	Contents	Notes
I	0-20	15	diffuse, irregular	silty sand	structure-less, very fine crumb/grain	very friable, non-sticky, non-plastic	2.5 Y 4/2 dark grayish brown	0	0	0	-
II	10-27	10	diffuse, wavy	sandy silt	structure-less, very fine crumb/grain	very friable, non-sticky, non-plastic	2.5 Y 3/3 dark olive brown	0	0	0	-
III	27-70	42	clear, smooth	silty sand	structure-less, very fine crumb/grain	very friable, non-sticky, non-plastic	2.5 Y 4/3 olive brown	0	0	0	-
IV	70-150	80	clear, smooth	silty sand	structure-less, very fine crumb/grain	very friable, non-sticky, non-plastic	10 YR 4/1 dark gray	0	0	0	-
V	150-162	10	clear, wavy	silty sand	structure-less, very fine crumb/grain	very friable, non-sticky, non-plastic	2.5 Y 3/1 very dark gray	0	70% water-worn basalt pebbles	0	-
VI	162-190	30	clear, smooth	silty sand	structure-less, very fine crumb/grain	very friable, non-sticky, non-plastic	2.5 Y 4/2 dark grayish brown	0	5-10% water-worn basalt pebbles	0	-
VII	190-210	20	BOE	sand	structure-less, very fine crumb/grain		2.5 Y 4/1 dark gray	0	40% water-worn basalt pebbles		

Trench 6

Layer	Depth (cm)	Thickness (cm)	Boundary	Texture	Structure	Consistence	Color	Root	Rock	Contents	Notes
IA	0-10	10	clear, wavy	-	-	-	-	-	-	-	-
IB	10-30	20	clear, smooth	silty sand	structure-less, very fine crumb/grain	very friable, non-sticky, non-plastic	10 YR 3/3 dark brown	0	0	0	fill
II	30-38	8	abrupt, smooth	sandy loam	weak, very fine crumb/grain	very friable, non-sticky, non-plastic	10 YR 3/4 dark yellowish brown	0	0	0	fill
III	38-80	40	abrupt, smooth	silty sand	structure-less, very fine crumb/grain	very friable, non-sticky, non-plastic	2.5 Y 4/2 dark grayish brown	0	0	0	fill
IV	80-90	10	abrupt, smooth	clay loam	weak, very fine crumb/grain	friable, sticky, plastic	7.5 YR 2.5/2 very dark brown	0	0	0	fill
V	90-150	60	clear, smooth	silty sand	structure-less, very fine crumb/grain	very friable, non-sticky, non-plastic	2.5 Y 4/2 dark grayish brown	0	0	0	-
VI	150-174	20	BOE	silty sand	structure-less, very fine crumb/grain	very friable, non-sticky, non-plastic	2.5 Y 3/2 very dark grayish brown	0	5-10% waterworn basalt pebbles	0	-

Trench 7

Layer	Depth (cm)	Thickness (cm)	Boundary	Texture	Structure	Consistence	Color	Root	Rock	Contents	Notes
IA	0-5	5	clear, wavy	-	-	-	-	-	-	-	-
IB	5-20	15	clear, smooth	silty sand	structure-less, very fine crumb/grain	very friable, non-sticky, non-plastic	2.5 Y 3/3 dark olive brown	0	0	0	-
II	20-110	90	clear, smooth	silty sand	structure-less, very fine crumb/grain	very friable, non-sticky, non-plastic	2.5 Y 4/3 olive brown	0	0	0	-
III	110-182	70	clear, smooth	silty sand	structure-less, very fine crumb/grain	very friable, non-sticky, non-plastic	2.5 Y 4/2 dark grayish brown	0	0	0	-
IV	182-190	10	BOE	sand	structure-less, very fine crumb/grain	very friable, non-sticky, non-plastic	10 YR 4/1 dark gray	0	20% water-worn basalt pebbles	0	-

Trench 8

Layer	Depth (cm)	Thickness (cm)	Boundary	Texture	Structure	Consistence	Color	Root	Rock	Contents	Notes
IA	0-4	4	clear, wavy	-	-	-	-	-	-	-	-
IB	4-38	35	diffuse, wavy	silty sand	structure-less, very fine crumb/grain	very friable, non-sticky, non-plastic	10 YR 3/3 dark brown	0	0	0	-
II	38-99	60	clear, wavy	silty sand	structure-less, very fine crumb/grain	very friable, non-sticky, non-plastic	2.5 Y 4/2 dark grayish brown	0	0	0	-
III	99-170	70	clear, wavy	silty sand	structure-less, very fine crumb/grain	very friable, non-sticky, non-plastic	2.5 Y 3/2 very dark grayish brown	0	0	0	-
IV	170-197	5	BOE	sand	structure-less, very fine crumb/grain	very friable, non-sticky, non-plastic	10 YR 4/1 dark gray	0	0	0	-

Trench 9

Layer	Depth (cm)	Thickness (cm)	Boundary	Texture	Structure	Consistence	Color	Root	Rock	Contents	Notes
I	0-20	20	clear, smooth	silty loam	weak, very fine crumb/grain	friable, slightly sticky, non-plastic	10 YR 3/1 very dark gray	0	gravel, abundant	0	gravel surface of parking lot
II	20-60	40	abrupt, smooth	sandy loam	weak, very fine crumb/grain	friable, slightly sticky, non-plastic	10 YR 3/2 very dark grayish brown	0	0	0	-
III	60-88	28	clear, smooth	silty sand	structureless, very fine crumb/grain	very friable, non-sticky, non-plastic	2.5 Y 3/2 very dark grayish brown	0	0	0	-
IV	88-160	70	BOE	silty sand	structureless, very fine crumb/grain	very friable, non-sticky, non-plastic	2.5 Y 4/2 dark grayish brown	0	5-10% waterworn basalt pebbles	0	-

Trench 10

Layer	Depth (cm)	Thickness (cm)	Boundary	Texture	Structure	Consistence	Color	Root	Rock	Contents	Notes
I	0-11	10	clear, wavy	silty loam	moderate, very fine crumb/grain	hard, slightly sticky, slightly plastic	10 YR 3/2 very dark grayish brown	0	0	0	-
Fea. I	30-48	18	abrupt, smooth	sandy silt	structure-less, very fine crumb/grain	very friable, non-sticky, non-plastic	2.5 Y 3/2 very dark grayish brown	0	0	0	pit feature
Fea. 1A	30-60	30	abrupt, smooth	sandy silt	structure-less, very fine crumb/grain	very friable, non-sticky, non-plastic	10 YR 3/1 very dark gray	0	0	0	stained area within fea. I
II	11-60	50	clear, irregular	silty sand	structure-less, very fine crumb/grain	very friable, non-sticky, non-plastic	2.5 Y 3/2 very dark grayish brown	0	0	0	-
III	60-120	60	clear, smooth	silty sand	structure-less, very fine crumb/grain	very friable, non-sticky, non-plastic	2.5 Y 4/2 dark grayish brown	0	20% water-worn basalt pebbles	0	pebbles only in last 15

Trench 10. Continued.

Layer	Depth (cm)	Thickness (cm)	Boundary	Texture	Structure	Consistence	Color	Root	Rock	Contents	Notes
IV	120-130	10	clear, wavy	silty sand	structureless, very fine crumb/grain	very friable, non-sticky, non-plastic	2.5 Y 3/1 very dark gray	0	70% water-worn basalt pebbles	0	-
V	130-150	20	clear, smooth	silty sand	structureless, very fine crumb/grain	very friable, non-sticky, non-plastic	2.5 Y 3/1 very dark gray	0	0	0	-
VI	150-180	25	BOE	silty sand	structureless, very fine crumb/grain	very friable, non-sticky, non-plastic	2.5 Y 3/2 very dark grayish brown	0	20% water-worn basalt pebbles	0	-

Trench 11

Layer	Depth (cm)	Thickness (cm)	Boundary	Texture	Structure	Consistence	Color	Root	Rock	Contents	Notes
I	0-10	10	clear, smooth	silty sand	structure-less, very fine crumb/grain	very friable, non-sticky, non-plastic	2.5 Y 5/3 light olive brown	0	0	0	-
II	10-75	65	diffuse, wavy	silty sand	structure-less, very fine crumb/grain	very friable, non-sticky, non-plastic	2.5 Y 4/3 olive brown	0	0	0	-
III	75-170	95	clear, wavy	sand	structure-less, very fine crumb/grain	very friable, non-sticky, non-plastic	2.5 Y 5/2 grayish brown	0	0	0	-
IV	170-200	20	BOE	sand	structure-less, very fine crumb/grain	very friable, non-sticky, non-plastic	2.5 Y 4/1 dark gray	0	0	0	-

**Appendix F
State Historic Preservation
Consultation Letters**

June 24, 1996
9606KD26

Mr. Fred Pascua, P.E.
State of Hawaii Department of Transportation
Harbors Division
79 So. Nimitz Highway
Honolulu, Hawaii 96813

Dear Mr. Pascua,

SUBJECT: Kahului Harbor Storage Yard Utility Improvements Project
H.C. 3280, Kahului, Maui

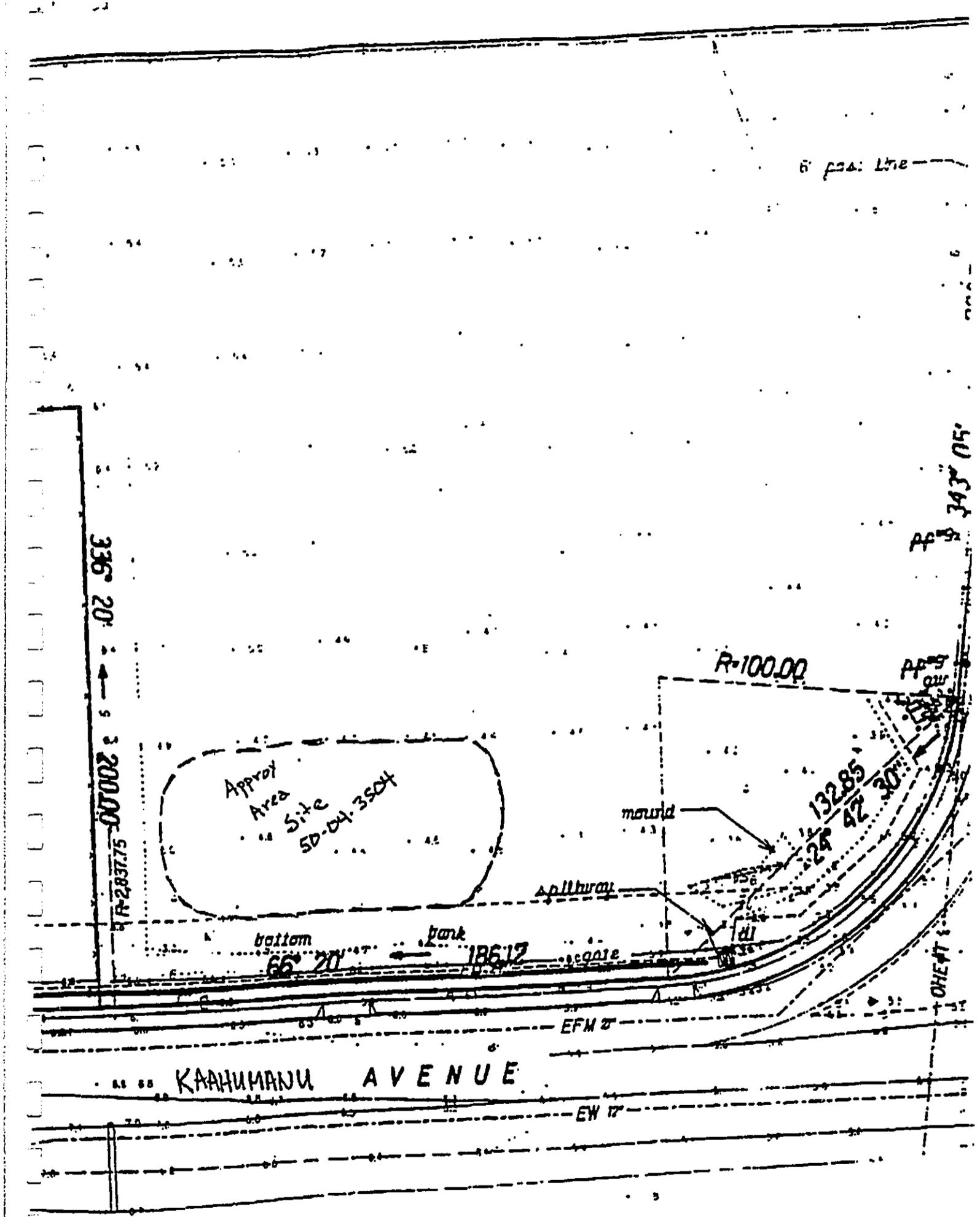
Please find attached the site plan for the Kahului Harbor storage yard improvement project, showing the approximate location of SIHP Site 50-50-04-3504. This site was identified during construction; no inventory survey was conducted of this area. The site boundaries are therefore only approximate, and may not include the full extent of the site.

Please contact me at 243-5169 if you need additional information.

Aloha,



Theresa K. Donham
Maui Island Archaeologist
State Historic Preservation Division



BENJAMIN J. CAYetano
GOVERNOR OF HAWAII



STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES

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

BOARD OF LAND AND NATURAL RESOURCES

DEPUTY
GILBERT COLOMA-AGARAN

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

May 9, 1996

Ms. Suelynn Chong
Department of Transportation
Harbors Division
79 South Nimitz Highway
Honolulu, Hawaii 96813-4896

LOG NO: 17167 ✓
DOC NO: 9605KD13

Dear Ms. Chong:

SUBJECT: Historic Preservation Review of Job H.C. 3280 - Proposed Storage Yard Paving and Utility Improvements, and Job H.C 3281 - Barge Terminal Improvements Kahului Harbor, Wailuku District, Island of Maui
TMK: 3-7-10: 9 and 3-7-08: 1, 2, 3, 4, and 6

Thank you for requesting our review of two proposed harbor improvement projects for the Kahului Harbor area. The storage yard paving and utility improvements project is located at the intersection of Ka'ahumam Avenue and Hobron Avenue. The c. 2.75 acre property is to be paved and subsurface utility and waterlines are to be installed. The barge terminal improvement project encompasses an 8 acre area along the shoreline of Kahului Harbor, between Pu'uene Street and Wharf Street. The project area is to be cleared and graded, and existing buildings within this area are to be demolished. A fence will be erected around the perimeter of the lot.

Our records indicate that a known historic site (SIHP 50-50-04-3504) is located within the area of the proposed storage yard utility improvements project. This site consists of subsurface structural remains (brick building foundation) and nineteenth to early twentieth century artifacts. The site was identified in July, 1993 by State Historic Preservation Division staff following its disturbance during tree removal and grading of the lot. The artifact deposit was located in coralline sand, beneath a layer of silty fill material, at an average depth of .50 m (20 inches) below surface. Very little information could be obtained from the excavation at that time, due to the high water table, and the extent of disturbance caused by artifact hunters. Material observed included complete bottles, ceramics, faunal remains, earthenware, marine shell, brick, metal, and mortar.

Based on available information regarding the proposed storage yard improvements, we cannot determine whether the site will be impacted by the proposed utility trenches. We therefore request additional information regarding the location and depth of the proposed utility trenches. If the trenches are to be located well away from the site, we will recommend archaeological monitoring of the construction work. If the trenching activities extend into the site area, either vertically or horizontally, we will recommend that archaeological data recovery be conducted at the site prior to initiation of the trenching.

Ms. Suelynn Chong
Page 2

The eight acre barge terminal project area is located within the coastal sand dune zone, along the original shoreline of Kahului Bay. Grading has occurred along the southeastern portion of this area, where an auto sales lot is presently located. The west (*makai*) portion of this area appears to have been only superficially graded. This area consists of sand, with no evidence of extensive filling. We have no information regarding the extent of fill in the eastern portion of the project area.

The barge terminal project site is immediately adjacent to the location of the first pier that was constructed at Kahului Harbor, prior to the construction of the breakwater. A map of the harbor dating to 1881 (Alexander) indicates the presence of structures within the project area. It is therefore possible that subsurface remains of nineteenth century historic sites are present.

The location of the barge terminal project is also near the Hawaiian canoe landing that was present at Kahului Bay prior to western contact. It is therefore a likely location for the presence of subsurface deposits reflecting precontact habitation or other activities. The presence of the sand dunes also increases the possibility that unmarked burials could be present.

For the above reasons, we recommend that a subsurface archaeological inventory survey be conducted of the proposed barge terminal project area prior to the initiation of tree removal, grading or demolition. The survey should also include examination of the extant structures and background research in order to determine whether they are over 50 years in age; if so, the potential historic significance of the buildings will need to be addressed in the survey report.

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

Aloha,



DON HIBBARD, Administrator
State Historic Preservation Division

KD:jen

Appendix G
Archaeological
Monitoring Plan

**ARCHAEOLOGICAL MONITORING PLAN
FOR
STORAGE YARD PAVING AND UTILITY IMPROVEMENTS
KAHULUI HARBOR, MAUI - JOB H.C. 3280
TMK: (2)3-7-10**

**Prepared for:
STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HARBORS DIVISION
79 SOUTH NIMITZ HIGHWAY
HONOLULU, HAWAII 96813**

**Prepared by:
STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HARBORS DIVISION - DESIGN SECTION
79 SOUTH NIMITZ HIGHWAY
HONOLULU, HAWAII 96813**

May 1997

INTRODUCTION

Archaeological monitoring during construction, with particular emphasis on a known historic site, was recommended by the Department of Land and Natural Resources, State Historic Preservation Division for the proposed storage yard improvements. This monitoring plan presents the appropriate scope of work to be followed within specific localities of the project area.

PROJECT AREA

The project area is located in Wailuku on the Island of Maui (Fig. 1). The 3.3 acre parcel is located at the corner of Hobron and Kaahumanu Avenues identified as a portion of Parcel 2 of Tax Map Key: (2) 3-7-10 (Fig. 2). This parcel is bounded by A&B Properties, Inc. to the north, Hobron Avenue to the east, Kaahumanu Avenue and the existing Harbor maintenance facility to the south and Ala Luina to the west.

EXPECTABILITY OF SUBSURFACE REMAINS

A historic site (SIHP 50-50-04-3504) within the project area was identified in July 1993 by State Department of Land and Natural Resources, State Historic Preservation Division staff. The site consists of subsurface structural remains (brick and mortar foundation footings) and nineteenth to twentieth century artifacts. The artifact deposit was located in coralline sand, beneath a layer of silty fill material, at an average depth of 0.50 m (20 inches) below surface. The approximate location of this site is shown in Figure 3 and may not include the full extent of the site.

The occurrence of burials within this site are considered to be relatively uncommon.

MONITORING PLAN

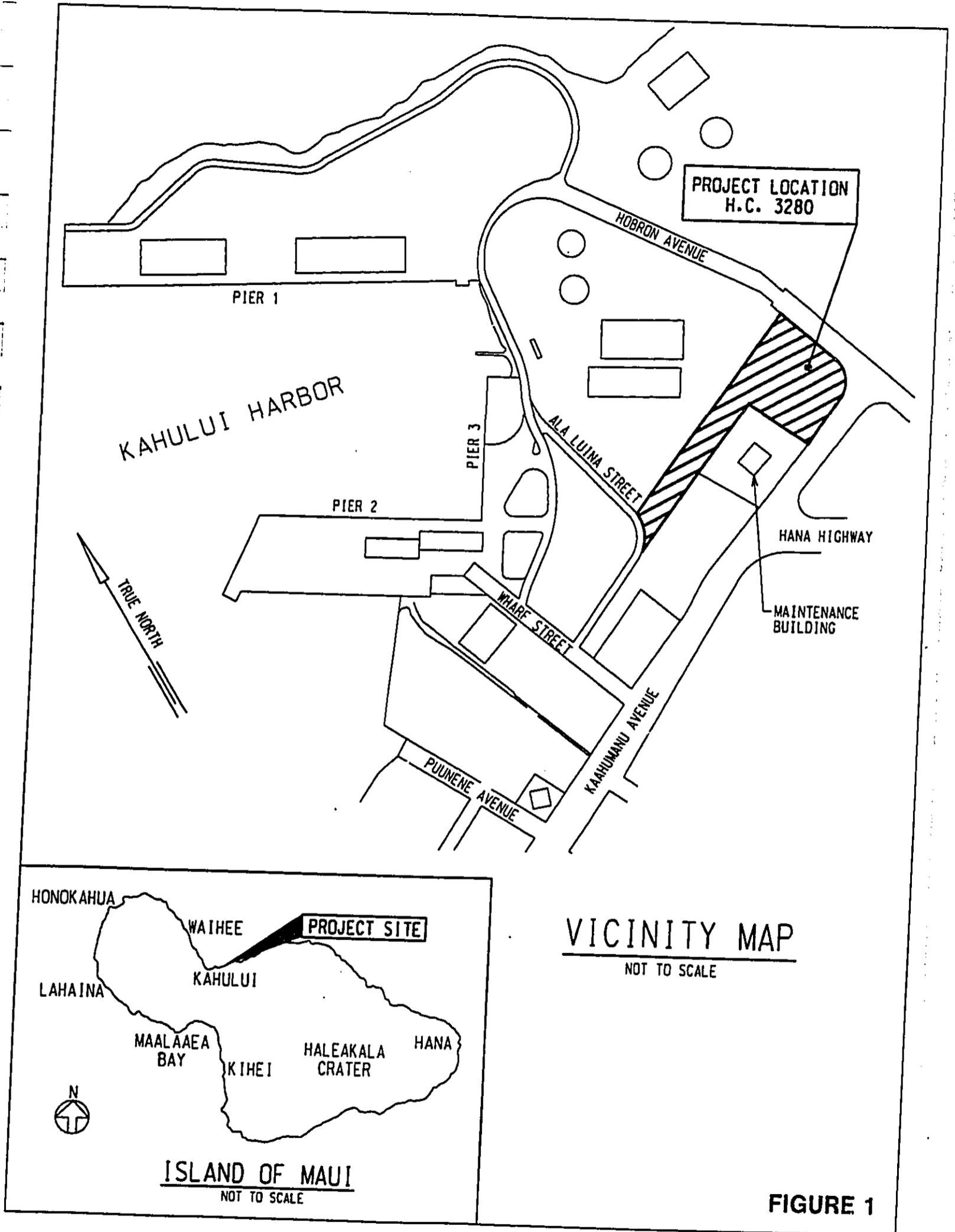
An on-island Archaeologist will be selected for this project to permit flexibility and expedient response time for on-call situations. A coordination meeting will be held with representatives of all pertinent parties involved prior to the commencement of construction and monitoring activities. At this meeting, the archaeological monitoring personnel will be introduced. The procedures to be followed for monitoring, authority of the monitor to halt work in the immediate vicinity of a discovery, and the type of features the archaeologist is interested in will be discussed and explained.

Fulltime monitoring will be required during trenching of the drainline, waterline and electrical lines along Kaahumanu Avenue and along the east side of the maintenance facility as shown in Figure 4. Fulltime monitoring will also be required if any excavation occurs in the vicinity of Site -3504.

On-call monitoring will be instituted for the remaining portions of the storage yard. Should any significant remains be exposed, construction-related activities in the immediate area will be halted and the Contractor shall notify the monitoring Archaeologist. The Archaeologist shall have sufficient time to record and mitigate the remains or determine if additional data recovery procedures are required. All standard archaeological methods and practices for recording and collecting data will be followed.

Should any human remains be exposed, the Contractor shall immediately halt all construction activities in the immediate vicinity and notify the monitoring Archaeologist. The monitoring Archaeologist shall determine the limits of the site and consult with the Harbors Division Construction Engineer to determine the best means for protecting the site from further disturbances. Protection may include barricades, roping off, temporary fencing or other means. The Archaeologist shall be provided sufficient time to determine the nature and significance of the site and confer with the Department of Land and Natural Resources, State Historic Preservation Division.

Following the completion of monitoring, all necessary laboratory procedures will be undertaken. This may include: the processing, cataloging, and analysis of artifacts; analyses of any collected samples as warranted; and outside consultant analysis of radiocarbon samples. The collected data will be synthesized and compiled into a final report to be submitted to the State Historic Preservation Division for review and approval within 90 days after completion of monitoring work. The Archaeologist will archive all records, notes, photographs and maps.



246° 56' → 819.29

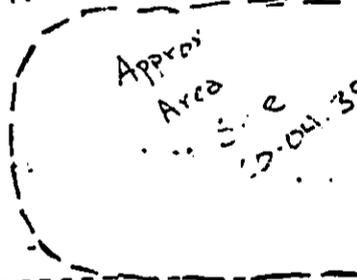
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bottom bank

66° 20' ← 311.86



336° 20' → 200.00



R=2292.01
R=2837.75

R=2837.75

66° 20'

KAHUMANU

EFM 2'

EW 6'

EW 2'

EW 6'

EW 12'

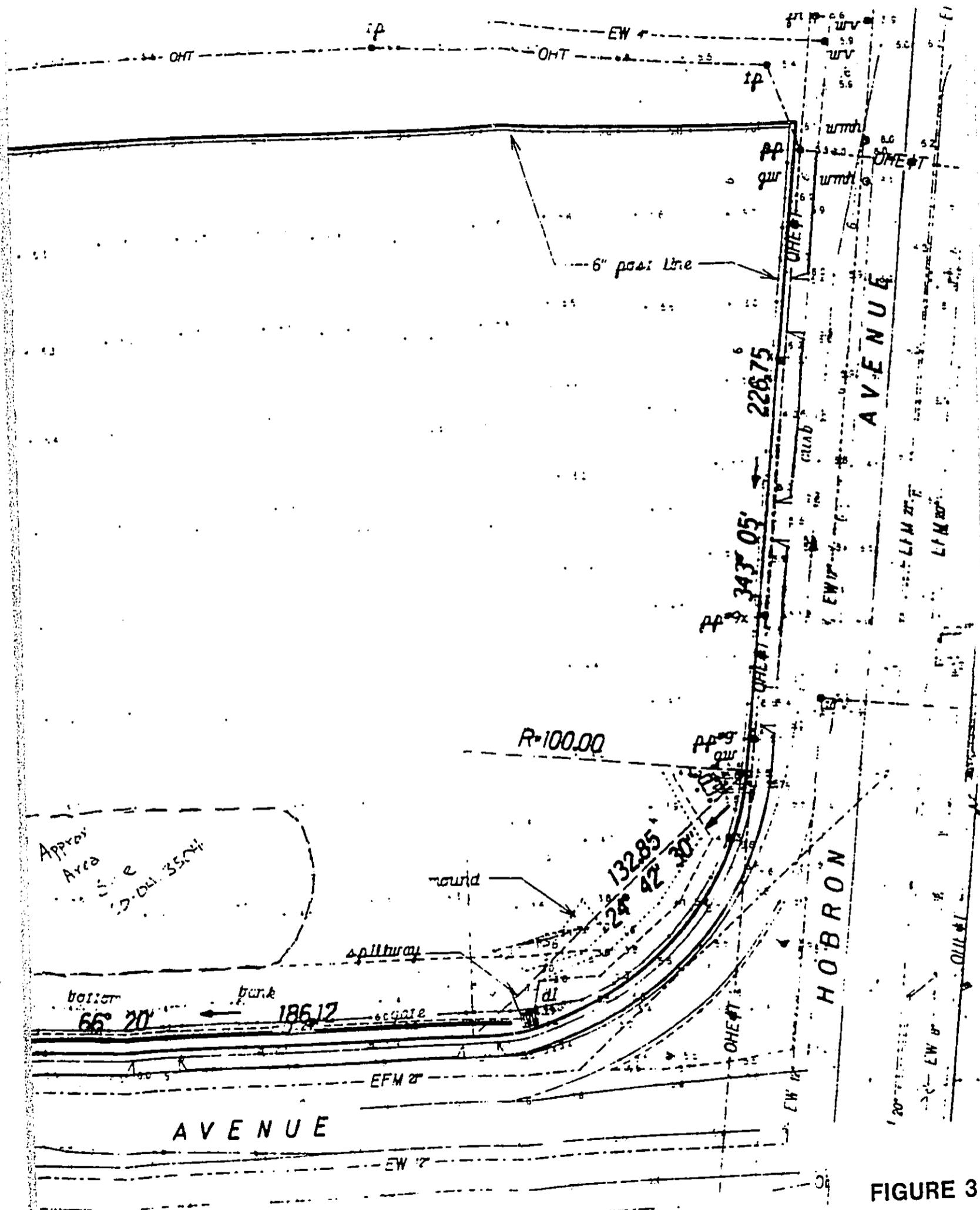


FIGURE 3

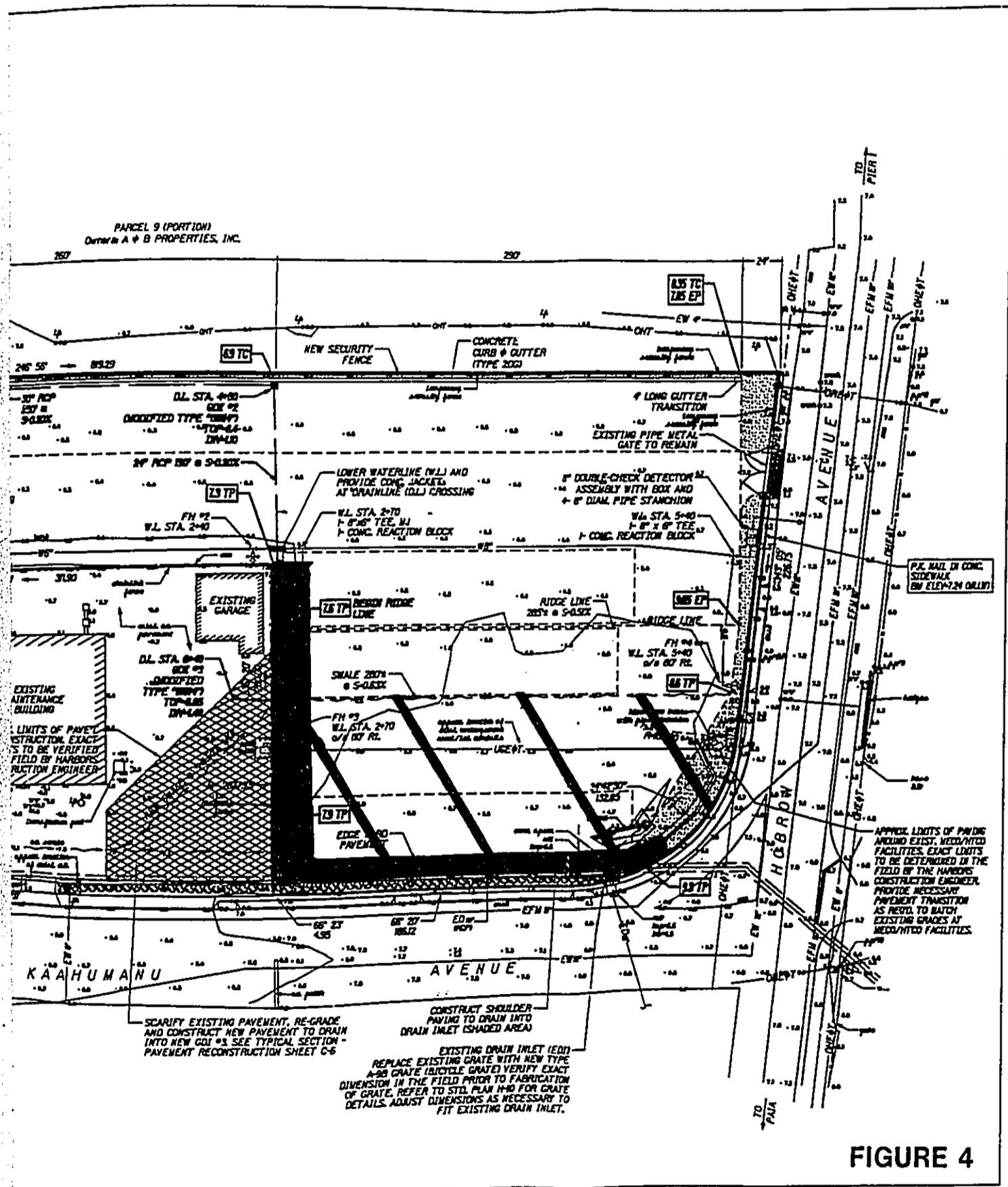


FIGURE 4

REFERENCES

- Donham, Theresa, Letter Report on Historic Preservation Review of Job H.C. 3280 - Proposed Storage Yard Paving and Utility Improvements, and Job H.C. 3281 - Barge Terminal Improvements, Kahului Harbor, Wailuku District, Island of Maui, TMK: 3-7-10:9 and 3-7-08: 1, 2, 3, 4, and 6, May 9, 1996.
- Collins, Sara, Letter Report on Chapter 6E-8 Historic Preservation Review of Job H.C. 3280 - Proposed Storage Yard Paving and Utility Improvements, Kahului Harbor, Wailuku District, Maui, TMK: 3-7-010:009, April 29, 1997.
- Garcia and Associates, and Aki Sinoto, Archaeological Inventory Survey of the Barge Terminal Improvement Project at Kahului Harbor, Kahului, Wailuku, Maui, Job H.C. 3281 (TMK:3-7-8:1, 2, 3, 4, and 6), revised March 1997.
- Sinoto, Aki, Archaeological Monitoring Plan for Phases 1 and 1A of the Proposed Maui Lani Development, Wailuku Ahupua'a, Wailuku District, Maui Island (TMK:3-8-07:2,110), March 1996.

Appendix H
Corp of Engineers
Letter

96029

KS
L



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

November 14, 1996

REPLY TO
ATTENTION OF:

Operations Branch

Mr. Loren G.S. Lau
Sato & Associates, Inc.
2046 S. King Street
Honolulu, Hawaii 96826

Dear Mr. Lau:

This letter is written in response to your October 4, 1996 transmittal and topographic survey regarding the Phase I, Kahalui Inter-Island Cargo Facility Improvements, located in Kahului, Maui.

My staff has reviewed the topographic survey and approved the delineated wetlands as shown on the drawings.

Should you have questions or need additional information, please call Ms. Lolly Silva at 438-9258, extension 17. Refer to file number 960000082 in future correspondence.

Sincerely,

Linda M. Hihara-Endo, Ph.D., P.E.
Acting Chief, Operations Branch

RECEIVED

SATO & ASSOC, INC

Appendix I
Memorandum of
Understanding with Canoe
Clubs

8/16/94

MEMORANDUM OF UNDERSTANDING (MOU)
RELOCATION OF HAWAIIAN CANOE AND NA KAI EWALU CANOE CLUBS

This memorandum will set forth the understanding and agreements reached among HAWAIIAN CANOE and NA KAI EWALU CANOE CLUB (Canoe Clubs) and the STATE DEPARTMENT OF TRANSPORTATION - HARBORS DIVISION (DOT).

1. Representatives designated by the Canoe Clubs will continue to be members of the Kahului Harbor Master Plan Task Force. The task force is convened periodically to update the master plan. The DOT and Canoe Clubs agree to provide each other with the following timely information affecting each party's activities: Canoe Clubs - their plans and progress in securing the necessary funds to assist their relocation, tenancy arrangements with County of Maui, planned relocation date, canoe regatta dates, or any other planned activities on DOT lands or activities in Kahului Harbor that may impact the safe and efficient operation of the harbor. DOT - their plans, progress and timeline in utilizing and developing the parcel the canoe clubs are located on, progress and results of wave data collection, any computer and/or physical model test results to determine the feasibility of modifying Kahului Harbor, and/or any other operational changes within the harbor that may affect the canoe clubs.
2. DOT has no present plans to acquire the 2.2 acre parcel of land (TMK: 3-7-8:17) better known as "Hoaloaha Park," which A & B Inc. has donated to the County of Maui for Canoe Club activities.
3. Canoe paddling activities and canoe regatta's will continue to be permitted in Kahului Harbor with the appropriate coordination and authorization from the Harbors Division Maui District Manager, provided that the paddling activities will not interfere with the safe and efficient operation of commercial vessels in Kahului Harbor.
4. DOT agrees that the Canoe Clubs may sell the coconut trees located on the revocable permit parcels they currently occupy to financially benefit the Canoe Clubs, provided the disposition of the coconut trees by the Canoe Clubs does not impede the timely development of DOT lands for cargo handling development and DOT is not liable for any event that may occur and any transactions connected to the sale of the coconut trees.

5. The sandy shoreline areas of the DOT property (TMK 3-7-08:6) will remain accessible to the Canoe Clubs until the construction of the harbor facilities begin.

HAWAIIAN CANOE CLUB

NA KAI EWALU

By *[Signature]* ^{Secretary}
Its PRESIDENT Secretary
11/16/94

By *[Signature]*
Its President Joint Com.

DEPARTMENT OF TRANSPORTATION - HARBORS DIVISION (DOT)

By *[Signature]*
or Calvin M. Tsuda
Its Deputy Director for Harbors
11/16/94

APPROVED AS TO FORM:

[Signature]
Deputy Attorney General

HAR-PM
4051.97

July 9, 1996

Hawaiian Canoe Club
c/o Ms. Diane Ho
2138 Vineyard Street, Suite 201
Wailuku, Hawaii 96793

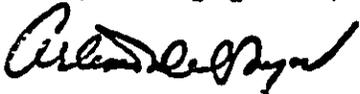
Gentlemen:

Under the terms of Revocable Permit No. H-94-1829, you are required to submit an insurance policy or certificate in lieu thereof, as evidence of your required insurance coverage. In auditing our records, we find that:

1. No insurance policy or certificate has been received.
2. The term of your policy expired on March 6, 1994.
3. Your insurance coverage must have the following:
 - a. The limits of liability must have a combined single limit coverage of not less than \$500,000.00 for bodily injury and property damage per occurrence.
 - b. The State of Hawaii must be named as an additional insured.
 - c. Under Cancellation, we require a 30-day written notice clause prior to any cancellation, termination or material change in policy and the clause, "...but failure to mail such notice shall impose no obligation or liability of any kind upon the company, its agents or representatives," must either be deleted or xxxxxxx out.

Please submit the required evidence of insurance coverage to this office within two weeks from the date of this letter. If no insurance certificate is received, we will process your permit for termination. Should you have any questions, please contact me at 587-1944.

Very truly yours,



ARTEMIO DELOS REYES
Property Manager

JLS:jls

Appendix J
Drainage Report H.C. 3280

DRAINAGE REPORT
FOR
KAHULUI HARBOR STORAGE YARD PAVING
AND UTILITY IMPROVEMENTS
KAHULUI, MAUI
JOB NO. H.C. 3280
FEBRUARY 1997

DRAINAGE REPORT

I. Narrative:

At present condition, majority of the project site, including the maintenance facility (refer to Hydrology Map - Existing Conditions), drains into the existing grated inlet (EGI) at the intersection of Hobron and Kaahumanu Avenue. It would then be conveyed by the existing drainline along Kaahumanu Avenue to the 60" RCP further west of the maintenance facility. Eventually, storm runoff will be discharged into the ocean at Pier 3 via culverts under drainage easements across A & B Properties and Kahului Harbor lands.

After completion of the project, most of the runoff that previously flowed into the EGI will be collected by the yard's internal drainage system. The new system will then be connected to the existing 2 - 58" x 36" CMP that crosses the storage yard site (refer to Hydrology Map - New Conditions). As before, the storm runoff will discharge into the ocean at Pier 3.

II. Drainage Calculations:

Calculations are given in the following pages.

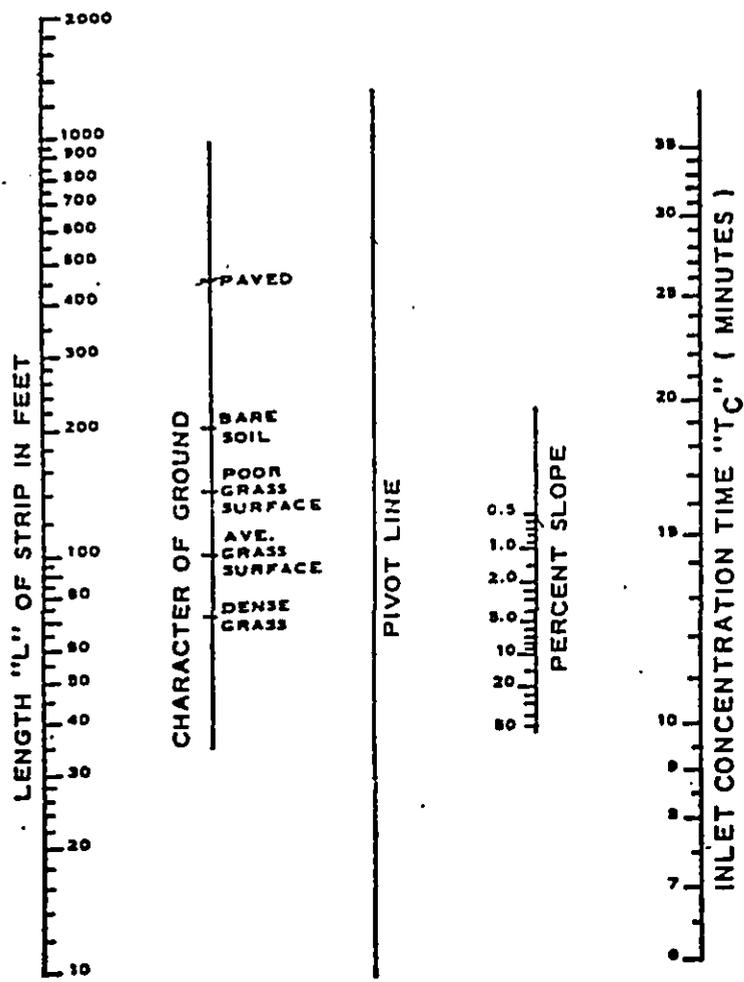
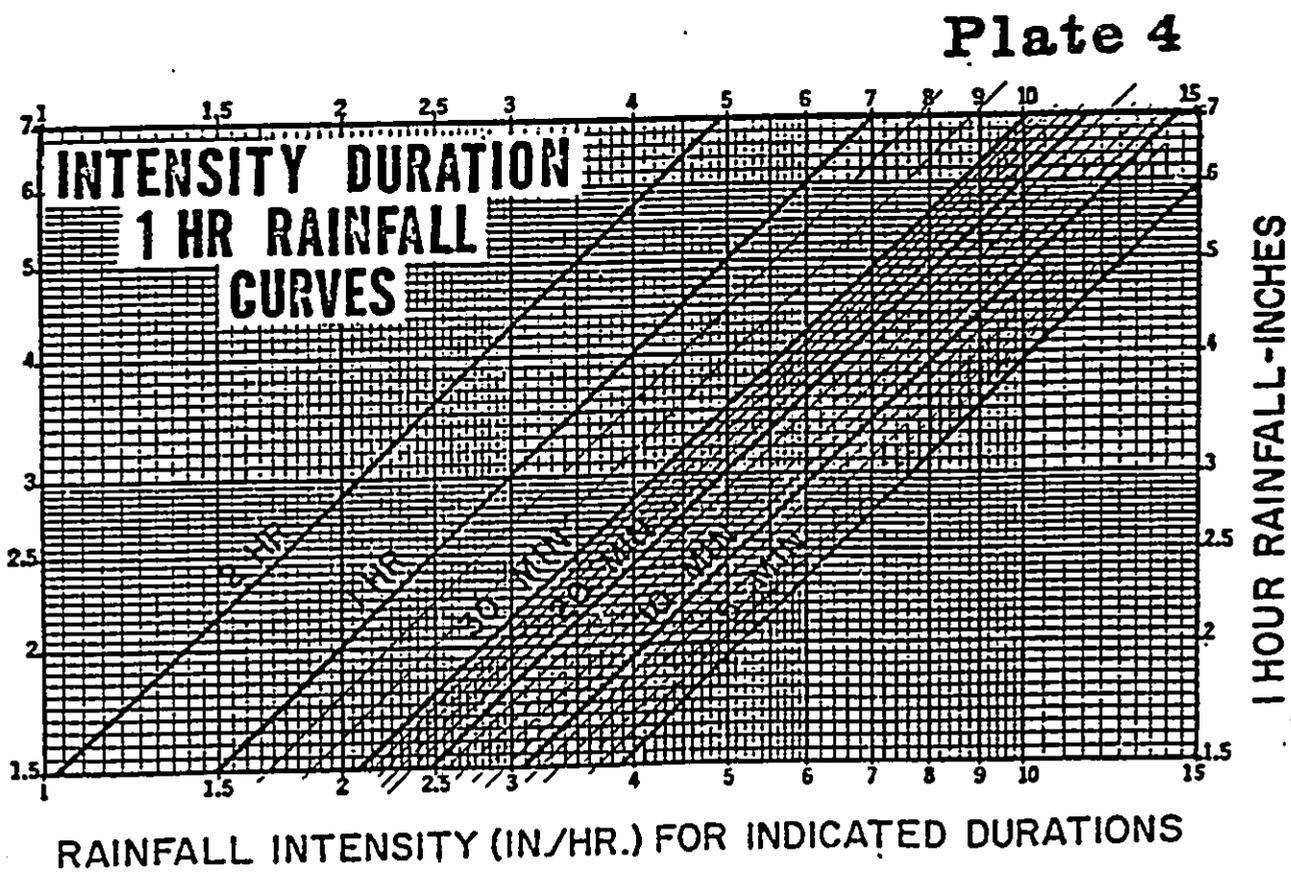
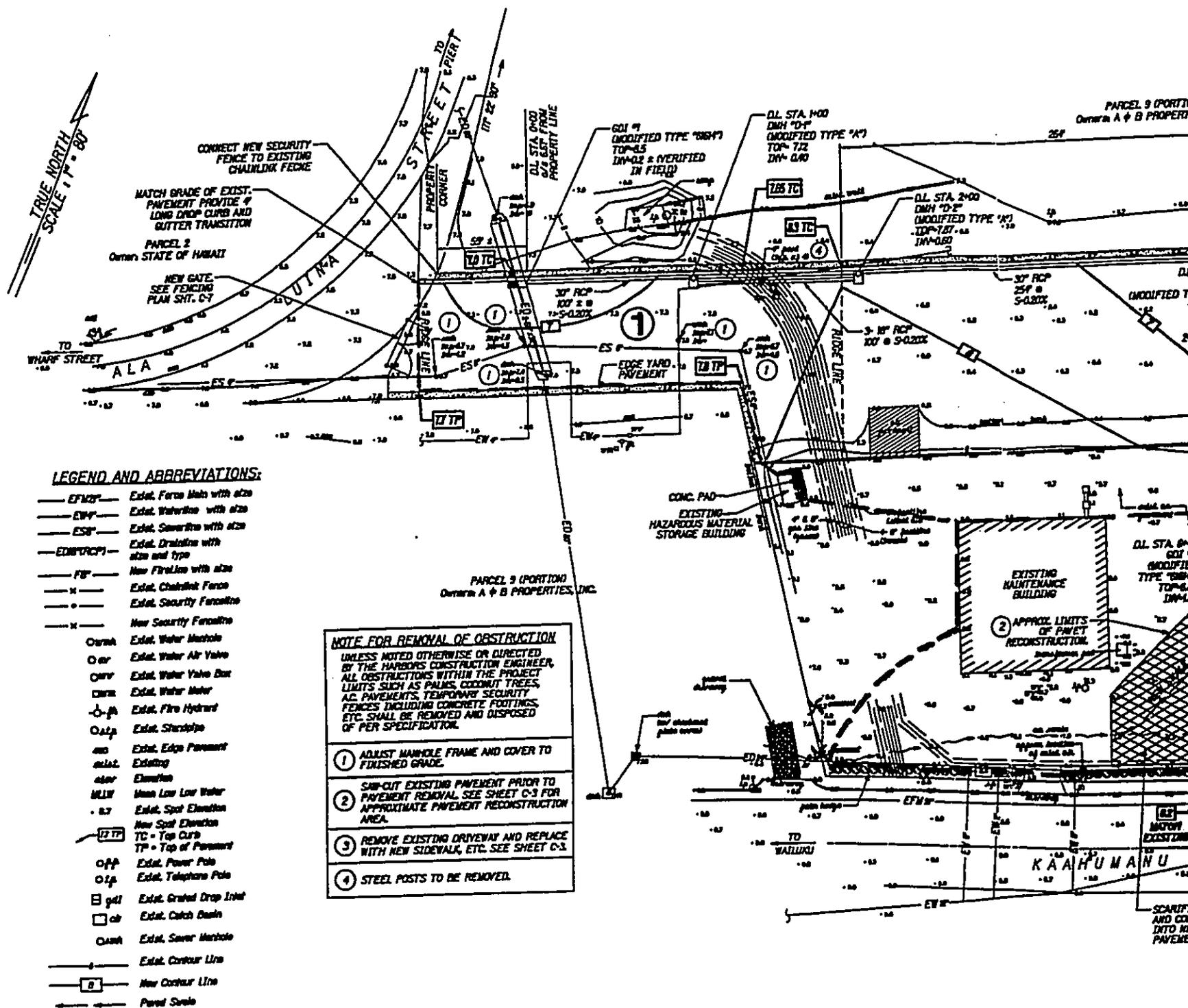


Plate 3
Overland
Flow
Chart



RAINFALL INTENSITY (IN/HR.) FOR INDICATED DURATIONS



LEGEND AND ABBREVIATIONS:

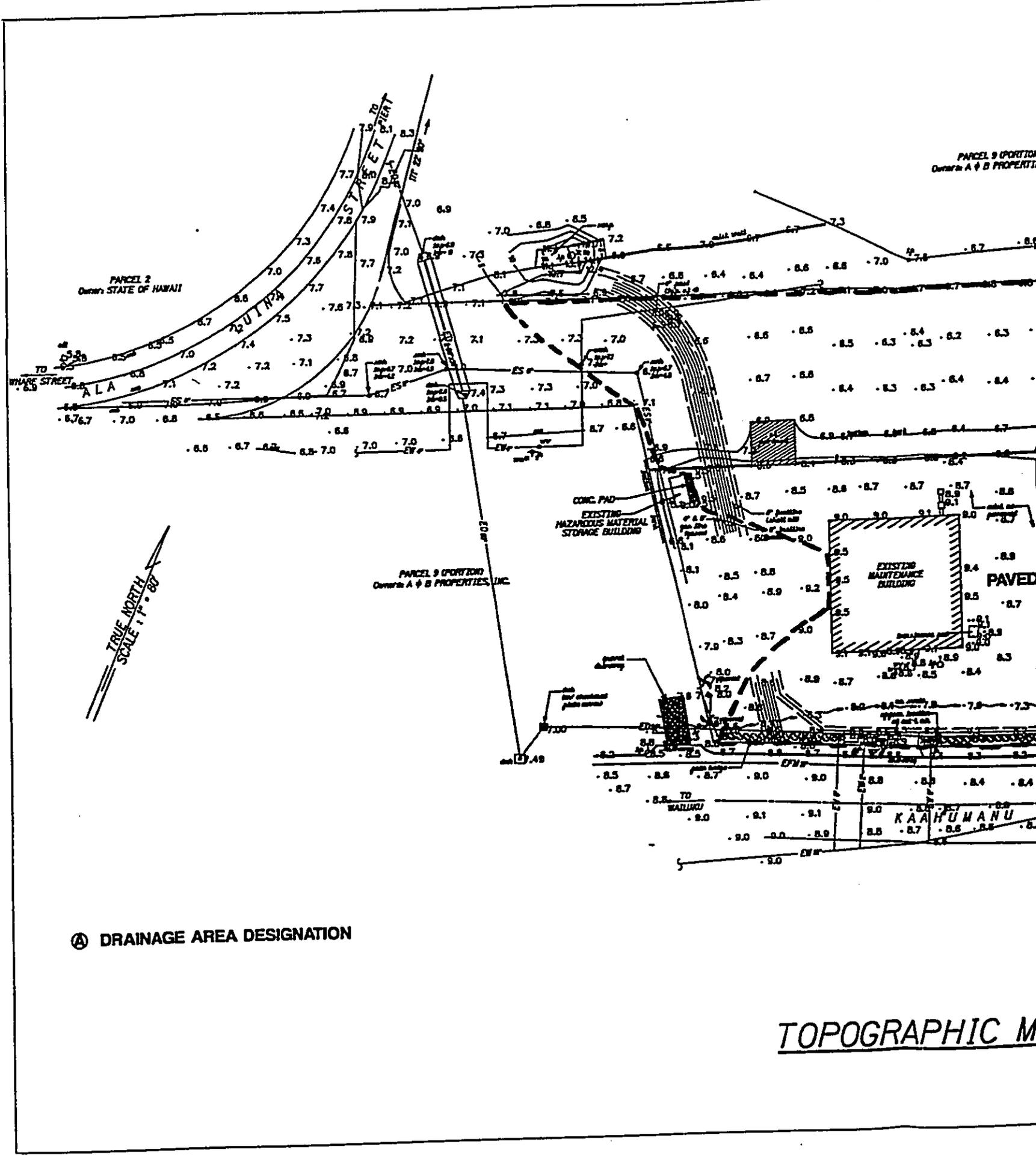
- EFM— Existing Fence with size
- EW— Existing Waterline with size
- ES— Existing Sewerline with size
- EDM/RCPI— Existing Drainline with size and type
- FP— New Fireline with size
- X— Existing Chainlink Fence
- X— Existing Security Fencing
- X— New Security Fencing
- Ow— Existing Water Manhole
- Ov— Existing Water Air Valve
- Ov— Existing Water Valve Box
- Ow— Existing Water Meter
- Ov— Existing Fire Hydrant
- Ost— Existing Storm Slope
- ms— Existing Edge Pavement
- ms— Existing
- MLW— Mean Low Low Water
- s.7— Existing Spot Elevation
- [TP]— New Spot Elevation
- TC— Top of Pavement
- TP— Top of Pavement
- O— Existing Power Pole
- O— Existing Telephone Pole
- [gdl]— Existing Grated Drop Inlet
- [cb]— Existing Catch Basin
- Ow— Existing Sewer Manhole
- []— Existing Contour Line
- []— New Contour Line
- []— Paved Slope

NOTE FOR REMOVAL OF OBSTRUCTION
 UNLESS NOTED OTHERWISE OR DIRECTED BY THE HARBORS CONSTRUCTION ENGINEER, ALL OBSTRUCTIONS WITHIN THE PROJECT LIMITS SUCH AS PALMS, COCONUT TREES, AG PAVEMENTS, TEMPORARY SECURITY FENCES INCLUDING CONCRETE FOOTINGS, ETC. SHALL BE REMOVED AND DISPOSED OF PER SPECIFICATION.

- ① ADJUST MANHOLE FRAME AND COVER TO FINISHED GRADE.
- ② SAW-CUT EXISTING PAVEMENT PRIOR TO PAVEMENT REMOVAL. SEE SHEET C-3 FOR APPROXIMATE PAVEMENT RECONSTRUCTION AREA.
- ③ REMOVE EXISTING DRIVEWAY AND REPLACE WITH NEW SIDEWALK, ETC. SEE SHEET C-3.
- ④ STEEL POSTS TO BE REMOVED.

① DRAINAGE AREA DESIGNATION

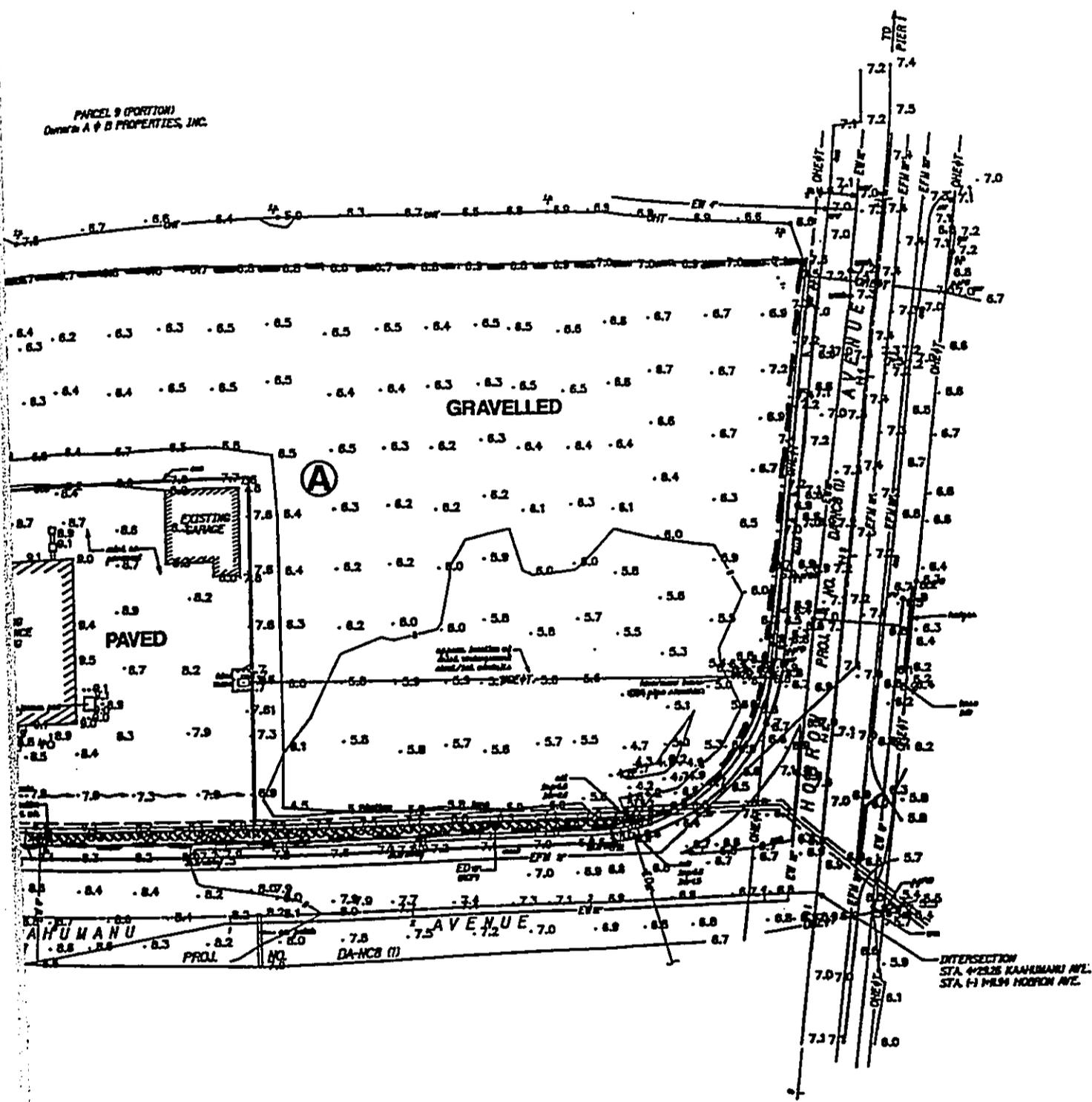
GRADING AND DRAINAGE



Ⓐ DRAINAGE AREA DESIGNATION

TOPOGRAPHIC M

PARCEL 9 (PORTION)
OWNER: A & B PROPERTIES, INC.



PHIC MAP

HYDROLOGY MAP EXISTING CONDITIONS