Wailuku Parkside

LINDA LINGLE
Mayor

DAVID W. BLANE
Director

LISA M. NUYEN
Deputy Director

COUNTY OF MAUI
DEPARTMENT OF PLANNING

CLAYTON I. YOSHIDA
Planning Division

AARON H. SHINMOTO
Zoning Administration and
Enforcement Division

RECEIVED
'98 JUN 10 A11:36
OFC. OF ENVIL.
QUALITY CONTROL

June 8, 1998

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

Dear Mr. Gill:

RE: Finding of No Significant Impact (FONSI) for Wailuku Parkside Application for Community Plan Amendment, TMK: 3-4-030:019 Por. 20, Por. 23, Wailuku, Maui, Hawaii (EA980002)

The Maui Planning Department has reviewed the comments received during the 30-day public comment period which began on April 23, 1998. The agency has determined that this project will not have significant environmental effects and has issued a FONSI. Please publish this notice in the June 23, 1998 Office of Environmental Quality Control (OEQC) Environmental Notice.

We have enclosed a completed OEQC Publication Form, and four copies of the final Environmental Assessment (EA). Please contact Don Schneider, Staff Planner, of this office at 243-7735 if you have any questions.

Sincerely,

Lisa M. Nuyen

LISA M. NUYEN
Director of Planning

LMN:DAS:cmh
Enclosures
c: Clayton Yoshida, AICP, Planning Program Administrator
Project File
Milton Arakawa
Don Schneider, Staff Planner
General File (C:oeqcfonsi.parkside)

1998-06-23-MA-FEA-Wailuku Parkside

Final Environmental Assessment

WAILUKU PARKSIDE

June 1998

Prepared for:

Stanford S. Carr
Development Corp.

Prepared by:

Munekiyo, Arakawa
& Hiraga, Inc.

in cooperation with
PBR Hawaii, Inc.

Final
Environmental Assessment

WAILUKU PARKSIDE

June 1998

Prepared for:

Stanford S. Carr
Development Corp.

Prepared by:

Munekiyo, Arakawa
& Hiraga, Inc.

in cooperation with
PBR Hawaii, Inc.

CONTENTS

LIST OF APPENDICES

LIST OF FIGURES

scan/wlkpksde.finales 001

Chapter I

Project Overview

I. PROJECT OVERVIEW

A. PROPERTY LOCATION, EXISTING USE AND LAND OWNERSHIP

The applicant, Stanford S. Carr Development Corporation, proposes to develop the Wailuku Parkside Project on approximately 24.267 acres of land in Wailuku, Maui, Hawaii (TMK 3-4-30:por. 19, por.20, por.23). See Figure 1.

The subject property was formerly utilized for the growing of seed cane but has lain fallow for over 10 years. Remnants of sugar cane exist on the site along with a variety of non-native vegetation such as koa haole, castor bean, guinea grass, natal redtop, and bristly foxtail.

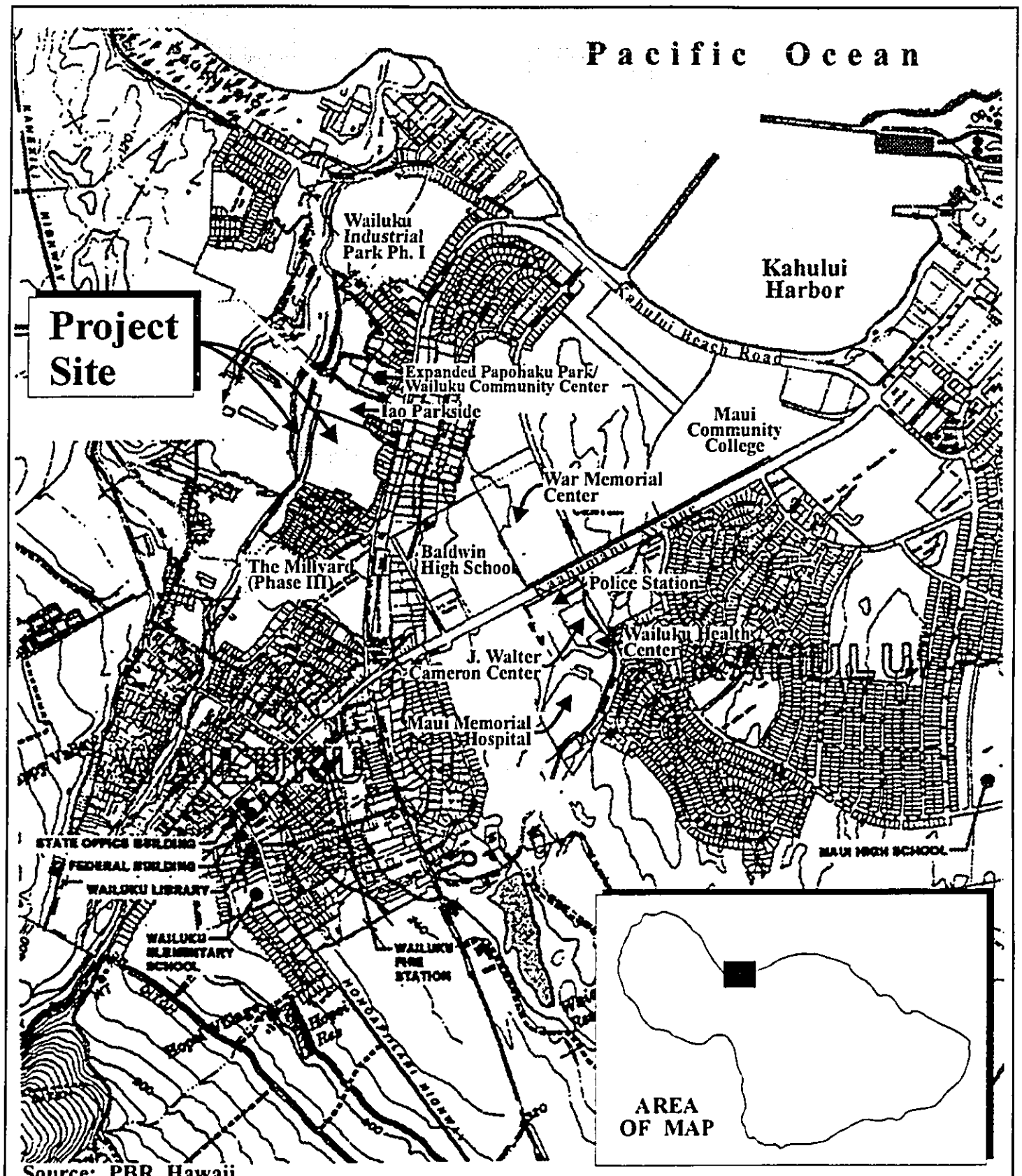
Eha Street extends through the subject property with 3.373 acres on the northwest side of Eha Street and 20.894 acres on the southeast side of Eha Street.

C. Brewer Homes, Inc. recently conveyed the property to Wailuku Parkside, LLC which has authorized Stanford S. Carr Development Corporation as the applicant.

B. PROPOSED ACTION

The applicant proposes to develop a fee simple, single-family residential development of approximately 118 units with a 1.4156 acre park. See Figure 2 and Figure 3. The project's objective is to provide high quality, entry level homes on relatively large lots, at high value points.

Lots could range from 6,500 to 10,000 square feet, with a typical homesite of approximately 7,000 square feet. Homes are planned in three (3) model types, including three-bedroom, two-bath units; three-bedroom, two-and-a-half bath units; and four-bedroom, two-and-a-half bath units.



Source: PBR Hawaii

Figure 1

Wailuku Parkside

Regional Location Map

MUNEKIYO ARAKAWA & HIRAGA, INC.

0 1000 2000 4000 Feet

Prepared for: Stanford Carr Development Corp.

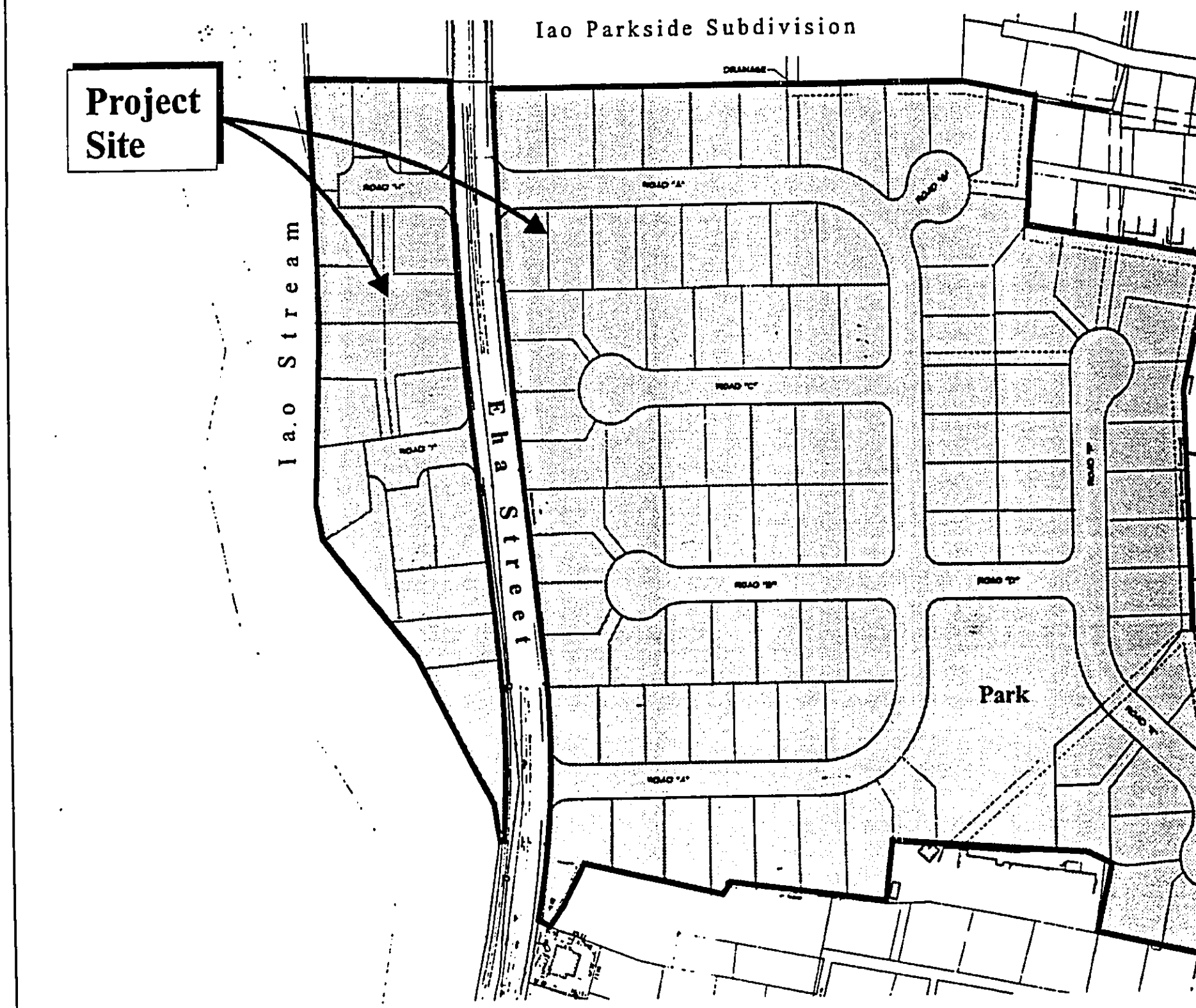
Preface

The applicant, Stanford S. Carr Development Corporation, proposes to construct the Wailuku Parkside Project, located in Wailuku, Maui, Hawaii (TMK 3-4-30:por. 19, por. 20, por. 23). Pursuant to Chapter 343, Hawaii Revised Statutes, and Chapter 200 of Title 11, Hawaii Administrative Rules, this Environmental Assessment documents the project's technical characteristics, environmental impacts and alternatives, and advances findings relative to the significance of the project.

Acknowledgements

We would like to acknowledge the work of Mr. Vincent Shigekuni of PBR Hawaii, Inc. We had the opportunity to work with Mr. Shigekuni in the formulation of the Planning, Environmental, and Engineering Considerations for Wailuku Parkside which was prepared by PBR Hawaii, Inc. for submittal to the State Land Use Commission for the district boundary amendment application relating to this project. We have utilized the PBR Hawaii report as the basis for the preparation of the Environmental Assessment, Community Plan Amendment and Change in Zoning applications for the Wailuku Parkside Project.

Munekiyo, Arakawa, & Hiraga, Inc.

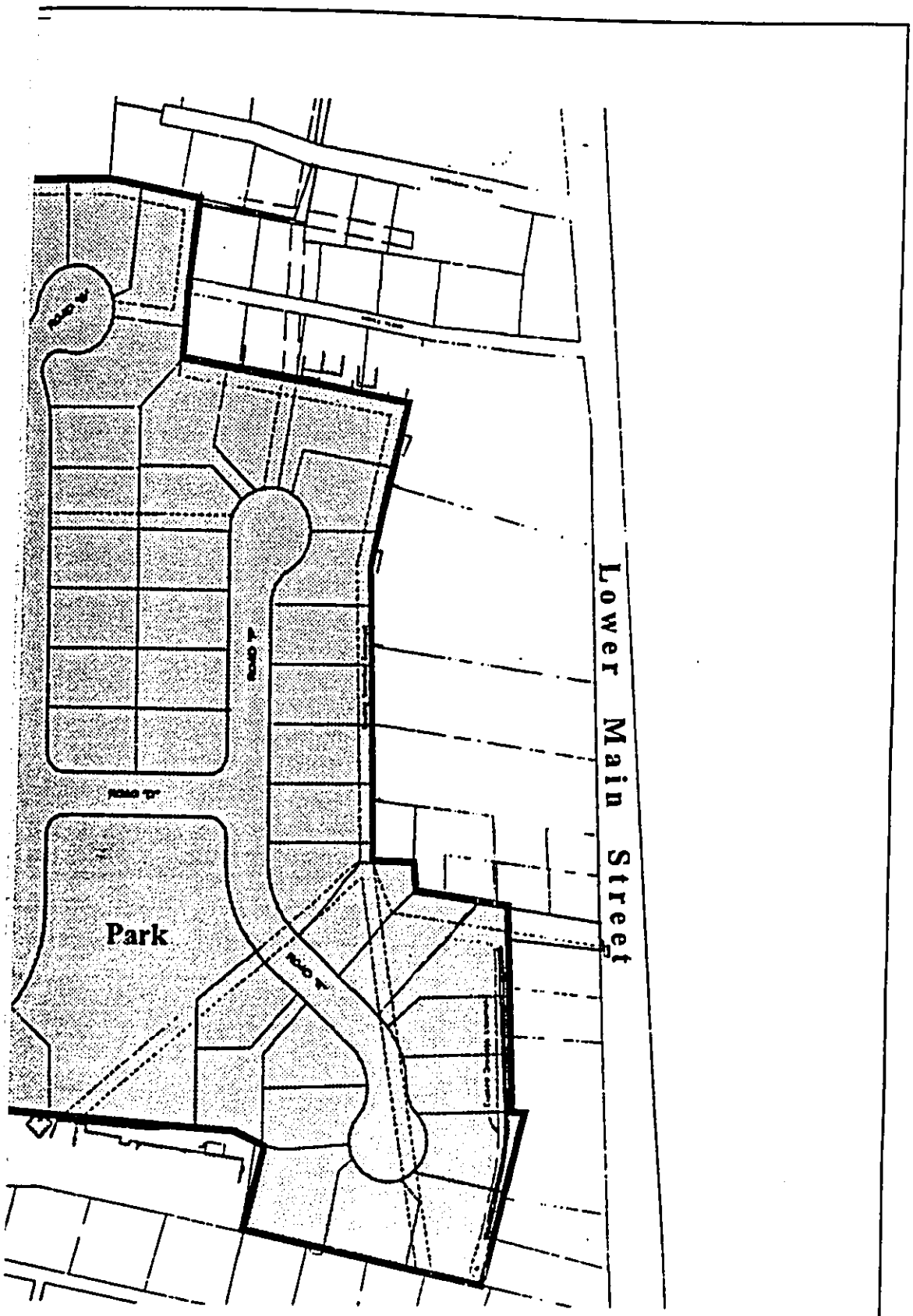


Source: Muroda & Associates, Inc.

Figure 2

Wailuku Parkside
Site Plan

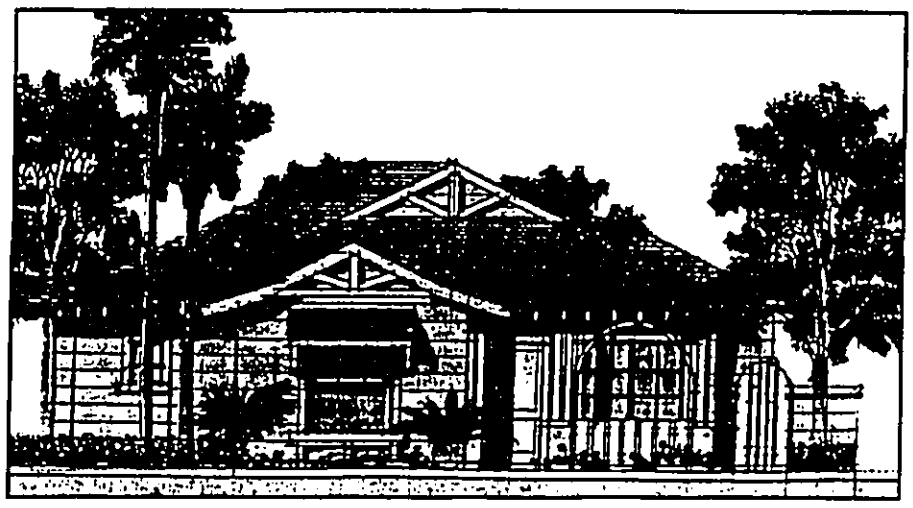
Prepared for: Stanford S. Carr Development Corp.



e

MUNEKIYO, ARAKAWA & HIRAGA, INC.

NOT TO SCALE



Three Bedroom Unit
(Conceptual Front Elevation)

Three Bedroom and Four Bedroom Unit
(Conceptual Front Elevation)

Source: Stanford S. Carr Development Corporation

Figure 3

Wailuku Parkside

Conceptual Front Elevations

Prepared for: Stanford S. Carr Development Corporation

Unit sizes and pricing are preliminarily planned as follows:

SUMMARY OF PROPOSED MODEL TYPES AND UNIT PRICING AT WAILUKU PARKSIDE			
Model	***Bedroom/Bath***	***Net Interior Area (s.f.)***	***Average Price (1998 $)***
1	3/2	1,300	$210,000
2	3/2.5	1,375	$220,000
3	4/2.5	1,500	$235,000
Source: Stanford S. Carr Development Corporation.			

Considering the entire project and its range of lot sizes, however, home prices could range from approximately $185,000 to $260,000 in 1998 dollars.

The Wailuku-Kahului Community Plan designates the project site as Light Industrial and Open Space. A community plan amendment to Single Family Residential is being requested. The community plan amendment request triggers review through Chapter 343, Hawaii Revised Statutes. Thus, an environmental assessment is being prepared.

The subject property is also in the State Agricultural District. A separate application to reclassify the property to the Urban District has been submitted to the State Land Use Commission.

The existing zoning for the subject property is County Agricultural District and M-1 Light Industrial District, with a small portion in R-1 Residential District. A change in zoning is being requested from County Agricultural District and M-1 Light Industrial District to R-1 Residential District.

Within the County residential district (Chapter 19.08), no building shall exceed two (2) stories in height. Moreover, side and rear yards shall be a minimum of six (6) feet and the front yard shall be a minimum of fifteen (15) feet. Side and rear yards for two-story buildings would be at least ten (10) feet. The proposed project will be developed in accordance with the foregoing standards.

Assuming all governmental approvals are obtained, construction is anticipated to begin in October 1998, marketing in January 1999 and selling out the project by mid-2000. Estimated project costs for development of the single-family residential and park are $22 million.

Chapter II

Description of Existing Environment

II. DESCRIPTION OF EXISTING ENVIRONMENT

A. PHYSICAL SETTING

1. Surrounding Land Uses

The project site is located in the midst of Wailuku Town which is the governmental and business center for Maui. Wailuku is located on the foothills of the West Maui Mountains containing a diverse range of commercial, light industrial, and public uses, as well as established older residential areas in the midst of town.

To the north of the subject property is the Iao Parkside Project, a moderately priced townhome development. In the middle of the Iao Parkside complex lies Papohaku Park and the Wailuku Community Center, which are both County facilities. Further north is the Wailuku Industrial Park.

To the east of the property are a mixture of older, established industrial, commercial and single-family residential uses which are adjacent to Lower Main Street.

To the south of the subject property is an established single-family residential neighborhood. Further south is the Wailuku Millyard, a light industrial subdivision.

To the west of the subject property is the Iao Stream. Flood control levees associated with the stream are located just at the edge of the project site.

2. Climate

Like most areas of Hawaii, Maui's climate is relatively uniform year round. Characteristic of Hawaii's climate, the project site

experiences mild and uniform temperature year-round, moderate humidity and a relatively consistent northeasterly trade wind. Variation in climate on the island is largely left to local terrain.

Average temperatures at the project site (based on temperatures recorded at Kahului Airport) range from lows in the 60's to highs in the 80's. August is historically the warmest month, while January and February are the coolest. Rainfall at the project site averages approximately 20 to 30 inches per year. Winds in the region are predominantly out of the north-northeast and northeast.

3. ***Topography and Soils Characteristics***

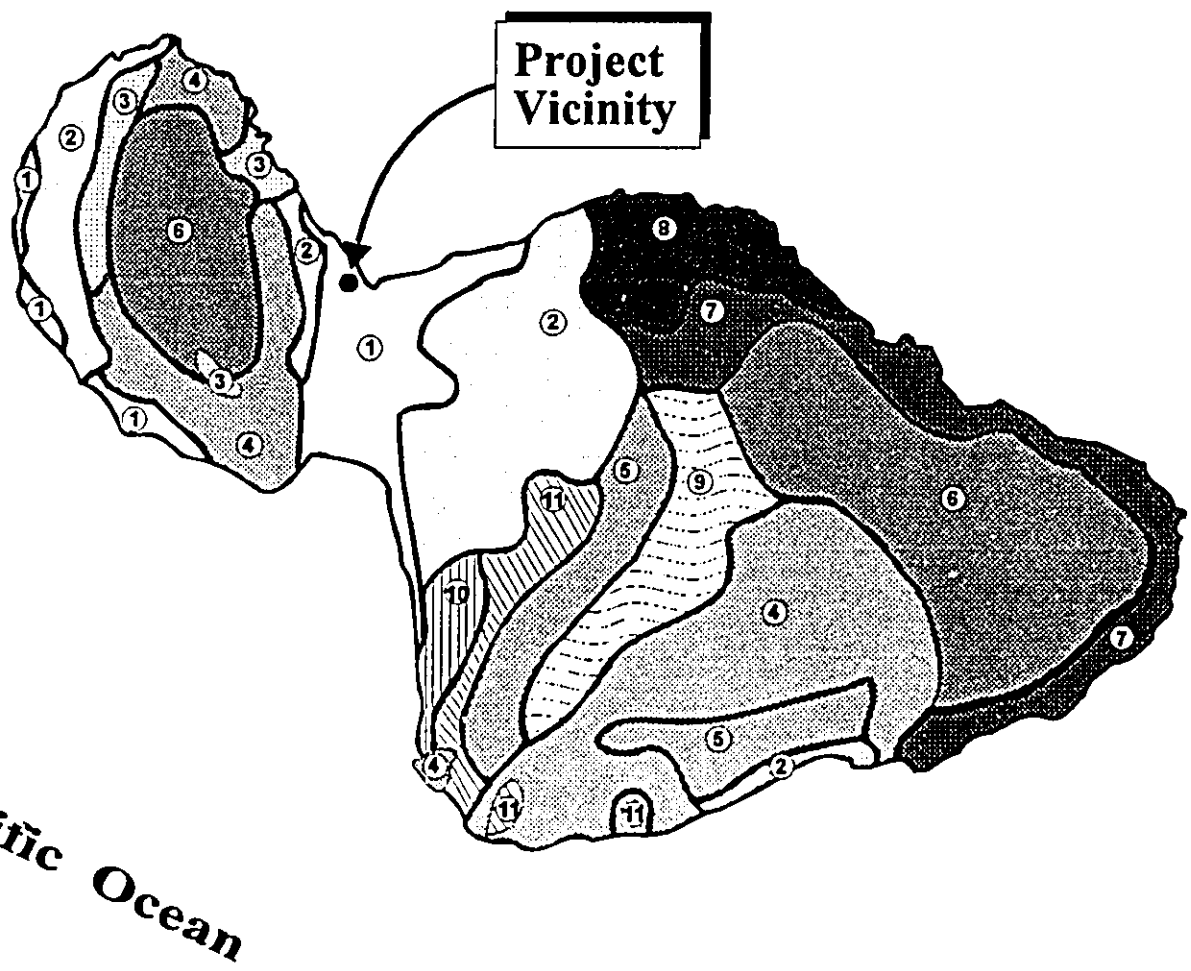
The project site lies within the elevations of 140 feet above mean sea level (msl) and rises to 160 feet above msl, sloping gently upward from east to west at an average of 5 percent.

Underlying the proposed site area are soils of the Pulehu-Ewa-Jaucas association. See Figure 4. This soil association is characteristically deep and well-drained and located on alluvial fans and basins.

Most of the subject property is comprised of soils classified as Iao Cobbly Silty Clay at 0 to 3 percent slopes, with some portions containing Pulehu Cobbly Clay Loam at 0 to 3 percent slopes. See Figure 5. The Iao series soils consist of well-drained soils that are located on valley fill and alluvial fans. In a representative soil profile, the surface layer is dark brown clay about 15 inches thick, the subsoil is very dark brown clay and silty clay about 45 inches thick, and the substratum is a clay alluvium. Permeability is moderately slow, run-off is medium, and the erosion hazard is

LEGEND

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



Base Map Source: U.S.D.A., Soil Conservation Service

Figure 4

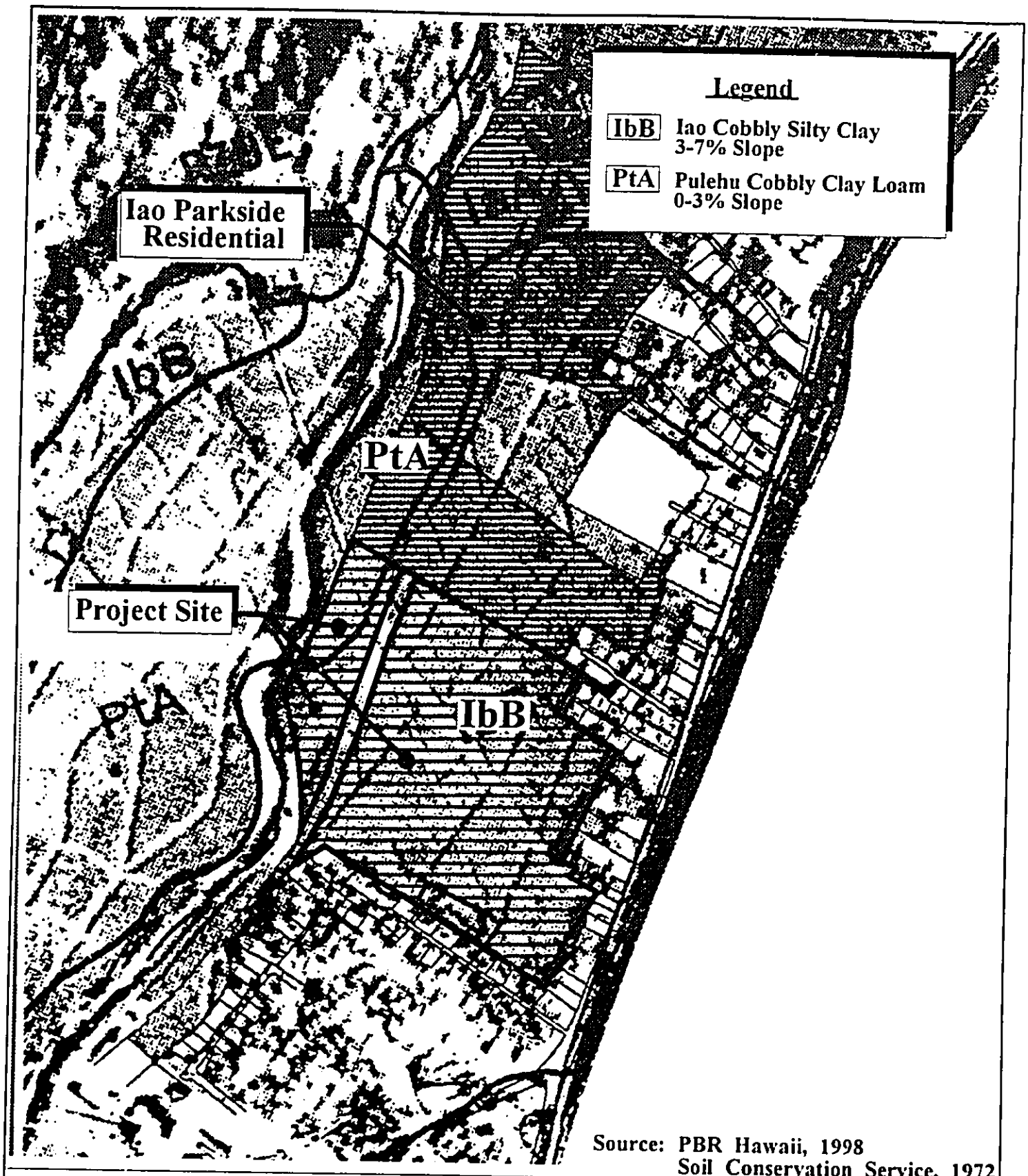
Wailuku Parkside

Soil Association Map

MUNEKIYO ARAKAWA & HIRAGA, INC

Prepared for: Stanford S. Carr Development Corporation

NOT TO SCALE



Source: PBR Hawaii, 1998
Soil Conservation Service, 1972

Figure 5

Wailuku Parkside
Soil Classifications Map

MUNEKIYO ARAKAWA & HIRAGA, INC

0 250 500 1000 Feet

Prepared for: Stanford Carr Development Corp.

slight to moderate. Iao Silty Cobbly Clay typically contains cobblestones within the surface layer.

The Pulehu series consists of well-drained soils on alluvial fans, stream terraces, and basins. In a representative profile, the surface layer is dark brown clay loam about 21 inches thick. The subsoil is various sands, loams and silts 39 inches thick, and the substratum is coarse, gravelly or sandy alluvium. Permeability is moderate, run-off is slow, and the erosion hazard is slight.

In terms of productivity ratings based on the 1967 Land Study Bureau Detailed Land Classification, the subject property contains none of Maui's Class A agricultural land. All of the approximately 24.3 acres are ranked as Class B lands. See Figure 6.

4. *Flood Hazard*

The proposed project is designated by the Flood Insurance Rate Map as Zone C, an area of minimal flooding. See Figure 7.

The completion of the Iao Flood Control Project by the U.S. Army Corps of Engineers eliminated riverine flood hazards from the overtopping of Iao Stream, and the project site is no longer subjected to flooding.

5. *Flora and Fauna*

A field reconnaissance survey which included the subject property was conducted in March 1981. The survey inventoried flora and fauna, described major vegetation zones and wildlife habitats, searched for rare and endangered species, and identified areas of potential environmental concern with regard to these resources.

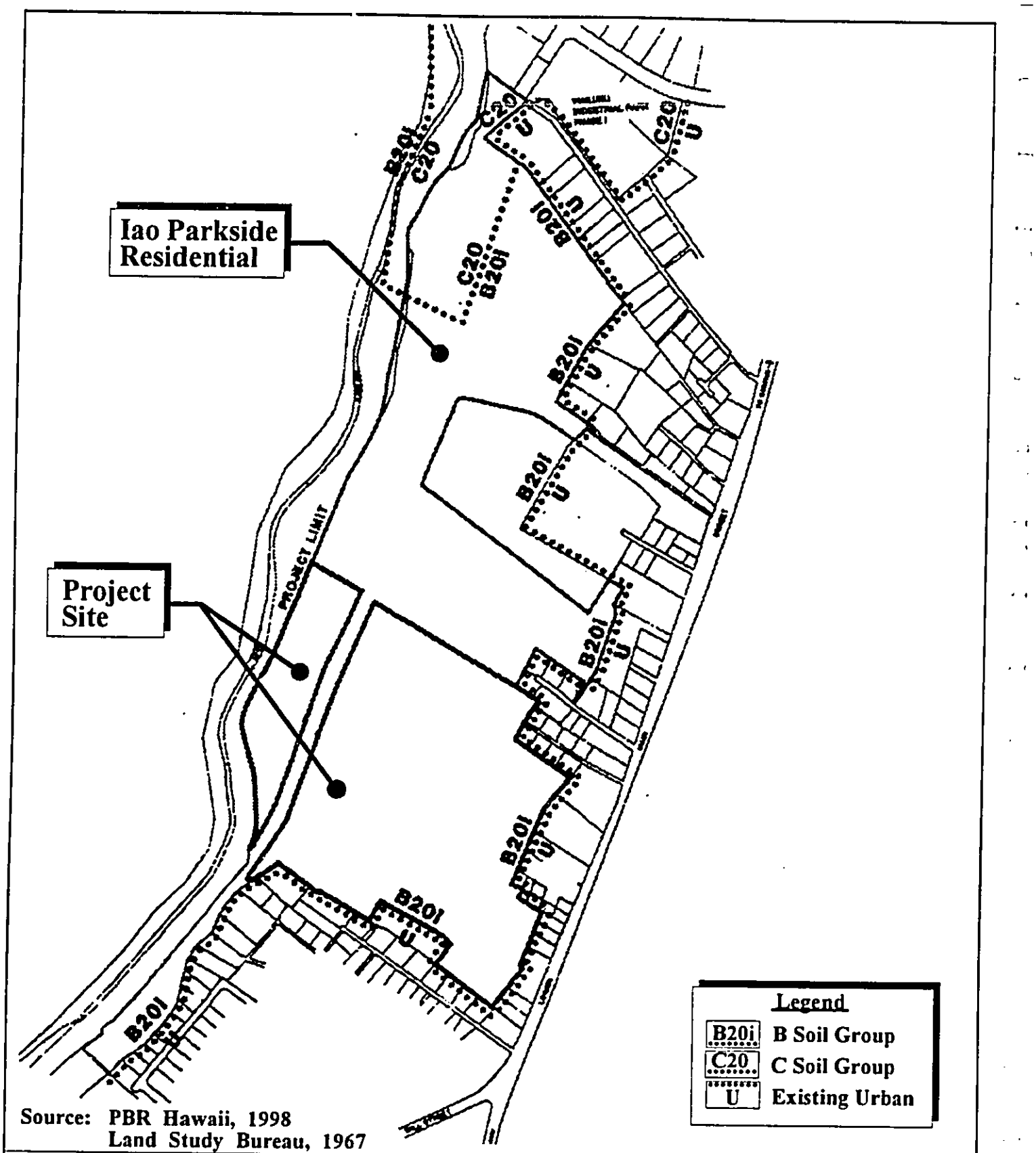


Figure 6

Wailuku Parkside

Soil Productivity Ranking

MUNEKIYO ARAKAWA & HIRAGA, INC

0 250 500 1000 Feet

Prepared for: Stanford Carr Development Corp.

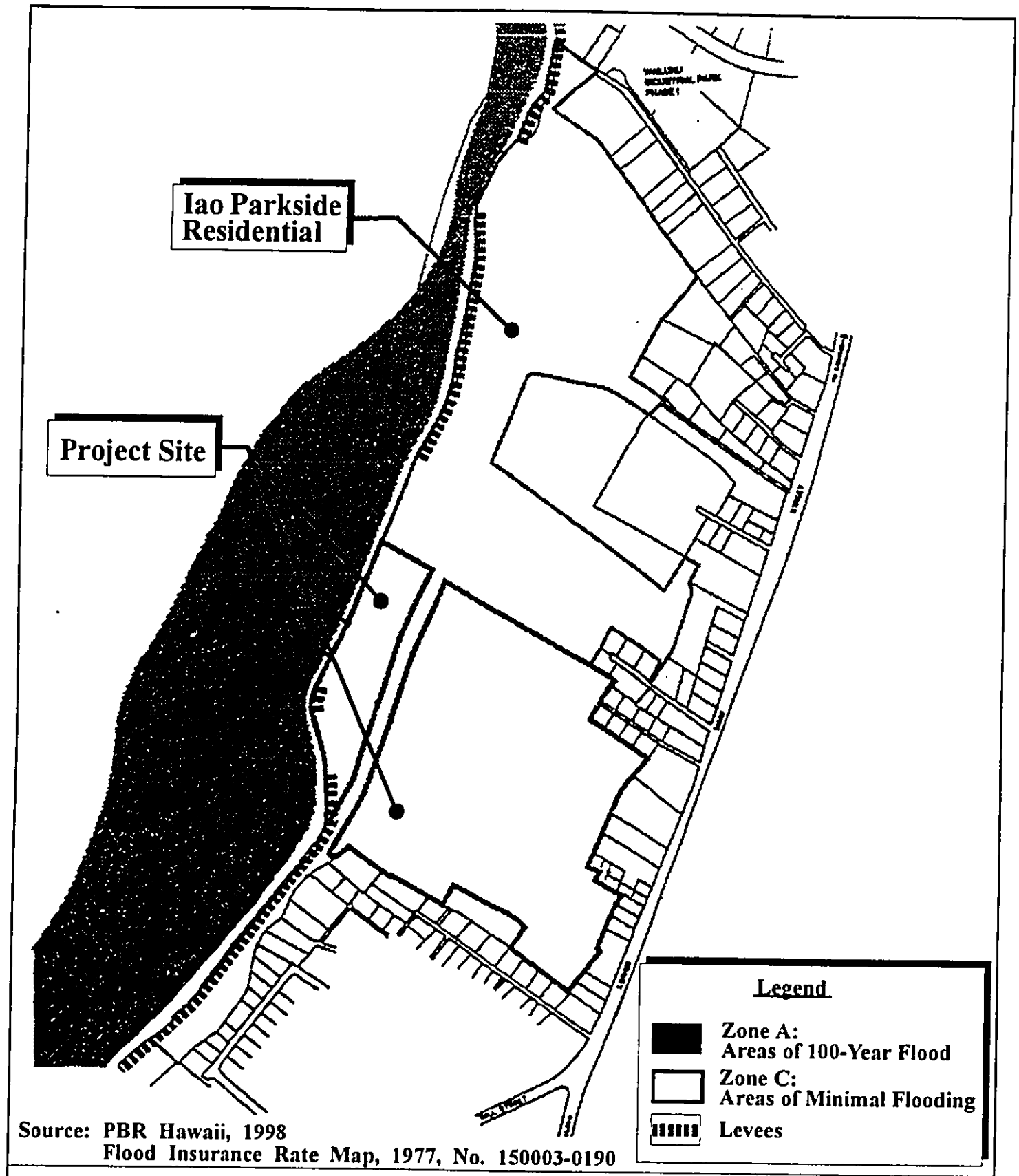


Figure 7

Wailuku Parkside
Flood Insurance Rate Map

See Appendix A.

6. ***Historic and Archaeological Sites***

A literature search and an archaeological reconnaissance survey of the subject property, consisting of a surface survey to roughly locate and describe areas of possible archaeological or historical interest, was conducted by Scientific Consultant Services, Inc. in 1998. See Appendix B.

A total of 40 backhoe trenches were excavated within the project area (as shown on Figure 2 of Appendix B). No cultural deposits, other than modern trash in fill material, were present in any of the trench excavations. Based on the results of the trench excavations the entire parcel appears to have been heavily impacted by prior mechanical disturbance of the soil. Information provided by the backhoe operator regarding more recent land modification included sugar cane cultivation, and grubbing activity over the entire parcel in 1993-94.

The majority of the soil deposition within the project area is characterized by two (2) layers consisting of fill overlying decomposing bedrock. Layer I throughout the project area consisted of fill. The northwest portion of the project adjacent to Iao Stream is characterized by two (2) layers, fill overlying old riverbed deposit as was found in ST-2 and ST-4. ST-1 in that same area consisted of a fill layer over a natural sand deposit which is consistent with its proximity to the old river channel. In many of the trenches the fill material contained irrigation drip-line hose and recent trash, including soda and beer cans, plastic, broken pieces of cement, and plastic pipe fragments.

The presence of *lo'i* terracing and related soils stratigraphy was expected in the project area based on the archival research. The lack of any *in situ* subsurface deposits in this area where LCA information indicates that numerous *lo'i* fields and mid-19th century agricultural endeavors existed speaks to the disturbed nature of the whole parcel being surveyed.

7. ***Air Quality***

There are no point sources of airborne emissions within close proximity of the project site. Air quality in the vicinity of the project site may be temporarily affected by a variety of sources, including smoke and dust from sugar cane harvesting and cultivation operations to the south and east. Although minimal, airborne pollutants are largely attributable to vehicular exhaust from traffic along the region's roadways. However, these sources are intermittent and prevailing winds quickly disperse the particulates generated by these temporary sources.

8. ***Noise***

Ambient noise conditions are generally attributable to vehicular noise levels in proximity of the project site. Other ambient noise is attributed to natural conditions (e.g., wind, rain, river flow).

9. ***Scenic and Open Space Resources***

In addition to Mount Haleakala to the east, Iao Valley and the West Maui Mountains define the scenic resources to the west of the project site.

B. SOCIO-ECONOMIC ENVIRONMENT

1. Population

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

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

2. Economy

As noted previously, the Wailuku region is the Island's center of governmental activities, as well as a focal point for professional and business services. Combined with neighboring Kahului, the region's economic character encompasses a broad range of commercial, service, and governmental activities. In addition, the region is surrounded by significant agricultural acreages which include sugar cane fields, pineapple fields, and macadamia nut orchards. The vast expanse of agricultural land, managed by Hawaiian Commercial & Sugar (HC&S) and Wailuku Agribusiness, is considered a key component of the local economy.

C. PUBLIC SERVICES

1. Police and Fire Protection

Police protection for the Wailuku-Kahului region is provided by the County Police Department headquartered at the Wailuku Station. The region is served by the Department's Central Maui patrol.

Fire prevention, suppression, and protection services for the Wailuku-Kahului region is provided by the County Department of Fire Control's Wailuku Station, located in Wailuku Town, as well as the Kahului Station located on Dairy Road.

2. Health Care

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

3. Solid Waste

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

4. Recreation Resources

The Wailuku-Kahului region encompasses a full range of recreational opportunities, including shoreline and boating activities

at the Kahului Harbor and adjoining beach parks, and individual and organized athletic activities offered at numerous County parks. The project site is in close proximity to Iao Valley State Park, the Wailuku Community Center, Wells Park, and Papohaku Park.

5. ***Schools***

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

D. ***INFRASTRUCTURE***

1. ***Roadways***

Major roadways in the project area include Lower Main Street, Eha Street, Waena Street, Imi Kala Street, Wili Pa Loop, and Mill Street.

Lower Main Street - In the study area, Lower Main Street is a four-lane, undivided roadway that runs from Waiehu Beach Road to a point just mauka of its intersection with Waena Street. From there to Wailuku, Lower Main Street is, primarily, a two-lane undivided roadway. Parking is not permitted on Lower Main Street.

The posted speed limit is 30 mph.

Waena Street - Waena Street is a connector road between Lower Main Street and Eha Street. Existing development along Waena Street includes commercial and residential development. Papohaku Park and Wailuku Community Center are also located on Waena Street. Waena Street is a two-lane roadway with median left-turn lanes and curb and gutters on both sides of the roadway. The posted speed limit is 20 mph.

Eha Street - Eha Street is a two-lane roadway that runs from Waiehu Beach Road to Imi Kala Street, roughly parallel to Lower Main Street. Currently, Eha Street is barricaded just makai of Imi Kala Street. There is one (1) through lane in each direction with median left-turn lanes. Sidewalks, curbs and gutters are provided on both sides on the road. The posted speed limit is 20 mph.

Mill Street - Mill Street is a collector road that runs from North Market Street to Lower Main Street. Mill Street is a two-lane roadway that services residential and commercial development. The south side of Mill Street is curbed and the north side alternates between curbed and open shoulder treatment. The St. Anthony School is on the south side of Mill Street, near its intersection with Lower Main Street. The posted speed limit is 20 mph.

Imi Kala Street - imi Kala Street provides access to the Millyard commercial development. Beginning at an unsignalized, "T"-intersection at Mill Street, it proceeds west and terminates between its intersection with Wili Pa Loop/Eha Street and Iao Stream. Imi Kala Street is striped as a two-lane, undivided roadway, but there

is sufficient width to provide four (4) through lanes in the future. Curbs and gutters are provided and parallel parking is permitted on both sides of the roadway. The posted speed limit is 20 mph.

Wili Pa Loop - Wili Pa Loop is a two-lane roadway with curbs and gutters provided on both sides of the roadway. Parallel parking is permitted on both sides of the road. There is frequent commercial driveway access along Wili Pa Loop. The posted speed limit is 20 mph. See Appendix C.

2. ***Water System***

The water sources presently serving the project site include the Central Maui Source Development Joint Venture Waiehu source, with a total pumping capacity of 13.8 million gallons a day (mgd), and the Waiehu Heights source, with a total daily capacity of 3.6 mgd. These sources are interconnected.

C. Brewer Homes, Inc., the former landowner of the site, participated in the development of the Waiehu Heights source and the installation of approximately 8,000 lineal feet of 16- and 18-inch lines from the Waiehu Heights source to Eha Street in Wailuku Industrial Park.

Water for Wailuku is provided by deep wells at Mokuhau in Iao Valley and in Upper Waiehu. These wells draw water from the Iao Aquifer.

The Department of Water Supply recently purchased two (2) existing deep wells in North Waihe'e. These wells, with a pumping capacity of approximately 1.0 mgd each, are currently drawing

water from the heretofore undeveloped North Waihe'e aquifer and pumping it into the Central Maui system at Waihe'e Village. With the completion of the new 24-inch transmission line and the one million gallon storage reservoir and pumping facility now under construction in North Waihe'e, water will be pumped from the North Waihe'e aquifer to the Central Maui system in Upper Waiehu, supplementing water being drawn from the Iao aquifer sources mentioned above.

The Department of Water Supply (DWS) is also planning to drill two (2) additional wells in North Waihe'e. According to DWS, bids have been received to drill these two (2) exploratory wells at Kanoa and Kupaa. Drilling is expected to commence soon. These wells are expected to be completely operational and productive sometime in year 2000 or 2001.

Storage for the project site and vicinity is provided by a 3.0 mg storage reservoir presently under construction at Mokuhau in Iao Valley, approximately 400 feet inland of the well source there. The floor elevation of this reservoir is 358 feet above mean sea level. Water will be conveyed from this 3.0 mg reservoir to the project vicinity by a series of existing 24-, 18-, and 12-inch lines. At the project site, there is a 12-inch line on Eha Street, which runs through the northerly portion of the project. Another 12-inch line runs along Lower Main Street on the southerly side of the proposed project. These two (2) lines are interconnected at Imi Kala Street in the Millyard located mauka of the project site and at Waena Street, the main entrance to Iao Parkside and the Wailuku Community Center located 900 feet to the east. This distribution network enables the project site to be fed from multiple directions.

See Appendix D.

3. ***Wastewater***

There are two (2) gravity interceptors that run through the project site. The first is a 12-inch line that runs along the southern boundary of the site. The second is a 10-inch line that was recently installed on Eha Street and through Iao Parkside Phase IV to the intersection of Waena Street on Lower Main Street. A new 15-inch gravity line was also installed at that time between Waena Street and Mamo Lane on Lower Main Street.

Expansion of the Kahului Wastewater Reclamation Facility (KWRF) was recently completed by the County of Maui, increasing its capacity from 6.0 mgd to 7.9 mgd. According to the County's Department of Public Works and Waste Management, presently there is approximately 786,000 gpd of capacity allocation left for affordable housing at the KWRF. See Appendix D.

4. ***Drainage***

Current onsite runoff from the project site for a 50-year recurrent interval rainfall is 33 cfs. Offsite runoff from Lower Main Street southeast of the project site is estimated to be 77 cfs. Offsite runoff from the residential area south of the project site is currently about 29 cfs. Total onsite/offsite runoff is presently being directed into a 66-inch drain line that was installed in conjunction with the Iao Parkside multi-family residential project. This line discharges into Iao Stream 1,250 feet northeast of the proposed project site.

5. ***Electrical and Telephone Services***

Underground ducts, pullboxes, and manholes were installed on Eha

Street for electrical, telephone, and CATV distribution systems in conjunction with the road improvements. There are also overhead distribution systems for these utilities on Lower Main Street south of the project site.

Chapter III

Potential Impacts and Mitigation Measures

III. POTENTIAL IMPACTS AND MITIGATION MEASURES

A. IMPACTS TO THE PHYSICAL ENVIRONMENT

1. Surrounding Land Uses

The project site is located in Wailuku Town and abuts urban development on three (3) sides. To the north is multi-family residential use which encompasses a public park and community center. To the east is a mix of light industrial, commercial and single-family residential uses abutting Lower Main Street. To the south is an established single-family residential neighborhood.

Iao Stream is located on the west side of the project. There are existing levees abutting the project boundaries which were built as part of the Iao Stream flood control project. There are existing urban uses up to the levees. The project site and vicinity are considered areas of minimal flooding.

The development of single-family residential uses at the project site is consistent with adjacent and surrounding land uses and is not anticipated to create any adverse impacts.

2. Topography and Landform

The proposed project is not anticipated to result in significant earthmoving activities. To the extent practicable, finished contours will follow existing grades to minimize earthwork costs and maintain drainage patterns.

3. Flora and Fauna

There are no known significant habitats or rare, endangered, or threatened species of flora or fauna located on the project site. In addition, the project site does not contain any known wetland areas

and wildlife habitats. As such, the removal of vegetation and displacement of wildlife from the project site is not considered an adverse impact to these components of the natural environment.

4. ***Archaeological Resources***

During the archaeological survey conducted on the subject property, no cultural deposits of any kind were discovered. See Appendix B. Thus, further development of the property would appear to have no significant impact on historic and archaeological parameters.

However, as recommended by the State Historic Preservation Division (SHPD), archaeological monitoring will be conducted for any ground altering activities within 50 meters of the Lower Main Street right-of-way. The production of a monitoring plan will be coordinated with the SHPD.

In the event historic or archaeological materials are encountered during construction on the remainder of the site, work will be halted in the area of the find and the SHPD will be notified. Applicable procedures to ensure compliance with Chapter 6E, Hawaii Revised Statutes (HRS), will be implemented.

5. ***Air Quality***

With the proposed project, some short- and long-term impacts on air quality will unavoidably occur either directly or indirectly as a consequence of project construction and use. Short-term impacts from fugitive dust will likely occur during the project construction phase. Fugitive dust emissions may arise from grading and dirt-moving activities within the project site.

State air pollution control regulations require that there be no visible fugitive dust emissions at the property line. Hence, an effective dust control plan should be implemented to ensure compliance with Chapter 11-60.1, Hawaii Administrative Rules, Section 11-60.1-33 on Fugitive Dust, and to avoid complaints from residents near construction areas. Dust control measures will address and include, as appropriate, material transfer operations, onsite vehicular traffic routing, watering and sprinkling of open areas, use of wind screens and landscaping and covering of bare areas in a timely manner.

To a lesser extent, exhaust emissions from stationary and mobile construction equipment and from workers' vehicles may also affect air quality during the period of construction. Onsite construction equipment (both mobile and stationary) will also emit some air pollutants in the form of engine exhaust. However, in terms of construction scale and duration, emissions from construction equipment are not expected to adversely impact air quality standards.

In the long term, the proposed project is not expected to adversely impact local and regional air quality conditions.

6. ***<u>Noise</u>***

The various construction phases of the project may generate noise, which may impact nearby residential areas. The actual noise is dependent upon the methods employed during each stage of the construction process. Earth moving equipment, such as bulldozers and diesel-powered trucks, will probably be the loudest equipment used during construction. The applicant will alleviate potential

construction noise to the greatest extent possible through adherence to the State Department of Health standards and guidelines such as limiting construction to daylight hours and requiring emission controls on motorized equipment.

Once completed, noise levels of the proposed single-family development should be similar to those experienced at Iao Parkside and other residential areas. Increased noise levels created by increase in traffic levels due to the proposed project are expected to be minimal and are not anticipated to adversely impact surrounding environs.

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

Since the project site is obscured by surrounding urbanized areas, the proposed project will not impact the scenic and visual resources of the area. Development will not negatively impact the visual quality of the surrounding area. Design guidelines will be adhered to by the applicant during the development to ensure adequate screening and setbacks, as well as compatibility of building materials. It is anticipated that the proposed project will be similar in materials and color to the existing Iao Parkside project nearby.

8. ***Use of Chemicals and Fertilizers***

Use of herbicides on the project site will generally be limited to the initial plant establishment period. Pesticides are anticipated to be used only as a treatment and not as a preventive measure. As a treatment, application usage will be minimal. In addition, plant selection for the project will be based on hardiness, drought tolerance, pest resistance as well as aesthetic concerns.

Nitrogen/Phosphorus/Potash mixed fertilizers are anticipated to be applied to lawn areas, groundcover, and flowering shrubs. With proper irrigation management practices, leaching fertilizers should be negligible.

No adverse effects on surface, underground and marine water resources are anticipated.

B. *IMPACTS TO COMMUNITY SETTING*

1. *Local Economy*

The Wailuku-Kahului region remains the civic, transportation, and business center of Maui. The deep draft harbor, airport and central location all contribute to the status of the region as the economic hub of the island. Thus, opportunities for permanent employment in the region are highly likely to remain strong.

The proposed single-family residential and park development will provide short-term construction-related and real estate sales-related jobs in its development stages. Once completed, residential development will require repair and maintenance services and will provide associated business opportunities.

While the proposed single-family residential development will provide relatively little permanent employment opportunities, it does provide affordably priced housing near existing employment center, reducing traffic and minimizing commuting times.

2. *Market Considerations*

Wailuku Parkside is anticipated to appeal to families who are already established on Maui, and perhaps particularly to those who

have ties to the Central Maui area. See Appendix E. As targeted by the developer, and based on the sales experience of other Central Maui projects, a significant share of buyers could also be first-time homeowners.

The first-time buyer market segment is considered "durable", so long as home prices are affordable, the market for entry level housing is constantly replenished as new generations come of age and form their own households. Additionally, according to developers and realtors on Maui, the island's single-family market is exhibiting strong appeal to this market, since:

- With prices only slightly higher than for comparable bedroom counts in multi-family units, single-family homes offer greater privacy, area for outdoor play and entertaining, and area for expansion.

- The multi-family market is generally considered a temporary hold, with the intention of "moving up" to a single-family residence after the unit's appreciation has helped the household to accumulate sufficient home equity for its down payment on the next buy. However, with competitive pricing and in a market of only gradual home price increases, most first-time buyers would prefer to go directly to a single-family product.

Based on its pricing, unit sizes and other project characteristics, Wailuku Parkside could compete most directly with future moderately priced subdivisions at Maui Lani, and with future phases at Pi'ilani Village in Kihei.

It is noted that the proposed Nanea subdivision in master-planned Kehalani, will provide about 80 single-family homes during the

1998-1999 time horizon. With average lot sizes of about 7,000 square feet and lot-and-home prices in the $180,000 to $250,000 range, this project could pose direct competition for the proposed development. Since the site is understood to be fully entitled, Nanea might begin marketing units by July 1998. Thus, assuming an average rate of absorption of five (5) units per month, this project could be sold out by the end of 1999. In that case, it would directly impact only the first year or so of marketing at Wailuku Parkside.

According to the market assessment, the Wailuku Parkside development is projected to achieve an average sales absorption of about five (5) units per month initially, with sales accelerating to a pace of about seven (7) to eight (8) units per month subsequently. This could result in sell-out of the project within approximately 19 months, or in mid-2000, assuming a January 1, 1999 marketing start date.

According to the market study, the projected level and acceleration of sales absorption is considered reasonable based on general economic trends, increasing demand, a recovering residential real estate market and product planning and positioning.

3. ***Agriculture***

While the proposed development will result in the urbanization of 24 acres of fallow agricultural land, the amount of those lands relative to Maui's total agricultural land resources is not significant. Approximately 246,370 acres of land is classified by the State Land Use Commission as Agricultural on the island of Maui. This designation encompasses 53 percent of the total land area of the

island of Maui. The subject property consists of approximately 24.3 acres of State Agricultural Land Use District, or less than one one-hundredth of a percent (.01 percent) of Maui's lands within the State Agricultural Land Use District boundaries. The acreage proposed to be converted to urban use will not significantly impact the agricultural resources of Maui.

The subject property had been used for the growing of seed cane in the past but currently lies fallow, since the landowner, C. Brewer Homes, Inc., or its affiliates, no longer have a need for seed cane. Wailuku Agribusiness, Inc. (an affiliate of C. Brewer Homes, Inc.) has phased out of the sugar business with the conversion of its lands north of Iao Stream into macadamia nut orchards and lands south to Maalaea being converted to pineapple (under an agreement with Maui Land and Pineapple Co., Inc.).

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

The proposed project is not anticipated to affect service capabilities of police, fire and emergency medical operations. The project will not extend existing service area limits for emergency services.

5. ***Recreation***

The nearest recreational facilities are Papohaku Park/Wailuku Community Center located on Waena Street.

The applicant is proposing to dedicate approximately 1.4 acres from within the project site to the County for park use upon receipt of the necessary land use approvals. Current park dedication requirements are 500 square feet of land for each unit, in excess of three (3). Based on the 118 units proposed within the project,

the applicant is required to provide 57,500 square feet of park area. The applicant intends to dedicate 61,733.74 square feet of park land to the County of Maui, or 4,233.74 square feet more than required, exceeding the park dedication requirements.

6. ***Schools***

Existing public schools which serve residents in the area of the project site include Wailuku Elementary, Iao Intermediate and Baldwin High Schools. According to the DOE, the 1997-1998 school year capacities of the above schools are 1,206, 640 and 1,668 students, respectively. Current enrollments during the 1997-1998 school year are 837, 823 and 1,850 students, respectively.

The DOE estimates that the project would generate 25 elementary school-, 11 intermediate school- and 12 high school-aged children.

While the Wailuku Parkside Project would contain students of elementary, intermediate and high school age, it is anticipated to appeal to families who are already established on Maui, and perhaps particularly to those who have ties to the Central Maui area. Thus, children from the Wailuku Parkside Project may already be attending public schools in the Wailuku area. To the extent that families with children move into the project from other parts of Maui or the State, this would likely result in a corresponding reduction in enrollment in other DOE facilities.

7. ***Solid Waste***

A solid waste management plan will be developed in coordination with the Solid Waste Division of the County Department of Public Works and Waste Management for the disposal of clearing and

grubbing material during construction. It is noted that prior to clearing the property, the applicant shall coordinate with DOH regarding applicable provisions for rodent eradication from vacant lots.

After completion of construction, it is anticipated that the single-family residential and park areas will be served by the County of Maui. Solid waste generated by the project will be disposed at the County's Central Maui Landfill.

C. IMPACTS TO INFRASTRUCTURE

1. Roadways

Within the time frame of this project, it is anticipated that the barricade on Eha Street will be removed, allowing traffic to utilize Eha Street for its full length between Waiehu Beach Road and Imi Kala Street.

The residential streets within the Wailuku Parkside development will have 44-foot-wide rights-of-way and 28-foot-wide, paved travelways in accordance with County of Maui standards for streets in residential-zoned areas. Minimum offset distances between opposing residential streets are maintained.

Travel Demand Estimation

The Wailuku Parkside development is projected to be completed by the year 2000. The proposed development will consist of approximately 118 single-family, detached residential units and will include a neighborhood park. The estimated 118 single-family, detached residential units is substantially less than the 400 multi-family residential or 30 acres of light-industrial use originally

planned for the site. Access to the site will be from Eha Street.

Future traffic volumes generated by the proposed Wailuku Parkside development were estimated using the Institute of Transportation Engineers (ITE) publication entitled, Trip Generation, 5th Edition. Table 3 of Appendix C summarizes the number of trips projected. As shown, 97 vehicles per hour (vph) will be generated during the morning peak hour, while 131 vph will be generated during the evening peak hour.

When the generated traffic is assigned to the roadway network, development-generated trips add, at most, 49 vph to any one (1) turning movement.

Intersection Operations

Five (5) key intersections were evaluated: Lower Main/Waena, Eha/Waena, Wili Pa/Eha/Imi Kala, Wili Pa/Imi Kala, and Mill/Imi Kala. The intersections were analyzed using the methodologies documented in the 1995 Highway Capacity Manual for unsignalized and signalized intersections. Operating conditions at the intersections are expressed as a qualitative index expressed as Level of Service (LOS). Letter designation ranging from "A" to "F" are used, with LOS "A" representing good, low delay conditions and LOS "F" representing over-saturated, high delay conditions.

Based on the traffic study, intersection operations are not projected to change much from the existing condition. This is due largely to the relatively low traffic volumes generated by the proposed residential development. All intersection movements analyzed operate at LOS "C" or better during the projected Year 2000 peak

hours.

Most of the changes in intersection operations are attributable to the assumed opening of Eha Street in the near future. This will occur with or without the proposed development, and has a beneficial effect by providing an alternative route to Lower Main Street and alternative access to the existing Millyard development.

Based on the analysis of the projected Year 2000 conditions with and without the proposed Wailuku Parkside development, it is concluded that the proposed development does not have significant traffic impacts within the study area.

2. ***Water***

The projected average daily water demand for the 118 lot single-family residential project is 72,000 gpd. This translates to a maximum daily demand of 108,000 gpd. Fire flow demand for single-family residential projects is 1,000 gpm. The existing storage and transmission system both have the capacity to satisfy these requirements. The project's pro-rata share of source development, storage and transmission costs will be paid for as part of the comprehensive water meter assessment for each lot.

Sufficient water allocations to develop the proposed project are available from the previous landowner, C. Brewer Homes, Inc., who has conditionally agreed to provide water commitments from its allocation which are necessary to service the Wailuku Parkside Project. C. Brewer Homes, Inc. is entitled to 21.0 percent of the joint venture source of 2.9 mgd and 50 percent of the Wailuku Heights source, or 1.8 mgd. Either of these sources would meet

the maximum requirements for development of the subject property (0.108 mgd).

3. ***Wastewater***

The proposed single-family residential project is expected to generate approximately 42,000 gpd of wastewater. This quantity of wastewater can be readily handled by the existing 10-inch interceptor line on Eha Street and the existing 12-inch line along the south boundary of the project site. The Kahului Wastewater Reclamation Facility still has unused capacity to receive and process wastewater generated by the project. In accordance with the provisions of the County Ordinance, the applicant's contribution towards the expansion of the wastewater facility will be in a form of an assessment at a rate of $4.57 per gallon of wastewater generated.

4. ***Drainage***

Post-development runoff from this single-family residential project for a 50-year recurrent rainfall is estimated to be about 67 cfs. Approximately 59 cfs of this onsite runoff from the portion of the project site east of Eha Street will be directed into the existing storm drain system that runs through Phase IV of Iao Parkside. This system was designed to handle onsite post development flow from the area east of Eha Street and also the offsite runoff from Lower Main Street and the residential subdivision to the south of the project. The remaining 8 cfs of onsite surface runoff from the portion of the project site west of Eha Street will be intercepted by the existing storm drain system on the Eha Street Extension, which also ties in to the storm drain system for Iao Parkside. Based on the available drainage improvements in the project vicinity, there

will be no adverse drainage-related impacts to downstream or surrounding properties.

The construction of the proposed project will involve temporary land disturbing activities that result in soil erosion. These land disturbing activities include removal of existing vegetation (clearing and grubbing) and leveling, removing and replacing soil.

The following soil erosion mitigation measures will be implemented, as appropriate:

a. Minimize time of construction.

b. Retain existing ground cover until the latest date before construction.

c. Early construction of drainage control features.

d. Use of temporary sprinklers in nonactive construction areas when ground cover is removed.

e. Station water truck onsite during construction period to provide for immediate sprinkling, as needed, in active construction zones (weekends and holidays included).

f. Use temporary berms and cut-off ditches, where needed, for control of erosion.

g. Thorough watering of graded areas after construction activity has ceased for the day and on weekends.

h. Sod or plant all cut and fill slopes immediately after grading work has been completed.

Grading and erosion control plans for the project sites will be prepared in compliance with Title 20 of the Maui County Code and will be designed to avoid any discharge of dredged or fill material

into the waterway of Iao Stream. The applicant shall also coordinate with DOH regarding applicable NPDES coverage for construction discharges.

Short-term impacts from fugitive dust will likely occur during the project construction phase. Fugitive dust emissions can be controlled by:

a. Planning the different phases of construction, focusing on minimizing the amount of dust-generating materials and activities, centralizing material transfer points and onsite vehicular traffic routes, and locating potentially dusty equipment in areas of the least impact;

b. Providing an adequate water source at the site prior to the start up of construction activities;

c. Landscaping and rapid covering of bare areas, including slopes, starting from the initial grading phase;

d. Control of dust from shoulders, project entrances, and access roads;

e. Providing adequate dust control measures during weekends, after hours, and prior to daily start up of construction activities; and

f. Control of dust from debris being hauled away from the project site.

5. ***Electrical and Telephone Services***

Underground distribution systems for electricity, telephone, and cable TV will be extended into the project from Eha Street along the subdivision streets, all in accordance with the provisions of the County Subdivision Standards.

Chapter IV

Relationship to Land Use Plans, Policies and Controls

IV. RELATIONSHIP TO LAND USE PLANS, POLICIES AND CONTROLS

A. STATE LAND USE DISTRICTS

Chapter 205, Hawaii Revised Statutes, relating to the Land Use Commission, establishes the four (4) major land use districts in which all lands in the State are placed. These district are designated "Urban", "Rural", "Agricultural", and "Conservation". The project site is within the Agricultural District. See Figure 8.

An application for a district boundary amendment from the Agricultural District to the Urban District for the project site has been filed with the State Land Use Commission. The proposed project would be compatible with the proposed Urban District classification.

B. MAUI COUNTY GENERAL PLAN

The Maui County General Plan (1990 Update) sets forth broad objectives and policies to help the long-range development of the County. As stated in the Maui County Charter, "The purpose of the General Plan is to recognize and state the major problems and opportunities concerning the needs and development of the County and the social, economic, and environmental effects of such development and set forth the desired sequence, patterns and characteristics of future development."

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

Land Use Objective 1: *To preserve for present and future generations existing geographic, cultural and traditional community lifestyles by limiting and managing growth through environmentally sensitive and effective use of land in accordance with the individual character of the various communities and regions of the County.*

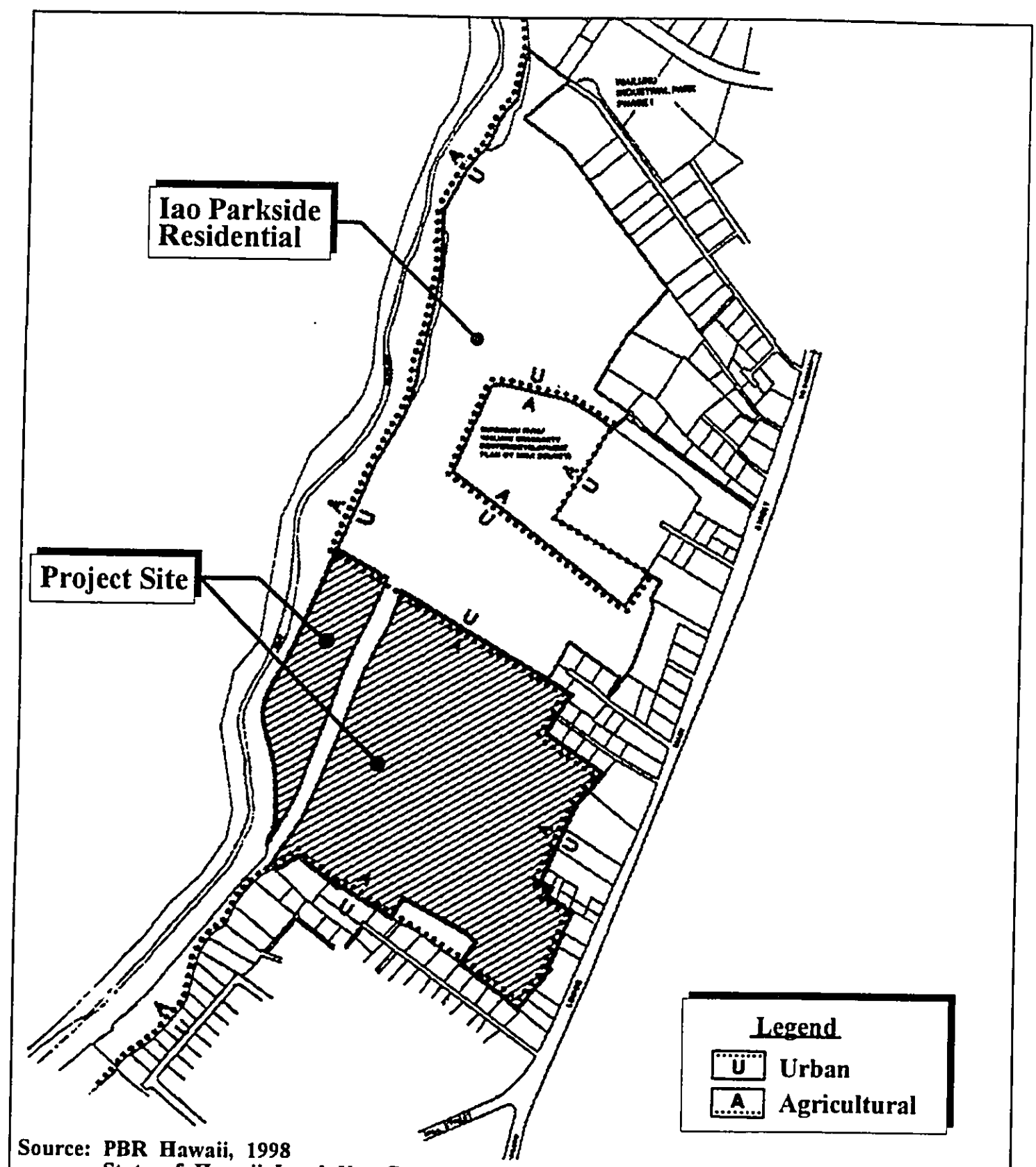


Figure 8

Wailuku Parkside

State Land Use District Classifications

MUNEKIYO ARAKAWA & HIRAGA, INC

0 250 500 1000 Feet

Prepared for: Stanford Carr Development Corp.

Response: Approval of the project will allow the infill of currently vacant land within an urban area. This represents an effective land use and will not adversely affect existing geographic, cultural and traditional community lifestyles.

Land Use Objective 2: *To use the land within the County for the social and economic benefit of all the County's residents.*

Response: Development of the project would benefit County residents by improving traffic routing and easing congestion (Eha Street extension), providing construction jobs and furnishing affordable fee ownership opportunities for County residents.

Land Use Objective 3: *To preserve lands that are well suited for agricultural pursuits.*

Response: Although used historically for agricultural purposes, the subject property is isolated from other agricultural lands. This limits the efficiency of the property for agricultural use. In addition, agricultural practices often adversely impact surrounding urban areas and for these reasons, the subject property has been fallow.

Environmental Objective 1: *To preserve and protect the County's unique and fragile environmental resources.*

Response: The subject property does not contain any unique and fragile flora and fauna or their habitats.

Economic Objective 2: *To provide a balance between visitor industry employment and non-visitor employment for a broader range of employment choices for the County's residents.*

Response: The proposed project will provide short-term construction employment and sustain employment at companies which will serve future project residents (i.e., furniture and home appliance stores, home appliance repair companies, landscaping companies, lumber and home improvement stores, moving companies, carpet installation companies, real estate offices and mortgage bankers).

Housing Design Objective 1: *To provide a choice of attractive, sanitary and affordable homes for all our residents.*

Response: The Applicant intends to provide new affordably priced, single-family housing. This improves the overall housing stock within the County.

Urban Design Objective 1: *To see that all developments are well designed and are in harmony with their surroundings.*

Response: The proposed project will be a master-planned and well-landscaped community that should complement the surrounding residential environs.

Transportation Objective 1: *To support an advanced and environmentally sensitive transportation system which will enable people and goods to move safely, efficiently and economically.*

Response: The extension (opening) of Eha Street will provide an alternative roadway to Lower Main Street, therefore supporting a safer and more efficient transportation network in Wailuku.

Transportation Objective 1: *To develop a program for anticipating and enlarging the local street and highway systems in a timely response to planned growth.*

Response: The circulation system designed for the proposed project has anticipated planned growth and will improve local vehicular circulation.

Water Objective 1: *To provide an adequate supply of potable and irrigation water to meet the needs of Maui County's residents.*

Response: The previous landowner participated in the development of the Waiehu Heights water source and is currently a partner in the Central Maui Source Development Joint Venture and has conditionally agreed to provide that portion of its water commitments necessary to service the proposed project to the applicant.

Public Utility and Facilities Objective 1: *To anticipate and provide public utilities which will meet community needs in a timely manner.*

Response: Preliminary infrastructure studies have been conducted to estimate future demand from the project and assess the availability of County resources to accommodate the project and the improvements required.

C. *WAILUKU-KAHULUI COMMUNITY PLAN*

The project area is located in the Wailuku-Kahului Community region, one (1) of nine (9) Community Plan regions established in the County of Maui. Planning for each region is guided by the respective Community Plans, which are designed to implement the Maui County General Plan. Each Community Plan contains recommendations and standards which guide the sequencing, patterns, and characteristics of future development in the region.

The current Wailuku-Kahului Community Plan (adopted in 1987 as Ordinance No. 1674) designates most of the subject property for Light Industrial use, with a portion in Open Space. See Figure 9.

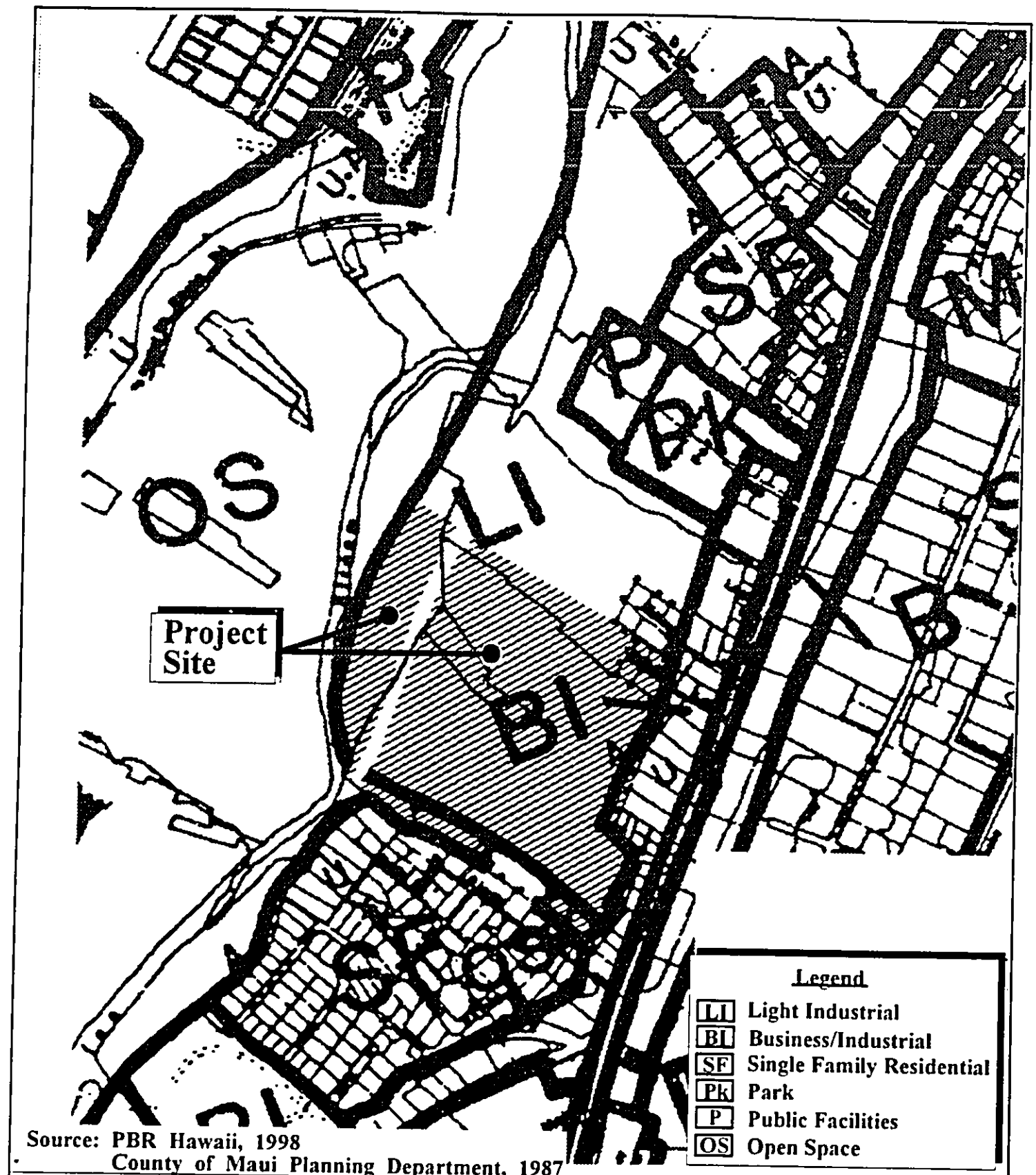


Figure 9

Wailuku Parkside

Community Plan Land Use Map

Prepared for: Stanford Carr Development Corp.

However, the County of Maui is currently in the process of comprehensively updating each Community Plan. The Wailuku-Kahului Community Plan update involves review by the Wailuku-Kahului Citizen Advisory Committee, the Department of Planning, the Maui Planning Commission, and the Maui County Council.

Maui County Council action on the proposed Wailuku-Kahului Community Plan is pending. The Council has acted on the Hana, Kahoolawe, Paia-Haiku, West Maui, Makawao-Pukalani-Kula, and Kihei-Makena Community Plans. Current deliberations focus on the Lanai Community Plan with the Wailuku-Kahului and Molokai Community Plans still to be reviewed by the Council.

It is noted that the Wailuku-Kahului Citizen Advisory Committee, Department of Planning, and the Maui Planning Commission have all recommended that the subject property be designated mostly Multi-Family Residential use with a portion in Open Space.

An application for Community Plan amendment to designate the Wailuku Parkside project site to Single Family Residential is being filed with the Maui Planning Department. Approximately 22.748 acres are proposed to be redesignated from Light Industrial to Single Family Residential. Approximately 1.519 acres are proposed to be redesignated from Open Space to Single Family Residential. The Single Family Residential designation is compatible with the proposed use of the property and represents a less intense usage of the land compared to the existing Light Industrial and proposed Multi-Family Residential designation. Although the Open Space designation is proposed to be amended, it is noted that a 1.4156 acre park is proposed within the project site.

D. *MAUI COUNTY ZONING*

According to the Zoning Ordinances and maps of the County of Maui, the subject property is currently zoned as R-1 Residential, Agriculture and M-1 Light Industrial. See Figure 10.

The subject request pertains to an amendment of the Agriculture and M-1 Light Industrial zoned portions of the subject property to R-1 Residential District which would be compatible with the proposed use of the property. Approximately 21.690 acres are proposed to be changed from County Agricultural District to R-1 Residential District. Approximately 2.505 acres is proposed to be changed from M-1 Light Industrial District to R-1 Residential District.

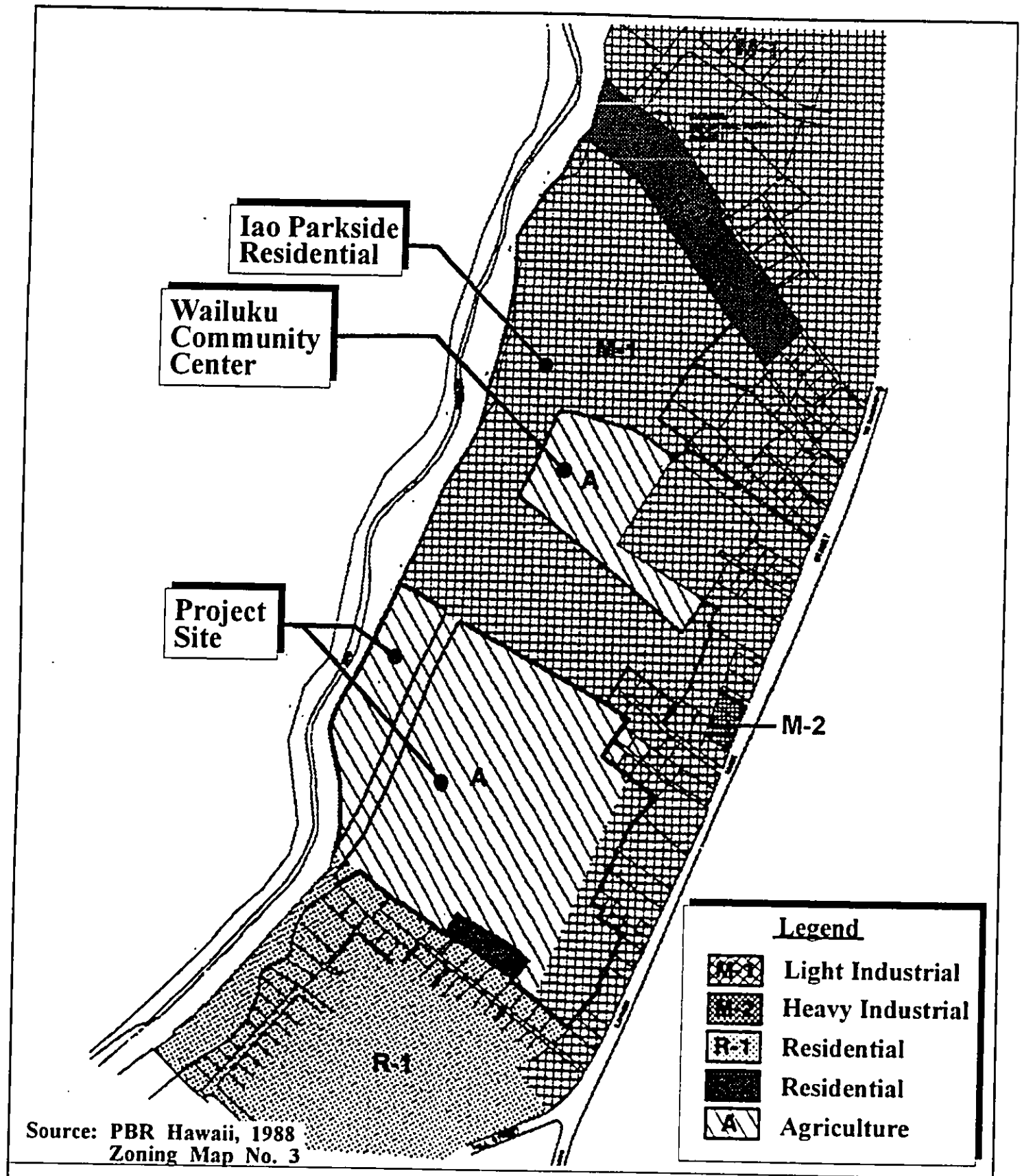


Figure 10

Wailuku Parkside
County Zoning

Chapter V

Summary of Adverse Environmental Effects Which Cannot Be Avoided

V. SUMMARY OF ADVERSE ENVIRONMENTAL EFFECTS WHICH CANNOT BE AVOIDED

The proposed development will result in unavoidable construction-related impacts as described in Chapter III, Potential Impacts and Mitigation Measures.

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

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

Chapter VI

Alternatives Analysis

VI. ALTERNATIVES ANALYSIS

Alternatives were considered for the subject property.

A. ALTERNATIVE A

Alternative A represents the proposed action. This alternative creates a new affordably priced single-family residential subdivision within Wailuku Town. The project is intended to appeal to families with incomes ranging from 100 percent to 140 percent of median thus providing home ownership opportunities for the entry level housing market.

The project represents an urban infill project which efficiently utilizes land within the Wailuku-Kahului urban area. The approximately 24.3 acre site was formerly used for the planting of seed cane but has lain fallow for more than ten (10) years. Moreover, the site already abuts urban development on three (3) sides with the remaining side being a part of the Iao Stream flood control project. The proposed single-family residential use of the site is compatible with the surrounding uses.

The proximity to urban infrastructure results in lower cost for services, and less expensive connections to water, sewer, power and drainage. The provision of affordably priced housing near existing employment centers of Wailuku and Kahului also reduces traffic, minimizes commuting times, and conserves energy.

It is also noted that an approximately 1.4 acre park within the boundary of the project site is proposed to be dedicated to the County of Maui to address open space and recreational needs within the development.

B. ALTERNATIVE B

Alternative B represents construction of a project in accordance with the

existing and proposed community plan designation. Most of the project site is currently community planned Light Industrial with a small portion in Open Space. As expressed through the Wailuku-Kahului Community Plan update, the proposed designation for most of the site is Multi-Family Residential with a small portion in Open Space.

As noted in Chapter 2.80A of the Maui County Code, the Community Plan contains recommendations and standards which guide the sequencing, patterns and characteristics of future development in the region.

The creation of light industrial uses on the project site would be compatible with existing light industrial uses abutting Lower Main Street. However, there may be incompatibilities with the existing single-family residential uses to the south and the existing Iao Parkside multi-family residential development to the north.

The alternative of light industrial uses on the project site would also result in a disjointed land use pattern. Wailuku Industrial Park Phase I is located near the northern terminus of Eha Street. To the south is the Iao Parkside multi-family residential development which was built on lands zoned for light industrial use. This abuts the subject property. To the south of the subject property is an established single-family residential neighborhood which then abuts the Millyard. Thus, from the northern terminus of Eha Street proceeding south, the land use pattern would be light industrial, multi-family residential, light industrial on the project site, single family residential and light industrial.

The alternative of multi-family residential uses on the site would be compatible with the Iao Parkside. Multi-family residential uses would also impact existing infrastructure and public services to a greater extent. For

instance, additional mitigation would likely be required for traffic, water, wastewater and public services as compared to a single-family residential development.

Passive uses of property, such as landscaping or natural drainage, are permitted in the approximately 1.519 acres of Open Space designation in the existing and proposed version of the Wailuku-Kahului Community Plan. It is noted that drainage functions for the site have been addressed by the construction of the storm drain system that runs through the subject property and Phase IV of Iao Parkside. Moreover, open space functions are addressed by the dedication of an onsite public park.

Chapter VII

Irreversible and Irretrievable Commitments of Resources

VII. IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

The proposed development would involve a commitment of approximately 24.3 acres of currently vacant land to single-family residential and park development. Other commitments involve expenditure of fuel, labor, funding and material resources. No other significant irreversible and irretrievable commitments of resources have been identified in connection with the proposed action.

Chapter VIII

Findings and Conclusions

VIII. FINDINGS AND CONCLUSIONS

The "Significance Criteria", Section 12 of Hawaii Administrative Rules, Title 11, Chapter 200, "Environmental Impact Statement Rules", were reviewed and analyzed to determine whether the proposed project will have significant impacts to the environment. The following analysis is provided:

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

   The proposed project will not result in any adverse environmental impacts. There are no known, rare, endangered or threatened species of flora, fauna, or avifauna located on the subject property.

   The archaeological inventory survey for the project site did not uncover any cultural deposits. However, as recommended by the State Historic Preservation Division, archaeological monitoring will be conducted for any ground altering activities within 50 meters of the Lower Main Street right-of-way. The production of a monitoring plan will be coordinated with the SHPD.

   Should any cultural materials be identified during the development of the remainder of the project site, work will stop in the immediate vicinity and the SHPD will be consulted to establish an appropriate mitigation strategy.

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

   The proposed project will involve a commitment of lands to the Urban district which may preclude other land use options within the project area. This commitment of resources would not have a significant effect on the range of beneficial uses of the environment.

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

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

Environmental Policy

Enhance the quality of life by:

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

Guideline

Community Life and Housing:

* Foster safe, sanitary, and decent homes.

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

The proposed project will have a direct economic benefit during construction. There are relatively few long-term jobs which would be created by the project. However, the project does provide affordably priced housing within Wailuku-Kahului which is a major employment center. The project should have no effect upon social welfare parameters.

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

No impacts to the public's health and welfare are anticipated as a result of the proposed project.

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

It is anticipated that the project will appeal to families who currently live in the Central Maui area or have ties to the Central Maui area. Thus, population changes to Wailuku-Kahului and Maui as a whole should be relatively minimal.

The project can be characterized as an urban infill project. Public facilities are either available in close proximity or are already existing.

The project should not result in substantial secondary impacts.

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

As the proposed project is implemented, appropriate environmental mitigation measures will be used to ensure that adverse environmental effects are minimized. If any, such effects are anticipated to be limited to temporary construction-related activities. Thus, no substantial degradation of environmental quality is anticipated.

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

There are no future phases to the Wailuku Parkside Project and no further commitments to larger actions.

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

There are no known significant habitats or rare, endangered or threatened species of flora or fauna at the project site. The removal of existing flora and the displacement of fauna or avifauna from the area due to construction activities are not considered a negative impact upon these environmental features.

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

Appropriate environmental mitigation measures will be used during construction to ensure that adverse environmental effects on air quality, water quality and noise are minimized. Appropriate dust control measures are being proposed. Grading and erosion control plans will be designed to avoid any discharge of dredged or fill material into the Iao Stream waterway. Noise parameters are being addressed by limiting construction to daylight hours and emission controls on motorized equipment.

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

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

The subject property is not located in and would not affect environmentally sensitive areas. The subject property is not subject to flooding or tsunami inundation and the underlying soils are not erosion-prone. There are no geologically hazardous lands,

estuaries, or coastal waters within or adjacent to the subject property. The Iao Stream is adjacent to the project site. Levees have been previously constructed at the stream's edge by the U.S. Army Corps of Engineers to prevent flooding within the urban area. No discharge of dredged or fill material from the project will be allowed to reach Iao Stream.

12. **The Proposed Project Will Not Substantially Affect Scenic Vistas and Viewplanes Identified in County or State Plans or Studies**

The proposed project will not affect coastal scenic and open space resources and will not affect scenic corridors.

13. **The Proposed Project Will Not Require Substantial Energy Consumption**

The proposed project will involve the short-term commitment of fuel for equipment, vehicles, and machinery during construction activities. However, this use is not anticipated to result in a substantial consumption of energy resources. In the long term, the project will create an additional demand for electricity. However, this demand is not deemed substantive or excessive within the context of the region's overall energy consumption requirements.

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

Chapter IX

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

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

1. Neal Fujiwara, Soil Conservationist
Natural Resources Conservation Service
U.S. Department of Agriculture
210 Imi Kala Street, Suite 209
Wailuku, Hawaii 96793-2100

2. Lolly Silva
Department of the Army
U.S. Army Engineer District, Hnl.
Attn: Operations Division
Bldg. T-1, Room 105
Fort Shafter, Hawaii 96858-5440

3. Brooks Harper
U. S. Fish and Wildlife Service
P.O. Box 50167
Honolulu, Hawaii 96850

4. Rick Egged, Director
State of Hawaii
Office of Planning
Department of Business, Economic, Development and Tourism
P.O. Box 2359
Honolulu, Hawaii 96804

5. Herbert Matsubayashi
District Environmental Health Program Chief
State of Hawaii
Department of Health
54 High Street
Wailuku, Hawaii 96793

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

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

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

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

10. Stephanie Aveiro, Director
County of Maui
Department of Housing and Human Concerns
200 S. High Street
Wailuku, Hawaii 96793

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

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

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

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

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

16. **Maui Electric Company, Ltd.**
P. O. Box 398
Kahului, Hawaii 96732

17. Jocelyn Perreira, Director
Wailuku Main Street Association
2062 Main Street
Wailuku, Hawaii 96793

MAR 3 0 1998

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Pacific Islands Ecoregion
300 Ala Moana Boulevard, Room 3122
Box 50088
Honolulu, Hawaii 96850

In Reply Refer To: LLLW

MAR 27 1998

Milton Arakawa
Project manager
Munekiyo, Arakawa, & Hiraga, Inc.
305 High Street, Suite 104
Wailuku, Maui, HI 96817

Re: Technical Assistance on the Preparation of an Environmental Assessment for the Wailuku Parkside Residential Development, Wailuku, Maui, Hawaii

Dear Mr. Arakawa:

The U.S. Fish and Wildlife Service (Service) has reviewed the information you provided to us relative to the preparation of an Environmental Assessment (EA) for the development of a residential subdivision in Wailuku, Maui. The project sponsor is the Stanford Carr Development Corporation. The proposed project involves the construction of 118 residential lots at a 25-acre site. The proposed site was previously used for sugar cane cultivation and is currently not in use. The Service offers the following comments for your consideration in the preparation of the EA.

To the best of our knowledge, no Federal endangered, threatened, or candidate species, significant wetlands, or other Federal trust resources occur at the immediate project site. However, the Service is concerned that the outdoor lighting and above-ground utility wires for the subdivision may adversely impact both the endangered Hawaiian dark-rumped petrel (*Pterodroma phaeopygia sandwichensis*) and the wedge-tailed shearwater (*Puffinus pacificus*), which is a native migratory seabird. Although these birds do not reside at the site, they can become disoriented by the lights or collide with the wires when the fly between their inland nesting sites and feeding grounds at sea.

For your information, we have enclosed a copy of the Hawaii Division of Forestry and Wildlife's (DOFAW) brochure on what can be done to minimize the effects of lighting on birds. Potential ways to minimize the effects of wires on birds include burying wires whenever feasible, aligning wires horizontally rather than vertically, and attaching mylar flashing tape and/or large helicopter warning balls to above-ground wires to assist birds in locating the wires before they fly into them. We also recommend that you contact the DOFAW office in Maui for other recommendations.

Technical Assistance on EA Preparation
Wailuku Parkside Residential Development
Wailuku, Maui, Hawaii

In general, the Service recommends that the EA address potential impacts from the proposed project on the above species as well as other native Hawaiian plants and animals and their habitats and identify the Best Management Practices that will be incorporated into the project to minimize adverse impacts. For example, we recommend that clearing and grading activities be minimized and limited to the immediate project site and that adequate erosion control measures be incorporated to ensure that project-related sediments are not carried into nearby Iao Stream by stormwater runoff.

The Service appreciates the opportunity to provide this technical assistance. If you have questions regarding our comments, please contact Fish and Wildlife Biologist Lorena Wada by telephone at (808) 541-3441 or facsimile transmission at (808) 541-3470.

Sincerely,

Donald Palanski
For Brooks Harper
Field Supervisor
Ecological Services

Enclosure

cc: DOFAW, Hawaii
DAR, Hawaii
CZMP, Hawaii
CWB, Hawaii

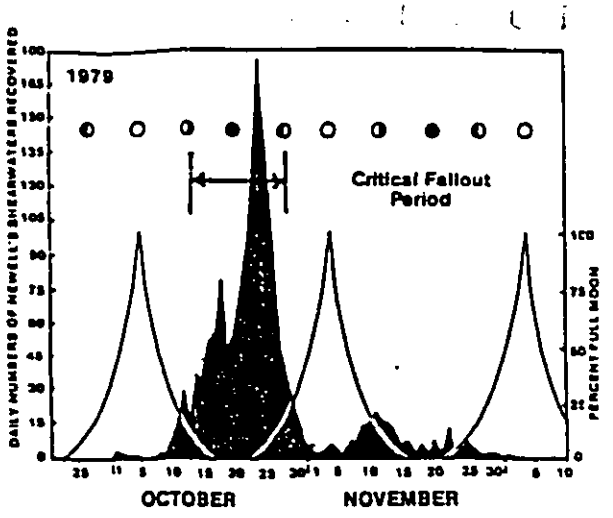


Figure 4. Relationship of shearwater "fallout" to the moon phases. The critical period of fallout occurs during the week before and after the new moon (darkest nights). Dowsing lights that are not absolutely necessary during that period could substantially reduce the annual shearwater fallout problem.

What To Do If Shearwaters Fall In Your Area

1. Collect birds as soon as possible to avoid losses to dogs and cats. They are generally docile birds and are easily handled. Take them to the nearest "shearwater aid station" located at county fire stations and at a few private business locations around the island. If birds must be held overnite, keep them in ventilated cardboard box with a secure lid.

2. Do not release birds by tossing them into the air. They may have unseen internal injuries and could become more badly injured.

TECHNICAL ASSISTANCE IS AVAILABLE

FOR ADDITIONAL INFORMATION, CONTACT:

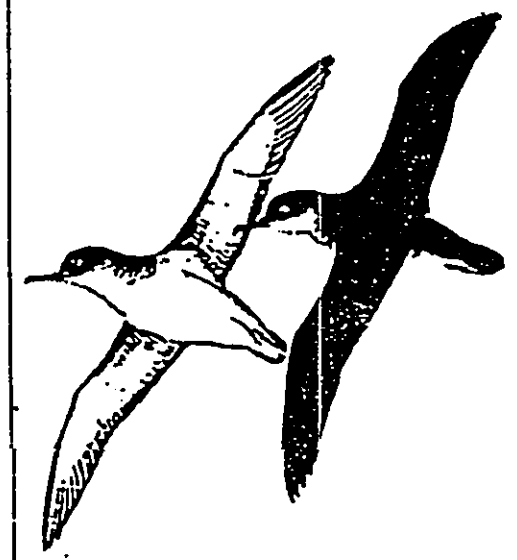
State of Hawaii
Department of Land and Natural Resources
Division of Forestry and Wildlife
P.O. Box 1671
Lihue, Hawaii 96766
245-4433

U.S. Dept. of the Interior
Fish and Wildlife Service
P.O. Box 87
Kilauea, Hawaii 96754
828-1413

The Nature Conservancy
of Hawaii
1026 Nuuanu Avenue, Suite 201
Honolulu, Hawaii 96813
537-4508

FORESTRY & WILDLIFE
HAWAII

DEPARTMENT OF
LAND AND NATURAL RESOURCES



THE NEWELL'S SHEARWATER LIGHT ATTRACTION PROBLEM

A GUIDE FOR ARCHITECTS, PLANNERS, AND RESORT MANAGERS

INTRODUCTION:

The future of a native Hawaiian seabird, the Newell's Shearwater, is threatened by the growth of new urban developments. Every year on Kauai nearly 1,500 Newell's Shearwaters are attracted to bright urban lights, fly into unseen objects and fall stunned to the ground. Fortunately, 90% of them are recovered and successfully returned to the wild through the "SOS" (save our shearwater) program which involves the cooperation of the general public.

This brochure is designed to describe the bird, its problems with lights and specifically what architects planners, resort managers and the general public can do to reduce or avoid the light attraction problem.

THE BIRD

The Newell's Shearwater once nested on all of the major Hawaiian Islands, but the mongoose, introduced to Hawaii, Maui, Molokai and Oahu in the late 1800's is believed to have caused the extinction of shearwaters on those islands. Kauai is the last strong-hold for this unique native Hawaiian seabird.

Newell's Shearwaters nest during the spring and summer months in the interior mountains of Kauai. They dig a long burrow in the ground beneath dense vegetation and lay a single egg each year. The eggs hatch during July and August, and the nestlings are reared within the burrow. The adult birds abandon the nestlings a week or two before they are old enough to fly. The nestlings become hungry, and leave the nesting grounds by themselves shortly after nightfall. They head for the open ocean, and must depend upon their instincts to find food. They do not return to their nest, but fly south towards the equator where they will remain all winter on the open seas until the following spring.

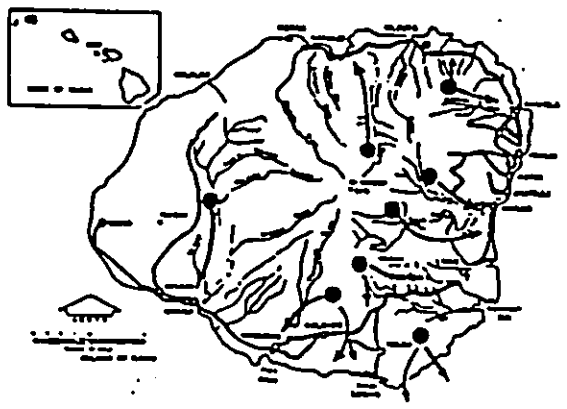


Figure 1. Map showing known nesting areas of the Newell's Shearwater, and probable flight paths to the sea, which require them to pass over heavily lit urban areas.

THE THREATS:

PREDATORS. Dogs, cats, rats and feral pigs are known to kill some shearwaters and their young on the nesting grounds each year. The accidental establishment of a new predator to Kauai such as the mongoose, could cause the rapid extinction of this bird. Mongoose sightings on Kauai should be reported to wildlife officials promptly.

LIGHT ATTRACTION: Young shearwaters leaving their nests for the first time, do so only after dark. They are inexperienced and have a natural attraction to bright lights. Flying near urban areas, they become temporarily blinded by the lights and fly into unseen objects such as utility wires, trees, buildings and automobiles. Oftentimes they are just confused and exhausted. Most often they are only stunned and fall to the ground, but about 10 percent of them die each year. The problem is growing because of the increased number of urban lights associated with new resort and residential developments. The greatest "fallout" problem occurs near coastal towns, particularly near river mouths.

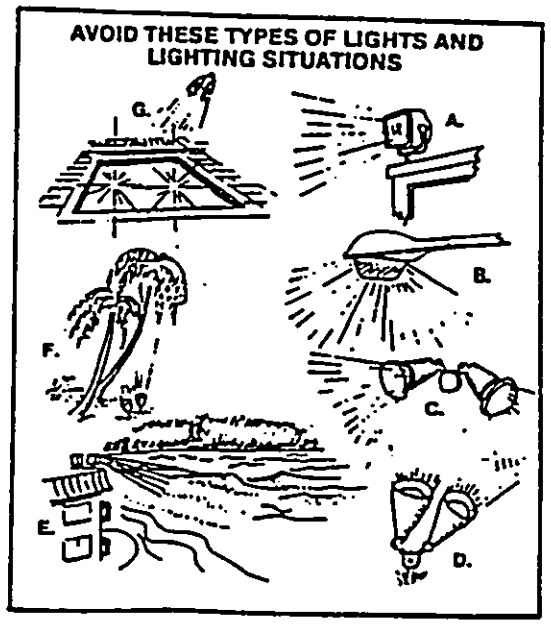


Figure 2. Avoid these types of lights: A. Unshielded high intensity floodlights on tall structures. B. Street lights without shields. C. Unshielded spotlights. D. Spotlights aimed upwards. Avoid using these types of lighting situations during peak fallout periods (new moon) during October and November. E. Floodlights on surf. F. Spotlights aimed up at vegetation. G. Spotlights directed on pools which reflect light

WHAT CAN WE DO TO HELP?

Architects and Planners

- Be aware of the light attraction problem during the planning stages of new development.
- Make every effort to avoid lighting situations where light glare projects upwards or laterally (see figure 2). Avoid large high-intensity floodlights located on building tops or poles whenever possible.
- Use shielded lights, cut-off luminaires, or indirect lighting whenever possible. (see figure 3)
- Avoid locating bright lights near utility wires or other objects that could be difficult for birds to see at night.

Hotel, Resort and Condominium Managers

- When converting to new exterior light fixtures, consider installing shielded lights, cut-off luminaires or indirect lighting.
- Consider installing shields on exterior lights that are known to attract shearwaters. Some light manufacturers offer ready made shields. In some cases inexpensive shields can be fabricated.
- Avoid using unnecessary lighting during the critical shearwater fallout period: (October and November each year). Note: The heaviest fallout occurs on and around the new moon, generally for only 10 to 12 days. (See figure 4) Dowsing unnecessary floodlights that light up the surf or shine upward upon buildings or trees for that short period, could significantly reduce shearwater fall-out.

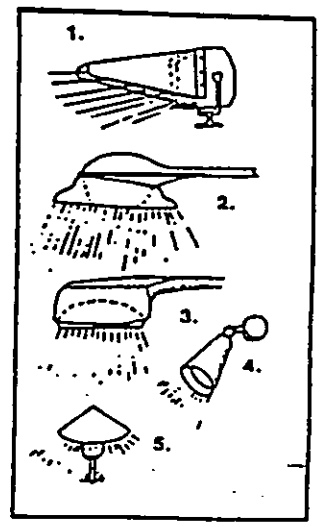


Figure 3. Use these types of lights whenever possible : Shielded floodlights. 2. Shielded streetlights. 3 Cut-off luminaire streetlights. 4 Shielded spotlights aimed downwards. 5 Indirect lighting low to the ground

MUNEKIYO, ARAKAWA & HIRAGA, INC.

April 7, 1998

Brooks Harper, Field Supervisor
Ecological Services
U.S. Department of the Interior
Fish and Wildlife Service
Pacific Islands Ecoregion
300 Ala Moana Boulevard, Room 3122
Box 50088
Honolulu, Hawaii 96850

SUBJECT: Environmental Assessment for Wailuku Parkside

Dear Mr. Harper:

Thank you for your letter of March 27, 1998 pertaining to the subject project. We also appreciated your transmittal of the Division of Forestry and Wildlife brochure on minimization of effects of wires and lighting on birds.

We would like to note that electrical distribution lines for the project will be located underground pursuant to County subdivision standards. Street lighting will also be done in accordance with County standards. Your recommendations as to lighting will be considered in the construction of the individual residences.

We would like to note that the site was formerly utilized for the planting of seed cane. There are no known rare, endangered, or threatened species of flora or fauna located within the project site.

Grading and erosion control plans for the project site will be prepared in compliance with Title 20 of the Maui County Code and will be designed to avoid any discharge or dredged or fill material into the waterway of Iao Stream.

Planning • Environmental Studies • Project Management
305 High Street, Suite 104 • Wailuku, Hawaii 96793 • Phone: (808) 244-2015 • Fax: (808) 244-8729

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

Very truly yours,

Milton Arakawa, Project Manager

MA:to
scan/wkpksde/us/waltr.001

MAR 2 0 1998

BENJAMIN J. CAYETANO
GOVERNOR
SEIJI F. NAYA
DIRECTOR
BRADLEY J. MOSSMAN
DEPUTY DIRECTOR
RICK EGGED
DIRECTOR, OFFICE OF PLANNING

DEPARTMENT OF BUSINESS, ECONOMIC DEVELOPMENT & TOURISM

OFFICE OF PLANNING

235 South Beretania Street, 6th Flr., Honolulu, Hawaii 96813
Mailing Address: P.O. Box 2359, Honolulu, Hawaii 96804

Tel.: (808) 587-2846
Fax: (808) 587-2824

Ref. No. P-7265

March 13, 1998

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

Dear Mr. Arakawa:

Subject: Early Consultation, Draft Environmental Assessment for a Residential Subdivision, Wailuku, Hawaii (TMK: 3-4-20:19, por.20, por.23)

We have reviewed the proposed construction of a 118-lot residential subdivision on an approximately 25-acre site in Wailuku, Hawaii. The draft Environmental Assessment (EA) should address impacts to the capacity of the sewer and water systems, traffic patterns including an increased demand for parking space, and aesthetics of the project. Since the project requires a State land use district boundary amendment, the draft EA should explore the consequences of a reduction in agriculture and industrial-zoned lands in this area. The draft EA should also discuss the project's compliance with the Coastal Zone Management (CZM) Program's objectives and policies.

Due to the close proximity of the proposed project to Iao Stream, the draft EA should detail any potential impacts to the natural flow of the water, including hardening of the stream banks, increased runoff and erosion. In addition, we are interested in mitigation measures to control polluted runoff from the project site during and after construction of the drainage ditch. You may find some of our recommended mitigation measures in the "Management Measures for Urban Areas" section of our report entitled "Hawaii's Coastal Nonpoint Pollution Control Plan."

If you have questions, please contact Claire Cappelle of our Coastal Zone Management Program at 587-2880.

Sincerely,

Rick Egged
Director
Office of Planning

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

APR 0 2 1998

LAWRENCE MIIKE
DIRECTOR OF HEALTH

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

In reply, please refer to
EMD/CWB

March 25, 1998

P0324JS

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

Dear Mr. Arakawa:

Subject: Wailuku Parkside
TMK: 3-4-20:19, por. 20, por. 23
Wailuku, Maui

The Department of Health (Department) acknowledges receipt of your March 5, 1998 letter regarding the Wailuku Parkside, a 118 lot residential subdivision proposed by the Stanford Carr Development Corporation. The Department has the following comments:

1. The applicant should contact the U.S. Army Corps of Engineers (COE) to identify whether a Federal permit (including a Department of Army (DA) permit) is required for this project. Pursuant to Section 401(a)(1) of the Federal Water Pollution Act (commonly known as the "Clean Water Act (CWA)"), a Section 401 Water Quality Certification (WQC) is required for "Any applicant for Federal license or permit to conduct any activity including, but not limited to, the construction or operation of facilities, which may result in any discharge into the navigable waters..."

2. A National Pollutant Discharge Elimination System (NPDES) general permit coverage is required for each of the following activities which discharges into State waters:

a. Discharge of storm water runoff associated with construction activities, including clearing, grading, and excavation that result in the disturbance of equal to or greater than five (5) acres of total land area;

b. Discharge of construction dewatering effluent;

c. Discharge of hydrotesting water;

d. Discharge of non-contact cooling water, less than one (1) million gallons per day;

e. Discharge of treated contaminated groundwater from underground storage tank remedial activities; and

f. Discharge of treated effluent from well-drilling activities.

3. The applicant may be required to apply for an Individual NPDES Permit if there is any type of process wastewater discharge from the project into State waters.

The application form(s) for those discharges which need to obtain a certification, coverage, and/or permit will be provided upon request.

If you have any questions, please call Ms. Joanna L. Seto, P.E., Engineering Section of the Clean Water Branch, at (808)586-4309.

Sincerely,

DENIS R. LAU, P.E., CHIEF
Clean Water Branch

JLS:auc

MAR 1 6 1998

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

LAWRENCE MIIKE
DIRECTOR OF HEALTH

LAWRENCE HART, M.D., M.P.H.
DISTRICT HEALTH OFFICER

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

March 17, 1998

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

Dear Mr. Arakawa:

Subject: **Wailuku Parkside**
TMK: (2) 3-4-30: 19, 20 & 23

The proposed Wailuku Parkside residential development will raise the following concerns:

1. NPDES coverage for construction discharges.
2. Noise permits for construction activities.
3. Rodent eradication from vacant lots.

Should you have any questions, please call me at 984-8230.

Sincerely,

HERBERT S. MATSUBAYASHI
District Environmental Health Program Chief

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

March 23, 1998

Mr. Milton Arakawa
Munekiyo, Arakawa, and Hiraga Inc.
305 High Street
Wailuku, Hawaii 96793

LOG NO: 21232 ✓
DOC NO: 9803BD21

Dear Mr. Arakawa:

SUBJECT: Chapter 6E-42 Historic Preservation Review of the Proposed Wailuku Parkside Subdivision
Wailuku Ahupua`a, Wailuku District, Island of Maui
TMK 3-4-30: Portions of 19, 20, and 23

This is a Historic Preservation review of the proposed Wailuku Parkside Subdivision in Wailuku Ahupua`a. Our review is based on reports, maps, and aerial photographs maintained at the State Historic Preservation Division; no field check was conducted of the subject property.

Our office reviewed a document entitled *An Archaeological Inventory Survey of the Proposed Wailuku Parkside Property, Wailuku, Maui Island, Hawai`i [TMK 3-4-30: Portion 20; 3-4-30: Portion 23; 3-4-30: 19]* submitted by Scientific Consultant Services Inc. in February, 1998 (SHPD DOC NO: 9803BD14).

Based on the negative findings of the inventory survey, we find the proposed undertaking to have "no effect" on known historic sites. However, we are concerned that a utility easement in the project area borders a section of Lower Main Street. No subsurface testing was conducted within this sensitive area, nor was any archaeological monitoring of utility work recommended. Areas along Lower Main Street often contain subsurface remains of habitations and associated burials. Because of this oversight (unless justified), we have requested revisions to the inventory survey report prior to its acceptance. Nonetheless, we can proceed with our historic preservation review for this project.

Given the above findings, we recommend archaeological monitoring of any ground-altering construction within 50 meters of the Lower Main Street right-of-way within the project area to

identify and document any buried habitation or burial sites that might be uncovered inadvertently. Conducting such monitoring should mitigate adverse impacts to unknown historic sites that might possibly be present.

Before beginning this work, a monitoring plan (scope) needs to be submitted to our Division for review and approval, outlining expected historic sites to be encountered during monitoring, documentation procedures (should any sites be found), and measures to ensure that adequate time will be allotted to their recording.

If you have any questions please contact Boyd Dixon at 243-5169.

Aloha,

DON HIBBARD, Administrator
State Historic Preservation Division

BD:jen

cc. David Blane, Maui County Planning Department (fax: 243-7634)
Ralph Nagamine, Maui County Department of Public Works (fax: 243-7972)

JAMIN J. CAYETANO
GOVERNOR

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

KAZU HAYASHIDA
DIRECTOR

DEPUTY DIRECTORS
Brian K. Minaai
GLENN M. OKIMOTO

MAR 1 7 1998

IN REPLY REFER TO:

HWY-M 2.073-98

March 16, 1998

MEMORANDUM

TO: Milton Arakawa
Munekiyo, Arakawa & Hiraga, Inc.

FROM: Paul M. Chung
State Highways-Maui

SUBJECT: WAILUKU PARKSIDE (TMK:3-4-20:19, POR.23)
I.D. NO. ME-98-11

Thank you for the opportunity to review and comment on the referenced project.

Please provide a Traffic Impact Analysis Report (TIAR) for our review to determine the proposed project's impact on State's highways. If you have any questions, please call me at 877-5061.

PMC:dmf

DEPARTMENT OF
HOUSING AND HUMAN CONCERNS
COUNTY OF MAUI

MAR 3 0 1998

LINDA CROCKETT LINGL
Mayo
STEPHANIE AVEIRO
Director
MARK PERCELL
Deputy Directo

200 SOUTH HIGH STREET • WAILUKU, HAWAII 96793 • PHONE (808) 243-7805 • FAX (808) 243-7829

March 24, 1998

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

Dear Mr. Arakawa:

Subject: Wailuku Parkside

We have reviewed the Project Summary for the Wailuku Parkside project that was attached to your March 5, 1998 letter, and expect to offer the following comments to the Planning Department during our review of the subject project's Applications for Community Plan Amendment and Change in Zoning:

1. It is our recommendation that the applicant be required to provide affordable housing units that is equivalent to twenty-five percent (25%) of the total units in the project, and that such affcrdable housing units be affordable to households whose gross annual income does not exceed one hundred twenty percent (120%) of Maui County's median annual income (as determined by the 1997 housing study and adjusted for subsequent years).

2. A sales price of $160,100 for a single family unit is currently deemed affordable to households at one hundred twenty percent (120%) of Maui County's median annual income.

   Our determination is based on a median household income of $40,285, a prevailing interest rate of 7.75% for a 30 year fixed rate mortgage loan with zero discount point, a 5% downpayment, a 33% housing expenses/income ratio and a $150 allowance for the buyer's customer trust fund. A final determination on affordability will be made when the units are actually offered for sale.

3. We recommend that the applicant be required to enter into an Affordable Housing Agreement with the County of Maui, to clearly establish procedures and requirements regarding the marketing of units, identification of the target market, manner in which affordable sales prices will be determined, manner in which buyers will be selected, etc.

Please call Wayde Oshiro of our Housing Division at 243-7351 if you have any questions.

Very truly yours,

STEPHANIE AVEIRO
Director of Housing
and Human Concerns

WTO:wo

xc: Housing Administrator

MUNEKIYO, ARAKAWA & HIRAGA, INC.

April 7, 1998

Stephanie Aveiro, Director
Department of Housing and Human Concerns
County of Maui
200 South High Street
Wailuku, Hawaii 96793

SUBJECT: Wailuku Parkside

Dear Ms. Aveiro:

Thank you for your letter of March 24, 1998 pertaining to the subject project. On behalf of the applicant, Stanford S. Carr Development Corporation, we would like an opportunity to further discuss the affordable housing issues you have raised in your letter.

We believe that the project is providing an affordably priced single family residential product on the market. Studies done for the project show that the proposed Wailuku Parkside sales prices ranging from $185,000 to $260,000 are affordable to families with incomes between 100 percent to 140 percent of median. This is based on a 1998 median income for the island of Maui of $55,500, according to the national forecasting company UDS/NDS Data Systems.

Should the applicant be required to sell 25 percent of the total units in the project for $160,100 as noted in your letter, this would require raising sales prices for all or a portion of the remaining units in the project. This would likely have a significant effect on the marketability of the project.

As you know, the entry level housing market is considered a strong position as long as pricing is within affordable levels. A price increase imposed on the remaining 75 percent of the units would result in a decrease in value offered to the potential buyer. Moreover, it is felt that the market is significantly weaker at prices higher than affordable levels. This could have a significant effect on sales and the resulting economic feasibility of the project.

An affordable housing requirement suggested by the Department may be economically feasible if the overall housing market and economy were in a more healthy condition. However, with the current state of the economy, the suggested affordable housing

requirement may have a serious negative effect on the project. Accordingly, on behalf of the applicant, we request that the recommendations as noted in your letter be rescinded.

We look forward to arranging a meeting with you and your staff to discuss these issues. If you have any questions, please feel free to call me. Thank you for your consideration.

Very truly yours,

Milton Arakawa

Milton Arakawa, Project Manager

MA:to
scam/wkpkade/dhhcltr.001

DEPARTMENT OF
PARKS AND RECREATION
COUNTY OF MAUI

1580-C Kaahumanu Avenue, Wailuku, Hawaii 96793

MAR 2 3 1998

LINDA CROCKETT LINGLE
Mayor

HENRY OLIVA
Director

ALLEN T. SHISHIDO
Deputy Director

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

March 19, 1998

Milton Arakawa, Project Manager
Munekiyo, Arakawa & Hiraga, Inc.
305 High Street
Wailuku, Hawaii 96793

Dear Mr. Arakawa:

SUBJECT: WAILUKU PARKSIDE

Thank you for the opportunity to review and comment on the conceptual plan for the Wailuku Parkside development. The proposed park site, Lot #120, appears to be adequately sized and suitably located for a neighborhood park. However, Lot #119 is small and isolated from most of the project by Eha Street. It would best serve the public and Parks Departments interest if the area of Lot #119 could be combined with Lot #120.

Should you have any questions on this matter or need further comments, please call Patrick Matsui, Chief of Parks Planning & Development at 243-7931.

Sincerely,

HENRY OLIVA
Director

HO:PTM:rh

S:\planning\rh\wailpksd.wpd

s:\planning\rh\wailpksd.wpd

MUNEKIYO, ARAKAWA & HIRAGA, INC.

April 7, 1998

Henry Oliva, Director
Department of Parks and Recreation
County of Maui
1580-C Kaahumanu Avenue
Wailuku, Hawaii 96793

SUBJECT: Wailuku Parkside

Dear Mr. Oliva:

Thank you for your March 19, 1998 letter pertaining to the subject project. In reference to your comment on Lot #119 located on the Waiehu side of Eha Street, it is noted that this parcel will not be utilized as a park because of its isolated nature relative to the most of the residential lots within the project. However, the 1.4156 acre park located on the Maalaea side of Eha Street will be retained. The intent is to dedicate this park to the County of Maui. It is noted that most of the residential lots within the project are located on the Maalaea side of Eha Street and the park land area exceeds County park assessment requirements.

We look forward to working with the Department is bringing this project to fruition. If you have any questions, please feel free to call me.

Very truly yours,

Milton Arakawa, Project Manager

MA:to
scarr/wlkpksde/dprtr.001

Planning • Environmental Studies • Project Management
305 High Street, Suite 104 • Wailuku, Hawaii 96793 • Phone: (808) 244-2015 • Fax: (808) 244-8729

LINDA LINGLE
Mayor

DAVID W. BLANE
Director

LISA M. NUYEN
Deputy Director

COUNTY OF MAUI
DEPARTMENT OF PLANNING

CLAYTON I. YOSHIDA
Planning Division

AARON H. SHINMOTO
Zoning Administration and
Enforcement Division

MAR 1 8 1998

March 16, 1998

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

Dear Mr. Arakawa:

RE: Preliminary Consultation on A Draft Environmental Assessment for the Wailuku Parkside Project at TMK: 3-4-030:19, Por. of 20 and Por. of 23, Wailuku, Maui, Hawaii

We have reviewed the above-referenced project and have the following comments:

1. The properties appear to be within the State Agricultural boundary and concur that a State District Boundary Amendment to the State Urban District will be required through the State Land Use Commission. Verification of the actual boundaries should be obtained from the State Land Use Commission.

2. The Wailuku-Kahului Community Plan Map identifies the majority of the subject properties as Light Industrial use. However, portions of the properties (proposed lots 40, 41, 42 and portions of lots 48, 49, 50, 51, 52, 53 and 54) are identified as open space on the Community Plan Map. The Environmental Assessment Report should identify the location and acreage of each of the existing land uses.

   It should be noted that the Wailuku-Kahului Community Plan Update which has been transmitted to the County Council

recommends that the existing Light Industrial Use should be changed to Multi-family Use while the open space areas remain unchanged.

3. Land Zoning Map No. 3 adopted on May 10, 1961 identifies the major portion of the site as within the Agricuiturai District and the portion of the site near Lower Main Street as M-1 Light Industrial District. In addition, a portion of proposed lot No. 54 is designated as R-1 Residential District. The Environmental Assessment Report should identify the location and acreage of each of the existing zoning districts.

4. Besides the land use, the Environmental Assessment report should address the impacts the proposed development will have on public infrastructure and services, such as water, sewers, drainage, traffic, schools, parks, etc.

5. The historic and cultural resources of the area should be addressed in the Environmental Assessment Report. The properties are adjacent to Iao Stream and is one of the areas that the Maui County Cultural Resources Commission had identified as being significant for its cultural landscape.

6. The site is adjacent to existing commercial/industrial uses along Lower Main Street which may have noxious impacts on Single-family residentiai uses such as noise, odors, and visual impacts. These issues should be addressed in the Environmental Assessment Report.

7. Socio-economic issues should be addressed in the Environmental Assessment Report. What impacts will the development have on the existing older residential development east of the site and on the more recent Multi-family residential development (Iao Parkside) west of the site? Will additional residential growth in the area create socio-economic impacts? Will these impacts be positive or negative?

Thank you for the opportunity to comment. If additional clarification is required, please contact Ms. Colleen Suyama, Staff Planner, of this office at 243-7735.

Very truly yours,

DAVID W. BLANE
Director of Planning

DWB:CMS:cmh
c: Clayton Yoshida, AICP, Planning Program Administrator
Aaron Shinmoto, PE, Planning Program Administrator
Colleen Suyama, Staff Planner
Project File
General File
(S:\CMS\Parkside)

LINDA LINGLE
MAYOR

OUR REFERENCE
at
YOUR REFERENCE

POLICE DEPARTMENT
COUNTY OF MAUI

55 MAHALANI STREET
WAILUKU, HAWAII 96793
(808) 244-6400
FAX (808) 244-6411

HOWARD H. TAGOMORI
CHIEF OF POLICE

THOMAS PHILLIPS
DEPUTY CHIEF OF POLICE

March 13, 1998

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

Dear Mr. Arakawa:

Subject: Wailuku Parkside

We have received your letter of March 5, 1998 and have reviewed the summary provided for the proposed project.

The proposal does not contain any projected traffic impact assessment studies that could affect the increased traffic flow to Eha Street caused by the additional 188 residential units and two parks. We would appreciate a traffic impact assessment study for review.

We have no other comments at this time. Thank you giving us the opportunity to comment on the project summary.

Very truly yours,

Assistant Chief Richie Nakashima
for: HOWARD H. TAGOMORI
Chief of Police

Maui Electric Company, Ltd. 10 West Kamehameha Avenue • PO Box 398 • K'' lui, Maui, HI 96733-6898 • (808) 871-8461

March 13, 1998

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

Subject: Wailuku Parkside
Eha Street, Wailuku, Maui

Dear Mr. Arakawa:

This will acknowledge receipt of your preliminary plans dated March 5, 1998 for electric service to the above subject project.

The infrastructure along Eha Street should be able to accommodate the proposed subdivision. We do require an electrical consultants plan at the time of the application submittal.

To expedite our design work, please submit the site plan by email (rnakama@hei.com) or 3 ½" floppy disks on a MicroStation (DGN) or AutoCadd (DXF & DWG) drawing format. Drawing files submitted by e-mail and totaling less than one megabyte may be submitted without compressing the files. Drawing files over one megabyte must be compressed by pkzip or winzip prior to sending by e-mail. If requested, any floppy disks will be returned to you upon completion.

Should you have any questions regarding this matter, please call me at (808) 871-2337.

Sincerely,

Randall Nakama
Customer Designer

RN/lh

APR 0 6 1998

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

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

April 2, 1998

LD-NAV
Ref.: WAILUKU.RCM

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

Dear Mr. Arakawa:

SUBJECT: Review : Project Summary
Proposal : Construct an 118 lot residential subdivision
Applicant: Stanford Carr Development Corporation
Location : Wailuku, Island of Maui, Hawaii

Thank you for the opportunity to review and comment on the subject project summary.

Our Land Division Engineering Branch confirms that the proposed project site, according to FEMA Community Panel Map No. 15003 0190 D, is located in Zone C. This is an area of minimal flooding.

Should you have any questions, please contact Nick Vaccaro of the Land Divisions' Support Services Branch at 1-808-587-0438.

Very truly yours,

DEAN Y. UCHIDA
Administrator

c: Maui Land Board Member
At Large Land Board Member
Maui District Land Office

APR 0 6 1998

LINDA CROCKETT LINGLE
MAYOR

RONALD P. DAVIS
CHIEF

HENRY A. LINDO, SR.
DEPUTY CHIEF

COUNTY OF MAUI
DEPARTMENT OF FIRE CONTROL

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

April 2, 1998

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

RE: Wailuku Parkside; TMK: 3-4-20:19, por 20, por 23;
Stanford Carr Development Corporation

Dear Mr. Arakawa,

Thank you for the opportunity to comment on the Wailuku Parkside development planned for Wailuku.

The Department of Fire Control wishes to reserve comment at this time, when complete plans are submitted for plans review our comments will be forwarded.

If you have any questions, you may contact me at the Fire Prevention Bureau 243-7566.

Sincerely,

LEONARD F NIEMCZYK
Captain, FPB

APR 1 5 1998

LINDA LINGLE
Mayor

CHARLES JENCKS
Director

DAVID C. GOODE
Deputy Director

Telephone: (808) 243-7845
Fax: (808) 243-7955

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

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

EASSIE MILLER, P.E.
Wastewater Reclamation Division

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

BRIAN HASHIRO, P.E.
Highways Division

Solid Waste Division

April 9, 1998

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

Dear Mr. Arakawa:

SUBJECT: EARLY CONSULTATION
WAILUKU PARKSIDE
TMK (2) 3-4-020:019, 020, 023

We reviewed the subject submittal and have the following comments.

1. Complete traffic and drainage reports are required before we can make any significant comment in those areas.

2. The developer should be informed that the Wastewater Reclamation Division cannot insure that wastewater system capacity will be available for the project.

3. Provide discussion and calculations (sewer impact study) to substantiate that the existing wastewater system is adequate to serve this project.

4. The developer shall pay assessment fees for treatment plant expansion costs in accordance with the ordinance setting such fees. At the present time, wastewater assessment fees are only utilized in Kihei and Central Maui. Other areas may be subject to fees at a later time.

5. The developer is required to fund any necessary off-site improvements to the collection system and wastewater pump stations.

6. The parcels are located on plat 30 and not plat 20.

7. The proposed subdivision shall comply with the provisions of Title 18, Maui County Code, Subdivisions.

If you have any questions, please contact David Goode at 243-7845.

Sincerely,

CHARLES JENCKS
Director of Public Works
and Waste Management

DG:co/mt
S:\LUCA\CZM\PARKSIDE

Chapter X

Comments Received During the Public Comment Period and Applicable Responses

BENJAMIN J. CAYETANO
GOVERNOR

ESTHER UEDA
EXECUTIVE OFFICER

'98 MAY -1 P4:42

STATE OF HAWAII
DEPARTMENT OF BUSINESS, ECONOMIC DEVELOPMENT & TOURISM
LAND USE COMMISSION
P.O. Box 2359
Honolulu, HI 96804-2359
Telephone: 808-587-3822
Fax: 808-587-3827

April 29, 1998

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

Dear Mr. Blane:

Subject: Applications for Community Plan Amendment (CPA 980001) and Change in Zoning (CTZ 980009) for Wailuku Parkside, Wailuku, Maui, TMK 3-4-30: por. 20 and por. 23

We have reviewed the applications for the subject project forwarded by your transmittal dated April 21, 1998, and have the following comments:

1) We confirm that the project site, as represented on Figure 7, is designated within the State Land Use Agricultural District. We note that the legend in the figure incorrectly refers to said district as "Agriculture."

2) A Petition for Land Use District Boundary Amendment (Petition) to reclassify the project site from the Agricultural District to the Urban District was filed with our office on April 14, 1998 (LUC Docket No. A98-724/Stanford S. Carr Development Corporation). We are currently reviewing the Petition for completeness pursuant to §15-15-50(e), Hawaii Administrative Rules.

3) We note that the project site is adjacent to the Petition Area in LUC Docket No. A87-615/C. Brewer Properties, Inc., which involved the reclassification of approximately 29 acres of land from the Agricultural District to the Urban District for the development of Increment I of the Wailuku Industrial Park Phase II project. According to said docket, the project site was identified as the location for Increment II of the

park. Clarification should be provided as to the reason for the change in the use of the project site.

4) We are currently processing a boundary interpretation request (BI No. 98-14) to determine the location of the Urban/Agricultural District boundary relative to the project site. We will forward a copy of the interpretation to your office upon its completion.

We have no further comments to offer at this time. We appreciate the opportunity to comment on the subject applications.

Should you have any questions, please feel free to call me or Bert Saruwatari of our office at 587-3822.

Sincerely,

ESTHER UEDA
Executive Officer

EU:th

MUNEKIYO, ARAKAWA & HIRAGA, INC.

June 2, 1998

Esther Ueda, Executive Officer
State of Hawaii
Department of Business, Economic
Development & Tourism
Land Use Commission
P.O. Box 2359
Honolulu, Hawaii 96804-2359

SUBJECT: Application for Community Plan Amendment (CPA 980001) and Change in Zoning (CIZ 980009) for Wailuku Parkside, Wailuku, Maui, TMK 3-4-30: por. 19, por. 20, por. 23

Dear Ms. Ueda:

We have received a copy of your April 29, 1998 letter to David Blane relating to the subject project. On behalf of the applicant, Stanford Carr Development Corporation, we would like to provide a response to your comments.

1. Figure 7 has been revised to refer to the Agricultural District.

2. The applicant has submitted a Petition for Land Use District Boundary Amendment to reclassify the project site from the Agricultural District to the Urban District. The intent is to process the petition concurrently with the subject community plan amendment and change in zoning request.

3. Regarding the project site adjacent to the Petition Area, our understanding is that the original intent of C. Brewer Properties, Inc. was to develop an industrial park. The appropriate State land use classification, community plan designation and zoning were obtained. However, due to market conditions, the lao Parkside multi-family residential development was built on the site. The multi-family residential project is in conformance with the existing entitlements.

   The developers of the proposed Wailuku Parkside project are seeking entitlements for an entry level single family residential development. It has been found that there is market demand for such a product and the project would complement existing surrounding uses.

Planning • Environmental Studies • Project Management
305 High Street, Suite 104 • Wailuku, Hawaii 96793 • Phone: (808) 244-2015 • Fax: (808) 244-8729

4. We acknowledge that a boundary interpretation is being prepared by your office.

If you have any questions, please call me. Thank you for your consideration.

Very truly yours,

Milton Arakawa

Milton Arakawa, Project Manager

MA:to
xc: Don Schneider, Planning Department
Stanford Carr, Stanford Carr Development Corporation
Eric Maehara, Esq.
scan/wlkpksde/luctr.001

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

LAWRENCE MIIKE
DIRECTOR OF HEALTH

LAWRENCE HART, M.D., M.P.H.
DISTRICT HEALTH OFFICER

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

April 30, 1998

'98 MAY -1 A9:20

Mr. David W. Blane
Director
Planning Department
County of Maui
250 South High Street
Wailuku, Hawai'i 96793

Dear Mr. Blane:

Subject: Wailuku Parkside
TMK: (2) 3-4-030: por. 20, por. 23
CPA 980001, CIZ 980009

Thank you for the opportunity to comment on the Community Plan Amendment and Change in Zoning Applications. Comments from this office were transmitted to our Honolulu Office. A coordinated response is forthcoming.

Should you have any questions, please call me at 984-8230.

Sincerely,

HERBERT S. MATSUBAYASHI
District Environmental Health Program Chief

c: Art Bauckham

3227

LINDA CROCKETT LINGLE
MAYOR

RONALD P. DAVIS
CHIEF

HENRY A. LINDO, SR.
DEPUTY CHIEF

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

'98 MAY -4 P3:04

DEPT OF PLANNING
COUNTY OF MAUI
RECEIVED

April 30, 1998

Mr. Don Schneider, Staff Planner
County of Maui, Department of Planning
250 South High Street
Wailuku, HI 96793

RE: Wailuku Parkside; TMK: 3-4-30:por. 20, por. 23;
CPA 980001 and CIZ 980009

Dear Mr. Schneider,

Thank you for the opportunity to comment on the Wailuku Parkside development.

The Department of Fire Control has no objection to granting the applicant's requests.

If you have any questions, you may contact me at extension 7568.

Sincerely,

Leonard F Niemczyk

LEONARD F NIEMCZYK
Captain, FPB

BENJAMIN J. CAYETANO
GOVERNOR

HERMAN M. AIZAWA, Ph.D.
SUPERINTENDENT

STATE OF HAWAII
DEPARTMENT OF EDUCATION
P.O. BOX 2360
HONOLULU, HAWAII 96804

OFFICE OF THE SUPERINTENDENT

May 4, 1998

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

Dear Mr. Blane:

Subject: Wailuku Parkside - CPA 980001, CIZ 980009

The Department of Education (DOE) concurs that the proposed 119 units are projected to generate approximately 25 elementary, 11 intermediate, and 12 high school students. Figures in the Draft Environmental Assessment (EA) also correctly indicate that Wailuku Elementary School is presently operating under capacity while Iao Intermediate and Baldwin High Schools are over capacity.

In fact, a majority of the other schools in Central Maui, including Waihee Elementary, Lihikai Elementary, and Maui High are currently over capacity. Thus, while it is true that Wailuku Parkside students may come from other schools in the area as stated in the Draft EA, the corresponding drop in enrollment will still, in most cases, result in those schools being over capacity.

The DOE will request that the State Land Use Commission require a fair-share contribution from the developer as a condition of district reclassification.

Thank you for the opportunity to comment.

Sincerely,

Herman M. Aizawa, Ph.D.
Superintendent

HMA:hy

cc: A. Suga, OBS
R. Murakami, MDO

MUNEKIYO, ARAKAWA & HIRAGA, INC.

June 2, 1998

Herman M. Aizawa, Ph.D.
Superintendent
Department of Education
State of Hawaii
P.O. Box 2360
Honolulu, Hawaii 96804

SUBJECT: Wailuku Parkside - CPA 980001, CIZ 980009

Dear Dr. Aizawa:

We have received a copy of your May 4, 1998 letter to David W. Blane relating to the subject project. On behalf of the applicant, Stanford Carr Development Corporation, we would like to provide a response to your comments regarding fair share contribution.

As we have noted in the draft environmental assessment, the Wailuku Parkside Project is intended to appeal to families who are already established on Maui and particularly to those who have ties to the Central Maui area. Although the project will generate elementary, intermediate and high school age children, these children may already be attending public schools in the Central Maui area. Moreover, should families with children move into the project from other parts of the island or the State, this would likely result in a corresponding reduction in enrollment in other DOE facilities.

We believe that the project may not result in a net increase in students within the State system. Thus, the justification for a "fair share" contribution or development exaction should be reexamined.

Planning • Environmental Studies • Project Management
305 High Street, Suite 104 • Wailuku, Hawaii 96793 • Phone: (808) 244-2015 • Fax: (808) 244-8729

We would certainly be willing to discuss the issue further with you or your staff. If you have any questions, please feel free to call me. Thank you for the opportunity to provide a response.

Very truly yours,

Milton Arakawa, Project Manager

MA:to
xc: Don Schneider, Planning Department
Stanford Carr, Stanford S. Carr Development Corporation
Eric Maehara, Esq.
scan/wikpkade/doeltr.001

BENJAMIN J. CAYETANO
GOVERNOR

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 14, 1998

David Blane, Director
Maui Planning Department
250 South High Street
Wailuku, HI 96793

Attn: Don Schneider

Dear Mr. Blane:

Subject: Draft Environmental Assessment (EA) for Wailuku Parkside

Please include the following in the final EA:

1. Library copy of draft EA: A new administrative rule, signed into law 8-31-96, requires the applicant of any environmental assessment to place a copy in the public library closest to the project site. If this has been completed, indicate the date of document placement. If not yet done, please arrange this as soon as possible, requesting library staff to place the document on reserve.

2. Project appearance: Include drawings or diagrams of the site, the proposed buildings and any proposed landscaping that show the final appearance of the project.

3. Resource conservation measures: Please describe any element or material being used in this project to promote environmentally sensitive and energy efficient design, such as low-flush toilets, solar panels or energy-efficient fixtures (such as compact fluorescent lights) or building designs allowing natural ventilation.

If you have any questions, call Nancy Heinrich at 586-4185.

Sincerely,

GARY GILL
Director

c: Milton Arakawa

MUNEKIYO, ARAKAWA & HIRAGA, INC.

June 2, 1998

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

SUBJECT: Draft Environmental Assessment for Wailuku Parkside

Dear Mr. Gill:

We have received a copy of your May 14, 1998 letter to David Blane pertaining to the subject project. We would like to provide a response as follows:

1. On behalf of the applicant, a Draft Environmental Assessment was provided to the Wailuku Public Library by letter dated April 17, 1998.

2. Design details of the project are in the process of being finalized. However, we will include additional information on project appearance within the Final EA.

3. Resource conservation measures are being considered in the final design of the project. Features such as low flush toilets are being incorporated within the project pursuant to applicable provisions of the Maui County Code. Other items like solar panels and energy efficient fixtures are being considered. The building designs will allow for natural ventilation.

Planning • Environmental Studies • Project Management
305 High Street. Suite 104 • Wailuku, Hawaii 96793 • Phone: (808) 244-2015 • Fax: (808) 244-8729

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

Very truly yours,

Milton Arakawa, Project Manager

MA:to
xc: Don Schneider, Planning Department
Stanford Carr, Stanford Carr Development Corporation
Eric Maehara, Esq.
scan/wlc/plade/oeqcltr.001

LINDA LINGLE
Mayor

CHARLES JENCKS
Director

DAVID C. GOODE
Deputy Director

Telephone: (808) 243-7845
Fax: (808) 243-7955

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

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

EASSIE MILLER, P.E.
Wastewater Reclamation Division

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

BRIAN HASHIRO, P.E.
Highways Division

Solid Waste Division

May 15, 1998

MEMO TO: DAVID W. BLANE, DIRECTOR OF PLANNING

F R O M: for CHARLES JENCKS, DIRECTOR OF PUBLIC WORKS AND WASTE MANAGEMENT

SUBJECT: COMMUNITY PLAN AMENDMENT AND CHANGE IN ZONING
WAILUKU PARKSIDE
TMK (2) 3-4-030:POR 20 & 23
CPA 98/001, CIZ98/009

We reviewed the subject application and have the following comments.

1. Driveway access onto Eha Street shall not be permitted. All driveways for lots shall be off side streets.

2. The minimum distance between street intersections shall be 500 feet unless approved by the Engineering Division.

3. Traffic signal system improvements on Lower Main Street at Waena Street needed as a result of this development shall be constructed by the developer.

4. Eha Street shall be opened to traffic from Waena Street to Imi Kala Street prior to issuance of any grading or building permits.

5. The traffic report should address the following:

   a. Traffic volumes for the year 2010.
   b. The intersection of Mill Street at Lower Main.

6. The developer should be informed that the Wastewater Reclamation Division cannot insure that wastewater system capacity will be available for the project.

7. Wastewater contribution calculations are required before a building permit is issued. The developer shall pay assessment fees for treatment plant expansion costs in accordance with the ordinance setting such fees.

8. The developer will be required to fund any necessary off-site improvements to the collection system and wastewater pump stations.

9. The subdivision shall comply with the provisions of Title 18, Maui County Code, "Subdivisions."

10. A detailed final drainage report and an erosion control Best Management Practices (BMP) plan shall be submitted with the construction plans for review and approval prior to issuance of grading permits. The drainage report shall include hydrologic and hydraulic calculations and the schemes for disposal of runoff waters. It must comply with the provisions of the "Rules for Design of Storm Drainage Facilities in the County of Maui" and must provide verification that the grading and runoff water generated by the project will not have an adverse effect on adjacent and downstream properties. The BMP plan shall show the location and details of structural and non-structural measures to control erosion.

If you have any questions, please call David Goode at 243-7845.

DG:co/mt
S:\LUCA\CZM\PARKSIDE.WPD

MUNEKIYO, ARAKAWA & HIRAGA, INC.

June 2, 1998

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

SUBJECT: Wailuku Parkside Community Plan Amendment and
Change in Zoning TMK 3-4-30:por. 19, por. 20, por. 23

Dear Mr. Jencks:

We have received a copy of your May 15, 1998 memorandum to David Blane relating to the subject application and would like to provide the following response.

1. Regarding the issue of driveway access, we will work with the Engineering Division in eliminating direct driveway access onto Eha Street.

2. Minimum spacing for street intersections is adequate for that portion of the project on the Maalaea side of Eha Street. However, minimum spacing will be difficult to achieve for the portion of the project on the Iao Stream side of Eha Street because of the physical configuration of the parcel. However, we will further coordinate this issue with the Engineering Division.

3. We would like to clarify that the traffic signal system improvements noted in the traffic impact assessment study for the Lower Main Street at Waena Street intersection are noted as a suggestion to the appropriate governmental agency to improve operating conditions. However, it is noted that existing operating conditions are already considered good and the project implementation will not result in the need for these traffic signal system improvements.

4. We acknowledge that Eha Street should be opened from Waena Street to Imi Kala Street. However, it is noted that this decision is beyond the control of the applicant.

5. The traffic impact assessment report has utilized the year 2000 as the projected year for which traffic impacts have been determined. This is due to the projected

completion of the Wailuku Parkside project by the year 2000. There are no future phases of the project which would require assessment to the year 2010.

With regard to the Mill Street at Lower Main intersection, it is noted that operating conditions should improve as a result of the opening of Eha Street which should provide an alternate parallel travel route to Lower Main Street.

6. With regard to wastewater issues, the developer intends to coordinate with the Wastewater Reclamation Division on compliance with applicable requirements.

7. The developer intends to work with applicable agencies in complying with the provisions of Title 18, Maui County Code, "Subdivisions".

8. The developer intends to prepare a detailed final drainage report and erosion control Best Management Practices (BMP) plan for submittal to the Department of Public Works and Waste Management.

If you have any questions pertaining to the foregoing responses, please call me. Thank you for your consideration.

Very truly yours,

Milton Arakawa, Project Manager

MA:to
scan/wlkplade/dpwwmltr.001

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

'98 MAY 18 P12:45

DEP. OF PLANNING
COUNTY OF MAUI
RECEIVED

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

May 15, 1998

LD-NAV

Ref.: CPA98001.RCM

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

Dear Mr. Blane:

SUBJECT: Review : Application for Community Plan Amendment and Change in Zoning
I.D. Nos.: CPA 980001, CIZ 980009 (Ref.:WAILUKU.RCM)
Project : Wailuku Parkside
Proposal : Construct 118 single-family residential homes and a 1.4+/- acre park
Applicant: Munekiyo Arakawa & Hiraga, Inc., on behalf of, Standard Carr Development Corporation
Location : Wailuku, Island of Maui, Hawaii
TMK : 2nd/ 3-4-030: 19 and portion of 20 and 23

Thank you for the opportunity to review and comment on the subject Application for Community Plan Amendment and Change in Zoning.

Attached herewith is a copy of the Commission on Water Resource Management's comments dated March 17, 1998, related to water resources for the proposed project.

The Department of Land and Natural Resources has no other comments to offer on the subject matter at this time.

Should you have any questions, please feel free to contact Nicholas A. Vaccaro of the Land Division Support Services Branch at 1-808-587-0438.

Very truly yours,

DEAN Y. UCHIDA
Administrator

c: Maui Land Board Member
Maui District Land Office

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT
P. O. BOX 621
HONOLULU, HAWAII 96809

March 17, 1998

TO: Mr. Dean Uchida, Administrator
Land Division

FROM: Edwin T. Sakoda, Acting Deputy Director
Commission on Water Resource Management (CWRM)

SUBJECT: Stanford Carr 118-lot Subdivision

FILE NO.: WAILUKU.COM

Thank you for the opportunity to review the subject document. Our comments related to water resources are marked below.

In general, the CWRM strongly promotes the efficient use of our water resources through conservation measures and use of alternative non-potable water resources whenever available, feasible, and there are no harmful effects to the ecosystem. Also, the CWRM encourages the protection of water recharge areas which are important for the maintenance of streams and the replenishment of aquifers.

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

[ ] We are concerned about the potential for ground or surface water degradation/contamination and recommend that approvals for this project be conditioned upon a review by the State Department of Health and the developer's acceptance of any resulting requirements related to water quality.

[ ] A Well Construction Permit and a Pump Installation Permit from the CWRM would be required before ground water is developed as a source of supply for the project.

[ ] The proposed water supply source for the project is located in a designated water management area, and a Water Use Permit from the CWRM would be required prior to use of this source.

[ ] Groundwater withdrawals from this project may affect streamflows. This may require an instream flow standard amendment.

[ ] If the proposed project diverts additional water from streams or if new or modified stream diversions are planned, the project may need to obtain a stream diversion works permit and petition to amend the interim instream flow standard for the affected stream(s).

[ ] If the proposed project performs any work within the bed and banks of a stream channel, the project may need to obtain a stream channel alteration permit and a petition to amend the interim instream flow standard for the affected stream(s).

[ ] We recommend that no development take place affecting highly erodible slopes which drain into streams within or adjacent to the project.

[X] OTHER: The water supply source for this project has been overpumped beyond the sustainable yield of the aquifer until recently, and the Commission may have to designate the aquifer as a water management area. If the aquifer is designated, all groundwater withdrawals to the purveyor would be subject to water use permits. The service and aquifer system area would be subject to a declaration of a water shortage or a water emergency.

If there are any questions, please contact Charley Ice at 587-0251.

CI:ss

DEPARTMENT OF
PARKS AND RECREATION
COUNTY OF MAUI

1580-C KAAHUMANU AVENUE WAILUKU, HAWAII 96793

Mayor

HENRY OLIVA
Director

ALLEN SHISHIDO
Deputy Director

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

MEMORANDUM

May 20, 1998

TO: David W. Blane, Planning Director

FROM: Henry Oliva, Director

SUBJECT: **Wailuku Parkside - Application For Community Plan Amendment And Change In Zoning**

Thank you for the opportunity to review and comment on the above subject action. We do not have any objections to this subdivision on its merit. However, we do object to major land owners, as C. Brewer Homes Inc., developing on a piecemeal basis. It would be in the best interest of the public and the Department of Parks & Recreation to adhere to the Community Plan. Papohaku Park was designed and located in an Industrial area to utilize on-street parking and future business parking lots for events that draw many participants and spectators. These events would normally take place after work hours and on weekends when off-site parking would be available. The development of residential housing together with an ordinance prohibiting on street parking in the area has created hardships for high profile events at the park and the community center. Measures should be taken to avoid occurrences of this nature in the future.

Should you have any questions on this matter please call me or Patrick Matsui, Chief of Parks Planning & Development at extension 7931.

HO:PTM:rh

s:\planning\blu\wrkside.wpd

MUNEKIYO, ARAKAWA & HIRAGA, INC.

June 2, 1998

Henry Oliva, Director
Department of Parks and Recreation
1580-C Kaahumanu Avenue
Wailuku, Hawaii 96793

SUBJECT: Wailuku Parkside Community Plan Amendment and
Change in Zoning TMK 3-4-30:por. 19, por. 20, por. 23

Dear Mr. Oliva:

We have received a copy of your May 20, 1998 memorandum to David Blane relating to the subject application and would like to provide the following response.

We would like to clarify that the project land area has recently been conveyed from C. Brewer Homes, Inc. to Wailuku Parkside LLC who has authorized the applicant, Stanford Carr Development Corporation, to file the subject application.

Although the Wailuku-Kahului Community Plan designates most of the subject property as Light Industrial, it is noted that the current update of the community plan designates most of the subject property for Multi-Family Residential use. Our proposed Single Family Residential designation is a less dense alternative to Multi-Family Residential.

Moreover, the subject property would not be contiguous to light industrial uses. Instead, it is bounded on one side by multi-family residential use and the other side by single family residential use.

If you have any questions pertaining to the foregoing responses, please call me. Thank you for your consideration.

Very truly yours,

Milton Arakawa

Milton Arakawa, Project Manager

MA:to
scan/wlkpksde/dprltr.002

Planning • Environmental Studies • Project Management
305 High Street, Suite 104 • Wailuku, Hawaii 96793 • Phone: (808) 244-2015 • Fax: (808) 244-8729

DEPARTMENT OF BUSINESS, ECONOMIC DEVELOPMENT & TOURISM

BENJAMIN J. CAYETANO
GOVERNOR
SEIJI F. NAYA
DIRECTOR
BRADLEY J. MOSSMAN
DEPUTY DIRECTOR
RICK EGGED
DIRECTOR, OFFICE OF PLANNING

OFFICE OF PLANNING
235 South Beretania Street, 6th Flr., Honolulu, Hawaii 96813
Mailing Address: P.O. Box 2359, Honolulu, Hawaii 96804

Tel.: (808) 587-2846
Fax: (808) 587-2824

'98 MAY 28 P12:26

DEPT OF PLANNING
COUNTY OF MAUI
RECEIVED

Ref. No. P-7464

May 26, 1998

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

Dear Mr. Blane:

Subject: CPA 980001, CIZ 980009
Tax Map Key: 3-4-30: Por. 20, Por. 23
Wailuku Parkside
Stanford S. Carr Development Corp.

We have reviewed the subject proposal and note that the applicant is also applying for a State Land Use District Boundary Amendment for approximately 24.267 acres of land from the Agricultural to the Urban Land Use District. The Petition was submitted on April 17, 1998, and has not been formally accepted for processing by the Land Use Commission due to the need for additional information.

In the near future, we will circulate the Petition for State and County agency review to formulate the State's position.

If you have any questions, please contact Lorene Maki of my staff at (808) 587-2888.

Sincerely,

Mary Lou Kobayashi for
Rick Egged
Director
Office of Planning

c: Ms. Esther Ueda, LUC

References

References

Armstrong, R. W., ed.; 1973; Atlas of Hawaii; University of Hawaii Press; Honolulu, HI

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

Foley, Maehara, Judge & Nip; 1987; Petition for District Boundary Amendment from Agricultural to Urban for Wailuku Industrial Park - Phase II Increment One; Honolulu, HI

Department of Land and Natural Resources. 1991, Water Resource Development Master Plan: Maui County. Honolulu, HI

Hawaii, State of. "Chapter 205: Land Use Commission." Hawaii Revised Statutes.

Hawaii, State of. "Chapter 343: Environmental Impact Statement Regulations." Hawaii Revised Statutes.

Hawaii, State of. "Act 176: Environmental Shoreline Protection Act." Session Laws of Hawaii 1976.

Hawaii, State of. "Objectives: Housing, Agriculture, Energy, and Transportation." Hawaii State Plan.

Maui, County of. General Plan. 1980.

Maui, County of. Prepared by Michael T. Munekiyo Consultants. General Plan Update. 1990

Maui, County of. Prepared by Aotani and Associates. Wailuku-Kahului Community Plan. October 1981.

PBR Hawaii, Planning, Environmental and Engineering Considerations for Wailuku Parkside, March 1998.

University of Hawaii, Land Study Bureau, Detailed Land Classification Island of Maui, May 1967.

Appendices

Appendix A

Proposed Wailuku Industrial Park II Project Biological and Archaeological Evaluation

PROPOSED WAILUKU INDUSTRIAL PARK II
BIOLOGICAL AND ARCHAEOLOGICAL EVALUATION

Wailuku, Maui, Hawaii

Prepared For:

Hawaiiana Investment, Inc.
C/O Warren S. Unemori Engineering, Inc.
Wailuku, Maui, Hawaii

Prepared by:

Environment Impact Study Corp.
Honolulu and Maui, Hawaii

APRIL, 1981

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

I. INTRODUCTION

In March, 1981, biological and archaeological reconnaissances were conducted on approximately 55 acres of land owned by Hawaiiana Investment, Inc., designated as TMK: 3-4-22:18 and 23, 3-4-23:5, 3-4-24, 3-4-30:portion 2, and 3-4-31:portion 1 Refer to Figures 1 through 3 for location maps of the project site. Results and conclusions of the surveys are presented below.

II. FLORA AND FAUNA RECONNAISSANCE

A. Introduction

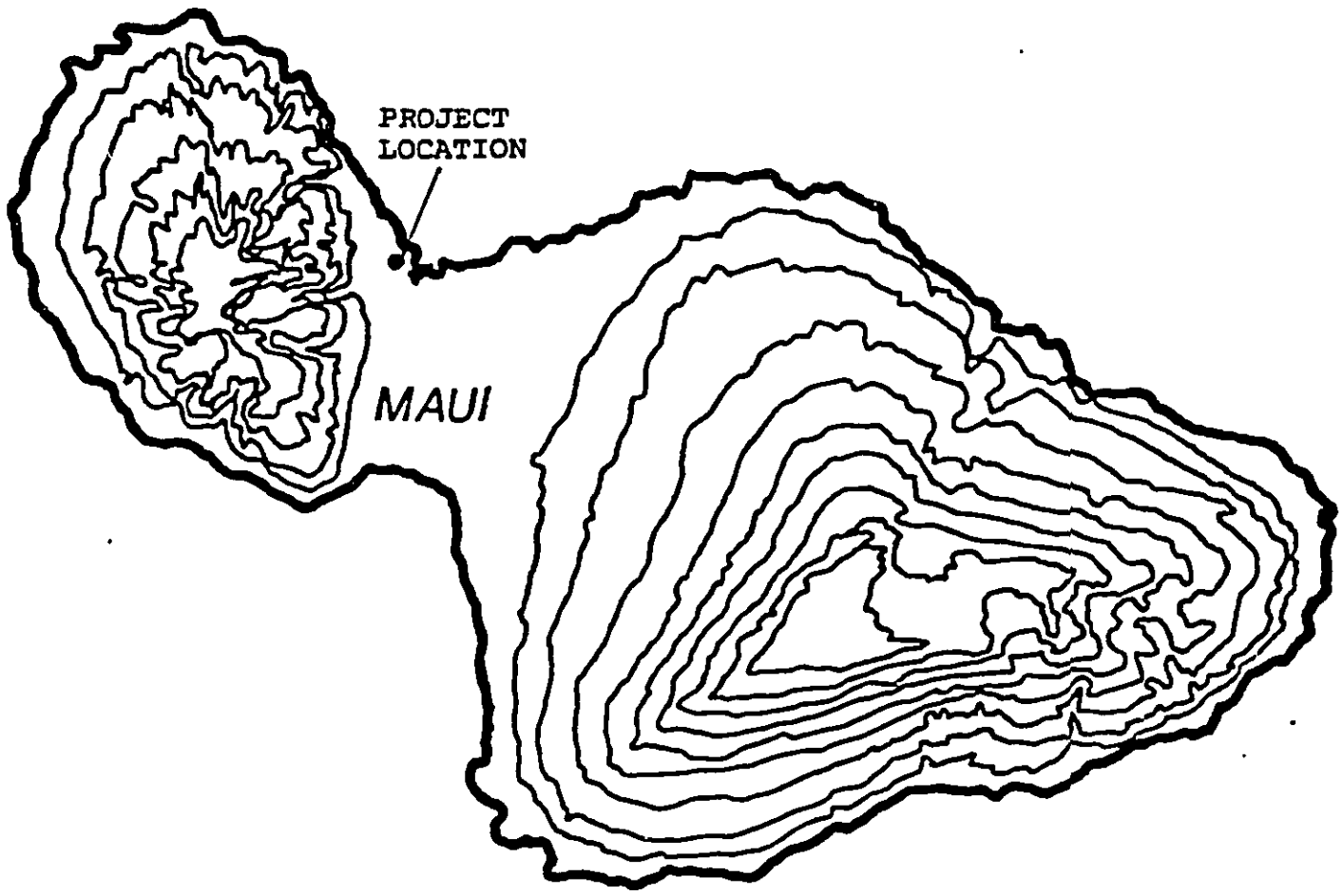
A field reconnaissance was conducted in March, 1981, to inventory the flora and fauna, describe major vegetation zones and wildlife habitat, search for rare and endangered species, and identify areas of potential environmental concern with regard to these resources.

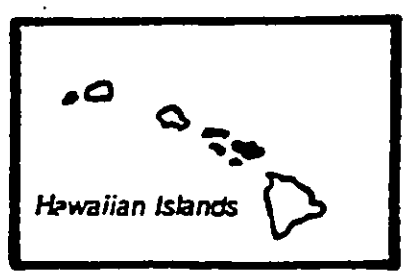
The survey was conducted after moderate rainfall and most of the expected vegetation was present, as is characteristic of the wet season. The vegetal composition will vary somewhat during different seasons and years.

B. Flora

1. Methodology

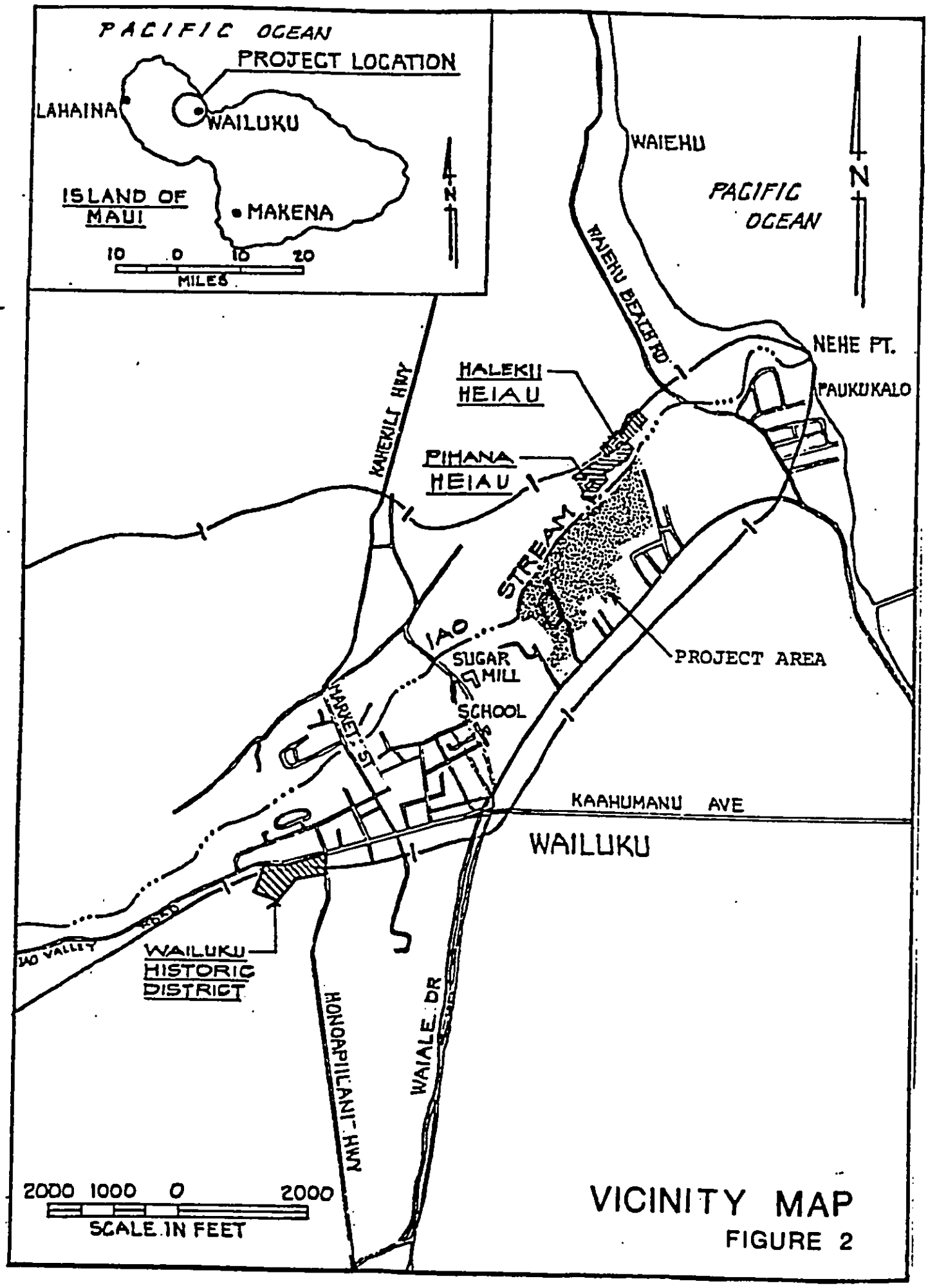
A walk-through reconnaissance technique was employed which covered all of the project parcel. Species observed and notes on the vegetation of



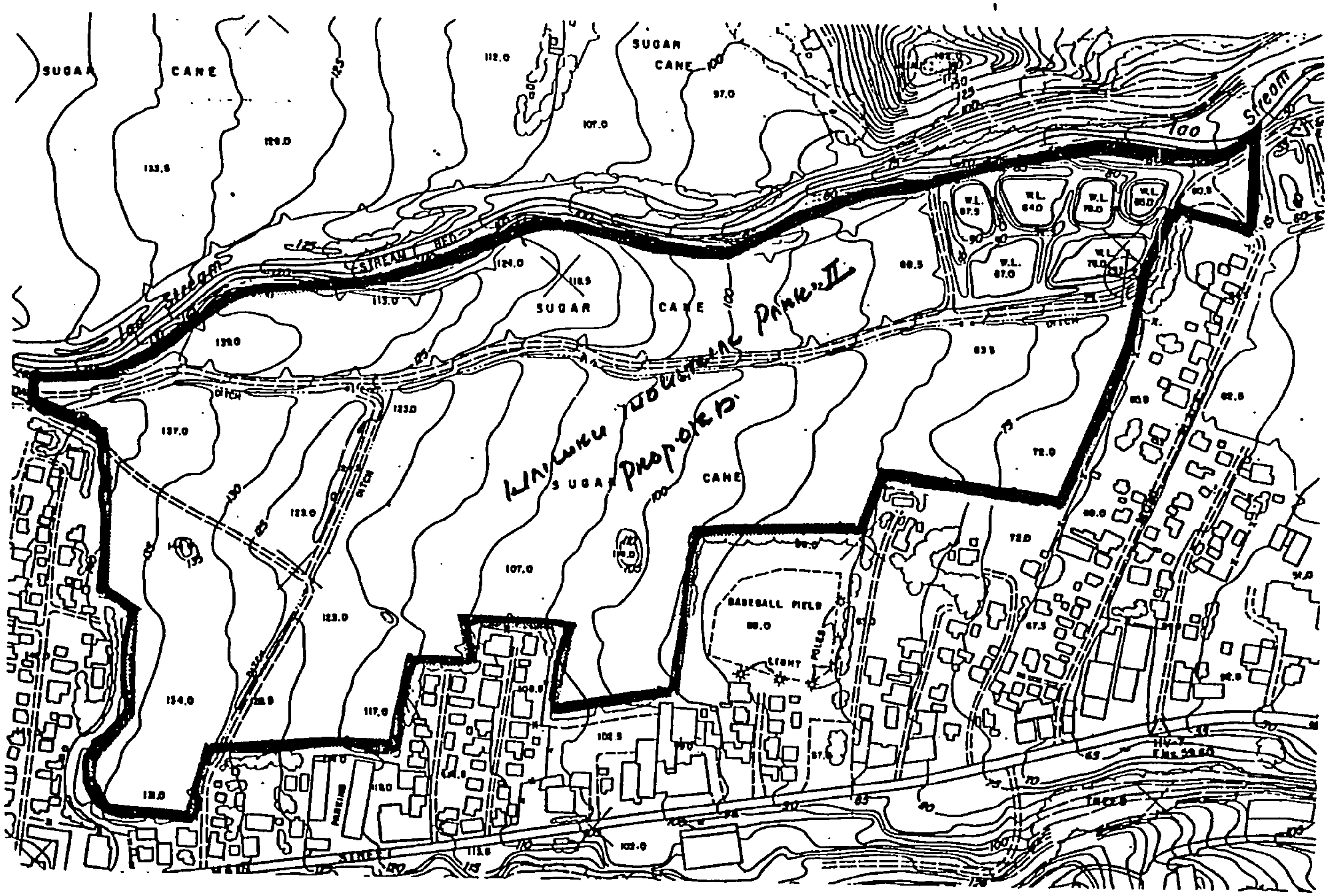


E.I.S.C.

LOCATION MAP
FIGURE 1



VICINITY MAP
FIGURE 2



PROJECT SITE
FIGURE 3

representative areas were recorded in the field. Plants that could not be positively identified in the field were collected for analysis in the laboratory.

2. Discussion and Results

The entire project area has been modified by human activities. The site has been used for sugar cane (Saccharum officinarum) production. A dirt road, irrigation ditches, and a County storm drain right-of-way cross the site, as shown in Figure 3.

Flora on the project site include native and introduced species common to arid, lowland coastal areas. On the day of the reconnaissance, the cane had been recently harvested and vegetation was profuse only along the roadside and former settling basins. Shrubs observed include koa haole (Leucaena lenocephala), castor bean (Ricinus communis), japanese tea (Cassia leschenaultiana), and hialoa (Waltheria americana). Common roadside weeds and grasses were also observed.

The project site is located in an area classified as Vegetation Zone B [1]. Vegetation characteristics of this zone are xerophytic shrubs with some trees. Herbaceous plants are

vigorous, due to annual rainfall of 20-40 inches. Refer to Table 1. Also refer to Appendix A for a complete listing of plant species on the project site.

None of the plants observed on the project site are rare or endangered species. The site has previously been disturbed and exotic species are dominant.

C. Fauna

1. Methodology

A walk-through reconnaissance technique was employed in which several transects were made across the project parcel. Notes on the habitat and on species observed were recorded in the field.

2. Discussion and Results

Avifauna seen on the project site include barred dove, spotted dove, northern cardinal, myna, house sparrow, and Japanese white-eye. The site primarily affords habitat for urban and lowland birds.

In addition to birds, individuals of mongoose, dog, and cat were observed. The vegetation also suggests the presence of rats and mice. Refer to Appendix A for a complete listing of faunal species observed or likely present on the site.

TABLE 1
VEGETATION ZONES

Zone	General elevations	Mean annual temperature	Annual rainfall, principal origin, and characteristics	Topography and soils	Land use	Vegetation characteristics and principal species
A	Sea level to 500 feet on lee sides or low windward lands	75° F. at sea level; maximum exceeding 90° F.	Less than 20 inches; southwest origin; torrential and infrequent; runoff and evaporation high; long, dry periods common	Coastal flats and adjacent sloping lands. Lava common	Irrigated sugar cane, grazing, waste	Ground cover sparse and conditions semi-desert. Algarobs, koa haole, and klu grow well where their roots penetrate ground water. Ilima and ulaloa are common shrubs. Annual grasses and herbs are scarce except following rains.
B	Sea level to 2,000 feet. Lee sides above A where present	70° F.	20-40 inches; southwest origin; similar to zone A	Similar to zone A	Irrigated sugar cane below 1,200 feet, pineapple above; grazing, waste	Vegetation similar to zone A but plants more numerous and vigorous due to increased rainfall. Annuals are longer lived. Cactus and *Lantana* often form dense stands. Both perennial and annual grasses occur. Annual herbs are prominent during and following rainy periods.
C_1	Sea level to 2,500 feet. Lies above B except where it reaches the sea	70° F.	40-60 inches; northeast trade-wind origin. Dry periods of more than one month uncommon. Moist spring and dry summer permit maturing of seeds	Gentle and steep slopes dissected by deep gullies; high plateaus. Excellent soil	Irrigated sugar cane and pineapple where topography and soils permit. Grazing restricted to gullies and poorer soils	Both temperate and tropical species adapted, the former seasonal, the latter perennial. Guava is the predominant shrub; *Lantana* and koa haole may form dense stands. Grasses and pasture legumes are responsive and small shrubs are common. Herbaceous forms volunteer good growth on disturbed soils. This zone formerly forested.
C_2	2,500 to 4,000 feet	60° F.	Similar to zone C_1	Steeper mountain gradients and high plateaus. Good soils used for pastures	Too cool for sugar cane or pineapple. Grazing is major use	Like zone C_1 this was once forested. Now mostly open grassland but remnants of koa and ohia lehua occur. Aalii and puakeawe are dominant shrubs. Grasses, legumes, and other herbs generally form good stands.
D_1	Sea level to 1,500 feet on windward sides	75° F. at sea level. 2-3° lower than on lee sides at same elevation	60 inches minimum; northeast trade-wind origin	Rugged; soils leached, acid, poorly aerated	Non-irrigated sugar cane; limited pineapple. Grazing on non-arable land	Perennial shrubs and grasses most abundant but commonly low in protein, minerals, and total dry matter. Guava, *Lantana*, and staghorn fern grow profusely in places restricting other vegetative growth.
D_2	Variable but generally between 1,500 to 4,000 feet on windward sides. Lies above D_1	60° F.	From more than 60 to 450 inches and more; northeast trade-wind origin	Rough topography. Soils acid, often boggy, have little available plant matter, decreased silica, high organic matter	Forest reserve providing main source of water for islands. Grazing in some cleared portions	Nearly impenetrable forest of koa and ohia lehua accompanied by tree ferns and various low growing ferns. Such forests lack diversification of vegetative types and seed producing species.
D_3	4,000-7,000 feet on windward sides. Lies above D_2	50° F.	About 100 to 50 inches; northeast trade-wind origin. Mist frequent	Gentle gradient with small gullies	Grazing	Originally forested like zone D_2 but heavy grazing has left only remnants. In cleared portions grasses do well but annuals do not persist because of lack of sunshine and a dry season necessary for seeding. Shrubs are scarce due to grazing.
E_1	4,000 - 7,000 feet. Lies above D_3 in wetter parts and C_2 in drier localities	50° F.	40 inches; northeast trade-wind origin. Mist common. Summers dry. Frost occasional in low regions and ice forms in upper areas.	High plateau and gentle mountain slopes. Lava common. Soil thin but good in places	Grazing	Formerly forested. Much now open grassland. Where grazing not so severe, remnant stands of koa, mamani, and naio persist. Aalii and puakeawe common where trees have disappeared. Herbs are frequent but grazing limits maximum coverage.
E_2	7,000 - 10,000 feet	40° F.	Less than 40 inches; northeast trade-wind origin. Summers are too cool to permit good plant	Topography steep. Soils little weathered and make poor substrata for plants. Lava plentiful	National Park and Forest Reserve; heavy grazing by feral sheep and goats	Vegetation similar to zone E_1 but sparser and more scrubby because of poorer soil and more rigorous climate. Heavy grazing in places has caused severe denudation of both vegetation and soil.
E_3	10,000 - 14,000 feet	Freezing	Less than 20 inches; northeast trade-wind origin. Snow frequent and may remain in sheltered places all year.	Steep but not rugged. Ash cones and lava common. Soil rocky and thin.	National Park and Forest Reserve	Little plant growth except moss and lichen association.

Source: C.W. Schwartz. 1949. The Game Birds of Hawaii.

The area along Iao Stream has been altered, providing very little wildlife habitat. Most of the trees along the stream have been removed in the past. During the reconnaissance, no water was observed flowing in Iao Stream nor were any stream fauna observed.

None of the animals seen or potentially present on the project parcel are rare or endangered species. The normal range of native forest birds is further upslope and to the west. Refer to Figure 4.

D. Conclusions

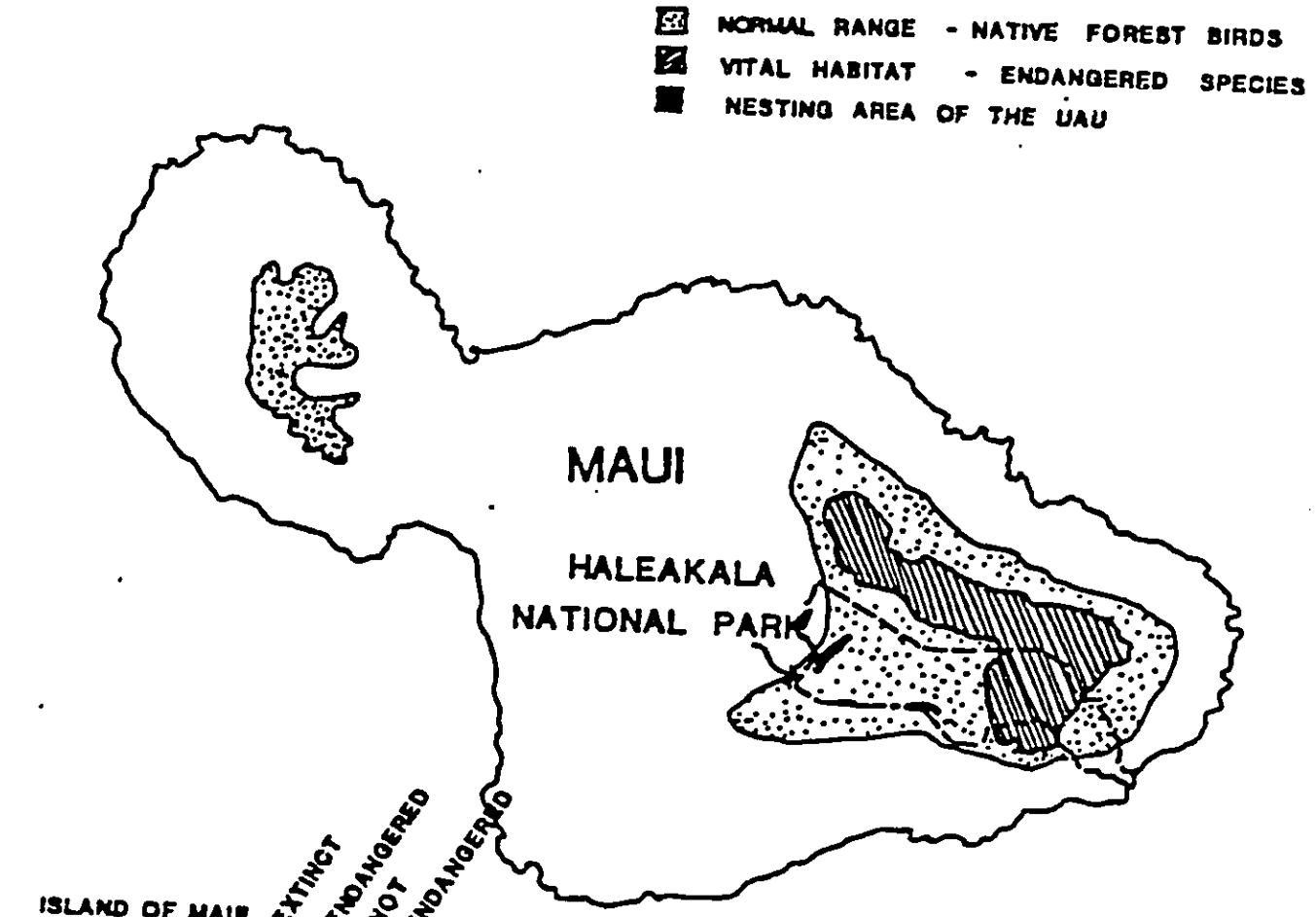
None of the biota observed or believed normally present in the project area are rare, threatened, or endangered species of biota. The area has been previously disturbed by agricultural production and does not provide suitable habitat for many endemic species.

No significant impacts to flora or fauna species would be expected due to development of the project parcel. Both flora and fauna species are primarily exotic species, commonly found throughout the island and the State.

III. ARCHAEOLOGICAL RECONNAISSANCE

A. Introduction

A field reconnaissance was conducted of the proposed project site located east of Iao Stream and



ISLAND OF MAUI	EXTINCT	ENDANGERED	NOT ENDANGERED
MAUI AMAKIHI			●
MAUI CREEPER			●
MAUI AKEPA		●	
POOULI		●	
MAUI NUKUPUU		●	
MAUI PARROTBILL		●	
OU	●		
APAPANE			●
CRESTED HONEYCREEPER		●	
IIWI			●
DARK-RUMPED PETREL (UAU)		●	
NEWELL'S SHEARWATER (AO)	●		
OO	●		

SOURCE: HAWAII'S ENDANGERED FOREST BIRDS

PREPARED BY THE STATE OF HAWAII DEPARTMENT OF LAND & NATURAL RESOURCES AND THE UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE

NATIVE BIRD RANGE

FIGURE 4

mauka of Wailuku Industrial Park I. The reconnaissance consisted of a surface survey to roughly locate and describe areas of possible archaeological or historical interest. Exact mapping was not warranted, nor was salvage or subsurface archaeological study.

The project parcel is on the eastern slope of the West Maui mountains, and extends from approximately the 75 to 140-foot elevation. The majority of the study area is in sugar cane production, while the rest of the area is covered primarily with grasses and shrubs. The study area is mauka of the coastline and is not in immediate association with fishponds.

Previous archaeological surveys in the vicinity include one in January, 1974 by a National Park Service archaeologist along Iao Stream, and one in October, 1974 by the Bishop Museum of some agricultural terraces upstream of Market Street [3].

The January, 1974 survey indicated that modern developments and activities have extended close to the banks of Iao Stream, except along the steepest banks. It appeared that most, if not all, archaeohistorical remains between the mouth of the stream and a point 2.5 miles inland have been destroyed by modern development, except near the 2.5-mile point. It is at this point that the agricultural terraces previously mentioned are located.

B. Methodology

A walk-through reconnaissance technique was employed, in which several transects were made across the project parcel.

C. Discussion and Results

Most of the study area has undergone extensive modification as a result of sugar cane production. In addition, the stream bank has had both gunite treatment and dike construction to aid in flood control. The combination of these two activities has effectively destroyed any cultural material of interest that might have been present. Examination of the surface of the project site yielded no cultural material, nor indications of site locations.

D. Conclusion

Due to the extensive historic disturbance of the area, it is recommended that no further archaeological or historical work is necessary or justified.

REFERENCES

[1] Ripperton, J.C. and E.Y. Hosaka. 1942. Vegetation Zones of Hawaii. Hawaii Agriculture Experimental Station Bulletin No. 89.

[2] U.S. Fish and Wildlife Service. December, 1974. Hawaii's Endangered Forest Birds. Prepared in conjunction with the Department of Land and Natural Resources, State of Hawaii.

[3] U.S. Army Engineer District, Honolulu. April, 1975. Final Environmental Statement: Flood Control and Allied Purposes, Iao Stream, Maui, Hawaii.

APPENDIX A

FLORA/FAUNA CHECKLISTS

APPENDIX A

FLORA/FAUNA CHECKLISTS

For each species, the following information is provided:

1. Family
2. Scientific name
3. Vernacular name
3. Status of the species. The following symbols are employed.

   E — endemic to the Hawaiian Islands, i.e., occurring naturally nowhere else in the world.

   I — indigenous, i.e., native to the Hawaiian Islands, but also occurring naturally (without the aid of man) elsewhere.

   X — exotic, i.e., species of accidental or deliberate introduction after the western discovery of the islands.

   P — Polynesian introduction; includes those species brought by the Polynesian immigrants previous to Captain Cook's discovery of the islands.

NOTE: No species of flora or fauna observed during the reconnaissance or believed present are considered rare or endangered.

APPENDIX A, cont'd.

FLORA/FAUNA CHECKLISTS

Flora References

Fosberg, F. R. and D. R. Herbst. 1975. Rare and endangered species of Hawaiian vascular plants. Allertonia 1 (1): 1-72.

Pope, Willis T. 1968. Manual of Wayside Plants of Hawaii. Charles E. Tuttle Co., Rutland, Vermont and Tokyo, Japan.

Ripperton, J. C. & E. Y. Hosaka. 1942. Vegetation Zones of Hawaii. Haw. Agric. Exp. Sta. Bull. No. 89.

Rotar, Peter P. 1968. Grasses of Hawaii. University of Hawaii Press, Honolulu, Hawaii.

St. John, Harold. 1973. List and Summary of the Flowering Plants in the Hawaiian Islands. Pacific Tropical Botanical Garden Memoir Number 1, Lawai, Kauai, Hawaii.

U. S. Department of the Interior, Fish and Wildlife Service. 1976. Endangered and threatened species, plants. Federal Register 41 (117): 23524-24572.

Fauna References

Berger, Andrew J. 1972. Hawaiian Birdlife. The University Press of Hawaii. Honolulu, Hawaii.

Hawaii Audubon Society. 1978. Hawaii's Birds. Edited by Robert J. Shallenberger. Hawaii Audubon Society. Honolulu, Hawaii.

State of Hawaii, Department of Land and Natural Resources, Division of Fish and Game, Wildlife Branch. Annotated Checklists of the Birds and Mammals of Hawaii.

CHECK LIST OF PLANTS

SCIENTIFIC NAME	COMMON NAME	STATUS
MONOCOTYLEDONAE		
GRAMINEAE		
Agrostis alba L.	Redtop	X
Chloris radiata (L.)Sw.	Radiate fingergrass	X
Coix lacchryma-jobi L.	Job's tears	X
Digitaria pruriens	Slender crabgrass	X
Panicum maximum Jacq.	Guinea grass	X
Sacchrum officinarum L.	Sugar cane; ko	X
Setaria verticillata (L.) Beauv.	Bristly foxtail	X
MUSACEAE		
Musa sp.	Banana	X
DICOTYLEDONAE		
ACANTHACEAE		
Thunbergia fragrans Roxs.	White thunbergia	X
AMARANTHACEAE		
Amaranthus spinosus L.	Spiny amaranth	X
COMPOSITAE		
Conyza bonariensis L. Cronq.	Hairy horseweed	X
Emilia sonchifolia (L.) DC.	Flora's paintbrush	X
Sonchus oleraceus L.	Sow thistle	X
CONVOLVULACEAE		
Ipomoea triloba L.	Little bell	X
CUCURBITACEAE		
Momordica charrantia var. *pavel* Crantz.	Balsam apple	X
EUPHORBIACEAE		
Ricinus communis L.	Castor bean; koli	X

CHECK LIST OF PLANTS, Continued

SCIENTIFIC NAME	COMMON NAME	STATUS
LABIATAE		
Leonotis nepetaefolia (L.) Ait. f.	Lion's-ear	X
LEGUMINOSAE		
Canavalia cathartica Thouars.	Mauna-loa	X
Cassia leschenaultiana DC.	Japanese tea; lauki	X
Cassia occidentalis L.	Coffee senna	X
Crotalaria mucronata	Smooth rattle-pod	X
Crotalaria spectabilis Roth.	Rattle-pod	X
Desmodium sandwicense	Spanish clover	X
Dolichos lablab	Lablab bean; Hyacinth bean	X
Leucaena leucocephala (Lam.) de Wit	Koa-haole	X
MALVACEAE		
Abutilon molle	Hairy abutilon	X
PASSIFLORACEAE		
Passiflora foetida L.	Scarlet-fruited passion flower	X
PORTULACACEAE		
Portulaca oleracea L.	Purslane; pigweed	X
STERCULIACEAE		
Waltheria americana L.	Hi'aloa	I

CHECK LIST OF FAUNA

[Fauna observed, likely present, or which would possibly visit the site]

	SCIENTIFIC NAME	COMMON NAME	STATUS
	CLASS AVES		
	STRIGIDAE		
	Asio flammeus sandwichensis	Short-eared owl; pueo	E
	COLUMBIDAE		
*	*Stretopelia chinensis*	Spotted dove	X
*	*Geopelia striata*	Barred dove	X
	STURNIDAE		
*	*Acridotheres tristis*	Common mynah	X
	ZOSTEROPIDAE		
*	*Zosterops japonica*	Japanese white-eye	X
	PLOCEIDAE		
	CARDUELINAE		
	Carpodacus mexicanus	House finch; linnet	X
	PASSERINAE		
*	*Passer domesticus*	House sparrow	X
	FRINGILLIDAE		
	RICHMONDENINAE		
*	*Richmondena cardinalis*	Cardinal	X
	Paroaria coronata	Brazilian cardinal	X
	ALAUDIDAE		
	Alauda arvensis arvensis	European skylark	X
	CLASS MAMMALIA		
	MURIDAE		
*	*Rattus exulans*	Polynesian rat	P
	Mus musculus	House mouse	X

CHECK LIST OF FAUNA - Continued

SCIENTIFIC NAME	COMMON NAME	STATUS
	CLASS MAMMALIA	
CANIDAE		
* *Canis familiaris*	Dog	X
VIVERRIDAE		
* *Herpestes auropunctatus*	Mongoose	X
FELIDAE		
* *Felis catus*	Cat	X

NOTE: There was no water flowing in Iao Stream at the time of the reconnaissance and no fauna were observed in the stream.

* Observed during field reconnaissance, March, 1981.

Appendix B

Archaeological Inventory Survey of the Proposed Wailuku Parkside Property

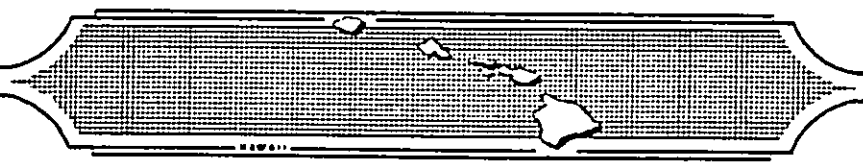
SCS Project Number 128-1

AN ARCHAEOLOGICAL INVENTORY SURVEY OF THE PROPOSED WAILUKU PARKSIDE PROPERTY, WAILUKU, MAUI ISLAND, HAWAI'I [TMK 3-4-30: Portion 20; 3-4-30: Portion 23; 3-4-30: 19]

By:
David B. Chaffee, B.A.,
Amy E. Dunn, B.S.,
Pam Asbury-Smith, B.A.
and
Robert L. Spear, Ph.D.
February, 1998

Prepared for:
Stanford Carr Development
Amfac Center, Hawaii Tower
745 Fort Street, Suite 2110
Honolulu, Hawaii 96813

SCIENTIFIC CONSULTANT SERVICES Inc.



711 Kapiolani Blvd. Suite 777 Honolulu, Hawai'i 96813

ABSTRACT

At the request of Mr. Jay Nakamura of Stanford Carr Development an archaeological inventory survey was conducted by Scientific Consultant Services, Inc. (SCS) on approximately 24.64 acres in the proposed Wailuku Parkside Property, Wailuku Ahupua`a, *Island of Maui, Hawai`i* [TMK 3-4-30:19, Por. 20, Por. 23].

A total of 40 backhoe trenches were excavated within the project area. The approximately 24.6 acres surveyed produced no cultural deposits in any of the trench excavations. Based on the results of the trench excavations the entire parcel appears to have been heavily impacted by prior mechanical disturbance of the soil.

No further archaeological work is recommended for this parcel.

TABLE OF CONTENTS

LIST OF FIGURES

INTRODUCTION

At the request of Mr. Jay Nakamura of Stanford Carr Development, Scientific Consultant Services, Inc. (SCS) conducted an inventory survey on approximately 24.64 acres in the proposed Wailuku Parkside Property, Wailuku Ahupua`a, Island of Maui, Hawai`i [TMK 3-4-30:19, Por. 20, Por. 23] (Figures 1 and 2).

Excavations were conducted between the 16th and 27th of January 1998. Crew members included Project Directors Amy Dunn and Field Archaeologist John Risedorf. The field work was conducted under the overall direction of Robert L. Spear, Ph.D.

PHYSICAL SETTING

The subject project area is situated in Wailuku *ahupua`a*, Wailuku District, island of Maui. The *ahupua`a* includes the coastal area of Kahului Bay from Kapukaula to Paukukalo and the northern half of the isthmus between Haleakala and the West Maui Mountains.

Wailuku Town is located on the northwestern side of the isthmus between East and West Maui. The island was formed from two separate shield volcanoes, Haleakala in East Maui and Pu`u Kukui in West Maui. The isthmus between is composed of coraline sands blown inland from the coast. The lower levels have become firmly lithified, forming a soft rock known as eolianite (Stearns 1966:10). The upper levels are generally less consolidated and surface layers are loose, unstable sands held in place by vegetation. Lithified sand dunes rest on alluvial fans near the shore between Kahului and Waihe`e and extend inland across most of the western edge of the isthmus. Some dunes near the north coast reach heights of 60 meters (MacDonald et al. 1986:388, Carlquist 1980:60).

The project area is located approximately 1 kilometer west of Kahului Bay. It lies just off the county road right-of-way on the north side of Lower Main Street and slightly west of Papohaku Park (see Figure 2). Soil within the immediate area consists of Puuone grayish brown calcareous and cemented sands (Foote, *et al.* 1972). Mean annual rainfall in the Wailuku area is

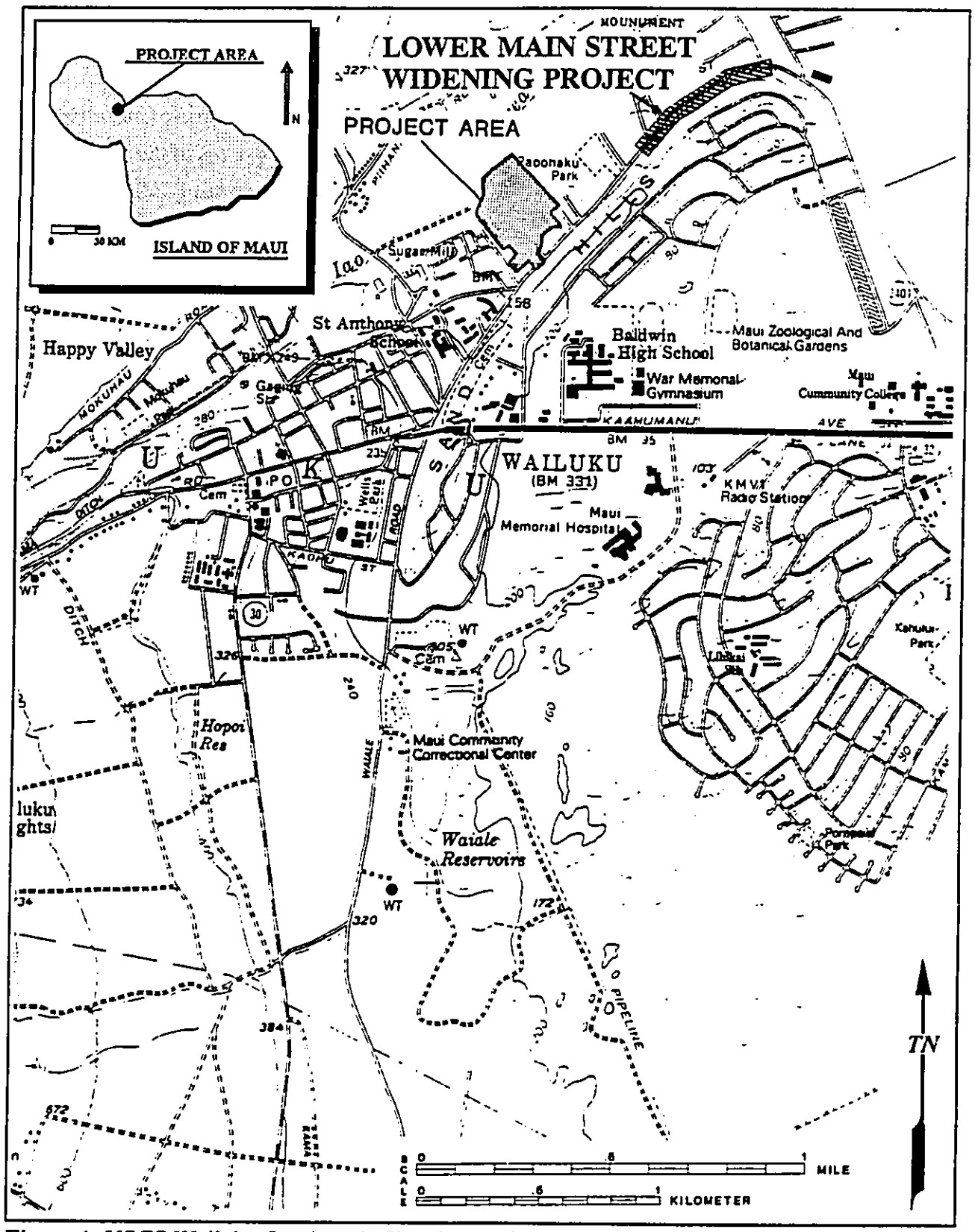
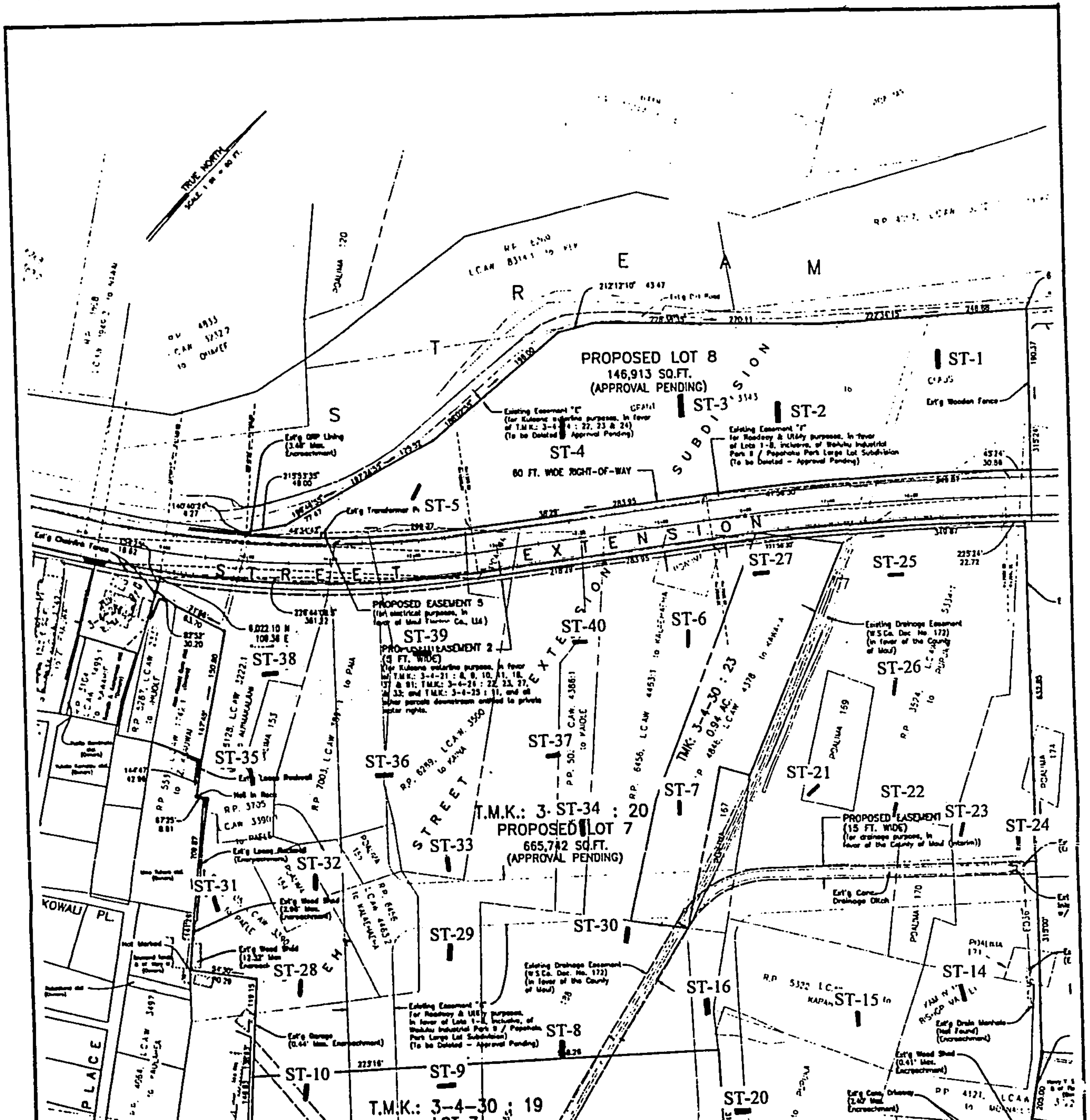


Figure 1: USGS Wailuku Quadrangle Showing Project Area (shaded).



TRUE NORTH
SCALE 1 in = 60 FT.
STREAM
PROPOSED LOT 8
146,913 SQ.FT.
(APPROVAL PENDING)
ST-1
Ext'g Wooden Fence
ST-2
Existing Easement "F"
for Roadway & Utility purposes, in favor of Lots 1-8, inclusive, of Wailuku Industrial Park II / Popohaku Park Large Lot Subdivision
(To be Deleted - Approval Pending)
ST-3
Existing Easement "E"
(To be Deleted - Approval Pending)
ST-4
60 FT. WIDE RIGHT-OF-WAY
SUBDIVISION
ST-5
Ext'g Transformer
STREET EXTENSION
ST-6
ST-7
T.M.K.: 3-4-30 : 23
0.94 AC.
ST-8
ST-9
ST-10
T.M.K.: 3-4-30 : 19
ST-14
ST-15
ST-16
ST-20
ST-21
ST-22
ST-23
ST-24
ST-25
ST-26
ST-27
ST-28
ST-29
ST-30
ST-31
ST-32
ST-33
ST-34
ST-35
ST-36
ST-37
ST-38
ST-39
ST-40
Existing Drainage Easement
(W.S.Co. Doc. No. 172)
(in favor of the County of Maui)
PROPOSED EASEMENT
(15 FT. WIDE)
(for drainage purposes, in favor of the County of Maui (interim))
Ext'g Conc. Drainage Ditch
PROPOSED EASEMENT 5
(for electrical purposes, in favor of Maui Electric Co., Ltd.)
PROPOSED EASEMENT 2
(5 FT. WIDE)
T.M.K.: 3-4-34 : 20
PROPOSED LOT 7
665,742 SQ.FT.
(APPROVAL PENDING)
KOWALI PL.
PLACE

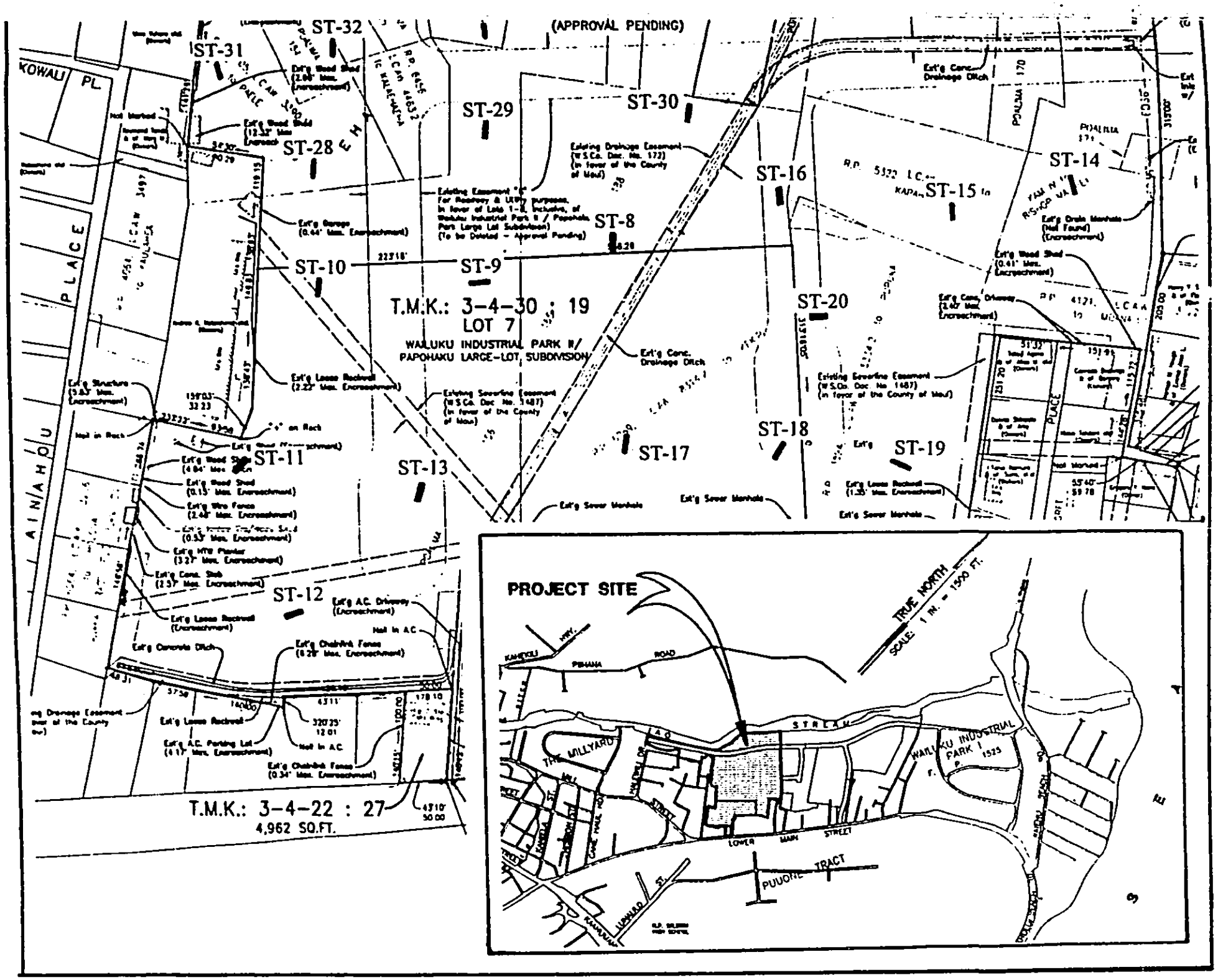


Figure 2: Planview of Wailuku Parkside Project Showing Stratigraphic Trench (ST) Locations.

approximately 20 inches per year (Price 1983:62). Vegetation at the time of the project was limited to a ground cover of grasses on the slope to Iao Stream, the northwestern boundary of the project area.

HISTORICAL BACKGROUND

In general, the prehistory of Maui prior to ca. AD 1200 is poorly known. Assumptions based on models from other islands in the Hawaiian archipelago suggest the windward portions of the island were occupied about AD 300 to 600, with a shift in emphasis to the drier, *kula* regions by AD 1000 to 1200 (Cordy 1974, Kirch 1985).

The historical background of Maui and the Wailuku region is treated in detail elsewhere (Rotunno *et al.* 1996, Burgett and Spear 1995a) and the reader is referred to these references. For the purposes of the subject report a summary overview is presented.

Maui was ruled in conjunction with the islands of Lana`i and Kaho`olawe by the *mo`i* Kahekili when Europeans arrived in AD 1778. The districts of Hana and Kipahulu were controlled by the island of Hawai`i since 1759, and wars between Kalaniopu`u of Hawai`i Island and Kahekili resulted in invasions of Maui-controlled territories from 1777 to 1779 (Fornander 1969). The subsequent death of Kalaniopu`u in 1782 and the fragmentation of the Hawaiian polity into three parts allowed Kahekili to extend Maui's territorial claims, resulting in the conquest of O`ahu in 1783.

Civil disorder on the Island of Hawai`i from Kamehameha's conflict with rival claimants resulted in a united island under one ruler. Inconclusive battles between Kamehameha and Kahekili occurred in the interim with combined forces from Maui, Kaua`i, and O`ahu participating in attacks on Kamehameha. Kalanikupule's role as ruler of Maui (1794) marked the end of an era, for the following year (1795), Kamehameha invaded Lahaina, Molokai, and O`ahu. Kalanikupule's defeat at the battle of Nu`unau established Kamehameha as absolute ruler of the Hawaiian Islands, with the exception of Kauai (Fornander 1969).

European involvement in Maui during the preceding events was confined to exploitation of the coast by Cook (1779), LaPerouse (1786), and Vancouver (1793). These expeditions reported on the contrasts in vegetation and climate between windward east Maui and leeward Maui (LaPerouse 1799; Vancouver 1798 in Kirch 1985).

By 1795, Maui was a part of the newly established Kingdom of Hawai`i. The political arrangement brought great changes to traditional demographics, religion, politics, and land use. On Maui, Lahaina became the focus of political life serving as the Kingdom's capital and residence of Kamehameha III from AD 1836 to 1844 (Kamakau 1992). Whaling, shipping, and the cultivation of imported crops, such as Irish potatoes, became mainstays of the local economy. Wailuku was considered to be one of the most fertile areas for agriculture and became an economically important district in the late prehistoric/protohistoric period.

LAND USE

TRADITIONAL LAND USE

Much of the knowledge of traditional land use patterns is based upon what was recorded at the time of, and shortly after, western contact. Early records, such as journals kept by travelers and missionaries, Hawaiian traditions which survived long enough to be written down, as well as archaeological investigations have assisted in understanding the past. The Hawaiian economy was based on agriculture production and marine exploitation as well as the raising of livestock, and wild plant and bird collection. Extended household groups settled in various *ahupua`a*. Here, they were able to harvest from both the land and the sea. Ideally, this allowed each *ahupua`a* to be self-sufficient by supplying needed resources for survival from many different environmental zones (Lyons 1875:111).

An applicable settlement model for this area can be described as dryland and wetland agriculture in the upper reaches of `Iao Valley with extensive agricultural terracing in the lower river basin areas. This was coupled with permanent habitation and marine resource exploitation in Kahului Harbor and the surrounding coastal areas. The presence of two large *heiau* in the area indicates a large population base.

THE GREAT MĀHELE

Western culture brought new concepts to Hawai'i. While it is a complex issue, many scholars believe that in order to protect Hawaiian sovereignty from foreign powers, Kauikeaouli (Kamehameha III) was forced to establish laws changing the traditional Hawaiian society to that of a market economy (Daws 1968:111; Kuykendall Vol. I, 1938:145 footnote 47, 152, 165-6, 170; Kame'eleihiwa 1992:169-70, 176). Among other things, the foreigners demanded private ownership of land to insure their investments (Kuykendall Vol. I, 1938:138, 145, 178, 184, 202, 206, 271; Kame'eleihiwa 1992:178). Once lands were made available and private ownership was instituted, native Hawaiians were able to claim *kuleana* they were occupying, either by cultivation or by residence. Government land was under control of the government, except that it was subject, as was all the land, to the rights of the native tenants. When native tenants proved that they had occupied a particular parcel, they would be issued a Land Commission Award (LCA) number and, finally, a Royal Patent number which conveyed no title but stated that the government's interest in the land was settled (Chinen 1971).

Wailuku *ahupua'a* was declared Crown Land and numerous LCAs were listed for the western section. In 1831-32, Wailuku District had a population of 5,235. Of that number, 2,256 were in Wailuku *ahupua'a,* mostly concentrated near the 'Iao Valley and 'Iao Stream. A 1937 Wailuku Sugar Company map shows Crown Lands and LCAs only between what is now Lower Main Street (formerly Old Government Road), and 'Iao Stream. Wailuku Sugar Company began leasing Crown Lands in Wailuku as early as 1865.

Twenty-one LCAs were awarded in or near the project area in Wailuku (TMK 3-4-22) (Table 1). Twelve LCAs were within the project area in the *'ili* of Lamali'i, Pauniu, Auhaka, Pohakea, and Pohaku'uli (see Figure 2). There are eleven *Po'alima* (Chief's plantation where the people worked on Fridays) within the LCAs, and in the *'ili.* Outside of the project area, but in close proximity, are nine additional LCAs.

Land use information was derived from individual entries recorded in Volume 6 of the Native Register, or in the Royal Patents. The entries described *lo'i* for the cultivation of wetland *kalo* on all of the LCAs in the project area, and several *kula* for dry-land *kalo* on five of the LCAs (see Table 1)

Table 1: Summary of Land Commission Awards in the Project Area.

LCA No.	Awardee	`Ili of the *Ahupua`a*	Land Use
3222:1	Auimakalani	Pohaku`uli and Kaulupala	10 *lo`i* in Pohaku`uli, 13 *lo`i* in Kaulupala, 1 *Po`alima.*
3390:1	Paele	Pohakea	22 *lo`i*, 1 *kula*, 1 *hala* clump, 1 *Po`alima.*
3891:1	Paia	Pohakuli	15 *lo`i*, 1 *kula*, bounded by stream on North, Kaina's on East, *Mo`o* on South is Pohakea, on West is Auimakalani's land.
3500	Kaina	Auhaka	22 *lo`i*, 1 *Po`alima.*
4386:1	Kaiole	Auhaka and Pohakea	13 *lo`i*, 1 *kula;* bounded on North by Kawaha's *Mo`o*, on the South by Waiaka, Kalaehaeha's land on the East, and Ohule's *Mo`o* on the West. Three combined *Po`alima.* 2 *lo`i* at Pohakea received from Kalaehaeha.
4463:1	Kalaehaeha	Lamali`i and Auhaka	18 *lo`i* and a *kula* at Auhaka. North boundary is Kawaha's *Mo`o,* Lamali`i Nui on the East, Waiaka to the South, and Kaiole's *Mo`o* on the West. 2 *lo`i* at Lamali`i Nui.
4378	Kawaha	Auhaka	11 *lo`i.* Bounded by a "flowing stream" on the North, Lamali`i on the East, Waiaka to the South, and Pohaku`uli on the West. 1 *Po`alima.*
5334:1, 2	Pupuka	Lamali`i	2 parcels of *kalo*, 1 *po`alima* in parcel 1; bordered *mauka* by Moanalua's land, *waihe`e* by Kahawa's land, *makai* by the `ili of Lemuke`e, *ma`alaea* by an acre of sugar cane of the *mo`i.*
4441	Kapahi	Lamali`i and Kalua	15 *lo`i* and a *kula.* Bounded on North by a stream, on the South by a land boundary wall, on the East by Lemuke`e and 7 *lo`i,* and on the West by the *lo`i* of Pupuka. 4 *lo`i* at Kalua.
8314:1, 2	Kekipi	Waiaka	The entire`ili with 50 *lo`i*

Although only five LCAs listed the stream as a boundary, the other portions of land were nearby and it is reasonable to assume that irrigation was in place for both wetland and dryland agriculture. Of the descriptions of the land, Pupuka made a poignant statement regarding land in the *`ili* of Lamali`i inherited from his *makuas* who had it in the time of Kamehameha I, saying that he had been dispossessed of land that was his "from the time when my body was strong".

Two *heiau* are located in the vicinity of the current project, Haleki`i and Pihana, (TMK 3-4-30:4). These *heiau* are the only remaining pre-Contact Hawaiian religious structures in the Wailuku-Kahului area that are easily accessible by the public. The *heiau* are important to the early history of Maui when Kamehameha I was uniting the islands. Kamehameha I is believed to have invoked his war god at Pihana Heiau. He is also believed to have sacrificed Poloahilani, foster sister of a Maui Chiefess, at the *heiau*. In addition, it was here that he was told by Kame`eiamoku that his true father was Kahekili (Kamakau 1960:188). The significance of these two *heiau* has been recognized with their listing on both the National and Hawai`i Registers of Historic Places in 1985. Kahekili had his main residence at Wailuku, which was a major gathering area for Maui chiefs and those of rank.

Much of the upper portion of Wailuku town was built atop old agricultural terraces. Handy and Handy (1972) report that stone terraces could still be seen extending along the stream bed for several miles into the valley. In 1934, the terraces in the lower portions of `Iao Valley were used for Wailuku Sugar Plantation Camps 6 and 10. Further up the valley, private homes and gardens were built on terraces, while at the upper reaches of the valley, they were overgrown with guava. At that time the old taro terraces at Wailuku and `Iao were cultivated by Japanese and Portugese farmers as market gardens producing Chinese bananas, vegetables, and flowers (Handy and Handy 1972:497).

The Lower Main Street and Mill Street areas have been extensively impacted by post-Contact cultural, agricultural, and industrial activities. However, even with such disturbances, intact burials and cultural deposits can still be found in the area.

MID 19TH AND 20TH CENTURY

Land use in the district and *ahupua`a* in the mid-19th and early 20th century was largely devoted to the sugar industry. During the 1860s the sugar business was growing, with plantations and mills at Wailuku, Waihe`e, Waikapu and Haiku. Wailuku Sugar Company was organized in 1862 by a syndicate that included C. Brewer & Company. By 1864, C. Brewer had gained controlling interest of Wailuku Sugar which then included Wailuku Plantation and Waihee Sugar Company. Waikapu Sugar Company was added in 1894 (Speakman 1978).

After the Civil War in the United States the Hawaiian sugar industry needed a stable market for their products. American goods were admitted to Hawaii at 5% duty while Hawaii paid a 30% duty on products sold to U.S. territories. In addition to the high U.S. tariff, Hawaii sugar exporters had to compete with low cost sugars produced by growers in Manila and China (Kuykendall 1938: 331-32).

Passage of the Reciprocity Treaty in 1876 assured a fair market for Hawaiian sugar in the United States. California sugar baron Claus Spreckels arrived in Hawaii at the same time as news of passage of the treaty. Before a price rise had taken effect Spreckels had bought over half of the 1877 sugar crop and also purchased a part interest in Waihee Plantation. In 1878, through his friendship with King Kalakaua, Spreckels was able to lease and purchase 40,000 acres of Crown Lands in centrai Maui. He then acquired water rights to the northern slope of Haleakala and the right to transport the water to his lands on the isthmus by means of a ditch (Speakman 1978).

Spreckels' holdings were incorporated as the Hawaiian Commercial Company and construction of a large sugar complex was begun at Spreckelsville. By 1882, a plantation rail-road had been constructed to haul cane from the fields to the mill and the company was reorganized as the Hawaiian Commercial and Sugar Company. Control of H.C.&S. passed to Alexander and Baldwin in 1899 (Conde and Best 1973: 208-210).

The first island railroad venture was started in 1879 by James Hobron, an entrepreneur who had established inter-island and west coast shipping lines and a general store in Kahului. Operating as the Kahului and Wailuku Railway, the train ran between Kahului and the sugar mill at Wailuku. In 1881 the railway was incorporated as the Kahului Railroad and the line was extended to the mill at Spreckelsville to carry sugar to the Port of Kahului. The railroad was sold to Hawaiian Commercial and Sugar Company in 1899. Cane and sugar hauling by rail was replaced by trucks in 1950 (Conde & Best 1973: 213).

In addition to sugar transport, by the early part of the 20th century, Kahului Railroad operated six daily-except-Sunday passenger trains from Kahului to Wailuku, and five from Kahului to Paia. Special trains on Saturdays carried passengers from the inter-island steamer at the wharf in Kahului to Wailuku, Puunene, and Spreckelsville. Passenger service was discontinued in 1936 (Hungerford 1963:74).

In 1895 the permanent railroad at Wailuku Sugar Company was begun. The company obtained rights-of-way from the Catholic Mission and Claus Spreckels for a railroad between the original mill site at Wailuku and their plantations at Waikapu and Waihee. In 1905 a new mill was constructed in Wailuku and Kahului Railroad offered to extend their line to the new mill site. The offer was accepted and a contract was signed with the Kahului Railroad to haul sugar from the new mill site to Kahului Harbor for storage. In 1947, when the company converted from railroad to truck hauling of cane from plantations to the mill, Wailuku Sugar Company Railroad operations were discontinued (Conde and Best 1973: 267-69).

The Wailuku Sugar Company Railroad track is shown following the east side of the Old Government Road (the present Lower Main Street) to approximately one mile north of the mill. After that point the railroad is not shown, but would probably have turned northwest toward the plantation at Waihee. The Kahului Railroad track ran along the upper dune area to Kahului Harbor and beyond. It is shown on a 1955 USGS map of the area. Mr. Adrian Tom, whose family lived in the area from 1946 until the late 1970s, remembers both the upper and lower tracks.

PREVIOUS ARCHAEOLOGY

Several archaeological studies have been conducted within the general area of the present project. Studies in the general area of the project include Barrera's (1976) survey of approximately 1020 acres in the Sand Hills (currently the Maui Lani area) c. 1.5 miles southeast of the present project area. No structural remains or cultural deposits were identified. Two indigenous artifacts, a basalt flake and a possible basalt hammerstone, were located in disturbed, previously cultivated, areas beyond the project boundaries. During later sand mining, human bone was found in sand shipped from the area. Neller (1984) identified skeletal remains of three individuals at the sand mining site (now designated Site 50-50-04-2797).

Rotunno and Cleghorn (1990) from the Bishop Museum, conducted an inventory survey of the proposed Maui Lani Subdivision area in the Sand Hills, approximately one half mile southeast of the present project area. Two identified archaeological sites were later determined to be recent modifications.

Sinoto (1990) conducted a 70 acre surface survey at the Maui Lani sand borrow, c. 1.5 miles southeast of the project area. No cultural materials were identified. Archaeological monitoring of the sand borrowing areas continues to this date with no cultural remains yet discovered during monitoring.

Kennedy (1995a) conducted surface and subsurface testing in the Pihana Ridge Sand Dune area. The testing identified no cultural material. During later sand mining activities, a number of burials were discovered in unsuspected soft pockets of sand near the surface of the dunes. Associated grave goods with one burial led to the determination that the remains were of a person of high rank.

Kennedy (1990b) conducted subsurface testing at the site of the proposed Maui Community Arts and Cultural Center. The sand dunes at the site had previously been leveled. Kennedy's testing included 51 backhoe trenches. No cultural materials were identified.

Donham (1992) disinterred skeletal remains representing three individuals in the western marginal area of the Sand Hills. The burials were discovered in two areas of construction activities at the Maui Homeless Shelter (Site 2916). Area 1 contained a flexed adult burial. Area 2 contained scattered remains representing an adult female and a smaller adult. No burial pits or portable remains were observed at either of the burial areas.

In 1993, two human burials (Site 3502) were discovered during roadway improvements at Waiale Road, c.1.5 miles south of the project area. One burial was recorded and disinterred. The second had been reburied beneath the road by county workers and could not be safely removed (Donham-in preparation).

Pantaleo and Sinoto (1996) conducted subsurface sampling at the proposed Maui Lani Development area in an attempt to explore the predictability of burials in the sand dune area. Although no conclusive patterns were evident, burials appeared to proliferate along the marginal boundaries of the Pu`uone feature including the area along the Sand Hills escarpment from Waiale Road to Lower Main Street.

Connolly (1973) identified The Lower Main Street Midden Site (Site 1172), located in the Sand Hills, during a B.P. Bishop Museum survey in 1971. The site consists of at least one cultural layer containing marine shells, charcoal, coral, and water-worn stones. Three indigenous artifacts were found at the site: a coral file, the end of a hammerstone, and a possible hammerstone.

Fredericksen and Fredericksen (1990) conducted an inventory survey of an unimproved commercial lot in the Sand Hills. The lot fronts Lower Main Street and had been partially excavated. The survey produced no evidence of pre-Contact habitation or use.

Fredericksen and Fredericksen (1992) conducted an inventory survey of a 2.024 acre parcel in the dune area Four sites were identified: Site 3112 the Wailuku Railroad bed; Site 3119 A, a historic refuse deposit containing late 19th and early 20th century bottles and other refuse; Site 3119B, two pre-contact cultural layers (III and IV) that contained fish bone, marine shells, coral, and stone artifacts. Carbon dating samples from Layer IV at the site yielded an occupation date of AD 233 to 410; Site 3120, contained two cultural layers (III and IV). Two test excavations at the site produced marine shells, fish bone, pig bone, indigenous artifacts, and a human carpal phalange. The phalange suggests that human burials may be present in the dune. It was not determined whether the cultural layers in Sites 3119B and 3120 represent separate cultural depositions, or a single continuous deposition (Fredericksen and Fredericksen 1992: 9-13).

Fredericksen (1994) conducted a project on the Home Maid Bakery site approximately one quarter mile northeast of the present project area. The project included monitoring of sand removal from the site for identification and collection of human skeletal material; surface collection of marked areas of human skeletal fragments; and shovel probes to determine if the recovered skeletal materials represented portions of human burials still present on the property or were an isolated bone scatter. No intact human burials were identified. Artifacts, shell midden, and bone fragments representing possibly two to four individuals were recovered.

During June 1994, skeletal remains representing four individuals were identified and removed from three locations on the Home Maid Bakery property (Site 50-50-04-3556). The burials were discovered during construction activities associated with expansion of the bakery (Donham-in preparation).

Two human burials were discovered eroding from The Lower Main Street Midden Site (1172) in June 1994. The burials were recorded and disinterred by Maui SHPD resident archaeologist Theresa Donham (Donham-in preparation).

Burgett and Spear (1995a) conducted a retroactive inventory survey of the Home Maid Bakery property where sand removal had taken place. Two sites, comprised of nine features, were identified and recorded during the survey. The features included burials, cultural layer remnants, pits and firepits. Radiocarbon dates obtained were 340 ± 70 BP and 410 ± 50 BP. These conventional ages indicate that the project area was being utilized during the 15th to 17th centuries.

Also located on Lower Main Street, the Oceanhouse project , located approximately one quarter mile southwest of the present project area, Burgett and Spear (1996) identified a remnant cultural deposit designated as State Site 50-50-04-4004. This site was interpreted as a temporary habitation associated with a radiocarbon dated conventional age of 400±50 BP. This date indicates a period of utilization sometime during the mid-15th to mid-17th centuries.

More recently, two 1997 studies by Fredericksen *et al.* were conducted in the Lower Main Street area. An inventory survey of the c. 1.34 acre proposed Maui Texaco Station located at Lower Main Street and Mill Street found a largely intact pre-Contact cultural deposit along with an associated burial. Both were assigned State Site No. 50-50-04-4414. This site remnant was found in 9 of 12 backhoe trenches. The cultural deposit was determined to be related to habitation. A radiocarbon date from a small hearth returned an age range of AD 1390 to 1670.

The other Fredericksen report involved data recovery excavations at the Nisei Veterans Memorial Center, Site 50-50-04-3120. The study parcel was a 2.024 acre parcel close to the shoreline of Kahului Harbor. This data recovery was a follow-up to the inventory survey study begun in 1992, and discussed above, in which four sites were recorded. The sites in this study were located on one of the last remnants of the large sand dune formation which had once surrounded Kahului Harbor. Site 3112 was a remnant of the Kahului Railroad Bed, built in the 1880s. Site 3119A was an historic refuse area. Sites 3119B and 3120 were determined to be pre-Contact sites. These pre-Contact sites yielded traditional tools, i.e. an adze fragment, a well-used

basalt hammerstone, a dense basalt polishing stone with a highly polished face, a retouched basalt flake, and a pecking stone. A radiocarbon date returned from Site 3120 was determined to have been contaminated with coal associated with railroad activity and therefore of little value. These sites are well *makai* of the present area of study.

METHODOLOGY

Systematic trenching was conducted throughout the project area using a mechanical backhoe to determine the presence or absence of subsurface cultural deposits. The locations of all trenches were plotted on a blue-line map provided by the client. Trench descriptions included overall measurements, stratigraphy identification, photographs, and selected profiles. All soil descriptions were completed in the field using standard SCS Stratigraphy forms, terminology and Munsell color charts.

FIELDWORK RESULTS

A total of 40 backhoe trenches were excavated within the project area. No cultural deposits were present in any of the trench excavations. Figures 3 and 4 give a general area view of the project area.

Based on the results of the trench excavations the entire parcel appears to have been heavily impacted by prior mechanical disturbance of the soil. Information provided by the backhoe operator regarding more recent land modification included sugar cane cultivation, and grubbing activity in 1993-94. He related that truckloads of soil were removed from the project area and that at other times, truckloads of soil were deposited in the project area. This was in part substantiated during the course of trench excavation. The majority of the soil deposition within the project area is characterized by two layers, a layer of fill overlying decomposing bedrock. The term "fill" in this case designates the end result of the sugarcane related activities, the grubbing of the project parcel and both the removal and deposition of soil in the project area. This fill layer was designated Layer I in all 40 trenches.

Figure 3: Overview of the Northwest Portion of the Project Area Taken from Iao Streambed. View to North

Figure 4: Overview of the Northwest Portion of the Project Area Showing Bulldozer in Heavy Vegetation. View to East

In many of the trenches the fill material contained irrigation drip-line hose and recent trash, including soda and beer cans, plastic, broken pieces of cement, and plastic pipe fragments.

The northwest portion of the project adjacent to `Iao Stream is characterized by a layer of fill which overlies old riverbed deposit.

TRENCHING DESCRIPTIONS

Due to the similarity of many of the stratigraphy trenches (ST), a representative sampling of trench profiles and photographs are presented. A more detailed soil analysis, including Munsell colors and soil descriptions of all the trenches is presented in Appendix A.

Table 2 shows the dimensions and layer designations of the forty stratigraphic trenches.

Stratigraphic Trenches 3 and 5 each had a single stratigraphic layer (Figures 5 and 6) composed of fill. Because these trenches contained only a single layer, no profiles were drawn.

Stratigraphic Trenches 2 and 4 had two layers. Layer I was fill. In these two trenches a riverbed layer, designated Layer II, was identified in the bottom of the trench excavation consisting of large water-rounded boulders and cobbles.

Stratigraphic Trenches 1, 6, 7, 8, 9, 10, 12, 13, and 15 through 40 had two stratigraphic layers each (Figures 7, 8, 9, and 10). Layer I was fill. Layer II was decomposing bedrock.

Stratigraphic Trenches 11 and 14 had three stratigraphic layers (Figures 11 and 12). Layers I and II were fill. Layer III was decomposing bedrock and soil.

Stratigraphic Trench 1 (ST-1) contained two layers overlying an unexcavated river rock deposit. Layer I was fill. Layer II appears to be a natural sand deposit. This was the only trench to show this natural sand deposit.

Layer I in ST-5 contained more boulders in the fill as well as broken chunks of concrete and recent paper and plastic debris than in adjacent trenches.

Table 2: Trench Dimensions

Trench No.	Length and Width (meters)	Max. Depth mbs	No. of Layers
ST-1	6.70 x 1.00	2.07	2
ST-2	7.50 x 0.75	2.90	2
ST-3	7.00 x 1.02	3.00	1
ST-4	5.20 x 0.95	2.30	2
ST-5	5.20 x 0.60	2.50	1
ST-6	5.30 x 0.70	1.90	2
ST-7	5.00 x 0.75	2.20	2
ST-8	5.40 x 0.70	1.45	2
ST-9	5.40 x 0.60	1.30	2
ST-10	7.00 x 0.70	1.70	2
ST-11	7.10 x 0.75	1.40	3
ST-12	6.30 x 0.60	1.21	2
ST-13	7.00 x 0.65	1.25	2
ST-14	6.90 x 0.70	1.22	3
ST-15	5.60 x 0.60	1.42	2
ST-16	7.30 x 0.70	1.27	2
ST-17	7.00 x 0.65	1.24	2
ST-18	6.50 x 0.67	1.30	2
ST-19	6.20 x 0.64	1.22	2
ST-20	7.40 x 0.65	1.23	2

Trench No.	Length and Width	Max. Depth mbs	No. of Layers
ST-21	7.00 x 0.85	1.90	2
ST-22	6.80 x 0.65	1.20	2
ST-23	7.30 x 0.72	1.42	2
ST-24	6.00 x 0.52	1.05	2
ST-25	7.00 x 0.60	1.17	2
ST-26	7.10 x 0.52	1.24	2
ST-27	6.00 x 0.65	1.50	2
ST-28	6.20 x 0.64	1.30	2
ST-29	5.30 x 0.54	0.96	2
ST-30	5.60 x 0.62	1.20	2
ST-31	6.00 x 0.52	1.40	2
ST-32	6.00 x 0.58	1.10	2
ST-33	6.20 x 0.51	1.32	2
ST-34	6.50 x 0.61	1.30	2
ST-35	7.00 x 0.47	1.40	2
ST-36	5.50 x 0.51	1.14	2
ST-37	6.90 x 0.52	1.26	2
ST-38	6.20 x 0.51	1.43	2
ST-39	6.70 x 0.52	1.18	2
ST-40	6.00 x 0.57	1.31	2

Figure 5: Overview of the ST-3. View to Southeast.

Figure 6: Overview of ST-5. View to Northwest.

Figure 7: Overview of ST-1. View to Southeast.

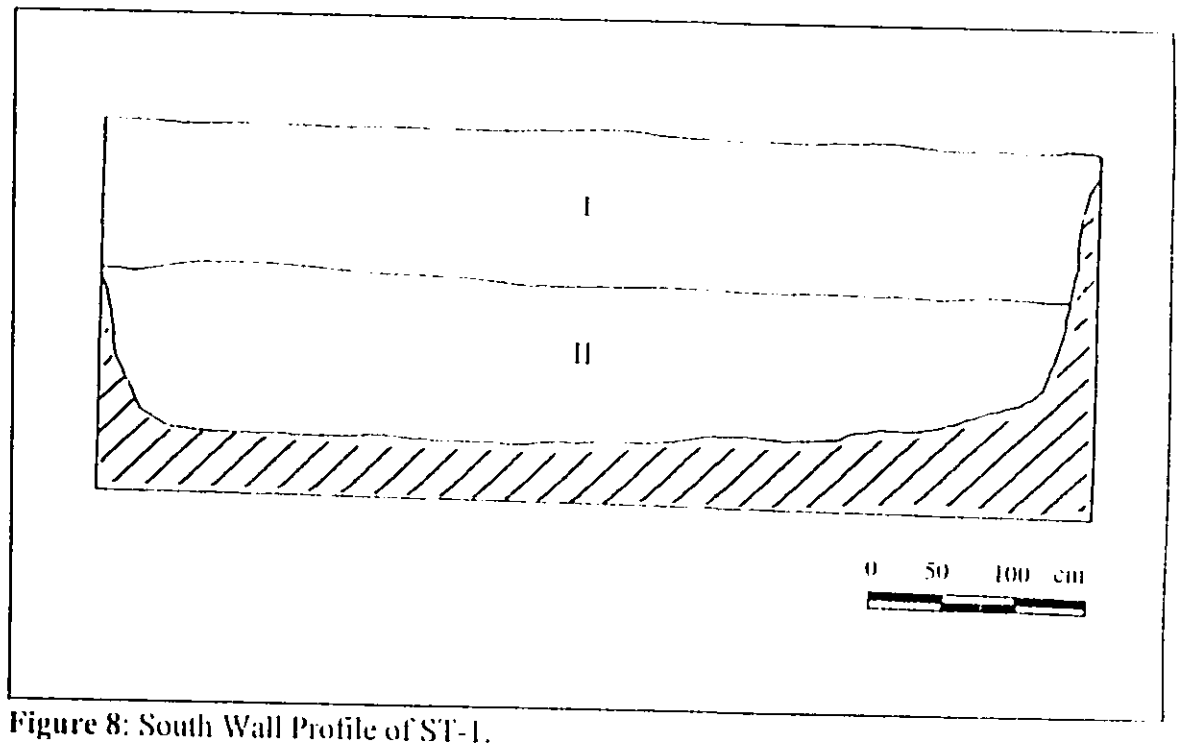


Figure 8: South Wall Profile of ST-1.

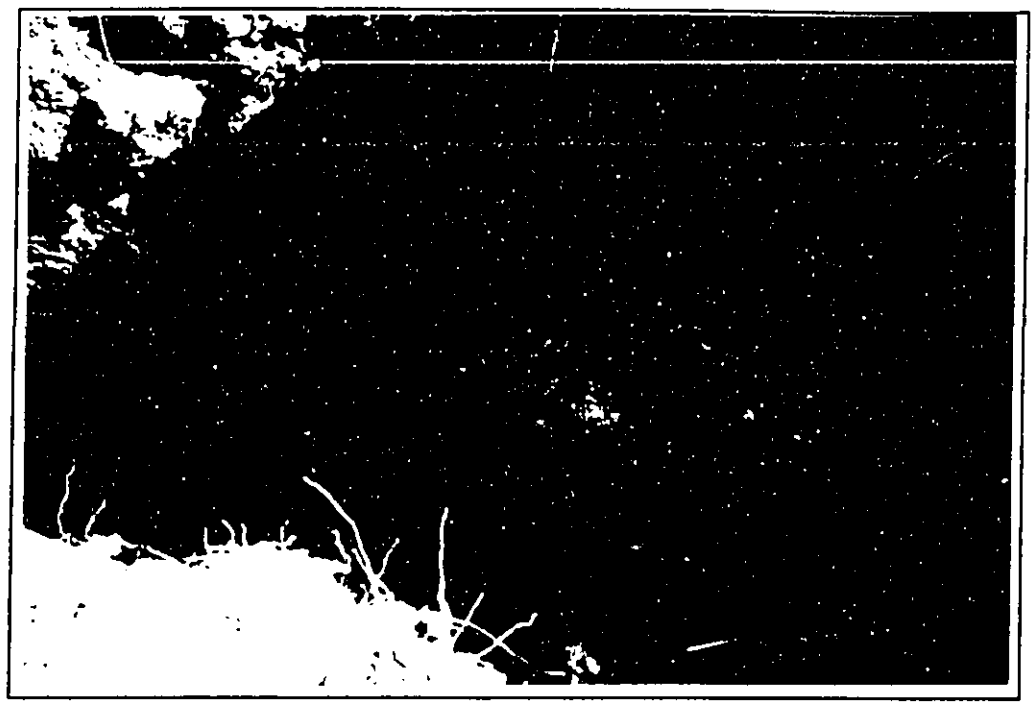


Figure 9: Base of Excavation View of ST-6.

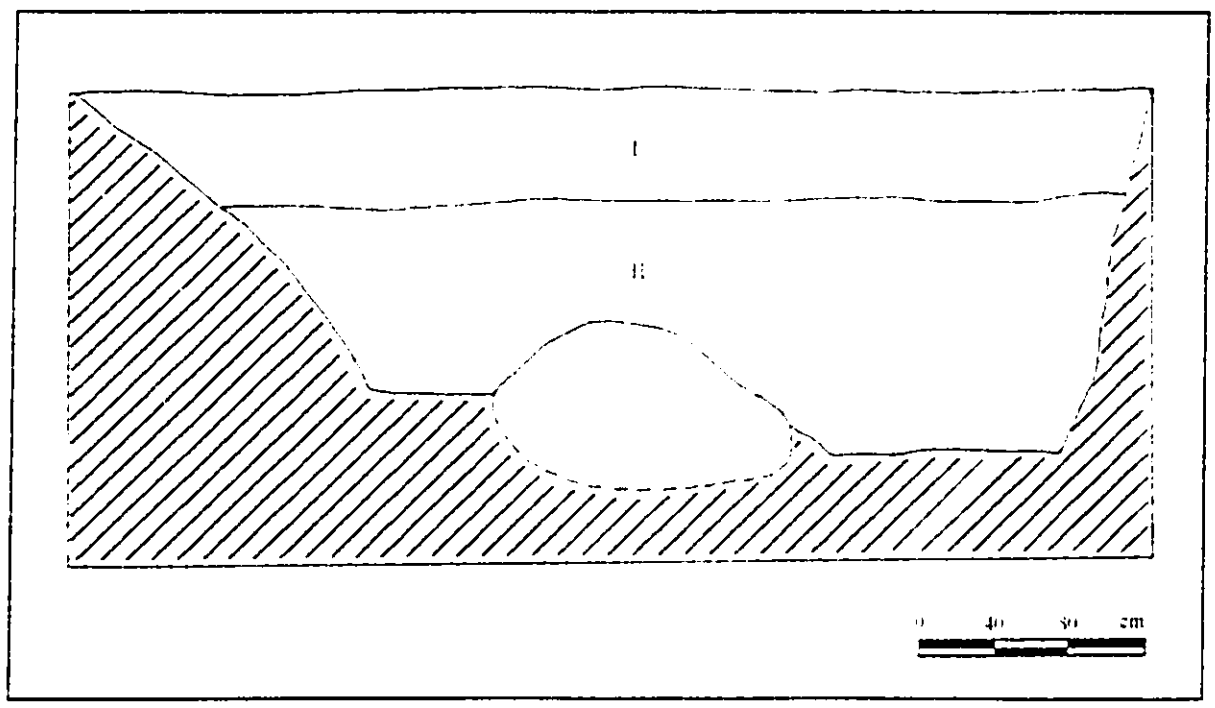


Figure 10: North Wall Profile ST-6.

Figure 11: Base of Excavation View of ST-11.

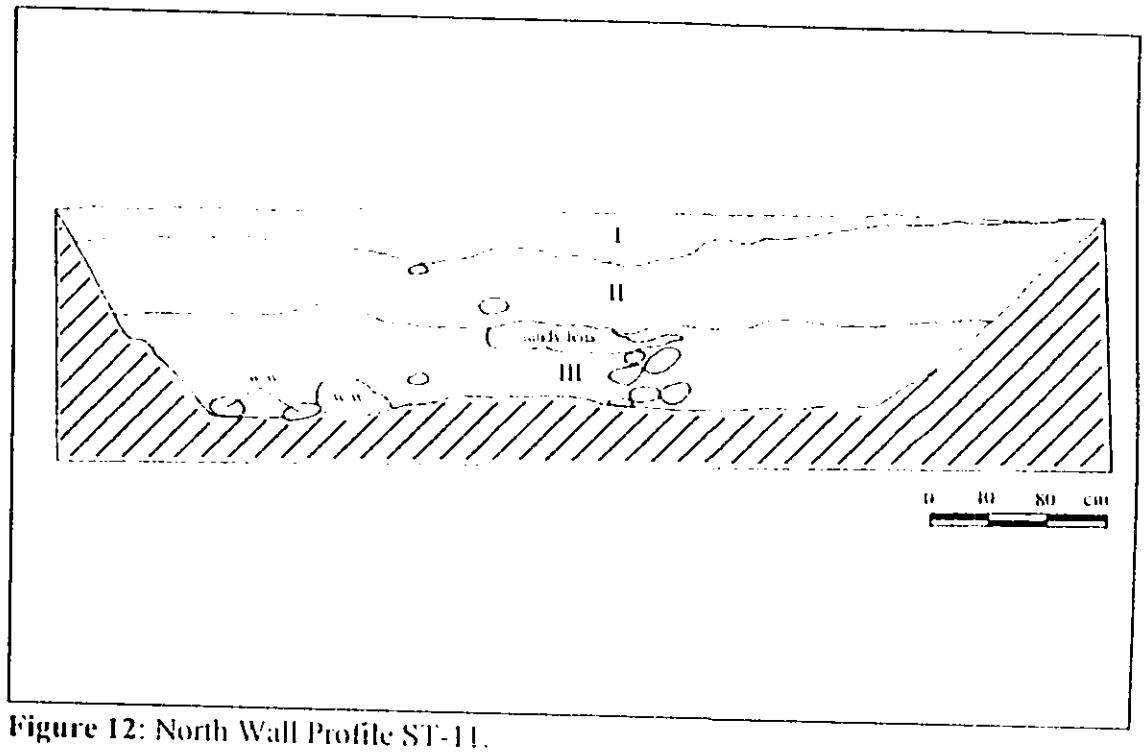


Figure 12: North Wall Profile ST-11.

The Layer I fill of ST-21 and ST-23 contained old rotten stumps, broken chunks of concrete, cardboard, and plastic.

The Layer I fill of ST-27 contained decomposing bedrock, pieces of PVC piping, recent glass shards, rubber (shredded tires) beer cans, plastic, stumps, and wire.

DISCUSSION AND CONCLUSIONS

A total of 40 backhoe trenches were excavated within the project area. No cultural deposits, other than modern trash in fill material, were present in any of the trench excavations. Based on the results of the trench excavations the entire parcel appears to have been heavily impacted by prior mechanical disturbance of the soil. Information provided by the backhoe operator regarding more recent land modification included sugar cane cultivation, and grubbing activity over the entire parcel in 1993-94.

The majority of the soil deposition within the project area is characterized by two layers consisting of fill overlying decomposing bedrock. Layer I throughout the project area consisted of fill. The northwest portion of the project adjacent to Iao Stream is characterized by two layers, fill overlying old riverbed deposit as was found in ST-2 and ST-4. ST-1 in that same area consisted of a fill layer over a natural sand deposit which is consistent with its proximity to the old river channel. In many of the trenches the fill material contained irrigation drip-line hose and recent trash, including soda and beer cans, plastic, broken pieces of cement, and plastic pipe fragments.

The presence of *lo'i* terracing and related soils stratigraphy was expected in the project area based on the archival research. The lack of any *in situ* subsurface deposits in this area where LCA information indicates that numerous *lo'i* fields and mid 19th century agricultural endeavors existed speaks to the disturbed nature of the whole parcel being surveyed.

Since no cultural deposits of any kind were discovered, further development on this parcel would appear to have no significant impact on any known historic sites. Because sufficient data was obtained through the current phase of trenching work, no further archaeological study is needed.

REFERENCES CITED

Barrera, W.
1976 *Archaeological Survey at Waiale, Maui.* Chinago Enterprises, Honolulu.

Board of Commissioners
1929 *Indices of Awards Made by the Board of Commissioners to Quiet Land Titles in the Hawaiian Islands.* Star Bulletin Press, Honolulu.

Burgett, B. and R.L. Spear
1995a *An Archaeological Inventory Survey of TMK: 3-8-37:48, Wailuku Ahupua`a,* Wailuku District, Island of Maui. Scientific Consultant Services, Honolulu.

Burgett, B. and R.L. Spear (Cont.)
1996 *An Archaeological Inventory Survey of the Oceanhouse, Inc. Property, [TMK:3-4-39:77], Land of Wailuku, Wailuku District, Island of Maui,* Scientific Consultant Services, Inc.

Carlquist, S.
1980 *Hawaii, A Natural History.* S.B. Printers: Honolulu.

Chinen, Jon J.
1971 *Original Land Titles In Hawaii.* Copyright 1961 Jon Jitsuzo Chinen. Honolulu.

Conde J. C., and G. M. Best
1973 *Sugar Trains Narrow Gauge Rails of Hawaii.* Glenwood Publishing.

Connoly, R.D.
1973 *State Historic Register Survey.* Identification Number 50-50-04-1172. SHPD Files.

Cordy, R. H.
1974 *Cultural Adaptation and Evolution in Hawaii: A suggested new sequence.* J. Polynesian Soc. 83:

Creed, V.S.
1993 *Settlement Pattern for Waikapu, Wailuku District, Maui, Hawaii.* Vol. I. Cultural Surveys Hawaii.

Daws, Gavin
1968 *Shoal of Time.* University of Hawaii Press. Honolulu

Donham, T.K.
1992 *Human Skeletal Remains Discovered at the Maui Homeless Shelter Construction Site (50-50-04-2916) Wailuku, Maui.* SHPD.

in prep. *Human Skeletal Remains Discovered under Waiale Road, Wailuku, Maui.* SHPD.

in prep. *Discovery of Human Skeletal Remains at Home Maid Bakery Construction Site.* SHPD.

in prep. *Recovery of Human Skeletal Remains at Site 50-50-04-1172.* SHPD.

Earle, Timothy
1978 *Economic and Social Organization of a Complex Chiefdom: The Halelea District, Kaua`i, Hawaii.* Anthropological Papers No. 63.University of Michigan. Ann Arbor, Michigan.

Foote, D.E., E.L. Hill, S. Nakamura, and F. Stephens
1972 *Soil Survey of the Islands of Kauai, Oahu, Maui, Molokai, and Lanai, State of Hawaii* U.S. Department of Agriculture - Soil Conservation Service and University of Hawaii Agricultural Experiment Station. Washington D.C.: Government Printing Office.

Fornander, Abraham
1969 *The Polynesian Race.* Charles Tuttle Company. Japan.

Fredericksen, W.M.
1994 *Monitoring of Sand Removal from the Home Maid Bakery Project Site. Letter report to SHPD.* Xamanek Researches, Maui.

Fredericksen, W.M and D.L Fredericksen
1997a *Archaeological Inventory Survey for Proposed Maui Texaco Service Station, Located at Lower Main and Mill Streets, Wailuku* Ahupua`a, *Wailuku District, Island of Maui.*

1997b *Archaeological Data Recovery Report for Site 50-50-04-3120 Nisei Veterans Memorial Center TMK 3-8-07:123, Wailuku, Maui Island.*

1992 *An Inventory Survey of a Parcel of Land (TMK:3-08-08:123) Located in the Ahupua`a of Wailuku, Island of Maui.* Xamanek Researches, Maui.

1990 *An Inventory Survey of a Commercial Parcel on Lower Main Street, Wailuku, Maui.*

Handy, E.S. Craighill and E. G. Handy
1972 *Native Planters in Old Hawaii.* Bishop Museum Bulletin 233. Honolulu, Hawai`i.

Hawaii State Archives
n.d. *Native and Foreign Testimonies for Land Commission Awards.* Interior Department Files.

Hungerford, J.B.
1963 *Hawaiian Railroads.* Hungerford Press: Reseda.

Kamakau, S.M.
1960 *Ruling Chiefs of Hawaii.* Kamehameha Schools Press: Honolulu.
1992 *Ruling Chiefs of Hawaii (revised edition).* Kamehameha Schools Press. Honolulu.

Kame`elehiwa, L.
1992 *Native Land and Foreign Desires.* Bishop Museum Press: Honolulu.

Kennedy, J.
1995a *Inventory Survey of TMK:3-4-30:11 Subdivision "C" Located at Paukualo, Wailuku, Island of Maui.* Archaeological Consultants of Hawaii: Haleiwa.

1990b *Archaeological Subsurface Testing Results at the Site of the Proposed Maui Community Arts and Cultural Center, TMK: 3-08-07, Located at Kahului, Maui.* Archaeological Consultants Hawaii, Oahu.

Kirch, P. V.
1985 *Feathered Gods and Fishhooks.* University of Hawaii Press. Honolulu.

Kirch, Patrick V. And Marshall Sahlins
1992 *Anahulu.* Vol. 1 and 2. University of Chicago Press. Chicago.

Kuykendall, R.S. and A.G. Day
1961 *Hawaii: A History from Polynesian Kingdom to American State.* Prentice-Hall: Englewood Cliffs.

Kuykendall, R.S.
1938 *The Hawaiian Kingdom Vol.1, 1778-1854, Foundation and Transformation.* University Press of Hawaii: Honolulu.

Lyons, C.J.
1875 *Land Matters in Hawaii.* In *The Islander* Vol. 1. Honolulu.

Neller, E.
1984 *Recovery of Endangered Bones from the Wailuku Sand Hills.* SHPD.

Pantaleo, J, and A. Sinoto
1996 *Archaeological Subsurface Sampling of the Proposed Maui Lani Development Phases I and IA, Wailuku Ahupua`a, Wailuku District, Maui Island.* For Maui Lani Partners

Price, S. [in] Armstrong, R.W, (ed)
1883 *Atlas of Hawaii.* University Press of Hawaii, Honolulu. (Second Edition)

Rotunno, L. and P. Cleghorn
1990 *Archaeological Survey of TMK: 3-4-30:11, Wailuku, Maui.* Bishop Museum, Honolulu.

Rotunno, L.
1996 *Archaeological Testing of Four Sites on the Maui Lani Property in Wailuku Ahupua`a, Wailuku District, Island of Maui, Hawai`i.* Dept. Of Anthrop., Bishop Museum. Honolulu.

Sinoto, A.
1990 *Post Field Summary, Maui Lani Sand Borrow Site, Wailuku, Maui Island.* Bishop Museum, Honolulu.

Speakman, C.E., Jr.
1978 *Moree: An Informal History of the Hawaiian Islands.* Pueo Press: San Francisco.

Stearns, H. T.
1966 *Geology of the State of Hawaii.* Pacific Books: Palo Alto, Calif.

Walker, W.M.
1931 *Archaeology of Maui.* Bishop Museum: Honolulu.

APPENDIX A
Stratigraphy Trench Soil Descriptions

Appendix A: Soil Descriptions

Trench	Layer	Color	Approx. Thickness	Texture	Structure		Consistency		Roots	Rock	Boundary
			[cm]			Dry	Moist	Wet			
ST-1	I	10YR 2/2 Very Dark Brown	102	sicl	3/f-m/sg-cr	-	mfr	ws	2	common	as
ST-1	II	10YR 6/4 Light Yellowish Brown	105	fs	0/f/sg	-	mlo	wso	1	few	
ST-2	I	10YR 3/3 Dark Brown	290+	sil	1/f-c/cr-sg	dlo	mvfr	wss	2	common	
ST-2	II	River Bed									
ST-3	I	10YR 3/3 Dark Brown	290+	sil	1/f-c/cr-sg	dlo	mvfr	wss	2	common	
ST-4	I	10YR 3/3 Dark Brown	290+	sil	1/f-c/cr-sg	dlo	mvfr	wss	2	common	
ST-4	II	River Bed									
ST-5	I	10YR 2/2 Very Dark Brown	100	sicl	1/f-c/cr-sg	dlo	mvfr	wss	2	very common- w/w	
ST-6	I	10YR 2/2 Very Dark Brown	65	sicl	2/m/cr	dsh	mfi	wss	1		w
ST-6	II	10YR 5/8 Yellowish Brown		sicl	2/m/cr	dsh	mfi	wss	vl		
ST-7	I	10YR 2/2 Very Dark Brown	120	sicl	2/m/cr	dsh	mfi	wss	1		
ST-7	II	7.5YR 3/4 Dark Brown	100	sic	2/m/cr	dsh	mvfi	ws	vl		
ST-8	I	7.5YR 3/2 Dark Brown	70	sic	2/m/cr	dsh	mfi	wss	1		
ST-8	II	7.5YR 4/6 Strong Brown	75	gsicl	3/c/cr	dh	mvfi	wss	vl		
ST-9	I	7.5YR 3/2 Dark Brown	65	sic	2/m/cr	dsh	mfi	wss	1		
ST-9	II	7.5YR 4/6 Strong Brown	65	gsicl	3/c/cr	dh	mvfi	wss	vl		
ST-10	I	7.5YR 3/2 Dark Brown	63	sic	2/m/cr	dsh	mfi	wss	1		
ST-10	II	7.5YR 4/6 Strong Brown	107	gsicl	3/c/cr	dh	mvfi	wss	vl		
ST-11	I	7.5YR 3/2 Dark Brown	42	sic	2/m/cr	dsh	mfi	wss	1		
ST-11	II	7.5YR 3/2 Dark Brown	53	gcl	3/c/cr	dh	mvfi	wss	1		
ST-11	III	7.5YR 4/6 Strong Brown	45	gsicl	3/c/cr	dh	mvfi	wss	vl		
ST-12	I	7.5YR 3/2 Dark Brown	62	sic	2/m/cr	dsh	mfi	wss	1		
ST-12	II	7.5YR 4/6 Strong Brown	59	gsicl	3/c/cr	dh	mvfi	wss	vl		
ST-13	I	7.5YR 3/2 Dark Brown	60	sic	2/m/cr	dsh	mfi	wss	1		
ST-13	II	7.5YR 4/6 Strong Brown	65	gsicl	3/c/cr	dh	mvfi	wss	vl		
ST-14	I	7.5YR 3/2 Dark Brown	43	sic	2/m/cr	dsh	mfi	wss	1		
ST-14	II	7.5YR 3/3 Dark Brown	42	gsicl	3/c/cr	dsh	mvfr	ws	vl		
ST-14	III	10YR 5/3 Yellowish Brown	37	gsic	3/c/cr	dh	mvfr	ws	vl		
ST-15	I	10YR 3/2 Dark Brown	80	gsicl	3/c/cr	dsh	mvfr	ws	1		
ST-15	I	10YR 4/4 Dark Yellowish Brown	62	gsic	3/c/cr	dh	mfr	ws	vl		
ST-16 thru 40	I	10YR 4/4 Dark Yellowish Brown		gsic	3/c/cr	dh	mfr	ws	vl		
	II	7.5YR 4/6 Strong Brown		gsicl	3/c/cr	dh	mvfi	wss	vl		

Appendix C

Traffic Impact Assessment Study - Wailuku Parkside

TRAFFIC IMPACT ASSESSMENT STUDY

WAILUKU PARKSIDE
SINGLE-FAMILY RESIDENTIAL

WAILUKU, MAUI, HAWAII

March 1998

PARSONS BRINCKERHOFF

Over a Century of Engineering Excellence

Traffic Impact Assessment Study

WAILUKU PARKSIDE
SINGLE-FAMILY RESIDENTIAL
WAILUKU, MAUI HAWAII

March 1998

Prepared for:

Stanford S. Carr Development Corporation
841 Bishop Street, Suite 2118
Honolulu, Hawaii 96813

Prepared by:

Parsons Brinckerhoff Quade & Douglas, Inc.
Pacific Tower, Suite 3000
1001 Bishop Street
Honolulu, Hawaii 96813
Ph. (808) 531-7094

PB Ref.: 16267A.01

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

I. INTRODUCTION

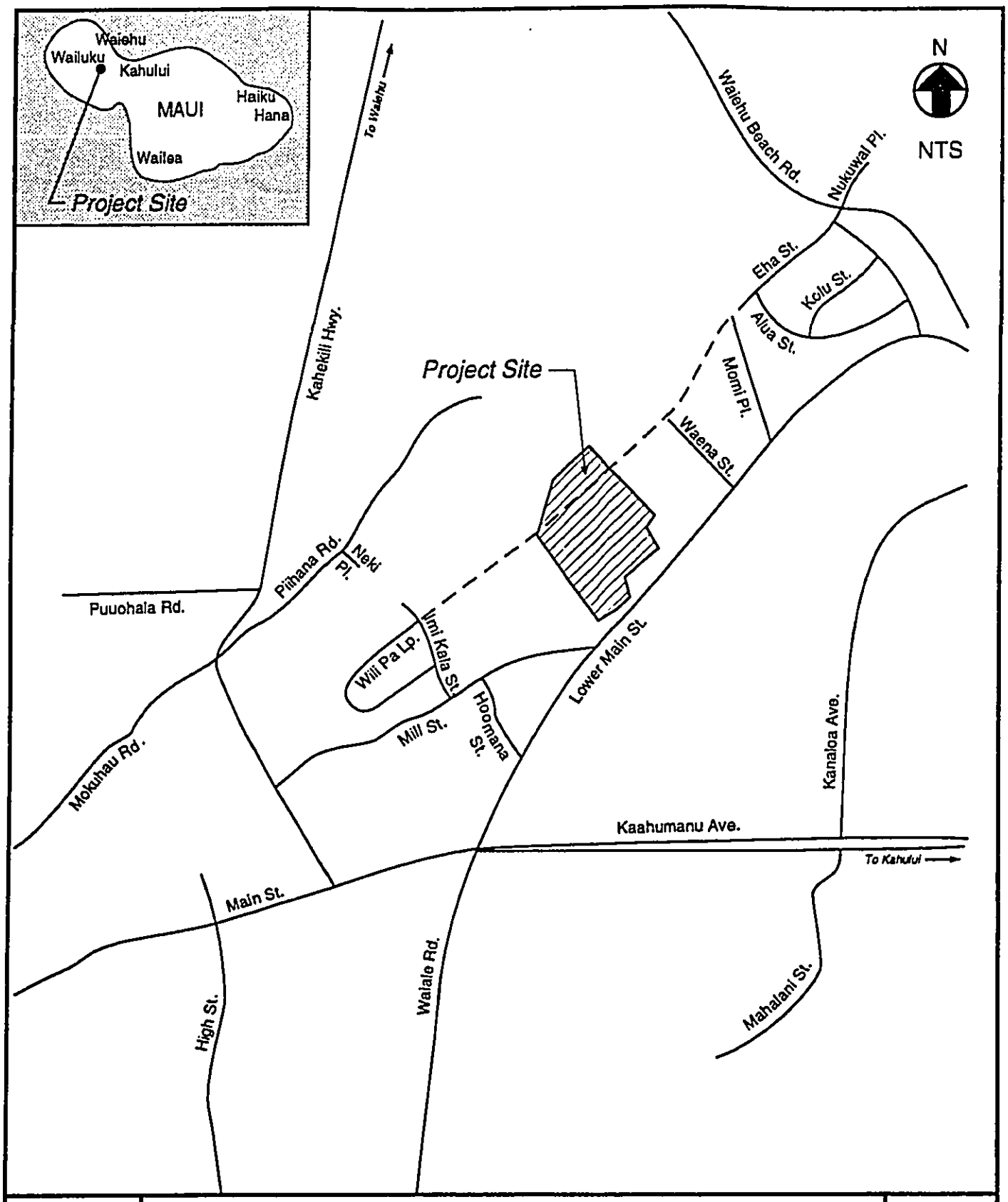
Stanford S. Carr Development Corporation proposes to develop the Wailuku Parkside residential development in Wailuku, Maui. The site will consist of 118 single-family residential units. The location of the proposed development is shown in Figure 1.

This site was previously referred to as the Wailuku Industrial Park II, Increment Two. In May 1993, Parsons Brinckerhoff, Quade and Douglas, Inc. performed a traffic impact study for the proposed site. At the time of the study, the development plans for the site called for either 400 multi-family residential units or 30 acres of light industrial use. The proposed development is significantly less at 118 single-family residential units.

Access to the proposed development is from Eha Street between Waena Street and Imi Kala Street. The opening of Eha Street from Waiehu Beach Road to Imi Kala Street will change travel patterns in the study area and this modification is incorporated into this study. Traffic impacts were evaluated at five intersections in the study area. They are:

1. Lower Main Street and Waena Street
2. Waena Street and Eha Street
3. Mill Street and Imi Kala Street
4. Imi Kala Street and Wili Pa Loop
5. Imi Kala Street and Wili Pa Loop/Eha Street

The proposed development is projected to be completed in the year 2000. The year 2000 is the projected year for which traffic impacts are determined.



PB 100 YEARS

PROJECT LOCATION

Figure 1

II. EXISTING CONDITIONS

The planned area for construction of Wailuku Parkside is the vacant parcel mauka of the existing Iao Parkside development on Eha Street. Access to the site will be provided via access roads to Eha Street.

A. Existing Roadway System

1. Existing Roadways

Major roadways within the project area include:

1. Lower Main Street
2. Waena Street
3. Eha Street
4. Mill Street
5. Imi Kala Street
6. Wili Pa Loop

a. Lower Main Street

In the study area, Lower Main Street is a four-lane, undivided roadway that runs from Waiehu Beach Road to a point just mauka of its intersection with Waena Street. From there to Wailuku, Lower Main Street is, primarily, a two-lane undivided roadway. Parking is not permitted on Lower Main Street. The posted speed limit is 30 mph.

b. Waena Street

Waena Street is a connector road between Lower Main Street and Eha Street. Existing development along Waena Street include commercial and residential development. Papohaku Park and Community Center are also located on Waena Street. Waena Street is a two-lane, roadway with median left-turn lanes and curb and gutters on both sides of the roadway. The posted speed limit is 20 mph.

c. Eha Street

Eha Street is a two-lane roadway that runs from Waiehu Beach Road to Imi Kala Street, roughly parallel to Lower Main Street. Currently, Eha Street is barricaded just makai of Imi Kala Street. There is one through lane in each direction with median left-turn lanes.

Sidewalks and curb and gutters are provided on both sides on the road. The posted speed limit is 20 mph.

d. Mill Street

Mill Street is a collector road that runs from North Market Street to Lower Main Street. Mill Street is a two-lane roadway that services residential and commercial development. The south side of Mill Street is curbed and the north side alternates between curbed and open shoulder treatment. The St. Anthony School is on the south side of Mill Street, near its intersection with Lower Main Street. The posted speed limit is 20 mph.

e. Imi Kala Street

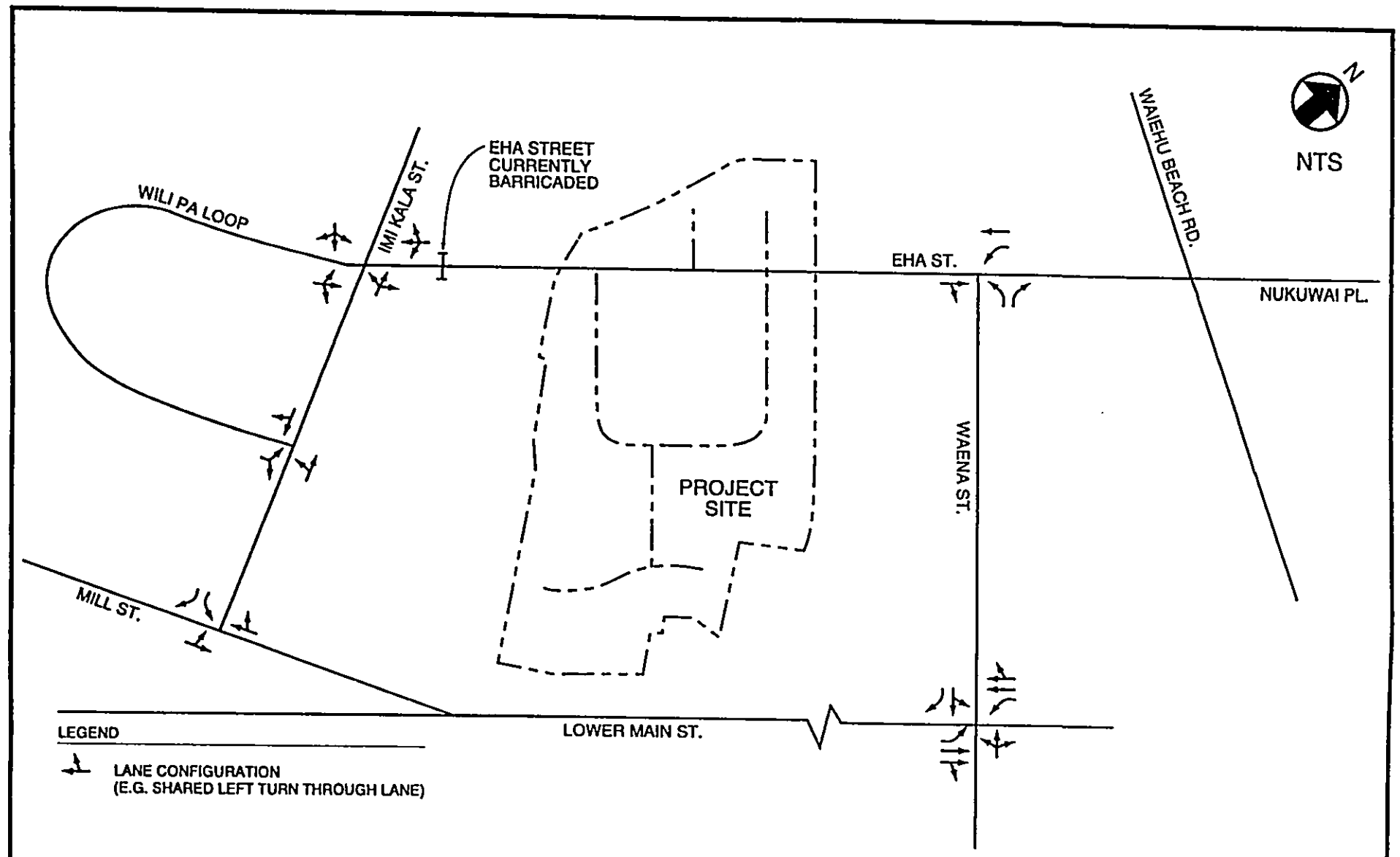
Imi Kala Street provides access to the Millyard commercial development. Beginning at an unsignalized, "T"-intersection at Mill Street, it proceeds west and terminates between its intersection with Wili Pa Loop/Eha Street and Iao Stream. Imi Kala Street is striped as a two-lane, undivided roadway, but there is sufficient width to provide four through lanes in the future. Curb and gutters are provided and parallel parking is permitted on both sides of the roadway. The posted speed limit is 20 mph.

f. Wili Pa Loop

Wili Pa Loop is a two-lane roadway with curb and gutters provided on both sides of the roadway. Parallel parking is permitted on both sides of the road. There is frequent commercial driveway access along Wili Pa Loop. The posted speed limit is 20 mph.

2. Existing Intersections

Within the study area, five existing intersections were evaluated. They are: 1) Lower Main Street and Waena Street, 2) Waena Street and Eha Street, 3) Mill Street and Imi Kala Street, 4) Imi Kala Street and Wili Pa Loop, and 4) Imi Kala Street and Wili Pa Loop/Eha Street. Figure 2 summarizes the lane configurations of these intersections.



EXISTING LANE CONFIGURATIONS

Figure 2

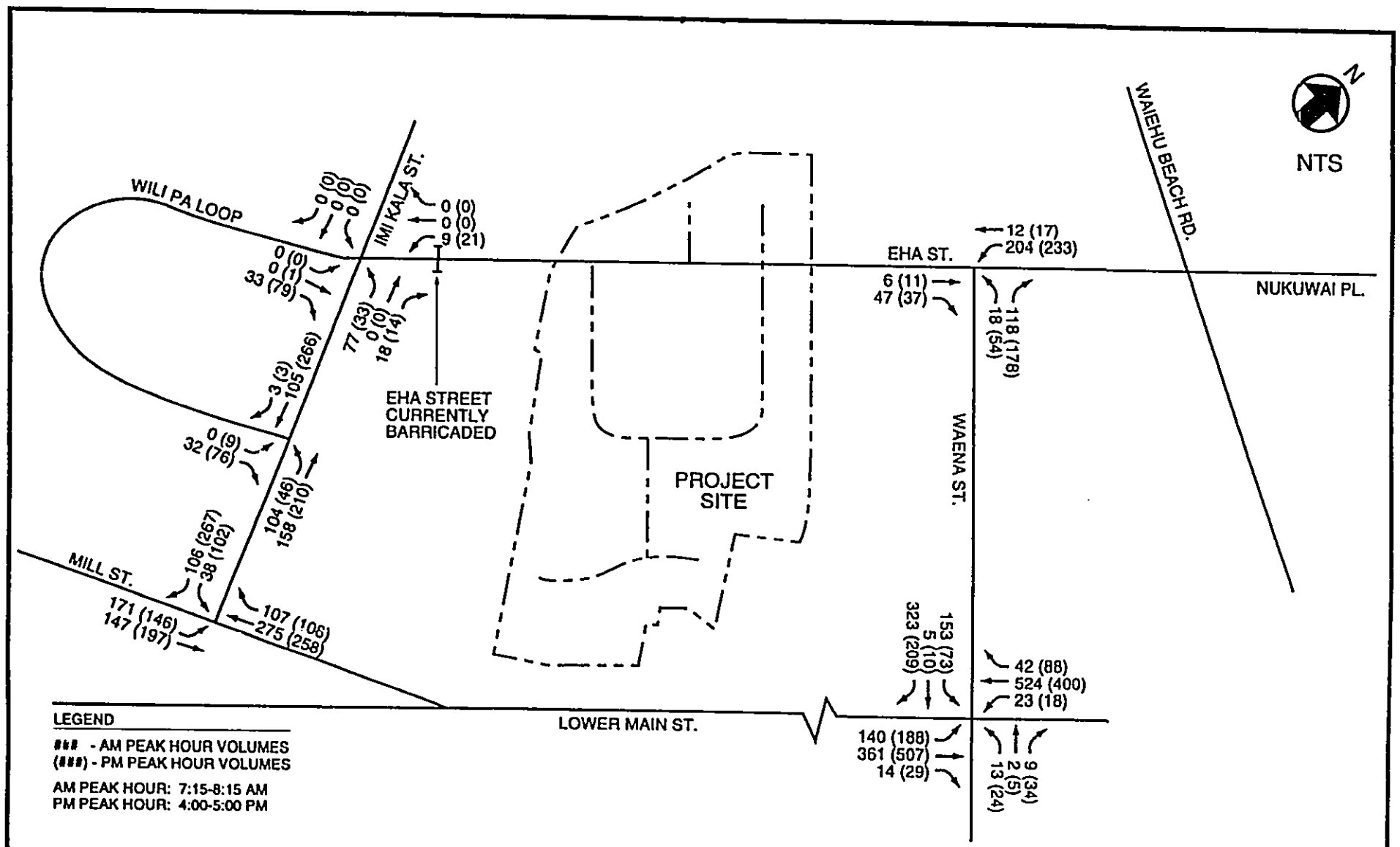
B. Existing Traffic Volumes, Intersection Configurations and Field Observations

Intersection turning movement counts were performed at the intersections during the morning and evening peak periods. The morning peak period was counted on January 18, 1998, Thursday from 6:30 to 8:30 a.m.. The evening peak period was counted on January 17, 1998 from 3:30 to 5:30 p.m.. The morning peak hour was found to occur from 7:15 a.m. to 8:15 a.m., while the evening peak hour was found to occur from 4:00 p.m. to 5:00 p.m.. Figure 3 summarizes the peak hour volumes at the study area intersections. Copies of the traffic count data are in Appendix A.

As part of the traffic counting process, observations were made to identify any unusual traffic patterns or congestion causing activities. At the intersection of Lower Main Street and Waena Street, Lower Main Street corridor observations were that congestion was not significant in either peak period. The Waena Street traffic was moderate in both peak periods. Traffic signal operations were observed to change phasing very frequently. The frequent changes appeared to be the result of the controller not receiving detection to extend a phase. This could be the result of advance loop detector failure or the absence of advance loops.

The observations at the Waena Street and Eha Street intersection indicated no significant congestion. The existing left-turn storage lane from Eha Street to Waena Street provides enough storage for about two vehicles. Vehicles were observed making the left turn from Eha Street to Waena Street from the through lane.

The observations at the Mill Street intersection with Imi Kala Street identified some minor congestion. In the evening peak period, once every 15 minutes vehicles making the left turn from Imi Kala Street to Mill Street would queue 3 to 4 vehicles. The queue resulted due to the lack of gaps in Mill Street traffic. Vehicles waited at most 30 seconds. At other times, the left turning vehicles experienced less than 10 seconds of delay.



EXISTING TRAFFIC VOLUMES

Figure 3

C. Existing Intersection Operations

The intersections were analyzed using the methodologies for unsignalized and signalized intersections outlined in the 1994 Highway Capacity Manual (HCM). Operating conditions at an intersection are expressed as a qualitative measure known as Level of Service (LOS). Letter designations ranging from 'A' through 'F' are used, with LOS 'A' representing very low delay conditions and LOS 'F' representing over-saturation conditions.

The results of the analyses are shown in Table 1. The overall intersection LOS is a result of a weighted average of the individual movement LOS's, also shown in Table 1. The results of the analyses indicate that the intersections as a whole operate very well, at LOS 'B' or better. Most of the side streets operate well. The left turn movement from Imi Kala Street to eastbound Mill Street during the evening peak hour operates at LOS D, which indicates that vehicles executing this movement experiences some delay.

Table 1

Existing Conditions
Level of Service Summary

INTERSECTION	A.M. Peak Hour LOS	A.M. Peak Hour DELAY (sec/veh)	P.M. Peak Hour LOS	P.M. Peak Hour DELAY (sec/veh)
Lower Main St./Waena St./Shopping Center Access (Signalized)				
Overall Intersection Performance	B	10.7	B	9.5
Minor Left (EB) Movement	B	5.3	B	5.1
Minor Left (WB) Movement	A	3.8	B	7.3
Major Left (NB) Movement	B	12.6	B	13.2
Major Left (SB) Movement	C	15.2	B	13.4
Waena Street/Eha Street (Unsignalized)				
Overall Intersection Performance	A	2.7	A	3.1
Minor Left (NB) Movement	B	7.2	B	7.4
Minor Right (NB) Movement	A	3.2	A	3.3
Major Left (WB) Movement	A	2.9	A	2.8
Mill Street/Imi Kala Street (Unsignalized)				
Overall Intersection Performance	A	2.2	A	4.1
Minor Left (SB) Movement	C	15.2	D	21.3
Minor Right (SB) Movement	B	5.0	B	6.1
Major Left (EB) Movement	A	4.5	A	4.0
Imi Kala Street/Wili Pa Loop (Unsignalized)				
Overall Intersection Performance	A	0.9	A	0.9
Minor Left & Right (EB) Movement	A	3.1	B	5.1
Major Left (NB) Movement	A	2.7	A	3.0
Imi Kala Street/Wili Pa Loop/Eha Street (Unsignalized)				
Overall Intersection Performance	A	2.2	A	2.7
Minor EB Approach	A	2.7	A	2.9
Minor WB Approach	A	4.7	A	4.7
Major Left (NB) Movement	A	2.2	A	2.2
Major Left (SB) Movement	A	2.2	A	2.1

Notes: Overall intersection and shared lane LOS is a weighted average of specific movement LOS.

Copies of the analysis worksheets are included in Appendix B of this report.

III. YEAR 2000 TRAFFIC CONDITIONS - WITHOUT WAILUKU PARKSIDE

The Wailuku Parkside development is projected to be completed in the year 2000. Traffic operations were evaluated for two future conditions to determine the impacts for the Wailuku Parkside development. The Year 2000 without Wailuku Parkside and the Year 2000 with Wailuku Parkside. The difference between the two conditions represents the traffic impact of the Wailuku Parkside development

A. Year 2000 Traffic Volumes, Without Wailuku Parkside

The Year 2000 traffic volumes incorporates two elements, the annual background growth in traffic and changes to the travel patterns with the opening of Eha Street.

1. Background Traffic Growth

The short-term growth trends used in the previous traffic study were compared with traffic trends on Lower Main Street. The result is that on Lower Main Street west of Waena Street, there is less traffic in the morning peak hour today then there was in 1993. The evening peak hour volumes are higher today than in 1993. The annual growth rate was computed to be 1.5%. For the purpose of this study, we will use the higher annual growth rate previously used which was 3.3%. The average annual growth rate was applied to the existing traffic volumes shown in Figure 3.

2. Travel Pattern Modifications Due to Eha Street Opening

Today Eha Street physically runs from Waiehu Beach Road to Imi Kala Street. However, traffic cannot use Eha Street to access Imi Kala Street, because Eha Street is barricaded just east of Imi Kala Street. This forces traffic on Eha Street to use Waena Street to enter and exit the area.

It is anticipated that the barricade on Eha Street will be removed, allowing traffic to utilize Eha Street for its full length between Waiehu Beach Road and Imi Kala Street by the Year 2000. This will alter travel patterns within the study area. Using the turning movement counts at the intersections in the study area and traffic count data from the previous study

at the intersection of Lower Main Street and Mill Street, intersection turning movement traffic volumes were modified to reflect the opening of Eha Street. The opening of Eha Street affects all five intersections analyzed in the study area. Eha Street provides a direct route from the Iao Parkside/Wailuku Industrial Park to the Mill Yard Industrial Park and Wailuku. Less traffic will be accessing Lower Main Street and Waena Street but traffic volumes on Eha Street and Imi Kala Street will increase. Figure 4 combines the background traffic growth and the travel pattern modification.

B. Year 2000 Intersection Operations Without Wailuku Parkside

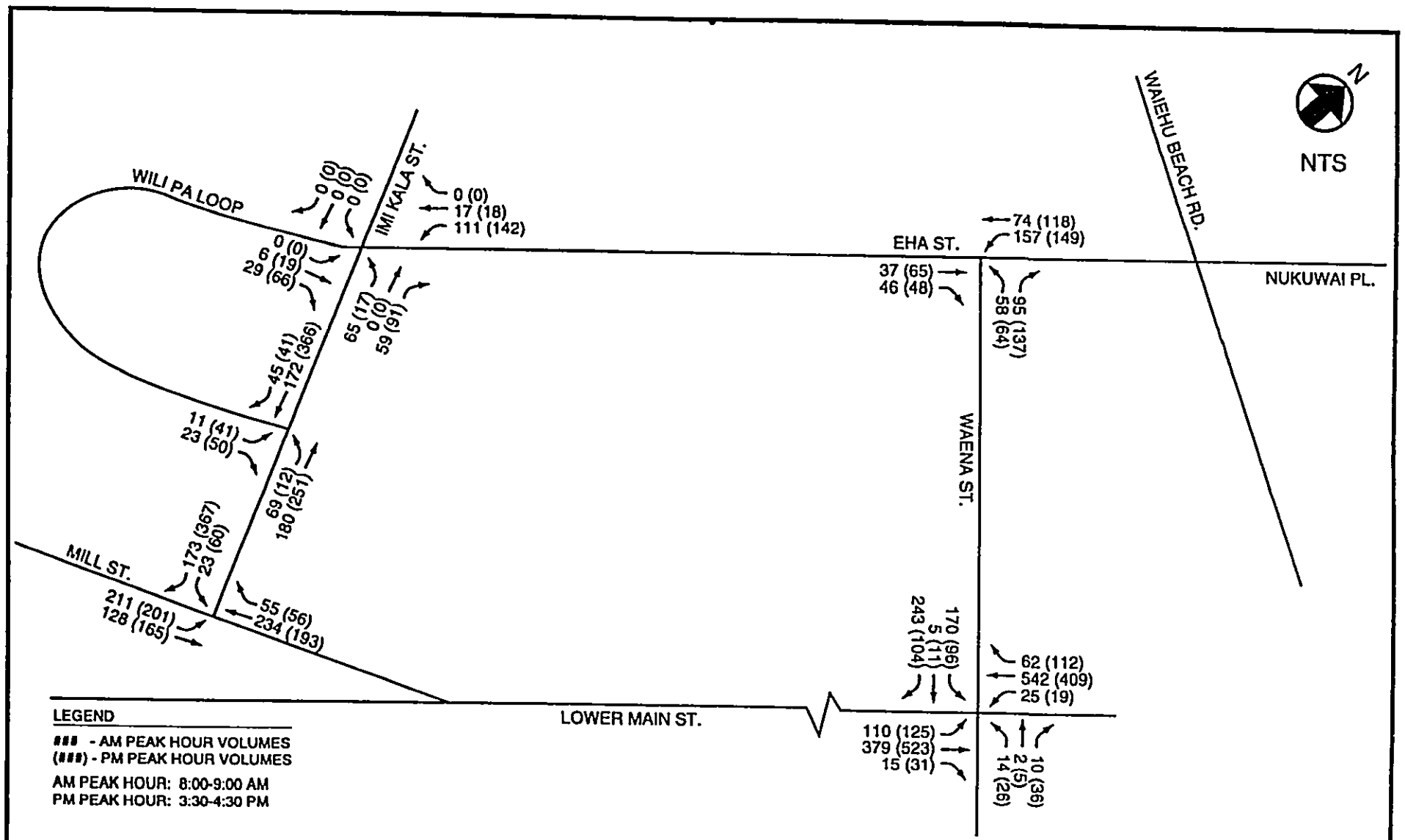
The volumes in Figure 4 were then analyzed using the existing lane configurations shown in Figure 2. The 1994 Highway Capacity Manual methodologies for unsignalized and signalized intersections were applied and Table 2 is a summary of the results. The overall intersection LOS is a result of a weighted average of the individual movement LOS's, also shown in Table 2.

The level of service analysis indicates that all of the intersections will continue to operate at LOS B or better. The change in performance for individual intersection turning movements ranges from a decrease in average delay of 5.7 seconds to an increase of 7.2 seconds.

The decrease in average delay of 5.7 seconds is projected for the left-turn movement from Imi Kala Street to Mill Street during the evening peak hour. This turning movement currently operates at LOS D and is projected to improve to LOS C in the short-range future. This is due to the ability for traffic to utilize Eha Street in addition to Imi Kala Street when exiting the Mill Yard development.

The increase in average delay of 7.2 seconds is projected for the shared left and right-turn lane on Wili Pa Loop to Imi Kala Street during the evening peak hour. This turning movement currently operates at LOS B and will operate at LOS C in the short-range future. This change merely reflects the reorientation of traffic to take advantage of Eha Street as an alternative access to the Mill Yard development.

No intersection turning movement is projected to operate lower than LOS C, an improvement over the existing condition which has one turning movement operating at LOS D.



YEAR 2000 WITHOUT PROJECT, EHA OPEN

Figure 4

Table 2

Year 2000 Without Wailuku Parkside Conditions
Level of Service Summary

INTERSECTION	A.M. Peak Hour LOS	A.M. Peak Hour DELAY (sec/veh)	P.M. Peak Hour LOS	P.M. Peak Hour DELAY (sec/veh)
Lower Main St./Waena St./Shopping Center Access (Signalized)				
Overall Intersection Performance	B	12.0	B	10.3
Major Left (EB) Movement	B	5.1	A	4.6
Major Left (WB) Movement	A	3.8	B	7.4
Minor (NB) Left/Through/Right Movement	B	12.8	B	13.6
Minor (SB) Through/Left Movement	C	16.8	C	15.3
Waena Street/Eha Street (Unsignalized)				
Overall Intersection Performance	A	2.9	A	2.6
Minor Left (NB) Movement	B	9.9	B	9.3
Minor Right (NB) Movement	A	3.4	A	3.6
Major Left (WB) Movement	A	3.0	A	2.9
Mill Street/Imi Kala Street (Unsignalized)				
Overall Intersection Performance	A	2.5	A	3.8
Minor Left (SB) Movement	C	13.3	C	15.6
Minor Right (SB) Movement	B	5.1	B	6.3
Major Left (EB) Movement	A	4.1	A	3.7
Imi Kala Street/Wili Pa Loop (Unsignalized)				
Overall Intersection Performance	A	0.9	A	1.6
Minor Left & Right (EB) Movement	B	5.4	C	12.3
Major Left (NB) Movement	A	3.3	A	3.7
Imi Kala Street/Wili Pa Loop/Eha Street (Unsignalized)				
Overall Intersection Performance	A	4.0	A	4.7
Minor EB Approach	A	3.1	A	4.0
Minor WB Approach	B	6.9	B	8.1
Major Left (NB) Movement	A	2.2	A	2.1
Major Left (SB) Movement	A	2.4	A	2.4

Notes: Overall intersection and shared lane LOS is a weighted average of specific movement LOS.

Copies of the analysis worksheets are included in Appendix B of this report.

IV. YEAR 2000 TRAFFIC CONDITIONS - WITH WAILUKU PARKSIDE

The Wailuku Parkside development is projected to be completed in the year 2000. The proposed development consists of 118 single-family residential units and will have a park for residents. Access to the site will be from Eha Street. The residential streets within the Wailuku Parkside development will have 44-foot-wide right-of-ways and 28-foot-wide, paved travelways in accordance with County of Maui standards for streets in residential-zoned areas. Minimum offset distances between opposing residential streets are maintained along Eha Street.

A. Trips Generated by Wailuku Parkside

Traffic volumes generated by the proposed Wailuku Parkside development were estimated using the Institute of Transportation Engineers (ITE) publication, Trip Generation, 5th Edition. ITE Code 210 equations were used for the 118 single-family, detached residential units. Table 3 summarizes the number of vehicular trip generated. As shown, only 97 vehicles per hour (vph) will be generated during the morning peak hour, while 131 vph will be generated during the evening peak hour.

Table 3
Wailuku Parkside
Trip Generation Summary

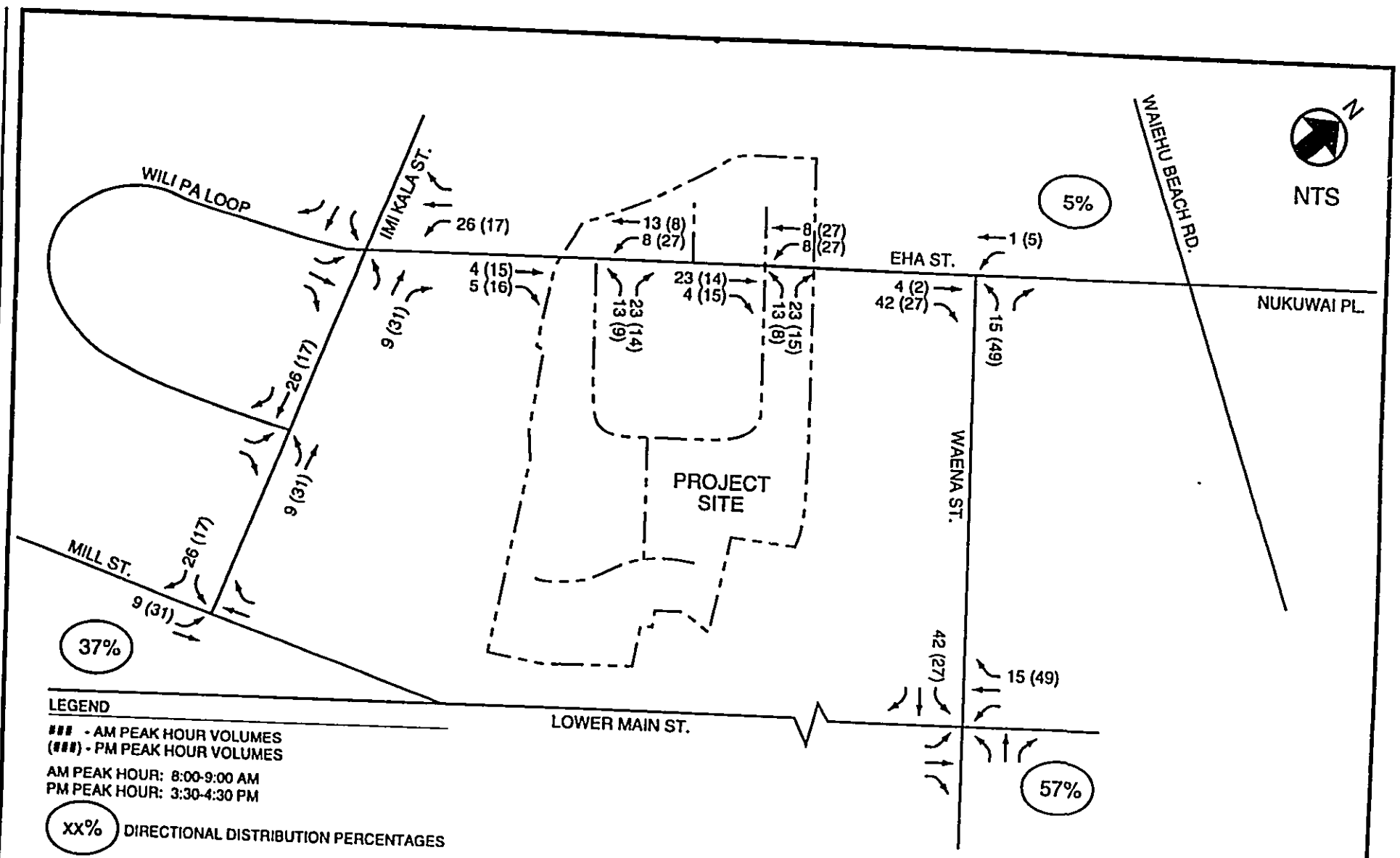
Peak Period	In	Out	Total
Morning Peak Hour	25	72	97
Evening Peak Hour	85	46	131

Note: traffic volumes are expressed in vehicles/hour

The distribution of trips generated by Wailuku Parkside assume the same pattern as the previous study. The trip distribution pattern assumes the following:

- Wailuku 19%
- Kahului 30%
- West Maui 18%
- Kihei 33%

Figure 5 assigns the trips generated by the Wailuku Parkside traffic onto the study area roadway network. The largest volume assigned to any one movement is 49 vph.



TRIP GENERATED/DISTRIBUTED PEAK HOUR TRAFFIC VOLUMES

Figure 5

B. Year 2000 Traffic Volumes With Wailuku Parkside

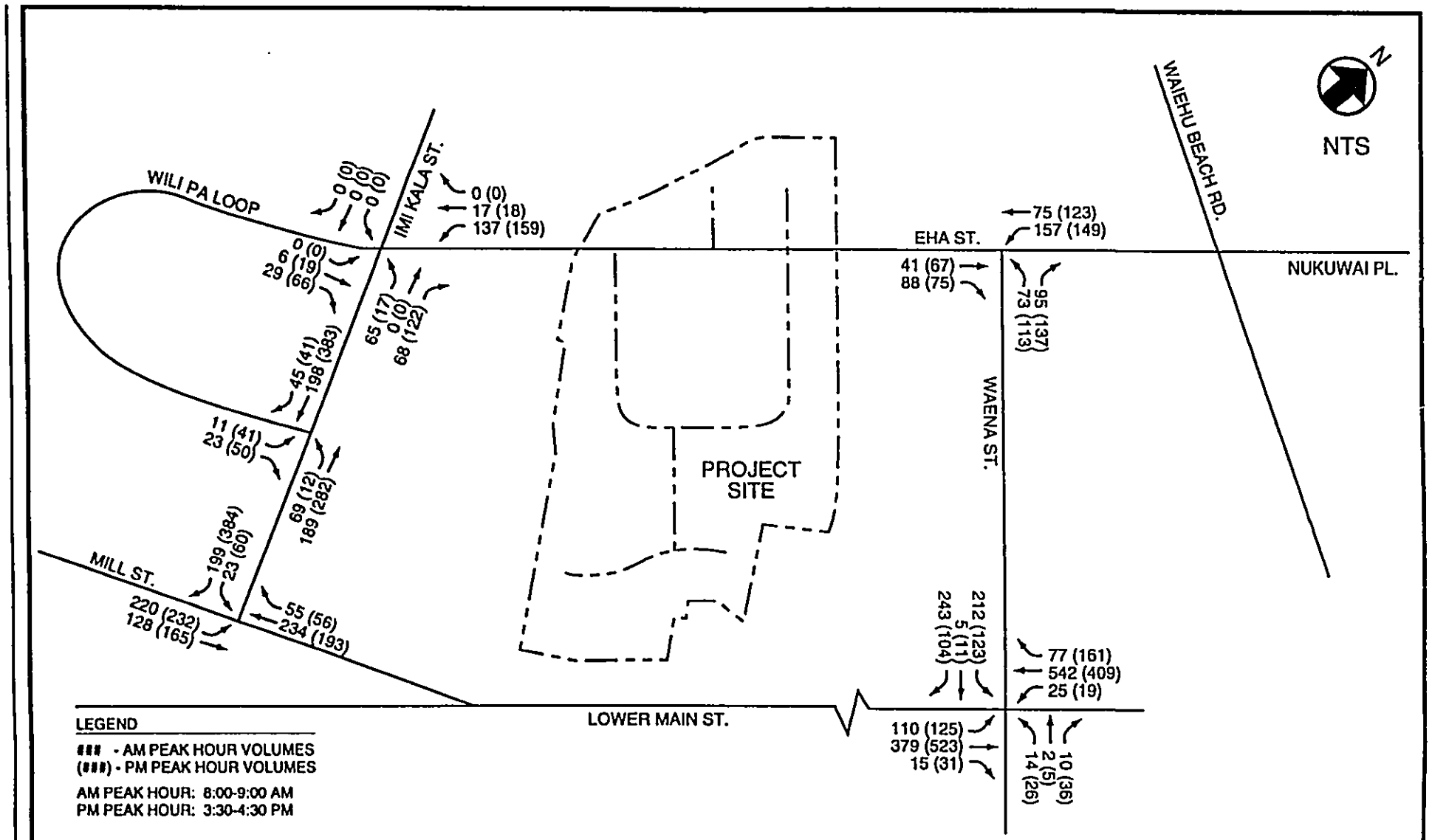
Adding the trips generated by the Wailuku Parkside development and the Year 2000 Traffic Volumes Without Wailuku Parkside will result in the Year 2000 Traffic Volumes With Wailuku Parkside. The traffic volumes are illustrated in Figure 6.

C. Year 2000 Intersection Operations With Wailuku Parkside

The peak hour volumes in Figure 6 were then analyzed using the lane configurations in Figure 2. This assumes no change from the existing lane configurations. The 1994 Highway Capacity Manual methodologies for unsignalized and signalized intersections were applied, and Table 5 summarizes the results of the analyses. The overall intersection LOS is a result of a weighted average of the individual movement LOS's, also shown in Table 4.

All of the intersections in the Year 2000 with Wailuku Parkside condition are projected to operate at similar LOS's as the Year 2000 without Wailuku Parkside condition. All intersections are projected to operate at LOS B or better. Individual intersection turning movements are projected to operate at LOS C or better. The change in performance for individual intersection turning movements ranges from no change in performance to an increase of 4.7 seconds of delay. The increase in average delay of 4.7 seconds is projected for the left-turn movement from Waena Street to Lower Main Street in the morning peak hour. The change in delay does not affect the level-of-service which is projected to operate at LOS C with or without the Wailuku Parkside development.

While analyzing this intersection, it was discovered that minor changes in the signal timing could improve intersection performance. Increasing the amount of green time for the intersection turning movement will minimize the increase in its average delay.



YEAR 2000, WITH PROJECT, WITH EHA OPEN
PEAK HOUR VOLUMES

Figure 6

Table 4

Year 2000 With Project Conditions
Level of Service Summary

INTERSECTION	A.M. Peak Hour LOS	A.M. Peak Hour DELAY (sec/veh)	P.M. Peak Hour LOS	P.M. Peak Hour DELAY (sec/veh)
Lower Main St./Waena St./Shopping Center Access (Signalized)				
Overall Intersection Performance	B	12.8	B	11.0
Major Left (EB) Movement	B	5.3	A	4.8
Major Left (WB) Movement	A	3.8	B	7.4
Minor (NB) Left/Through/Right Movement	B	12.8	B	13.7
Minor (SB) Through/Left Movement	C	21.5	C	18.7
Waena Street/Eha Street (Unsignalized)				
Overall Intersection Performance	A	3.3	A	3.7
Minor Left (NB) Movement	C	12.3	C	12.9
Minor Right (NB) Movement	A	3.6	A	3.8
Major Left (WB) Movement	A	3.3	A	3.1
Mill Street/Imi Kala Street (Unsignalized)				
Overall Intersection Performance	A	2.7	A	4.1
Minor Left (SB) Movement	C	13.7	C	18.1
Minor Right (SB) Movement	B	5.3	B	6.5
Major Left (EB) Movement	A	4.1	A	3.9
Imi Kala Street/Wili Pa Loop (Unsignalized)				
Overall Intersection Performance	A	0.9	A	1.6
Minor Left & Right (EB) Movement	B	5.7	C	13.7
Major Left (NB) Movement	A	3.4	A	3.8
Imi Kala Street/Wili Pa Loop/Eha Street (Unsignalized)				
Overall Intersection Performance	A	4.6	A	5.0
Minor EB Approach	A	3.1	A	4.1
Minor WB Approach	B	7.8	B	9.3
Major Left (NB) Movement	A	2.2	A	2.1
Major Left (SB) Movement	A	2.4	A	2.6

Notes: Overall intersection and shared lane LOS is a weighted average of specific movement LOS.

Copies of the analysis worksheets are included in Appendix B of this report.

V. SUMMARY AND CONCLUSIONS

Stanford S. Carr Development Corporation proposes to develop Wailuku Parkside in Wailuku, Maui. The site will consist of 118 single-family residential units and a park. Currently, the project is estimated to be completed in the year 2000. Access to the development is proposed from Eha Street between Waena Street and Imi Kala Street.

Within the time frame of this development, it is expected that the barricade on Eha Street in the vicinity of Imi Kala Street will be removed, thus allowing traffic to travel on Eha Street from Waiehu Beach Road to Imi Kala Street. This will change travel patterns in the study area, and this change is accounted for in this study.

A. Summary of Traffic Analysis

Table 5 summarizes the results of the intersection evaluations for the Existing condition, the Year 2000 without Wailuku Parkside condition, and the Year 2000 with Wailuku Parkside condition. As shown, intersection operations are not projected to change much from the existing condition. This is due largely to the relatively low traffic volumes generated by the proposed residential development. All intersection movements analyzed operate at LOS 'C' or better during the projected Year 2000 peak hours.

Most of the changes in intersection operations are attributable to the assumed opening of Eha Street in the near future. This will occur with or without the proposed development, and has a beneficial effect by providing an alternative route to Lower Main Street and alternative access to the existing Millyard development.

B. Conclusion

Based on the analysis of the projected Year 2000 conditions with and without the proposed Wailuku Parkside development, it is concluded that the proposed development does not have significant traffic impacts within the study area.

C. Recommendations Associated with Wailuku Parkside

Eha Street has sufficient roadway width to provide single through lanes with a center turn lane. The location of major access points from the Wailuku Parkside site to Eha Street will meet minimum intersection spacing criteria and be designed to minimize the traffic impacts.

Table 5

Level of Service Summary

Intersection	Existing A.M. Peak Hour LOS	Existing A.M. Peak Hour DELAY (sec/veh)	Existing P.M. Peak Hour LOS	Existing P.M. Peak Hour DELAY (sec/veh)	Year 2000 Background A.M. Peak Hour LOS	Year 2000 Background A.M. Peak Hour DELAY (sec/veh)	Year 2000 Background P.M. Peak Hour LOS	Year 2000 Background P.M. Peak Hour DELAY (sec/veh)	Year 2000 w/Project A.M. Peak Hour LOS	Year 2000 w/Project A.M. Peak Hour DELAY (sec/veh)	Year 2000 w/Project P.M. Peak Hour LOS	Year 2000 w/Project P.M. Peak Hour DELAY (sec/veh)
Lower Main St./Waena St./Shopping Center Access (Signalized)												
Overall Intersection Performance	B	10.7	B	9.5	B	12.0	B	10.3	B	12.8	B	11.0
Major Left (EB) Movement	B	5.3	B	5.1	B	5.1	A	4.6	B	5.3	A	4.8
Major Left (WB) Movement	A	3.8	B	7.3	A	3.8	B	7.4	A	3.8	B	7.4
Minor Left (NB) Movement	B	12.6	B	13.2	B	12.8	B	13.6	B	12.8	B	13.7
Minor Left (SB) Movement	C	15.2	B	13.4	C	16.8	C	15.3	C	21.5	C	18.7
Waena Street/Eha Street (Unsignalized)												
Overall Intersection Performance	A	2.7	A	3.1	A	2.9	A	2.6	A	3.3	A	3.7
Minor Left (NB) Movement	B	7.2	B	7.4	B	9.9	B	9.3	C	12.3	C	12.9
Minor Right (NB) Movement	A	3.2	A	3.3	A	3.4	A	3.6	A	3.6	A	3.8
Major Left (WB) Movement	A	2.9	A	2.8	A	3.0	A	2.9	A	3.3	A	3.1
Mill Street/Imi Kala Street (Unsignalized)												
Overall Intersection Performance	A	2.2	A	4.1	A	2.5	A	3.8	A	2.7	A	4.1
Minor Left (SB) Movement	C	15.2	D	21.3	C	13.3	C	15.6	C	13.7	C	18.1
Minor Right (SB) Movement	B	5.0	B	6.1	B	5.1	B	6.3	B	5.3	B	6.5
Major Left (EB) Movement	A	4.5	A	4.0	A	4.1	A	3.7	A	4.1	A	3.9
Imi Kala Street/Wili Pa Loop (Unsignalized)												
Overall Intersection Performance	A	0.9	A	0.9	A	0.9	A	1.6	A	0.9	A	1.6
Minor Left & Right (EB) Movement	A	3.1	B	5.1	B	5.4	C	12.3	B	5.7	C	13.7
Major Left (NB) Movement	A	2.7	A	3.0	A	3.3	A	3.7	A	3.4	A	3.8
Imi Kala Street/Wili Pa Loop/Eha Street (Unsignalized)												
Overall Intersection Performance	A	2.2	A	2.7	A	4.0	A	4.7	A	4.6	A	5.0
Minor EB Approach	A	2.7	A	2.9	A	3.1	A	4.0	A	3.1	A	4.1
Minor WB Approach	A	4.7	A	4.7	B	6.9	B	8.1	B	7.8	B	9.3
Major Left (NB) Movement	A	2.2	A	2.2	A	2.2	A	2.1	A	2.2	A	2.1
Major Left (SB) Movement	A	2.2	A	2.1	A	2.4	A	2.4	A	2.4	A	2.6

Note: Overall intersection LOS is a weighted average of specific movement LOS.

D. Recommendations to Improve Existing Operations

While overall existing intersection operations are good, there is one element of the existing roadway system in the study area that could be improved. This is a condition that currently exists, and the improvement recommendation could be most efficiently implemented by the appropriate governmental agency.

At the intersection of Lower Main Street and Waena Street, the field observations of the traffic signal indicated that the traffic signal could be made to operate more efficiently. Conflicting traffic movements at traffic signals are serviced by sequencing the signal through phases. A phase is allocated to, at least, each major conflicting movement. Sometimes phases are programmed to handle specific movements, such as left turns. Especially for mainline movements, such as the through movement on Lower Main Street, a minimum green indication is programmed, so that the major road flow isn't constantly interrupted by cross-street traffic demand. Minimum green indications are also programmed on the cross-street to allow vehicles and pedestrians to safely complete their movements. Often, these minimum green times are extended through the use of advance vehicle loop detectors. These advance detectors notify the traffic signal controller when vehicles approach an intersection. Within the parameters of the signal timing, detection causes an extension of a signal phase beyond the minimum green when a vehicle is detected approaching the signal. This minimizes the interruption of traffic streams.

The traffic signal at the Waena/Lower Main intersection appears to have very short minimum green times for each phase, and it also appears that the green times are not being extended even when approaching vehicles are present. This seems to cause frequent interruptions of traffic flow on Lower Main Street.

We recommend that the appropriate agency set the minimum green times for the phases of this signal controller to larger values or implement advance loop detectors on the Lower Main Street approaches to increase the efficiency of traffic signal operation at this intersection.

APPENDIX A

Traffic Count Data

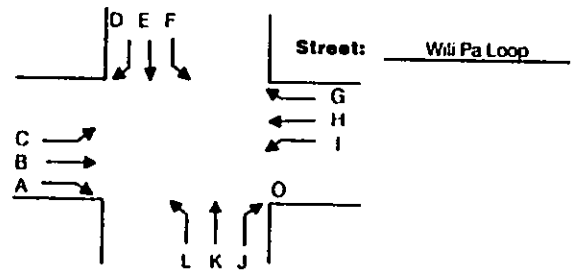
AM COUNT SHEET

Intersection: Ima Kala St /Wili Pa Loop

Date: 01/14-15/98

By: Kristi (Aloha Int)

Weather: Sunny



TIME	A	C	D	E	K	I							Total Mvmt	Total Hour
6 30 - 6 45	2	0	0	14	20	5							41	249
6 45 - 7 00	5	0	0	15	26	8							54	294
7 00 - 7 15	4	0	0	15	27	9							55	350
7 15 - 7 30	7	0	2	22	48	20							99	402
7 30 - 7 45	5	0	0	27	35	19							86	389
7 45 - 8 00	9	0	0	28	33	40							110	
8 00 - 8 15	11	0	1	28	42	25							107	
8 15 - 8 30	9	0	1	26	26	24							86	
													Pk Tll	phf
7 15 - 8 15	32	0	3	105	158	104							402	0 914
Mvmt Phf	0 727	1 000	0 375	0 938	0 823	0 650								

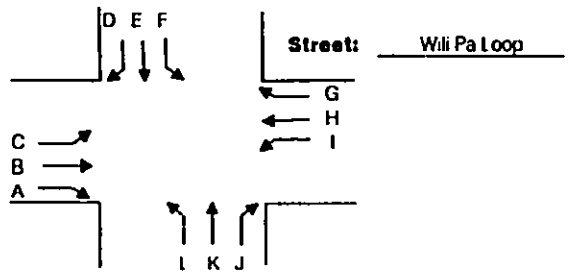
PM COUNT SHEET

Intersection: Imi Kala St /Wili Pa Loop

Date: 01/14-15/98

By: Kristi (Aloha Int)

Weather: Sunny



Street Imi Kala Street

TIME	A	C	D	E	K	L							Total Mvmt	Total Hour
3 30 - 3 45	22	0	3	59	49	16							149	604
3 45 - 4 00	19	2	2	68	65	12							168	610
4 00 - 4 15	17	5	1	73	51	9							156	574
4 15 - 4 30	13	1	0	59	46	12							131	537
4 30 4 45	27	1	0	66	48	13							155	500
4 45 - 5 00	14	3	0	59	42	14							132	
5 00 - 5 15	18	0	0	51	36	14							119	
5 15 - 5 30	12	1	1	41	32	7							94	
													Pk Ttl	phf
3 45 - 4 45	76	9	3	266	210	46							610	0 908
Mvmt Phf	0 704	0 450	0 375	0 978	0 808	0 885								

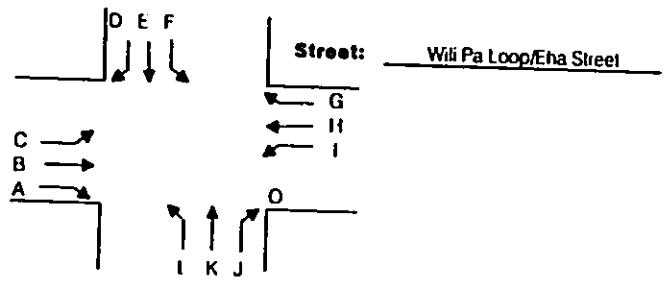
AM COUNT SHEET

Intersection: Imi Kala St /Wili Pa Loop/Eha St

Date: 01/14-15/98

By: Mariana (Aloha Int)

Weather: Sunny



TIME	D	F	C	B	H	G							Total Mvmt	Total Hour
6:30 - 6:45	2	3	1	0	0	2							8	67
6:45 - 7:00	4	5	3	0	0	3							15	87
7:00 - 7:15	1	4	1	0	0	1							7	98
7:15 - 7:30	9	20	2	0	0	6							37	137
7:30 - 7:45	3	17	4	0	0	4							28	136
7:45 - 8:00	1	15	1	0	0	9							26	
8:00 - 8:15	5	25	2	0	0	14							46	
8:15 - 8:30	2	16	3	0	0	15							36	
													Pk Tl	phf
7:15 - 8:15	18	77	9	0	0	33							137	0.745
Mvmt Phf	0.500	0.770	0.563	1.000	1.000	0.589								

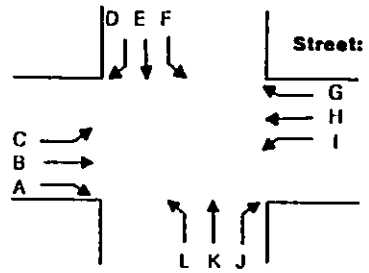
PM COUNT SHEET

Intersection: Imi Kala St /Wili Pa Loop/Eha St.

Date: 01/14-15/98

By: Mariana (Aloha Int)

Weather: Sunny



TIME	D	F	C	B	H	G							Total Mvmt	Total Hour
3 30 - 3 45	3	10	2	0	0	16							31	127
3 45 - 4 00	3	7	2	1	0	17							30	141
4 00 - 4 15	4	10	8	0	0	12							34	148
4 15 - 4 30	2	10	4	0	0	16							32	130
4 30 - 4 45	5	5	4	1	0	30							45	132
4 45 - 5 00	3	8	5	0	0	21							37	
5 00 - 5 15	6	1	5	1	0	3							16	
5 15 - 5 30	2	9	9	0	0	14							34	
													Pk Tll	phf
4 00 - 5 00	14	33	21	1	0	79							148	0 822
Mvmt Phf	0 700	0 825	0 656	0 250	1 000	0 658								

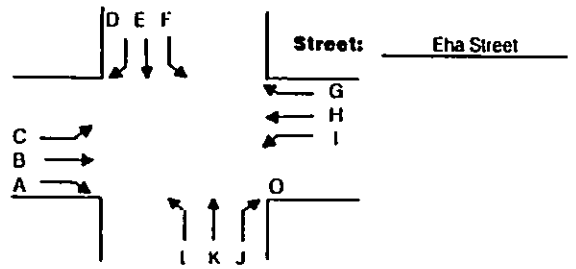
AM COUNT SHEET

Intersection: Waena St /Eha St

Date: 01/14-15/98

By: Diana (Aloha Int)

Weather: Sunny



TIME	A	B	H	I	J	L							Total Mvmt	Total Hour
6 30 - 6 45	7	5	5	60	40	12							129	266
6 45 - 7 00	3	5	6	10	10	2							36	216
7 00 - 7 15	5	2	4	10	20	2							43	318
7 15 - 7 30	12	5	2	19	18	2							58	382
7 30 7 45	9	2	3	49	13	3							79	405
7 45 - 8 00	20	3	2	68	42	3							138	
8 00 - 8 15	12	1	3	52	36	3							107	
8 15 8 30	6	0	4	35	27	9							81	
													Pk Ttl	phf
7 30 - 8 30	47	6	12	204	118	18							405	0 734
Mvmt Phf	0 5875	0 5	0 75	0 75	0 702381	0 5								

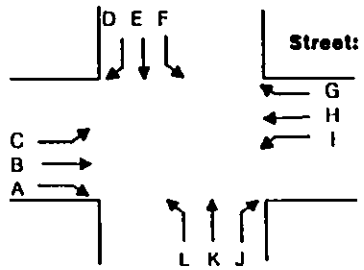
PM COUNT SHEET

Intersection: Waena St./Eha St.

Date: 01/14-15/98

By: Diana (Aloha Int.)

Weather: Sunny



TIME	A	B	H	I	J	I							Total Mvmt	Total Hour
3 30 - 3 45	3	2	2	32	12	3							54	393
3 45 - 4 00	5	0	2	51	26	9							93	468
4 00 - 4 15	4	3	2	61	35	12							117	530
4 15 - 4 30	8	3	6	60	45	7							129	522
4 30 - 4 45	9	1	3	57	45	14							129	512
4 45 - 5 00	16	4	6	55	53	21							155	
5 00 - 5 15	9	3	5	35	41	16							109	
5 15 - 5 30	8	3	4	48	42	14							119	
													Pk Ttl	phf
4 00 - 5 00	37	11	17	233	178	54							530	0 855
Mvmt Phf	0 578125	0 6875	0 708333	0 954918	0 839623	0 642857								

Pa[illegible] Bri[illegible]off
Pacific Tower, Suite 3000
1001 Bishop Street
Honolulu, HI 96813

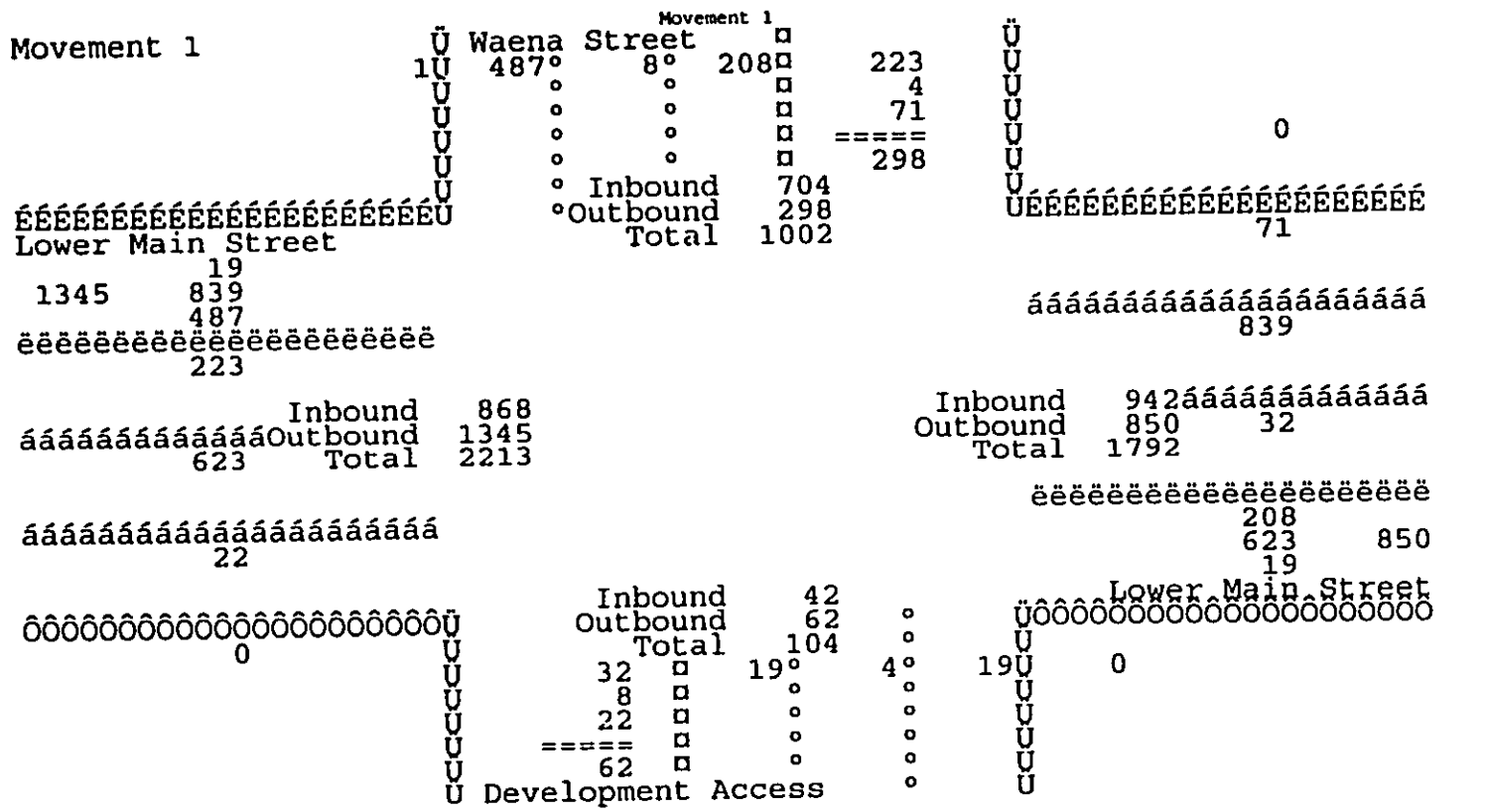
Site Code : 00000000
Start Date: 01/15/98
File I.D. :
Page : 1

Start Time	Waena Street From North				Lower Main Street From East				Movement 1 Development Access From South				Lower Main Street From West				Total-	Other-	
	Left	Thru	Rght	Other	Left	Thru	Rght	Other	Left	Thru	Rght	Other	Left	Thru	Rght	Other			
6:30	10	0	37	0	1	48	2	0	2	0	2	0	16	55	0	0	173	0	173
6:45	21	0	54	0	2	79	8	0	1	0	2	0	23	53	0	0	243	0	243
Total	31	0	91	0	3	127	10	0	3	0	4	0	39	108	0	0	416	0	416
7:00am	48	0	78	0	2	78	23	0	3	0	1	0	40	72	1	0	346	0	346
7:15	37	1	90	0	4	143	7	0	4	0	7	0	30	74	1	0	398	0	398
7:30	31	1	87	0	8	157	4	0	1	1	0	0	23	94	6	0	413	0	413
7:45	37	3	68	0	9	146	8	0	5	1	1	0	47	121	6	0	452	0	452
Hour Total	153	5	323	0	23	524	42	0	13	2	9	0	140	361	14	0	1609	0	1609
8:00am	14	2	37	0	3	95	9	0	1	2	3	0	19	92	4	0	281	0	281
8:15	10	1	36	1	3	93	10	0	2	0	3	0	25	62	4	0	250	1	249
8:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	24	3	73	1	6	188	19	0	3	2	6	0	44	154	8	0	531	1	530
Grand	208	8	487	1	32	839	71	0	19	4	19	0	223	623	22	0	2556	1	2555
% of Total	8.1%	.3%	19.1%	0.0%	1.3%	32.8%	2.8%	0.0%	.7%	.2%	.7%	0.0%	8.7%	24.4%	.9%	0.0%		0.0%	100.0%
Apprch %	27.5%				36.9%				1.6%				34.0%						
% of Apprch	29.5%	1.1%	69.2%	.1%	3.4%	89.1%	7.5%	0.0%	45.2%	9.5%	45.2%	0.0%	25.7%	71.8%	2.5%	0.0%			

Parsons Brinckerhoff
Pacific Tower, Suite 3000
1001 Bishop Street
Honolulu, HI 96813

Site Code : 00000000
Start Date: 01/15/98
File I.D. :

Movement 1



Parsons Brinckerhoff
Pacific Tower, Suite 3000
1001 Bishop Street
Honolulu, HI 96813

Site Code : 00000000
Start Date: 01/15/98
File I.D. :

Peak Hour Analysis By Entire Intersection for the Period: 06:30am to 08:30am on 01/15/98

Direction	Street Name	Start Peak Hour	Peak Hr Factor	Volumes Left	Thru	Rght	Total	Percentages Left	Thru	Rght
From North	Waena Street	07:00am	.939	153	5	323	481	31.8	1.0	67.1
From East	Lower Main Street		.871	23	524	42	589	3.9	88.9	7.1
From South	Development Access		.545	13	2	9	24	54.1	8.3	37.5
From West	Lower Main Street		.740	140	361	14	515	27.1	70.0	2.7

Parsons Brinckerhoff
Pacific Tower, Suite 3000
1001 Bishop Street
Honolulu, HI 96813

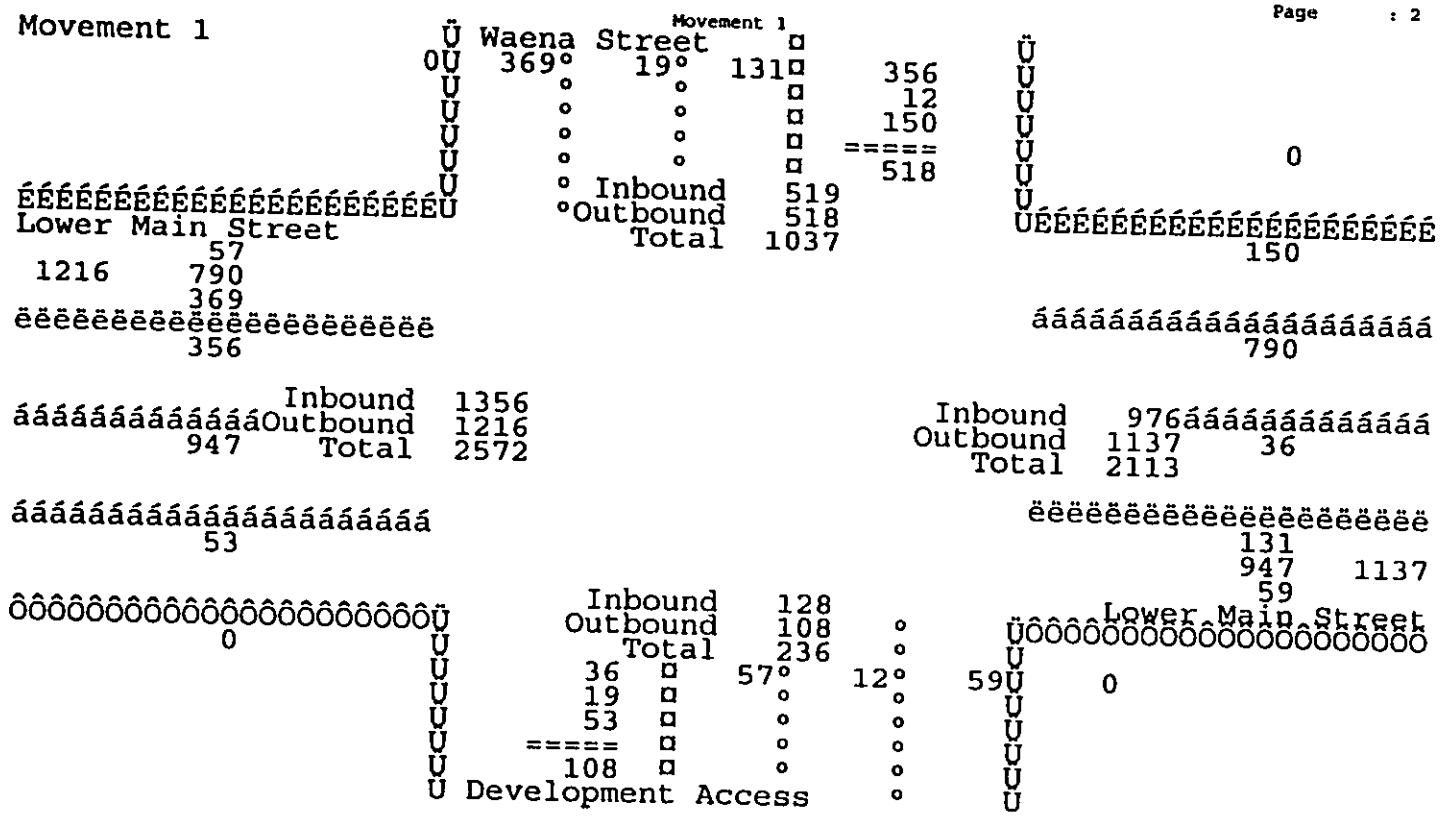
Site Code : 00000000
Start Date: 01/14/98
File I.D. : PMWAENA
Page : 1

Start Time	Waena Street From North				Lower Main Street From East				Movement 1 Development Access From South				Lower Main Street From West				Total-	Other-	
	Left	Thru	Rght	Other	Left	Thru	Rght	Other	Left	Thru	Rght	Other	Left	Thru	Rght	Other			
3:30	9	2	43	0	6	111	11	0	3	1	7	0	50	113	11	0	367	0	367
3:45	18	3	52	0	5	108	14	0	12	0	6	0	39	111	3	0	371	0	371
Total	27	5	95	0	11	219	25	0	15	1	13	0	89	224	14	0	738	0	738
4:00pm	14	0	52	0	5	118	17	0	4	1	9	0	39	130	4	0	393	0	393
4:15	19	1	59	0	4	90	16	0	9	2	4	0	45	109	10	0	368	0	368
4:30	22	4	54	0	3	95	26	0	10	0	8	0	56	160	8	0	446	0	446
4:45	18	5	44	0	6	97	29	0	1	2	14	0	48	108	7	0	378	0	378
Hour Total	73	10	209	0	18	400	88	0	24	5	34	0	188	507	29	0	1585	0	1585
5:00pm	12	1	27	0	6	88	19	0	9	5	5	0	38	105	5	0	320	0	320
5:15	19	3	38	0	1	83	18	0	9	1	7	0	41	111	5	0	336	0	336
Total	31	4	65	0	7	171	37	0	18	6	12	0	79	216	10	0	656	0	656
Grand	131	19	369	0	36	790	150	0	57	12	59	0	356	947	53	0	2979	0	2979
% of Total	4.4%	.6%	12.4%	0.0%	1.2%	26.5%	5.0%	0.0%	1.9%	.4%	2.0%	0.0%	12.0%	31.8%	1.8%	0.0%		0.0%	100.0%
Apprch %	17.4%				32.8%				4.3%				45.5%						
% of Apprch	25.2%	3.7%	71.1%	0.0%	3.7%	80.9%	15.4%	0.0%	44.5%	9.4%	46.1%	0.0%	26.3%	69.8%	3.9%	0.0%			

Parsons Brinckerhoff
Pacific Tower, Suite 3000
1001 Bishop Street
Honolulu, HI 96813

Site Code : 00000000
Start Date: 01/14/98
File I.D. : PMWAENA
Page : 2

Movement 1



Parsons Brinckerhoff
Pacific Tower, Suite 3000
1001 Bishop Street
Honolulu, HI 96813

Site Code : 00000000
Start Date: 01/14/98
File I.D. : PMWAENA
Page : 3

Peak Hour Analysis By Entire Intersection for the Period: 03:30pm to 05:15pm on 01/14/98

		Start	Peak Hr	..... Volumes				..... Percentages		
Direction	Street Name	Peak Hour	Factor	Left	Thru	Rght	Total	Left	Thru	Rght
From North	Waena Street	04:00pm	.912	73	10	209	292	25.0	3.4	71.5
From East	Lower Main Street		.904	18	400	88	506	3.5	79.0	17.3
From South	Development Access		.875	24	5	34	63	38.0	7.9	53.9
From West	Lower Main Street		.808	188	507	29	724	25.9	70.0	4.0

Parsons Brinckerhoff

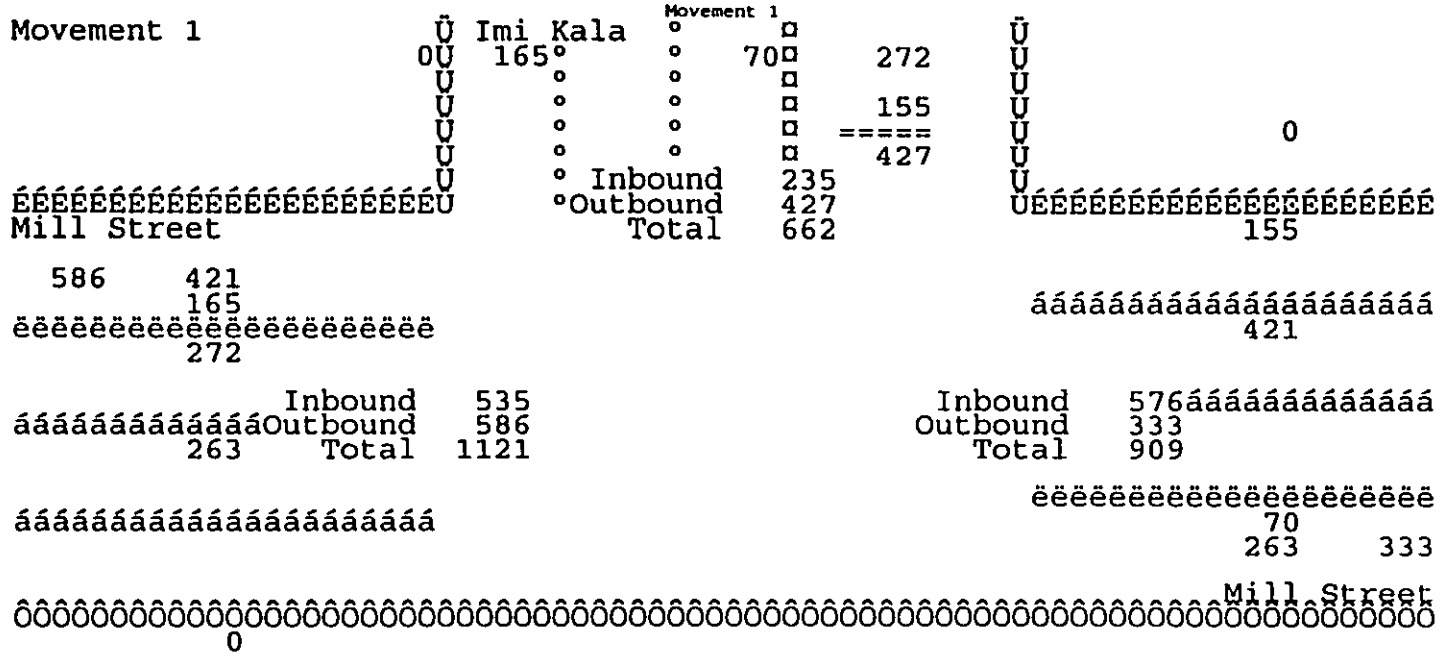
Pacific Tower, Suite 3000
1001 Bishop Street
Honolulu, HI 96813

Site Code : 00000000
Start Date: 01/15/98
File I.D. : AMIMI
Page : 1

	Imi Kala From North				Mill Street From East				Movement 1 Mill Street From West						
Start Time	Left	Thru	Rght	Other	Left	Thru	Rght	Other	Left	Thru	Rght	Other	Total-	Other-	
6:30	4	0	11	0	0	15	10	0	11	32	0	0	83	0	83
6:45	7	0	13	0	0	35	13	0	22	26	0	0	116	0	116
Total	11	0	24	0	0	50	23	0	33	58	0	0	199	0	199
7:00am	9	0	12	0	0	51	12	0	28	33	0	0	145	0	145
7:15	8	0	24	0	0	69	23	0	45	36	0	0	205	0	205
7:30	8	0	25	0	0	69	26	0	33	35	0	0	196	0	196
7:45	8	0	31	0	0	88	33	0	46	38	0	0	244	0	244
Hour Total	33	0	92	0	0	277	94	0	152	142	0	0	790	0	790
8:00am	14	0	26	0	0	49	25	0	47	38	0	0	199	0	199
8:15	12	0	23	0	0	45	13	0	40	25	0	0	158	0	158
Total	26	0	49	0	0	94	38	0	87	63	0	0	357	0	357
Grand	70	0	165	0	0	421	155	0	272	263	0	0	1346	0	1346
% of Total	5.2%	0.0%	12.3%	0.0%	0.0%	31.3%	11.5%	0.0%	20.2%	19.5%	0.0%	0.0%		0.0%	100.0%
Apprch %	17.5%				42.8%				39.7%						
% of Apprch	29.8%	0.0%	70.2%	0.0%	0.0%	73.1%	26.9%	0.0%	50.8%	49.2%	0.0%	0.0%			

Parsons Brinckerhuff
Pacific Tower, Suite 3000
1001 Bishop Street
Honolulu, HI 96813

Site Code : 00000000
Start Date: 01/15/98
File I.D. : AMIMI



Parsons Brinckerhoff

Pacific Tower, Suite 3000
1001 Bishop Street
Honolulu, HI 96813

Site Code : 00000000
Start Date: 01/15/98
File I.D. : AMIMI
Page : 3

Peak Hour Analysis By Entire Intersection for the Period: 06:30am to 08:15am on 01/15/98

Direction	Street Name	Start Peak Hour	Peak Hr Factor	Volumes Left	Thru	Rght	Total	Percentages Left	Thru	Rght
From North	Imi Kala	07:15am	.900	38	0	106	144	26.3	.0	73.6
From East	Mill Street		.789	0	275	107	382	.0	71.9	28.0
From South	I		.0	0	0	0	0	0.0	0.0	0.0
From West	Mill Street		.935	171	147	0	318	53.7	46.2	.0

Pacific Tower, Suite 3000
1001 Bishop Street
Honolulu, HI 96813

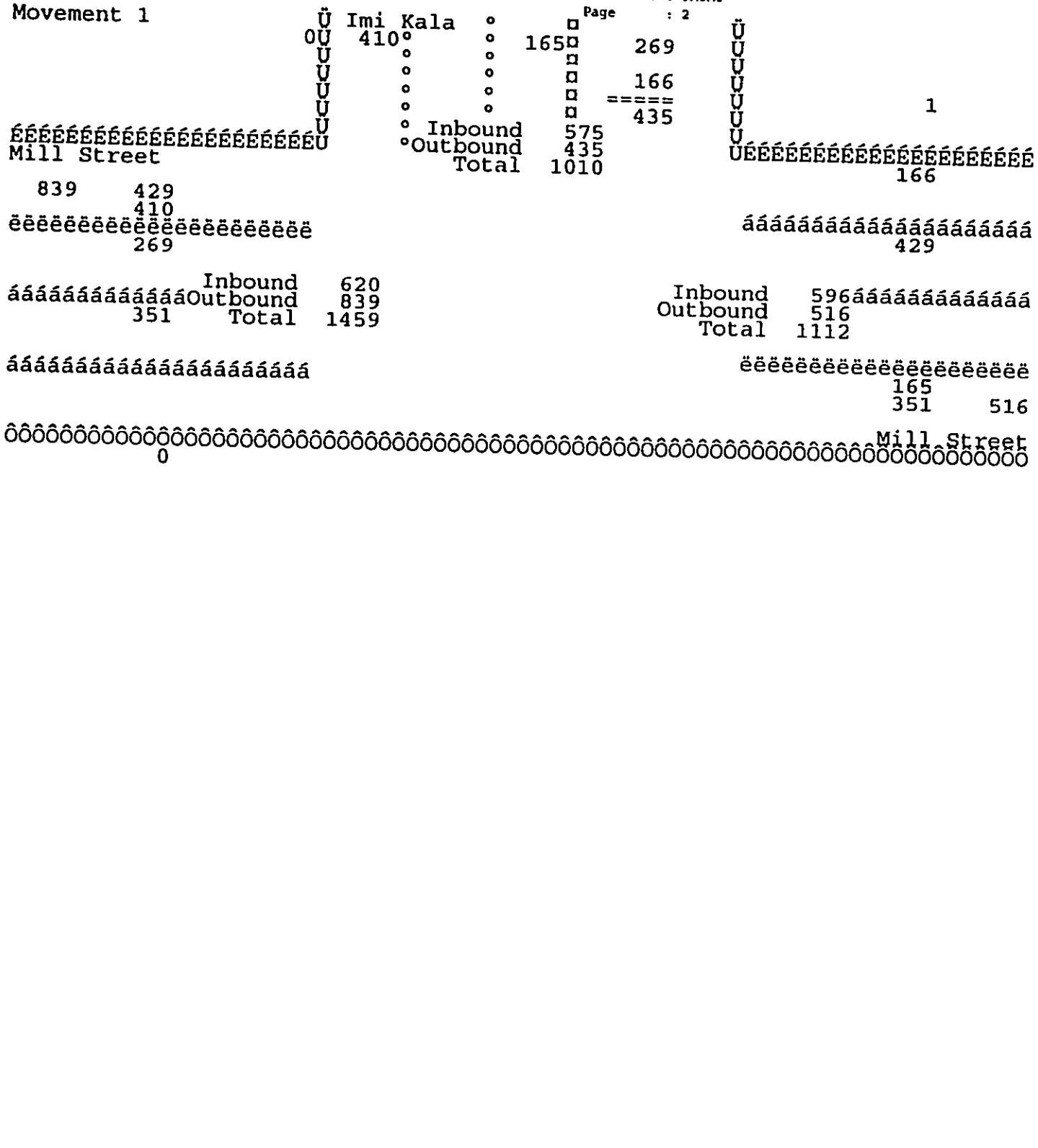
Parsons Brinckerhoff
Site Code : 00000000
Start Date: 01/14/98
File I.D. : PMIMI
Page : 1

Start Time	Imi Kala From North Left	Thru	Rght	Other	Mill Street From East Left	Thru	Rght	Other	Movement 1 Mill Street From West Left	Thru	Rght	Other	Total-	Others	
3:30	24	0	53	0	0	53	20	1	47	52	0	0	250	1	249
3:45	31	0	77	0	0	69	26	0	47	45	0	0	295	0	295
Total	55	0	130	0	0	122	46	1	94	97	0	0	545	1	544
4:00pm	17	0	60	0	0	69	32	0	37	48	0	0	263	0	263
4:15	30	0	62	0	0	55	30	0	33	48	0	0	258	0	258
4:30	24	0	68	0	0	65	20	0	29	56	0	0	262	0	262
4:45	24	0	40	0	0	55	22	0	40	50	0	0	231	0	231
Hour Total	95	0	230	0	0	244	104	0	139	202	0	0	1014	0	1014
5:00pm	15	0	50	0	0	63	16	0	36	52	0	0	232	0	232
Total	15	0	50	0	0	63	16	0	36	52	0	0	232	0	232
Grand	165	0	410	0	0	429	166	1	269	351	0	0	1791	1	1790
% of Total	9.2%	0.0%	22.9%	0.0%	0.0%	24.0%	9.3%	.1%	15.0%	19.6%	0.0%	0.0%		.1%	99.9%
Apprch %	32.1%				33.3%				34.6%						
% of Apprch	28.7%	0.0%	71.3%	0.0%	0.0%	72.0%	27.9%	.2%	43.4%	56.6%	0.0%	0.0%			

Pacific Tower, Suite 3000
1001 Bishop Street
Honolulu, HI 96813

Pa... Bri... hoff

Site Code : 00000000
Start Date: 01/14/98
File I.D. : PMIMI
Page : 2



Parsons Brinckerhoff

Pacific Tower, Suite 3000
1001 Bishop Street
Honolulu, HI 96813

Site Code : 00000000
Start Date: 01/14/98
File I.D. : PMIMI
Page : 3

Peak Hour Analysis By Entire Intersection for the Period: 03:30pm to 05:00pm on 01/14/98

		Start	Peak Hr	..... Volumes				..... Percentages		
Direction	Street Name	Peak Hour	Factor	Left	Thru	Rght	Total	Left	Thru	Rght
From North	Imi Kala	03:45pm	.854	102	0	267	369	27.6	.0	72.3
From East	Mill Street		.906	0	258	108	366	.0	70.4	29.5
From South	IMI		.0	0	0	0	0	0.0	0.0	0.0
From West	Mill Street		.932	146	197	0	343	42.5	57.4	.0

APPENDIX B

Intersection Analysis

Parsons Brinckerhoff Quade & Douglas
Pacific Tower, Suite 3000
1001 Bishop Street
Honolulu, HI 96813-
Ph: (808) 531-7094

Streets: (N-S) Imi Kala Street (E-W) Wili Pa/Eha Street
Major Street Direction.... NS
Length of Time Analyzed... 60 (min)
Analyst..... Miyamoto
Date of Analysis..... 1/16/98
Other Information.....Existing 1998 A.M. Peak Hour
Two-way Stop-controlled Intersection

	Northbound			Southbound			Eastbound			Westbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	> 1	< 0	0	> 1	< 0	0	> 1	< 0	0	> 1	< 0
Stop/Yield			N			N						
Volumes	77	0	18	0	0	0	0	0	33	9	0	0
PHF	.77	1	.5	1	1	1	1	1	.589	.563	1	1
Grade		0			0			0			0	
MC's (%)												
SU/RV's (%)												
CV's (%)												
PCE's	1.10			1.10			1.10	1.10	1.10	1.10	1.10	1.10

Adjustment Factors

Vehicle Maneuver	Critical Gap (tg)	Follow-up Time (tf)
Left Turn Major Road	5.00	2.10
Right Turn Minor Road	5.50	2.60
Through Traffic Minor Road	6.00	3.30
Left Turn Minor Road	6.50	3.40

Worksheet for TWSC Intersection

Step 1: RT from Minor Street	WB	EB
Conflicting Flows: (vph)	18	0
Potential Capacity: (pcph)	1356	1385
Movement Capacity: (pcph)	1356	1385
Prob. of Queue-Free State:	1.00	0.96

Step 2: LT from Major Street	SB	NB
Conflicting Flows: (vph)	36	0
Potential Capacity: (pcph)	1648	1714
Movement Capacity: (pcph)	1648	1714
Prob. of Queue-Free State:	1.00	0.94
TH Saturation Flow Rate: (pcphpl)	1700	1700
RT Saturation Flow Rate: (pcphpl)	1700	1700
Major LT Shared Lane Prob. of Queue-Free State:	1.00	0.93

Step 3: TH from Minor Street	WB	EB
Conflicting Flows: (vph)	118	136
Potential Capacity: (pcph)	946	926
Capacity Adjustment Factor due to Impeding Movements	0.93	0.93
Movement Capacity: (pcph)	884	865
Prob. of Queue-Free State:	1.00	1.00

Step 4: LT from Minor Street	WB	EB
Conflicting Flows: (vph)	146	118
Potential Capacity: (pcph)	872	905
Major LT, Minor TH Impedance Factor:	0.93	0.93
Adjusted Impedance Factor:	0.95	0.95
Capacity Adjustment Factor due to Impeding Movements	0.91	0.95
Movement Capacity: (pcph)	791	860

Intersection Performance Summary

Movement		Flow Rate (pcph)	Move Cap (pcph)	Shared Cap (pcph)	Avg. Total Delay (sec/veh)	95% Queue Length (veh)	LOS	Approach Delay (sec/veh)
EB	L	0	860 >					
EB	T	0	865 >	1385	2.7	0.0	A	2.7
EB	R	62	1385 >					
WB	L	18	791 >					
WB	T	0	884 >	791	4.7	0.0	A	4.7
WB	R	0	1356 >					
NB	L	110	1714		2.2	0.1	A	1.8
SB	L	0	1648		2.2	0.0	A	0.0

Intersection Delay = 2.2 sec/veh

Parsons Brinckerhoff Quade & Douglas
Pacific Tower, Suite 3000
1001 Bishop Street
Honolulu, HI 96813-
Ph: (808) 531-7094

Streets: (N-S) Imi Kala Street (E-W) Wili Pa/Eha Street
Major Street Direction.... NS
Length of Time Analyzed... 60 (min)
Analyst..... Miyamoto
Date of Analysis..... 1/16/98
Other Information.....Existing 1998 P.M. Peak Hour
Two-way Stop-controlled Intersection

	Northbound			Southbound			Eastbound			Westbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	> 1	< 0	0	> 1	< 0	0	> 1	< 0	0	> 1	< 0
Stop/Yield			N			N						
Volumes	33	0	14	0	0	0	0	1	79	21	0	0
PHF	.825	1	.7	1	1	1	1	.25	.658	.656	1	1
Grade		0			0			0			0	
MC's (%)												
SU/RV's (%)												
CV's (%)												
PCE's	1.10			1.10			1.10	1.10	1.10	1.10	1.10	1.10

Adjustment Factors

Vehicle Maneuver	Critical Gap (tg)	Follow-up Time (tf)
Left Turn Major Road	5.00	2.10
Right Turn Minor Road	5.50	2.60
Through Traffic Minor Road	6.00	3.30
Left Turn Minor Road	6.50	3.40

Worksheet for TWSC Intersection

Step 1: RT from Minor Street	WB	EB
Conflicting Flows: (vph)	10	0
Potential Capacity: (pcph)	1369	1385
Movement Capacity: (pcph)	1369	1385
Prob. of Queue-Free State:	1.00	0.90

Step 2: LT from Major Street	SB	NB
Conflicting Flows: (vph)	20	0
Potential Capacity: (pcph)	1677	1714
Movement Capacity: (pcph)	1677	1714
Prob. of Queue-Free State:	1.00	0.97
TH Saturation Flow Rate: (pcphpl)	1700	1700
RT Saturation Flow Rate: (pcphpl)	1700	1700
Major LT Shared Lane Prob. of Queue-Free State:	1.00	0.97

Step 3: TH from Minor Street	WB	EB
Conflicting Flows: (vph)	50	60
Potential Capacity: (pcph)	1027	1015
Capacity Adjustment Factor due to Impeding Movements	0.97	0.97
Movement Capacity: (pcph)	1000	989
Prob. of Queue-Free State:	1.00	1.00

Step 4: LT from Minor Street	WB	EB
Conflicting Flows: (vph)	112	50
Potential Capacity: (pcph)	912	991
Major LT, Minor TH Impedance Factor:	0.97	0.97
Adjusted Impedance Factor:	0.98	0.98
Capacity Adjustment Factor due to Impeding Movements	0.88	0.98
Movement Capacity: (pcph)	806	971

Intersection Performance Summary

Movement		Flow Rate (pcph)	Move Cap (pcph)		Shared Cap (pcph)	Avg. Total Delay (sec/veh)	95% Queue Length (veh)	LOS	Approach Delay (sec/veh)
EB	L	0	971	>					
EB	T	4	989	>	1369	2.9	0.3	A	2.9
EB	R	132	1385	>					
WB	L	35	806	>					
WB	T	0	1000	>	806	4.7	0.0	A	4.7
WB	R	0	1369	>					
NB	L	44	1714			2.2	0.0	A	1.5
SB	L	0	1677			2.1	0.0	A	0.0

Intersection Delay = 2.7 sec/veh

HCM: SIGNALIZED INTERSECTION SUMMARY Version 2.4d 01-16-1998
Parsons Brinckerhoff Quade & Douglas

Streets: (E-W) Lower Main Street (N-S) Waena St./SC Access
Analyst: Miyamoto File Name: LMSEA.HC9
Area Type: Other 1-16-98 Morning
Comment: Existing 1998 Peak Hour

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	2 <		1	2 <			> 1 <			> 1	1
Volumes	140	361	14	23	524	42	13	2	9	153	5	323
PHF or PK15	0.75	0.75	0.58	0.64	0.83	0.46	0.65	0.50	0.32	0.80	0.42	0.90
Lane W (ft)	11.0	11.0		11.0	11.0			12.0			12.0	12.0
Grade		0			0			0			0	
% Heavy Veh	2	2	2	2	2	2	2	2	2	2	2	2
Parking	(Y/N)	N		(Y/N)	N		(Y/N)	N		(Y/N)	N	
Bus Stops			0			0			0			0
Con. Peds			0			0			0			0
Ped Button	(Y/N)	Y	8.5 s	(Y/N)	Y	11.5 s	(Y/N)	Y	16.4 s	(Y/N)	N	
Arr Type	3	3		3	3			3			3	3
RTOR Vols			0			0			0			140
Lost Time	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00
Prop. Share												
Prop. Prot.												65

Signal Operations

Phase Combination		1	2	3	4			5	6	7	8
EB	Left	*	*			NB	Left	*			
	Thru		*				Thru	*			
	Right		*				Right	*			
	Peds		*				Peds	*			
WB	Left	*	*			SB	Left	*			
	Thru		*				Thru	*			
	Right		*				Right	*			
	Peds		*				Peds	*			
NB	Right					EB	Right				
SB	Right	*	*			WB	Right				
Green		15.0A	25.0A			Green		20.0A			
Yellow/AR		5.0	5.0			Yellow/AR		5.0			

Cycle Length: 75 secs Phase combination order: #1 #2 #5

Intersection Performance Summary

	Lane Mvmts	Group: Cap	Adj Sat Flow	v/c Ratio	g/C Ratio	Delay	LOS	Approach: Delay	LOS
EB	L	484	1711	0.388	0.627	5.3	B	10.1	B
	TR	1287	3576	0.414	0.360	11.8	B		
WB	L	550	1711	0.065	0.627	3.8	A	12.8	B
	TR	1272	3532	0.595	0.360	13.2	B		
NB	LTR	367	1250	0.142	0.293	12.6	B	12.6	B
SB	LT	400	1362	0.511	0.293	15.2	C	7.6	B
	R	1520	1583	0.134	0.960	0.0	A		

Intersection Delay = 10.7 sec/veh Intersection LOS = B
Lost Time/Cycle, L = 9.0 sec Critical v/c(x) = 0.538

HCM: SIGNALIZED INTERSECTION SUMMARY Version 2.4d 01-16-1998
Parsons Brinckerhoff Quade & Douglas

Streets: (E-W) Lower Main Street (N-S) Waena St./SC Access
Analyst: Miyamoto File Name: LMSEP.HC9
Area Type: Other 1-16-98 Evening
Comment: Existing 1998 Peak Hour

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	2 <		1	2 <			> 1 <			> 1	1
Volumes	188	507	29	18	400	88	24	5	34	73	10	209
PHF or PK15	0.84	0.79	0.73	0.75	0.85	0.76	0.60	0.63	0.65	0.83	0.50	0.89
Lane W (ft)	11.0	11.0		11.0	11.0			12.0			12.0	12.0
Grade		0			0			0			0	
% Heavy Veh	2	2	2	2	2	2	2	2	2	2	2	2
Parking	(Y/N)	N		(Y/N)	N		(Y/N)	N		(Y/N)	N	
Bus Stops			0			0			0			0
Con. Peds			0			0			0			0
Ped Button	(Y/N)	Y	8.5 s	(Y/N)	Y	11.5 s	(Y/N)	Y	16.4 s	(Y/N)	N	
Arr Type	3	3		3	3			3			3	3
RTOR Vols			0			0			0			188
Lost Time	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00
Prop. Share												
Prop. Prot.												65

Signal Operations

Phase Combination		1	2	3	4	5	6	7	8
EB	Left	*	*	*		NB Left	*		
	Thru		*	*		Thru	*		
	Right		*	*		Right	*		
	Peds		*	*		Peds	*		
WB	Left	*		*		SB Left	*		
	Thru			*		Thru	*		
	Right			*		Right	*		
	Peds			*		Peds	*		
NB	Right					EB Right			
SB	Right		*	*	*	WB Right			
Green			5.0A	5.0A	25.0A	Green	20.0A		
Yellow/AR			5.0	5.0	5.0	Yellow/AR	5.0		

Cycle Length: 75 secs Phase combination order: #1 #2 #3 #5

Intersection Performance Summary

	Lane Mvmts	Group: Cap	Adj Sat Flow	v/c Ratio	g/C Ratio	Delay	LOS	Approach: Delay	LOS
EB	L	515	1711	0.435	0.627	5.1	B	7.2	B
	TR	1761	3570	0.405	0.493	7.9	B		
WB	L	306	1711	0.078	0.493	7.3	B	12.1	B
	TR	1258	3495	0.490	0.360	12.3	B		
NB	LTR	385	1312	0.260	0.293	13.2	B	13.2	B
SB	LT	366	1247	0.295	0.293	13.4	B	11.0	B
	R	1520	1583	0.016	0.960	0.0	A		

Intersection Delay = 9.5 sec/veh Intersection LOS = B
Lost Time/Cycle, L = 9.0 sec Critical v/c(x) = 0.448

Parsons Brinckerhoff Quade & Douglas
Pacific Tower, Suite 3000
1001 Bishop Street
Honolulu, HI 96813-
Ph: (808) 531-7094

Streets: (N-S) Waena Street (E-W) Eha Street
Major Street Direction.... EW
Length of Time Analyzed... 60 (min)
Analyst..... Miyamoto
Date of Analysis..... 1/16/98
Other Information.....Existing 1998 A.M. Peak Hour
Two-way Stop-controlled Intersection

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	1	< 0	1	1	0	1	0	1	0	0	0
Stop/Yield			N			N						
Volumes		6	47	204	12		18		118			
PHF		.5	.587	.75	.75		.5		.702			
Grade		0			0			0				
MC's (%)												
SU/RV's (%)												
CV's (%)												
PCE's				1.10			1.10		1.10			

Adjustment Factors

Vehicle Maneuver	Critical Gap (tg)	Follow-up Time (tf)
Left Turn Major Road	5.00	2.10
Right Turn Minor Road	5.50	2.60
Through Traffic Minor Road	6.00	3.30
Left Turn Minor Road	6.50	3.40

Worksheet for TWSC Intersection

Step 1: RT from Minor Street	NB	SB
Conflicting Flows: (vph)	52	
Potential Capacity: (pcph)	1303	
Movement Capacity: (pcph)	1303	
Prob. of Queue-Free State:	0.86	

Step 2: LT from Major Street	WB	EB
Conflicting Flows: (vph)	92	
Potential Capacity: (pcph)	1550	
Movement Capacity: (pcph)	1550	
Prob. of Queue-Free State:	0.81	

Step 4: LT from Minor Street	NB	SB
Conflicting Flows: (vph)	340	
Potential Capacity: (pcph)	673	
Major LT, Minor TH Impedance Factor:	0.81	
Adjusted Impedance Factor:	0.81	
Capacity Adjustment Factor due to Impeding Movements	0.81	
Movement Capacity: (pcph)	543	

Intersection Performance Summary

Movement	Flow Rate (pcph)	Move Cap (pcph)	Shared Cap (pcph)	Avg. Total Delay (sec/veh)	95% Queue Length (veh)	LOS	Approach Delay (sec/veh)
NB L	40	543		7.2	0.1	B	3.7
NB R	185	1303		3.2	0.5	A	
WB L	299	1550		2.9	0.8	A	2.7

Intersection Delay = 2.7 sec/veh

Parsons Brinckerhoff Quade & Douglas
Pacific Tower, Suite 3000
1001 Bishop Street
Honolulu, HI 96813-
Ph: (808) 531-7094

Streets: (N-S) Waena Street (E-W) Eha Street
Major Street Direction.... EW
Length of Time Analyzed... 60 (min)
Analyst..... Miyamoto
Date of Analysis..... 1/16/98
Other Information.....Existing 1998 P.M. Peak Hour
Two-way Stop-controlled Intersection

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	1	< 0	1	1	0	1	0	1	0	0	0
Stop/Yield			N			N						
Volumes		11	37	233	17		54		178			
PHF		.688	.578	.955	.708		.643		.84			
Grade		0			0			0				
MC's (%)												
SU/RV's (%)												
CV's (%)												
PCE's				1.10			1.10		1.10			

Adjustment Factors

Vehicle Maneuver	Critical Gap (tg)	Follow-up Time (tf)
Left Turn Major Road	5.00	2.10
Right Turn Minor Road	5.50	2.60
Through Traffic Minor Road	6.00	3.30
Left Turn Minor Road	6.50	3.40

Worksheet for TWSC Intersection

Step 1: RT from Minor Street	NB	SB
Conflicting Flows: (vph)	48	
Potential Capacity: (pcph)	1309	
Movement Capacity: (pcph)	1309	
Prob. of Queue-Free State:	0.82	

Step 2: LT from Major Street	WB	EB
Conflicting Flows: (vph)	80	
Potential Capacity: (pcph)	1570	
Movement Capacity: (pcph)	1570	
Prob. of Queue-Free State:	0.83	

Step 4: LT from Minor Street	NB	SB
Conflicting Flows: (vph)	316	
Potential Capacity: (pcph)	695	
Major LT, Minor TH Impedance Factor:	0.83	
Adjusted Impedance Factor:	0.83	
Capacity Adjustment Factor due to Impeding Movements	0.83	
Movement Capacity: (pcph)	576	

Intersection Performance Summary

Movement	Flow Rate (pcph)	Move Cap (pcph)	Shared Cap (pcph)	Avg. Total Delay (sec/veh)	95% Queue Length (veh)	LOS	Approach Delay (sec/veh)
NB L	92	576		7.4	0.6	B	4.3
NB R	233	1309		3.3	0.7	A	
WB L	268	1570		2.8	0.7	A	2.6

Intersection Delay = 3.1 sec/veh

Parsons Brinckerhoff Quade & Douglas
Pacific Tower, Suite 3000
1001 Bishop Street
Honolulu, HI 96813-
Ph: (808) 531-7094

Streets: (N-S) Imi Kala Street (E-W) Mill Street
Major Street Direction.... EW
Length of Time Analyzed... 60 (min)
Analyst..... Miyamoto
Date of Analysis..... 1/16/98
Other Information.....Existing 1998 A.M. Peak Hour
Two-way Stop-controlled Intersection

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	> 1	0	0	1	< 0	0	0	0	1	0	1
Stop/Yield			N			N						
Volumes	171	147			275	107				38		106
PHF	.91	.967			.781	.811				.679		.855
Grade		0			0						0	
MC's (%)												
SU/RV's (%)												
CV's (%)												
PCE's	1.10									1.10		1.10

Adjustment Factors

Vehicle Maneuver	Critical Gap (tg)	Follow-up Time (tf)
Left Turn Major Road	5.00	2.10
Right Turn Minor Road	5.50	2.60
Through Traffic Minor Road	6.00	3.30
Left Turn Minor Road	6.50	3.40

Worksheet for TWSC Intersection

Step 1: RT from Minor Street	NB	SB
Conflicting Flows: (vph)		418
Potential Capacity: (pcph)		850
Movement Capacity: (pcph)		850
Prob. of Queue-Free State:		0.84

Step 2: LT from Major Street	WB	EB
Conflicting Flows: (vph)		484
Potential Capacity: (pcph)		1008
Movement Capacity: (pcph)		1008
Prob. of Queue-Free State:		0.79
TH Saturation Flow Rate: (pcphpl)		1700
RT Saturation Flow Rate: (pcphpl)		
Major LT Shared Lane Prob. of Queue-Free State:		0.77

Step 4: LT from Minor Street	NB	SB
Conflicting Flows: (vph)		758
Potential Capacity: (pcph)		385
Major LT, Minor TH Impedance Factor:		0.77
Adjusted Impedance Factor:		0.77
Capacity Adjustment Factor due to Impeding Movements		0.77
Movement Capacity: (pcph)		298

Intersection Performance Summary

Movement	Flow Rate (pcph)	Move Cap (pcph)	Shared Cap (pcph)	Avg. Total Delay (sec/veh)	95% Queue Length (veh)	LOS	Approach Delay (sec/veh)
SB L	62	298		15.2	0.9	C	
SB R	136	850		5.0	0.6	B	7.7
EB L	207	1008		4.5	0.9	A	2.4

Intersection Delay = 2.2 sec/veh

Parsons Brinckerhoff Quade & Douglas
Pacific Tower, Suite 3000
1001 Bishop Street
Honolulu, HI 96813-
Ph: (808) 531-7094

Streets: (N-S) Imi Kala Street (E-W) Mill Street
Major Street Direction.... EW
Length of Time Analyzed... 60 (min)
Analyst..... Miyamoto
Date of Analysis..... 1/16/98
Other Information.....Existing 1998 P.M. Peak Hour
Two-way Stop-controlled Intersection

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	> 1	0	0	1	< 0	0	0	0	1	0	1
Stop/Yield			N			N						
Volumes	146	197			258	108				102		267
PHF	.777	.879			.935	.844				.823		.867
Grade		0			0						0	
MC's (%)												
SU/RV's (%)												
CV's (%)												
PCE's	1.10									1.10		1.10

Adjustment Factors

Vehicle Maneuver	Critical Gap (tg)	Follow-up Time (tf)
Left Turn Major Road	5.00	2.10
Right Turn Minor Road	5.50	2.60
Through Traffic Minor Road	6.00	3.30
Left Turn Minor Road	6.50	3.40

Worksheet for TWSC Intersection

Step 1: RT from Minor Street	NB	SB
Conflicting Flows: (vph)		340
Potential Capacity: (pcph)		931
Movement Capacity: (pcph)		931
Prob. of Queue-Free State:		0.64

Step 2: LT from Major Street	WB	EB
Conflicting Flows: (vph)		404
Potential Capacity: (pcph)		1100
Movement Capacity: (pcph)		1100
Prob. of Queue-Free State:		0.81
TH Saturation Flow Rate: (pcphpl)		1700
RT Saturation Flow Rate: (pcphpl)		
Major LT Shared Lane Prob. of Queue-Free State:		0.78

Step 4: LT from Minor Street	NB	SB
Conflicting Flows: (vph)		752
Potential Capacity: (pcph)		388
Major LT, Minor TH Impedance Factor:		0.78
Adjusted Impedance Factor:		0.78
Capacity Adjustment Factor due to Impeding Movements		0.78
Movement Capacity: (pcph)		304

Intersection Performance Summary

Movement	Flow Rate (pcph)	Move Cap (pcph)	Shared Cap (pcph)	Avg. Total Delay (sec/veh)	95% Queue Length (veh)	LOS	Approach Delay (sec/veh)
SB L	136	304		21.3	2.6	D	10.3
SB R	339	931		6.1	1.9	B	
EB L	207	1100		4.0	0.8	A	1.7

Intersection Delay = 4.1 sec/veh

Parsons Brinckerhoff Quade & Douglas
Pacific Tower, Suite 3000
1001 Bishop Street
Honolulu, HI 96813-
Ph: (808) 531-7094

Streets: (N-S) Imi Kala Street (E-W) Wili Pa Street
Major Street Direction.... NS
Length of Time Analyzed... 60 (min)
Analyst..... Miyamoto
Date of Analysis..... 1/16/98
Other Information.....Existing 1998 A.M. Peak Hour
Two-way Stop-controlled Intersection

	Northbound			Southbound			Eastbound			Westbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	> 1	0	0	1	< 0	0	> 0	< 0	0	0	0
Stop/Yield			N			N						
Volumes	104	158			105	3	0		32			
PHF	.65	.823			.938	.375	1		.727			
Grade		0			0			0				
MC's (%)												
SU/RV's (%)												
CV's (%)												
PCE's	1.10						1.10		1.10			

Adjustment Factors

Vehicle Maneuver	Critical Gap (tg)	Follow-up Time (tf)
Left Turn Major Road	5.00	2.10
Right Turn Minor Road	5.50	2.60
Through Traffic Minor Road	6.00	3.30
Left Turn Minor Road	6.50	3.40

Worksheet for TWSC Intersection

Step 1: RT from Minor Street	WB	EB
Conflicting Flows: (vph)		116
Potential Capacity: (pcph)		1209
Movement Capacity: (pcph)		1209
Prob. of Queue-Free State:		0.96

Step 2: LT from Major Street	SB	NB
Conflicting Flows: (vph)		120
Potential Capacity: (pcph)		1503
Movement Capacity: (pcph)		1503
Prob. of Queue-Free State:		0.88
TH Saturation Flow Rate: (pcphpl)		1700
RT Saturation Flow Rate: (pcphpl)		
Major LT Shared Lane Prob. of Queue-Free State:		0.87

Step 4: LT from Minor Street	WB	EB
Conflicting Flows: (vph)		468
Potential Capacity: (pcph)		567
Major LT, Minor TH Impedance Factor:		0.87
Adjusted Impedance Factor:		0.87
Capacity Adjustment Factor due to Impeding Movements		0.87
Movement Capacity: (pcph)		492

Intersection Performance Summary

Movement	Flow Rate (pcph)	Move Cap (pcph)	Shared Cap (pcph)	Avg. Total Delay (sec/veh)	95% Queue Length (veh)	LOS	Approach Delay (sec/veh)
EB L	0	492 >	1209	3.1	0.0	A	3.1
EB R	48	1209 >					
NB L	176	1503		2.7	0.4	A	1.1

Intersection Delay = 0.9 sec/veh

Parsons Brinckerhoff Quade & Douglas
Pacific Tower, Suite 3000
1001 Bishop Street
Honolulu, HI 96813-
Ph: (808) 531-7094

Streets: (N-S) Imi Kala Street (E-W) Wili Pa Street
Major Street Direction.... NS
Length of Time Analyzed... 60 (min)
Analyst..... Miyamoto
Date of Analysis..... 1/16/98
Other Information.....Existing 1998 P.M. Peak Hour
Two-way Stop-controlled Intersection

	Northbound			Southbound			Eastbound			Westbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	> 1	0	0	1	< 0	0	> 0	< 0	0	0	0
Stop/Yield			N			N						
Volumes	46	210			266	3	9		76			
PHF	.885	.808			.978	.375	.45		.704			
Grade		0			0			0				
MC's (%)												
SU/RV's (%)												
CV's (%)												
PCE's	1.10						1.10		1.10			

Adjustment Factors

Vehicle Maneuver	Critical Gap (tg)	Follow-up Time (tf)
Left Turn Major Road	5.00	2.10
Right Turn Minor Road	5.50	2.60
Through Traffic Minor Road	6.00	3.30
Left Turn Minor Road	6.50	3.40

Worksheet for TWSC Intersection

Step 1: RT from Minor Street	WB	EB
Conflicting Flows: (vph)		276
Potential Capacity: (pcph)		1003
Movement Capacity: (pcph)		1003
Prob. of Queue-Free State:		0.88

Step 2: LT from Major Street	SB	NB
Conflicting Flows: (vph)		280
Potential Capacity: (pcph)		1261
Movement Capacity: (pcph)		1261
Prob. of Queue-Free State:		0.95
TH Saturation Flow Rate: (pcphpl)		1700
RT Saturation Flow Rate: (pcphpl)		
Major LT Shared Lane Prob. of Queue-Free State:		0.95

Step 4: LT from Minor Street	WB	EB
Conflicting Flows: (vph)		588
Potential Capacity: (pcph)		483
Major LT, Minor TH Impedance Factor:		0.95
Adjusted Impedance Factor:		0.95
Capacity Adjustment Factor due to Impeding Movements		0.95
Movement Capacity: (pcph)		457

Intersection Performance Summary

Movement	Flow Rate (pcph)	Move Cap (pcph)	Shared Cap (pcph)	Avg. Total Delay (sec/veh)	95% Queue Length (veh)	LOS	Approach Delay (sec/veh)
EB L	22	457 >	845	5.1	0.7	B	5.1
EB R	119	1003 >					
NB L	57	1261		3.0	0.0	A	0.5

Intersection Delay = 0.9 sec/veh

HCM: SIGNALIZED INTERSECTION SUMMARY Version 2.4e 01-26-1998
Parsons Brinckerhoff Quade & Douglas

Streets: (E-W) Lower Main Street (N-S) Waena St./SC Access
Analyst: Miyamoto File Name: LMSBA.HC9
Area Type: Other 1-16-98 Morning
Comment: Year 2000, Base w/o Project, Eha St. Open

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	2 < 0		1	2 < 0		0 > 1 < 0			0 > 1		1
Volumes	110	380	15	25	545	65	15	5	10	170	5	245
PHF or PK15	0.75	0.75	0.58	0.64	0.83	0.46	0.65	0.50	0.32	0.80	0.42	0.90
Lane W (ft)	11.0	11.0		11.0	11.0			12.0			12.0	12.0
Grade		0			0			0			0	
% Heavy Veh	2	2	2	2	2	2	2	2	2	2	2	2
Parking	N	N		N	N		N	N		N	N	
Bus Stops			0			0			0			0
Con. Peds			0			0			0			0
Ped Button	(Y/N)	Y	8.5 s	(Y/N)	Y	11.5 s	(Y/N)	Y	16.4 s	(Y/N)	N	
Arr Type	3	3		3	3			3			3	3
RTOR Vols			0			0			0			140
Lost Time	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00
Prop. Share												
Prop. Prot.												65

Signal Operations

Phase Combination		1	2	3	4	5	6	7	8
EB	Left	*	*			NB Left *			
	Thru		*			Thru *			
	Right		*			Right *			
	Peds		*			Peds *			
WB	Left	*	*			SB Left *			
	Thru		*			Thru *			
	Right		*			Right *			
	Peds		*			Peds *			
NB	Right					EB Right			
SB	Right	*	*			WB Right			
Green		15.0A	25.0A			Green 20.0A			
Yellow/AR		5.0	5.0			Yellow/AR 5.0			

Cycle Length: 75 secs Phase combination order: #1 #2 #5

Intersection Performance Summary

	Lane Mvmts	Group: Cap	Adj Sat Flow	v/c Ratio	g/C Ratio	Delay	LOS	Approach: Delay	LOS
EB	L	484	1711	0.306	0.627	5.1	B	10.5	B
	TR	1287	3575	0.437	0.360	11.9	B		
WB	L	538	1711	0.072	0.627	3.8	A	13.5	B
	TR	1262	3505	0.662	0.360	13.9	B		
NB	LTR	360	1226	0.178	0.293	12.8	B	12.8	B
SB	LT	369	1258	0.610	0.293	16.8	C	11.1	B
	R	1520	1583	0.077	0.960	0.0	A		

Intersection Delay = 12.0 sec/veh Intersection LOS = B
Lost Time/Cycle, L = 9.0 sec Critical v/c(x) = 0.572

HCM: SIGNALIZED INTERSECTION SUMMARY Version 2.4e 01-26-1998

Parsons Brinckerhoff Quade & Douglas

Streets: (E-W) Lower Main Street (N-S) Waena St./SC Access
Analyst: Miyamoto File Name: LMSBP.HC9
Area Type: Other 1-16-98 Evening
Comment: Year 2000, w/o Project, Eha St. Open

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	2 < 0		1	2 < 0		0	> 1 < 0		0	> 1	1
Volumes	125	525	35	20	410	115	30	5	40	100	15	105
PHF or PK15	0.84	0.79	0.73	0.75	0.85	0.76	0.60	0.63	0.65	0.83	0.50	0.89
Lane W (ft)	11.0	11.0		11.0	11.0			12.0			12.0	12.0
Grade		0			0			0			0	
% Heavy Veh	2	2	2	2	2	2	2	2	2	2	2	2
Parking	N	N		N	N		N	N		N	N	
Bus Stops			0			0			0			0
Con. Peds			0			0			0			0
Ped Button	(Y/N)	Y 8.5 s		(Y/N)	Y 11.5 s		(Y/N)	Y 16.4 s		(Y/N)	N	
Arr Type	3	3		3	3			3			3	3
RTOR Vols			0			0			0			104
Lost Time	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00
Prop. Share												
Prop. Prot.												65

Signal Operations

Phase Combination		1	2	3	4			5	6	7	8
EB	Left	*	*	*		NB	Left	*			
	Thru		*	*			Thru	*			
	Right		*	*			Right	*			
	Peds		*	*			Peds	*			
WB	Left	*		*		SB	Left	*			
	Thru			*			Thru	*			
	Right			*			Right	*			
	Peds			*			Peds	*			
NB	Right					EB	Right				
SB	Right	*	*	*		WB	Right				
Green		5.0A	5.0A	25.0A		Green		20.0A			
Yellow/AR		5.0	5.0	5.0		Yellow/AR		5.0			

Cycle Length: 75 secs Phase combination order: #1 #2 #3 #5

Intersection Performance Summary

	Lane Mvmts	Group: Cap	Adj Sat Flow	v/c Ratio	g/C Ratio	Delay	LOS	Approach: Delay	LOS
EB	L	492	1711	0.303	0.627	4.6	A	7.4	B
	TR	1759	3565	0.425	0.493	8.0	B		
WB	L	296	1711	0.091	0.493	7.4	B	12.4	B
	TR	1250	3472	0.534	0.360	12.6	B		
NB	LTR	358	1222	0.332	0.293	13.6	B	13.6	B
SB	LT	300	1024	0.499	0.293	15.3	C	15.1	C
	R	1520	1583	0.001	0.960	0.0	A		

Intersection Delay = 10.3 sec/veh Intersection LOS = B

Lost Time/Cycle, L = 9.0 sec Critical v/c(x) = 0.484

Parsons Brinckerhoff Quade & Douglas
Pacific Tower, Suite 3000
1001 Bishop Street
Honolulu, HI 96813-
Ph: (808) 531-7094

Streets: (N-S) Waena Street (E-W) Eha Street
Major Street Direction.... EW
Length of Time Analyzed... 60 (min)
Analyst..... Miyamoto
Date of Analysis..... 1/16/98
Other Information..... Year 2000, w/o Project, Eha St. Open, AM
Two-way Stop-controlled Intersection

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	1	< 0	1	1	0	1	0	1	0	0	0
Stop/Yield			N			N						
Volumes		40	50	160	75		60		95			
PHF		.5	.587	.75	.75		.5		.702			
Grade		0			0			0				
MC's (%)												
SU/RV's (%)												
CV's (%)												
PCE's				1.10			1.10		1.10			

Adjustment Factors

Vehicle Maneuver	Critical Gap (tg)	Follow-up Time (tf)
Left Turn Major Road	5.00	2.10
Right Turn Minor Road	5.50	2.60
Through Traffic Minor Road	6.00	3.30
Left Turn Minor Road	6.50	3.40

Worksheet for TWSC Intersection

Step 1: RT from Minor Street	NB	SB
Conflicting Flows: (vph)	122	
Potential Capacity: (pcph)	1201	
Movement Capacity: (pcph)	1201	
Prob. of Queue-Free State:	0.88	

Step 2: LT from Major Street	WB	EB
Conflicting Flows: (vph)	165	
Potential Capacity: (pcph)	1430	
Movement Capacity: (pcph)	1430	
Prob. of Queue-Free State:	0.84	

Step 4: LT from Minor Street	NB	SB
Conflicting Flows: (vph)	436	
Potential Capacity: (pcph)	592	
Major LT, Minor TH Impedance Factor:	0.84	
Adjusted Impedance Factor:	0.84	
Capacity Adjustment Factor due to Impeding Movements	0.84	
Movement Capacity: (pcph)	495	

Intersection Performance Summary

Movement	Flow Rate (pcph)	Move Cap (pcph)	Shared Cap (pcph)	Avg. Total Delay (sec/veh)	95% Queue Length (veh)	LOS	Approach Delay (sec/veh)
NB L	132	495		9.9	1.2	B	5.9
NB R	149	1201		3.4	0.4	A	
WB L	234	1430		3.0	0.6	A	2.0

Intersection Delay = 2.9 sec/veh

Parsons Brinckerhoff Quade & Douglas
Pacific Tower, Suite 3000
1001 Bishop Street
Honolulu, HI 96813-
Ph: (808) 531-7094

Streets: (N-S) Waena Street (E-W) Eha Street
Major Street Direction.... EW
Length of Time Analyzed... 60 (min)
Analyst..... Miyamoto
Date of Analysis..... 1/16/98
Other Information..... Year 2000, w/o Project, Eha St. Open, P M
Two-way Stop-controlled Intersection

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	1	< 0	1	1	0	1	0	1	0	0	0
Stop/Yield			N			N						
Volumes		65	50	150	120		65		140			
PHF		.688	.578	.955	.708		.643		.84			
Grade		0			0			0				
MC's (%)												
SU/RV's (%)												
CV's (%)												
PCE's				1.10			1.10		1.10			

Adjustment Factors

Vehicle Maneuver	Critical Gap (tg)	Follow-up Time (tf)
Left Turn Major Road	5.00	2.10
Right Turn Minor Road	5.50	2.60
Through Traffic Minor Road	6.00	3.30
Left Turn Minor Road	6.50	3.40

Worksheet for TWSC Intersection

Step 1: RT from Minor Street	NB	SB
Conflicting Flows: (vph)	138	
Potential Capacity: (pcph)	1179	
Movement Capacity: (pcph)	1179	
Prob. of Queue-Free State:	0.84	

Step 2: LT from Major Street	WB	EB
Conflicting Flows: (vph)	181	
Potential Capacity: (pcph)	1406	
Movement Capacity: (pcph)	1406	
Prob. of Queue-Free State:	0.88	

Step 4: LT from Minor Street	NB	SB
Conflicting Flows: (vph)	464	
Potential Capacity: (pcph)	570	
Major LT, Minor TH Impedance Factor:	0.88	
Adjusted Impedance Factor:	0.88	
Capacity Adjustment Factor due to Impeding Movements	0.88	
Movement Capacity: (pcph)	500	

Intersection Performance Summary

Movement	Flow Rate (pcph)	Move Cap (pcph)	Shared Cap (pcph)	Avg. Total Delay (sec/veh)	95% Queue Length (veh)	LOS	Approach Delay (sec/veh)
NB L	111	500		9.3	1.0	B	
NB R	184	1179		3.6	0.6	A	5.4
WB L	173	1406		2.9	0.4	A	1.6

Intersection Delay = 2.6 sec/veh

Parsons Brinckerhoff Quade & Douglas
Pacific Tower, Suite 3000
1001 Bishop Street
Honolulu, HI 96813-
Ph: (808) 531-7094

Streets: (N-S) Imi Kala Street (E-W) Mill Street
Major Street Direction.... EW
Length of Time Analyzed... 60 (min)
Analyst..... Miyamoto
Date of Analysis..... 1/16/98
Other Information..... Year 2000, w/o Project, Eha St. Open, AM
Two-way Stop-controlled Intersection

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	> 1	0	0	1	< 0	0	0	0	1	0	1
Stop/Yield			N			N						
Volumes	215	130			235	55				25		175
PHF	.91	.967			.781	.811				.679		.855
Grade		0			0						0	
MC's (%)												
SU/RV's (%)												
CV's (%)												
PCE's	1.10									1.10		1.10

Adjustment Factors

Vehicle Maneuver	Critical Gap (tg)	Follow-up Time (tf)
Left Turn Major Road	5.00	2.10
Right Turn Minor Road	5.50	2.60
Through Traffic Minor Road	6.00	3.30
Left Turn Minor Road	6.50	3.40

Worksheet for TWSC Intersection

Step 1: RT from Minor Street	NB	SB
Conflicting Flows: (vph)		335
Potential Capacity: (pcph)		937
Movement Capacity: (pcph)		937
Prob. of Queue-Free State:		0.76

Step 2: LT from Major Street	WB	EB
Conflicting Flows: (vph)		369
Potential Capacity: (pcph)		1144
Movement Capacity: (pcph)		1144
Prob. of Queue-Free State:		0.77
TH Saturation Flow Rate: (pcphpl)		1700
RT Saturation Flow Rate: (pcphpl)		
Major LT Shared Lane Prob. of Queue-Free State:		0.75

Step 4: LT from Minor Street	NB	SB
Conflicting Flows: (vph)		705
Potential Capacity: (pcph)		414
Major LT, Minor TH Impedance Factor:		0.75
Adjusted Impedance Factor:		0.75
Capacity Adjustment Factor due to Impeding Movements		0.75
Movement Capacity: (pcph)		312

Intersection Performance Summary

Movement		Flow Rate (pcph)	Move Cap (pcph)	Shared Cap (pcph)	Avg. Total Delay (sec/veh)	95% Queue Length (veh)	LOS	Approach Delay (sec/veh)
SB	L	41	312		13.3	0.5	C	6.1
SB	R	226	937		5.1	1.1	B	
EB	L	260	1144		4.1	1.0	A	2.5

Intersection Delay = 2.5 sec/veh

Parsons Brinckerhoff Quade & Douglas
Pacific Tower, Suite 3000
1001 Bishop Street
Honolulu, HI 96813-
Ph: (808) 531-7094

Streets: (N-S) Imi Kala Street (E-W) Mill Street
Major Street Direction.... EW
Length of Time Analyzed... 60 (min)
Analyst..... Miyamoto
Date of Analysis..... 1/16/98
Other Information..... Year 2000, w/o Project, Eha St. Open, PM

Two-way Stop-controlled Intersection

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	> 1	0	0	1	< 0	0	0	0	1	0	1
Stop/Yield			N			N						
Volumes	205	165			195	60				60		370
PHF	.777	.879			.935	.844				.823		.867
Grade		0			0						0	
MC's (%)												
SU/RV's (%)												
CV's (%)												
PCE's	1.10									1.10		1.10

Adjustment Factors

Vehicle Maneuver	Critical Gap (tg)	Follow-up Time (tf)
Left Turn Major Road	5.00	2.10
Right Turn Minor Road	5.50	2.60
Through Traffic Minor Road	6.00	3.30
Left Turn Minor Road	6.50	3.40

Worksheet for TWSC Intersection

Step 1: RT from Minor Street	NB	SB
Conflicting Flows: (vph)		244
Potential Capacity: (pcph)		1042
Movement Capacity: (pcph)		1042
Prob. of Queue-Free State:		0.55

Step 2: LT from Major Street	WB	EB
Conflicting Flows: (vph)		280
Potential Capacity: (pcph)		1261
Movement Capacity: (pcph)		1261
Prob. of Queue-Free State:		0.77
TH Saturation Flow Rate: (pcphpl)		1700
RT Saturation Flow Rate: (pcphpl)		
Major LT Shared Lane Prob. of Queue-Free State:		0.74

Step 4: LT from Minor Street	NB	SB
Conflicting Flows: (vph)		696
Potential Capacity: (pcph)		419
Major LT, Minor TH Impedance Factor:		0.74
Adjusted Impedance Factor:		0.74
Capacity Adjustment Factor due to Impeding Movements		0.74
Movement Capacity: (pcph)		311

Intersection Performance Summary

Movement	Flow Rate (pcph)	Move Cap (pcph)	Shared Cap (pcph)	Avg. Total Delay (sec/veh)	95% Queue Length (veh)	LOS	Approach Delay (sec/veh)
SB L	80	311		15.6	1.2	C	7.6
SB R	470	1042		6.3	2.7	B	
EB L	290	1261		3.7	1.0	A	2.1

Intersection Delay = 3.8 sec/veh

Parsons Brinckerhoff Quade & Douglas
Pacific Tower, Suite 3000
1001 Bishop Street
Honolulu, HI 96813-
Ph: (808) 531-7094

Streets: (N-S) Imi Kala Street (E-W) Wili Pa Street
Major Street Direction.... NS
Length of Time Analyzed... 60 (min)
Analyst..... Miyamoto
Date of Analysis..... 1/16/98
Other Information..... Year 2000, w/o Project, Eha St. Open, AM
Two-way Stop-controlled Intersection

	Northbound			Southbound			Eastbound			Westbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	> 1	0	0	1	< 0	0	> 0	< 0	0	0	0
Stop/Yield			N			N						
Volumes	70	180			175	45	15		25			
PHF	.65	.823			.938	.375	.95		.727			
Grade		0			0			0				
MC's (%)												
SU/RV's (%)												
CV's (%)												
PCE's	1.10						1.10		1.10			

Adjustment Factors

Vehicle Maneuver	Critical Gap (tg)	Follow-up Time (tf)
Left Turn Major Road	5.00	2.10
Right Turn Minor Road	5.50	2.60
Through Traffic Minor Road	6.00	3.30
Left Turn Minor Road	6.50	3.40

Worksheet for TWSC Intersection

Step 1: RT from Minor Street	WB	EB
Conflicting Flows: (vph)		247
Potential Capacity: (pcph)		1038
Movement Capacity: (pcph)		1038
Prob. of Queue-Free State:		0.96

Step 2: LT from Major Street	SB	NB
Conflicting Flows: (vph)		307
Potential Capacity: (pcph)		1224
Movement Capacity: (pcph)		1224
Prob. of Queue-Free State:		0.90
TH Saturation Flow Rate: (pcphpl)		1700
RT Saturation Flow Rate: (pcphpl)		
Major LT Shared Lane Prob. of Queue-Free State:		0.89

Step 4: LT from Minor Street	WB	EB
Conflicting Flows: (vph)		574
Potential Capacity: (pcph)		493
Major LT, Minor TH Impedance Factor:		0.89
Adjusted Impedance Factor:		0.89
Capacity Adjustment Factor due to Impeding Movements		0.89
Movement Capacity: (pcph)		438

Intersection Performance Summary

Movement	Flow Rate (pcph)	Move Cap (pcph)	Shared Cap (pcph)	Avg. Total Delay (sec/veh)	95% Queue Length (veh)	LOS	Approach Delay (sec/veh)
EB L	18	438 >	717	5.4	0.2	B	5.4
EB R	37	1038 >					
NB L	119	1224		3.3	0.3	A	0.9

Intersection Delay = 0.9 sec/veh

Parsons Brinckerhoff Quade & Douglas
Pacific Tower, Suite 3000
1001 Bishop Street
Honolulu, HI 96813-
Ph: (808) 531-7094

Streets: (N-S) Imi Kala Street (E-W) Wili Pa Street
Major Street Direction.... NS
Length of Time Analyzed... 60 (min)
Analyst..... Miyamoto
Date of Analysis..... 1/16/98
Other Information..... Year 2000, w/o Project, Eha St. Open, PM
Two-way Stop-controlled Intersection

	Northbound			Southbound			Eastbound			Westbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	> 1	0	0	1	< 0	0	> 0	< 0	0	0	0
Stop/Yield			N			N						
Volumes	15	255			370	45	45		50			
PHF	.885	.808			.978	.375	.45		.704			
Grade		0			0			0				
MC's (%)												
SU/RV's (%)												
CV's (%)												
PCE's	1.10						1.10		1.10			

Adjustment Factors

Vehicle Maneuver	Critical Gap (tg)	Follow-up Time (tf)
Left Turn Major Road	5.00	2.10
Right Turn Minor Road	5.50	2.60
Through Traffic Minor Road	6.00	3.30
Left Turn Minor Road	6.50	3.40

Worksheet for TWSC Intersection

Step 1: RT from Minor Street	WB	EB
Conflicting Flows: (vph)		438
Potential Capacity: (pcph)		831
Movement Capacity: (pcph)		831
Prob. of Queue-Free State:		0.91

Step 2: LT from Major Street	SB	NB
Conflicting Flows: (vph)		498
Potential Capacity: (pcph)		993
Movement Capacity: (pcph)		993
Prob. of Queue-Free State:		0.98
TH Saturation Flow Rate: (pcphpl)		1700
RT Saturation Flow Rate: (pcphpl)		
Major LT Shared Lane Prob. of Queue-Free State:		0.98

Step 4: LT from Minor Street	WB	EB
Conflicting Flows: (vph)		771
Potential Capacity: (pcph)		379
Major LT, Minor TH Impedance Factor:		0.98
Adjusted Impedance Factor:		0.98
Capacity Adjustment Factor due to Impeding Movements		0.98
Movement Capacity: (pcph)		370

Intersection Performance Summary

Movement	Flow Rate (pcph)	Move Cap (pcph)	Shared Cap (pcph)	Avg. Total Delay (sec/veh)	95% Queue Length (veh)	LOS	Approach Delay (sec/veh)
EB L	110	370 >	481	12.3	2.1	C	12.3
EB R	78	831 >					
NB L	19	993		3.7	0.0	A	0.2

Intersection Delay = 1.6 sec/veh

Parsons Brinckerhoff Quade & Douglas
Pacific Tower, Suite 3000
1001 Bishop Street
Honolulu, HI 96813-
Ph: (808) 531-7094

Streets: (N-S) Imi Kala Street (E-W) Wili Pa/Eha Street
Major Street Direction.... NS
Length of Time Analyzed... 60 (min)
Analyst..... Miyamoto
Date of Analysis..... 1/16/98
Other Information..... Year 2000, w/o Project, Eha St. Open, AM
Two-way Stop-controlled Intersection

	Northbound			Southbound			Eastbound			Westbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	> 1	< 0	0	> 1	< 0	0	> 1	< 0	0	> 1	< 0
Stop/Yield			N			N						
Volumes	65	0	60	0	0	0	0	10	30	115	20	0
PHF	.77	1	.5	1	1	1	1	.95	.589	.563	.95	1
Grade		0			0			0			0	
MC's (%)												
SU/RV's (%)												
CV's (%)												
PCE's	1.10			1.10			1.10	1.10	1.10	1.10	1.10	1.10

Adjustment Factors

Vehicle Maneuver	Critical Gap (tg)	Follow-up Time (tf)
Left Turn Major Road	5.00	2.10
Right Turn Minor Road	5.50	2.60
Through Traffic Minor Road	6.00	3.30
Left Turn Minor Road	6.50	3.40

Worksheet for TWSC Intersection

Step 1: RT from Minor Street	WB	EB
Conflicting Flows: (vph)	60	0
Potential Capacity: (pcph)	1291	1385
Movement Capacity: (pcph)	1291	1385
Prob. of Queue-Free State:	1.00	0.96

Step 2: LT from Major Street	SB	NB
Conflicting Flows: (vph)	120	0
Potential Capacity: (pcph)	1503	1714
Movement Capacity: (pcph)	1503	1714
Prob. of Queue-Free State:	1.00	0.95
TH Saturation Flow Rate: (pcphpl)	1700	1700
RT Saturation Flow Rate: (pcphpl)	1700	1700
Major LT Shared Lane Prob. of Queue-Free State:	1.00	0.94

Step 3: TH from Minor Street	WB	EB
Conflicting Flows: (vph)	144	204
Potential Capacity: (pcph)	917	853
Capacity Adjustment Factor due to Impeding Movements	0.94	0.94
Movement Capacity: (pcph)	864	804
Prob. of Queue-Free State:	0.97	0.99

Step 4: LT from Minor Street	WB	EB
Conflicting Flows: (vph)	175	154
Potential Capacity: (pcph)	838	862
Major LT, Minor TH Impedance Factor:	0.93	0.92
Adjusted Impedance Factor:	0.95	0.94
Capacity Adjustment Factor due to Impeding Movements	0.91	0.94
Movement Capacity: (pcph)	760	807

Intersection Performance Summary

Movement		Flow Rate (pcph)	Move Cap (pcph)	Shared Cap (pcph)	Avg. Total Delay (sec/veh)	95% Queue Length (veh)	LOS	Approach Delay (sec/veh)
EB	L	0	807 >					
EB	T	12	804 >	1228	3.1	0.0	A	3.1
EB	R	56	1385 >					
WB	L	224	760 >					
WB	T	23	864 >	769	6.9	1.6	B	6.9
WB	R	0	1291 >					
NB	L	92	1714		2.2	0.0	A	1.2
SB	L	0	1503		2.4	0.0	A	0.0

Intersection Delay = 4.0 sec/veh

Parsons Brinckerhoff Quade & Douglas
Pacific Tower, Suite 3000
1001 Bishop Street
Honolulu, HI 96813-
Ph: (808) 531-7094

Streets: (N-S) Imi Kala Street (E-W) Wili Pa/Eha Street
Major Street Direction.... NS
Length of Time Analyzed... 60 (min)
Analyst..... Miyamoto
Date of Analysis..... 1/16/98
Other Information..... Year 2000, w/o Project, Eha St. Open, PM
Two-way Stop-controlled Intersection

	Northbound			Southbound			Eastbound			Westbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	> 1	< 0	0	> 1	< 0	0	> 1	< 0	0	> 1	< 0
Stop/Yield			N			N						
Volumes	20	0	95	0	0	0	0	20	70	145	20	0
PHF	.825	1	.7	1	1	1	1	.25	.658	.656	.95	1
Grade		0			0			0			0	
MC's (%)												
SU/RV's (%)												
CV's (%)												
PCE's	1.10			1.10			1.10	1.10	1.10	1.10	1.10	1.10

Adjustment Factors

Vehicle Maneuver	Critical Gap (tg)	Follow-up Time (tf)
Left Turn Major Road	5.00	2.10
Right Turn Minor Road	5.50	2.60
Through Traffic Minor Road	6.00	3.30
Left Turn Minor Road	6.50	3.40

Worksheet for TWSC Intersection

Step 1: RT from Minor Street	WB	EB
Conflicting Flows: (vph)	68	0
Potential Capacity: (pcph)	1279	1385
Movement Capacity: (pcph)	1279	1385
Prob. of Queue-Free State:	1.00	0.92

Step 2: LT from Major Street	SB	NB
Conflicting Flows: (vph)	136	0
Potential Capacity: (pcph)	1477	1714
Movement Capacity: (pcph)	1477	1714
Prob. of Queue-Free State:	1.00	0.98
TH Saturation Flow Rate: (pcphpl)	1700	1700
RT Saturation Flow Rate: (pcphpl)	1700	1700
Major LT Shared Lane Prob. of Queue-Free State:	1.00	0.98

Step 3: TH from Minor Street	WB	EB
Conflicting Flows: (vph)	92	160
Potential Capacity: (pcph)	976	899
Capacity Adjustment Factor due to Impeding Movements	0.98	0.98
Movement Capacity: (pcph)	960	884
Prob. of Queue-Free State:	0.98	0.90

Step 4: LT from Minor Street	WB	EB
Conflicting Flows: (vph)	185	102
Potential Capacity: (pcph)	827	924
Major LT, Minor TH Impedance Factor:	0.89	0.96
Adjusted Impedance Factor:	0.91	0.97
Capacity Adjustment Factor due to Impeding Movements	0.84	0.97
Movement Capacity: (pcph)	691	896

Intersection Performance Summary

Movement		Flow Rate (pcph)	Move Cap (pcph)		Shared Cap (pcph)	Avg. Total Delay (sec/veh)	95% Queue Length (veh)	LOS	Approach Delay (sec/veh)
EB	L	0	896	>					
EB	T	88	884	>	1114	4.0	0.8	A	4.0
EB	R	117	1385	>					
WB	L	243	691	>					
WB	T	23	960	>	708	8.1	2.0	B	8.1
WB	R	0	1279	>					
NB	L	26	1714			2.1	0.0	A	0.4
SB	L	0	1477			2.4	0.0	A	0.0

Intersection Delay = 4.7 sec/veh

HCM: SIGNALIZED INTERSECTION SUMMARY Version 2.4e 01-26-1998
Parsons Brinckerhoff Quade & Douglas

Streets: (E-W) Lower Main Street (N-S) Waena St./SC Access
Analyst: Miyamoto File Name: LMSPA.HC9
Area Type: Other 1-16-98 Morning
Comment: Year 2000, Base w/ Project, Eha St. Open

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	2	< 0	1	2	< 0	0	> 1	< 0	0	> 1	1
Volumes	110	380	15	25	545	80	15	5	10	212	5	245
PHF or PK15	0.75	0.75	0.58	0.64	0.83	0.46	0.65	0.50	0.32	0.80	0.42	0.90
Lane W (ft)	11.0	11.0		11.0	11.0			12.0			12.0	12.0
Grade		0			0			0			0	
% Heavy Veh	2	2	2	2	2	2	2	2	2	2	2	2
Parking	N	N		N	N		N	N		N	N	
Bus Stops			0			0			0			0
Con. Peds			0			0			0			0
Ped Button	(Y/N)	Y	8.5 s	(Y/N)	Y	11.5 s	(Y/N)	Y	16.4 s	(Y/N)	N	
Arr Type	3	3		3	3			3			3	3
RTOR Vols			0			0			0		110	
Lost Time	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00
Prop. Share												
Prop. Prot.												65

Signal Operations

Phase Combination		1	2	3	4	5	6	7	8
EB	Left	*	*			NB Left *			
	Thru		*			Thru *			
	Right		*			Right *			
	Peds		*			Peds *			
WB	Left	*	*			SB Left *			
	Thru		*			Thru *			
	Right		*			Right *			
	Peds		*			Peds *			
NB	Right					EB Right			
SB	Right	*	*			WB Right			
Green		15.0A	25.0A			Green 20.0A			
Yellow/AR		5.0	5.0			Yellow/AR 5.0			

Cycle Length: 75 secs Phase combination order: #1 #2 #5

Intersection Performance Summary

	Lane Mvmts	Group: Cap	Adj Sat Flow	v/c Ratio	g/C Ratio	Delay	LOS	Approach: Delay	LOS
EB	L	484	1711	0.306	0.627	5.3	B	10.5	B
	TR	1287	3575	0.437	0.360	11.9	B		
WB	L	538	1711	0.072	0.627	3.8	A	13.9	B
	TR	1255	3487	0.692	0.360	14.4	B		
NB	LTR	337	1149	0.190	0.293	12.8	B	12.8	B
SB	LT	368	1254	0.755	0.293	21.5	C	13.9	B
	R	1520	1583	0.099	0.960	0.0	A		

Intersection Delay = 12.8 sec/veh Intersection LOS = B
Lost Time/Cycle, L = 9.0 sec Critical v/c(x) = 0.633

HCM: SIGNALIZED INTERSECTION SUMMARY Version 2.4e 01-26-1998
Parsons Brinckerhoff Quade & Douglas

Streets: (E-W) Lower Main Street (N-S) Waena St./SC Access
Analyst: Miyamoto File Name: LMSPP.HC9
Area Type: Other 1-16-98 Evening
Comment: Year 2000, w/ Project, Eha St. Open

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	2 < 0		1	2 < 0		0	> 1 < 0		0	> 1	1
Volumes	125	525	35	20	410	164	30	5	40	127	15	105
PHF or PK15	0.84	0.79	0.73	0.75	0.85	0.76	0.60	0.63	0.65	0.83	0.50	0.89
Lane W (ft)	11.0	11.0		11.0	11.0			12.0			12.0	12.0
Grade		0			0			0			0	
% Heavy Veh	2	2	2	2	2	2	2	2	2	2	2	2
Parking	N	N		N	N		N	N		N	N	
Bus Stops			0			0			0			0
Con. Peds			0			0			0			0
Ped Button	(Y/N)	Y	8.5 s	(Y/N)	Y	11.5 s	(Y/N)	Y	16.4 s	(Y/N)	N	
Arr Type	3	3		3	3			3			3	3
RTOR Vols			0			0			0			104
Lost Time	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00
Prop. Share												
Prop. Prot.												65

Signal Operations

Phase Combination	1	2	3	4
EB Left	*	*	*	
Thru		*	*	
Right		*	*	
Peds		*	*	
WB Left	*		*	
Thru			*	
Right			*	
Peds			*	
NB Right				
SB Right		*	*	*
Green	5.0A	5.0A	25.0A	
Yellow/AR	5.0	5.0	5.0	

	5	6	7	8
NB Left	*			
Thru	*			
Right	*			
Peds	*			
SB Left	*			
Thru	*			
Right	*			
Peds	*			
EB Right				
WB Right				
Green	20.0A			
Yellow/AR	5.0			

Cycle Length: 75 secs Phase combination order: #1 #2 #3 #5

Intersection Performance Summary

	Lane Mvmts	Group: Cap	Adj Sat Flow	v/c Ratio	g/C Ratio	Delay	LOS	Approach: Delay	LOS
EB	L	484	1711	0.308	0.627	4.8	A	7.5	B
	TR	1759	3565	0.425	0.493	8.0	B		
WB	L	296	1711	0.091	0.493	7.4	B	13.0	B
	TR	1236	3435	0.594	0.360	13.2	B		
NB	LTR	345	1175	0.345	0.293	13.7	B	13.7	B
SB	LT	280	953	0.654	0.293	18.7	C	18.5	C
	R	1520	1583	0.001	0.960	0.0	A		

Intersection Delay = 11.0 sec/veh Intersection LOS = B
Lost Time/Cycle, L = 9.0 sec Critical v/c(x) = 0.560

Parsons Brinckerhoff Quade & Douglas
Pacific Tower, Suite 3000
1001 Bishop Street
Honolulu, HI 96813-
Ph: (808) 531-7094

Streets: (N-S) Waena Street (E-W) Eha Street
Major Street Direction.... EW
Length of Time Analyzed... 60 (min)
Analyst..... Miyamoto
Date of Analysis..... 1/16/98
Other Information.....Year 2000, w/ Project, Eha St. Open, AM
Two-way Stop-controlled Intersection

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	1	< 0	1	1	0	1	0	1	0	0	0
Stop/Yield			N			N						
Volumes		44	92	160	76		75		95			
PHF		.5	.587	.75	.75		.5		.702			
Grade		0			0			0				
MC's (%)												
SU/RV's (%)												
CV's (%)												
PCE's				1.10			1.10		1.10			

Adjustment Factors

Vehicle Maneuver	Critical Gap (tg)	Follow-up Time (tf)
Left Turn Major Road	5.00	2.10
Right Turn Minor Road	5.50	2.60
Through Traffic Minor Road	6.00	3.30
Left Turn Minor Road	6.50	3.40

Worksheet for TWSC Intersection

Step 1: RT from Minor Street	NB	SB
Conflicting Flows: (vph)	166	
Potential Capacity: (pcph)	1141	
Movement Capacity: (pcph)	1141	
Prob. of Queue-Free State:	0.87	
Step 2: LT from Major Street	**WB**	**EB**
Conflicting Flows: (vph)	245	
Potential Capacity: (pcph)	1310	
Movement Capacity: (pcph)	1310	
Prob. of Queue-Free State:	0.82	
Step 4: LT from Minor Street	**NB**	**SB**
Conflicting Flows: (vph)	480	
Potential Capacity: (pcph)	558	
Major LT, Minor TH Impedance Factor:	0.82	
Adjusted Impedance Factor:	0.82	
Capacity Adjustment Factor due to Impeding Movements	0.82	
Movement Capacity: (pcph)	458	

Intersection Performance Summary

Movement	Flow Rate (pcph)	Move Cap (pcph)	Shared Cap (pcph)	Avg. Total Delay (sec/veh)	95% Queue Length (veh)	LOS	Approach Delay (sec/veh)
NB L	165	458		12.3	1.9	C	7.4
NB R	149	1141		3.6	0.5	A	
WB L	234	1310		3.3	0.7	A	2.3

Intersection Delay = 3.3 sec/veh

Parsons Brinckerhoff Quade & Douglas
Pacific Tower, Suite 3000
1001 Bishop Street
Honolulu, HI 96813-
Ph: (808) 531-7094

Streets: (N-S) Waena Street (E-W) Eha Street
Major Street Direction.... EW
Length of Time Analyzed... 60 (min)
Analyst..... Miyamoto
Date of Analysis..... 1/16/98
Other Information.....Year 2000, w/ Project, Eha St. Open, PM
Two-way Stop-controlled Intersection

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	1	< 0	1	1	0	1	0	1	0	0	0
Stop/Yield			N			N						
Volumes		67	77	150	125		114		140			
PHF		.688	.578	.955	.708		.643		.84			
Grade		0			0			0				
MC's (%)												
SU/RV's (%)												
CV's (%)												
PCE's				1.10			1.10		1.10			

Adjustment Factors

Vehicle Maneuver	Critical Gap (tg)	Follow-up Time (tf)
Left Turn Major Road	5.00	2.10
Right Turn Minor Road	5.50	2.60
Through Traffic Minor Road	6.00	3.30
Left Turn Minor Road	6.50	3.40

Worksheet for TWSC Intersection

Step 1: RT from Minor Street	NB	SB
Conflicting Flows: (vph)	164	
Potential Capacity: (pcph)	1143	
Movement Capacity: (pcph)	1143	
Prob. of Queue-Free State:	0.84	

Step 2: LT from Major Street	WB	EB
Conflicting Flows: (vph)	230	
Potential Capacity: (pcph)	1332	
Movement Capacity: (pcph)	1332	
Prob. of Queue-Free State:	0.87	

Step 4: LT from Minor Street	NB	SB
Conflicting Flows: (vph)	498	
Potential Capacity: (pcph)	545	
Major LT, Minor TH Impedance Factor:	0.87	
Adjusted Impedance Factor:	0.87	
Capacity Adjustment Factor due to Impeding Movements	0.87	
Movement Capacity: (pcph)	474	

Intersection Performance Summary

Movement	Flow Rate (pcph)	Move Cap (pcph)	Shared Cap (pcph)	Avg. Total Delay (sec/veh)	95% Queue Length (veh)	LOS	Approach Delay (sec/veh)
NB L	195	474		12.9	2.3	C	
NB R	184	1143		3.8	0.6	A	7.8
WB L	173	1332		3.1	0.5	A	1.7

Intersection Delay = 3.7 sec/veh

Parsons Brinckerhoff Quade & Douglas
Pacific Tower, Suite 3000
1001 Bishop Street
Honolulu, HI 96813-
Ph: (808) 531-7094

Streets: (N-S) Imi Kala Street (E-W) Mill Street
Major Street Direction.... EW
Length of Time Analyzed... 60 (min)
Analyst..... Miyamoto
Date of Analysis..... 1/16/98
Other Information.....Year 2000, w/ Project, Eha St. Open, AM
Two-way Stop-controlled Intersection

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	> 1	0	0	1	< 0	0	0	0	1	0	1
Stop/Yield			N			N						
Volumes	224	130			235	55				25		201
PHF	.91	.967			.781	.811				.679		.855
Grade		0			0						0	
MC's (%)												
SU/RV's (%)												
CV's (%)												
PCE's	1.10									1.10		1.10

Adjustment Factors

Vehicle Maneuver	Critical Gap (tg)	Follow-up Time (tf)
Left Turn Major Road	5.00	2.10
Right Turn Minor Road	5.50	2.60
Through Traffic Minor Road	6.00	3.30
Left Turn Minor Road	6.50	3.40

Worksheet for TWSC Intersection

Step 1: RT from Minor Street	NB	SB
Conflicting Flows: (vph)		335
Potential Capacity: (pcph)		937
Movement Capacity: (pcph)		937
Prob. of Queue-Free State:		0.72

Step 2: LT from Major Street	WB	EB
Conflicting Flows: (vph)		369
Potential Capacity: (pcph)		1144
Movement Capacity: (pcph)		1144
Prob. of Queue-Free State:		0.76
TH Saturation Flow Rate: (pcphpl)		1700
RT Saturation Flow Rate: (pcphpl)		
Major LT Shared Lane Prob. of Queue-Free State:		0.74

Step 4: LT from Minor Street	NB	SB
Conflicting Flows: (vph)		715
Potential Capacity: (pcph)		408
Major LT, Minor TH Impedance Factor:		0.74
Major LT, Minor TH Impedance Factor:		0.74
Adjusted Impedance Factor:		0.74
Capacity Adjustment Factor due to Impeding Movements		0.74
Movement Capacity: (pcph)		303

Intersection Performance Summary

Movement	Flow Rate (pcph)	Move Cap (pcph)	Shared Cap (pcph)	Avg. Total Delay (sec/veh)	95% Queue Length (veh)	LOS	Approach Delay (sec/veh)
SB L	41	303		13.7	0.5	C	6.2
SB R	259	937		5.3	1.3	B	
EB L	271	1144		4.1	1.1	A	2.6

Intersection Delay = 2.7 sec/veh

Parsons Brinckerhoff Quade & Douglas
Pacific Tower, Suite 3000
1001 Bishop Street
Honolulu, HI 96813-
Ph: (808) 531-7094

Streets: (N-S) Imi Kala Street (E-W) Mill Street
Major Street Direction.... EW
Length of Time Analyzed... 60 (min)
Analyst..... Miyamoto
Date of Analysis..... 1/16/98
Other Information.....Year 2000, w/ Project, Eha St. Open, PM
Two-way Stop-controlled Intersection

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	> 1	0	0	1	< 0	0	0	0	1	0	1
Stop/Yield			N			N						
Volumes	236	165			195	60				60		387
PHF	.777	.879			.935	.844				.823		.867
Grade		0			0						0	
MC's (%)												
SU/RV's (%)												
CV's (%)												
PCE's	1.10									1.10		1.10

Adjustment Factors

Vehicle Maneuver	Critical Gap (tg)	Follow-up Time (tf)
Left Turn Major Road	5.00	2.10
Right Turn Minor Road	5.50	2.60
Through Traffic Minor Road	6.00	3.30
Left Turn Minor Road	6.50	3.40

Worksheet for TWSC Intersection

Step 1: RT from Minor Street	NB	SB
Conflicting Flows: (vph)		244
Potential Capacity: (pcph)		1042
Movement Capacity: (pcph)		1042
Prob. of Queue-Free State:		0.53

Step 2: LT from Major Street	WB	EB
Conflicting Flows: (vph)		280
Potential Capacity: (pcph)		1261
Movement Capacity: (pcph)		1261
Prob. of Queue-Free State:		0.74
TH Saturation Flow Rate: (pcphpl)		1700
RT Saturation Flow Rate: (pcphpl)		
Major LT Shared Lane Prob. of Queue-Free State:		0.70

Step 4: LT from Minor Street	NB	SB
Conflicting Flows: (vph)		736
Potential Capacity: (pcph)		397
Major LT, Minor TH Impedance Factor:		0.70
Adjusted Impedance Factor:		0.70
Capacity Adjustment Factor due to Impeding Movements		0.70
Movement Capacity: (pcph)		279

Intersection Performance Summary

Movement	Flow Rate (pcph)	Move Cap (pcph)	Shared Cap (pcph)	Avg. Total Delay (sec/veh)	95% Queue Length (veh)	LOS	Approach Delay (sec/veh)
SB L	80	279		18.1	1.3	C	8.1
SB R	491	1042		6.5	2.9	B	
EB L	334	1261		3.9	1.2	A	2.3

Intersection Delay = 4.1 sec/veh

Parsons Brinckerhoff Quade & Douglas
Pacific Tower, Suite 3000
1001 Bishop Street
Honolulu, HI 96813-
Ph: (808) 531-7094

Streets: (N-S) Imi Kala Street (E-W) Wili Pa Street
Major Street Direction.... NS
Length of Time Analyzed... 60 (min)
Analyst..... Miyamoto
Date of Analysis..... 1/16/98
Other Information.....Year 2000, w/ Project, Eha St. Open, AM
Two-way Stop-controlled Intersection

	Northbound			Southbound			Eastbound			Westbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	> 1	0	0	1	< 0	0	> 0	< 0	0	0	0
Stop/Yield			N			N						
Volumes	70	189			201	45	15		25			
PHF	.65	.823			.938	.375	.95		.727			
Grade		0			0			0				
MC's (%)												
SU/RV's (%)												
CV's (%)												
PCE's	1.10						1.10		1.10			

Adjustment Factors

Vehicle Maneuver	Critical Gap (tg)	Follow-up Time (tf)
Left Turn Major Road	5.00	2.10
Right Turn Minor Road	5.50	2.60
Through Traffic Minor Road	6.00	3.30
Left Turn Minor Road	6.50	3.40

Worksheet for TWSC Intersection

Step 1: RT from Minor Street	WB	EB
Conflicting Flows: (vph)		274
Potential Capacity: (pcph)		1006
Movement Capacity: (pcph)		1006
Prob. of Queue-Free State:		0.96

Step 2: LT from Major Street	SB	NB
Conflicting Flows: (vph)		334
Potential Capacity: (pcph)		1188
Movement Capacity: (pcph)		1188
Prob. of Queue-Free State:		0.90
TH Saturation Flow Rate: (pcphpl)		1700
RT Saturation Flow Rate: (pcphpl)		
Major LT Shared Lane Prob. of Queue-Free State:		0.88

Step 4: LT from Minor Street	WB	EB
Conflicting Flows: (vph)		612
Potential Capacity: (pcph)		468
Major LT, Minor TH Impedance Factor:		0.88
Adjusted Impedance Factor:		0.88
Capacity Adjustment Factor due to Impeding Movements		0.88
Movement Capacity: (pcph)		414

Intersection Performance Summary

Movement	Flow Rate (pcph)	Move Cap (pcph)	Shared Cap (pcph)	Avg. Total Delay (sec/veh)	95% Queue Length (veh)	LOS	Approach Delay (sec/veh)
EB L	18	414 >	685	5.7	0.2	B	5.7
EB R	37	1006 >					
NB L	119	1188		3.4	0.3	A	0.9

Intersection Delay = 0.9 sec/veh

Parsons Brinckerhoff Quade & Douglas
Pacific Tower, Suite 3000
1001 Bishop Street
Honolulu, HI 96813-
Ph: (808) 531-7094

Streets: (N-S) Imi Kala Street (E-W) Wili Pa Street
Major Street Direction.... NS
Length of Time Analyzed... 60 (min)
Analyst..... Miyamoto
Date of Analysis..... 1/16/98
Other Information.....Year 2000, w/ Project, Eha St. Open, PM
Two-way Stop-controlled Intersection

	Northbound			Southbound			Eastbound			Westbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	> 1	0	0	1	< 0	0	> 0	< 0	0	0	0
Stop/Yield			N			N						
Volumes	15	286			387	45	45		50			
PHF	.885	.808			.978	.375	.45		.704			
Grade		0			0			0				
MC's (%)												
SU/RV's (%)												
CV's (%)												
PCE's	1.10						1.10		1.10			

Adjustment Factors

Vehicle Maneuver	Critical Gap (tg)	Follow-up Time (tf)
Left Turn Major Road	5.00	2.10
Right Turn Minor Road	5.50	2.60
Through Traffic Minor Road	6.00	3.30
Left Turn Minor Road	6.50	3.40

Worksheet for TWSC Intersection

Step 1: RT from Minor Street	WB	EB
Conflicting Flows: (vph)		456
Potential Capacity: (pcph)		813
Movement Capacity: (pcph)		813
Prob. of Queue-Free State:		0.90

Step 2: LT from Major Street	SB	NB
Conflicting Flows: (vph)		516
Potential Capacity: (pcph)		973
Movement Capacity: (pcph)		973
Prob. of Queue-Free State:		0.98
TH Saturation Flow Rate: (pcphpl)		1700
RT Saturation Flow Rate: (pcphpl)		
Major LT Shared Lane Prob. of Queue-Free State:		0.98

Step 4: LT from Minor Street	WB	EB
Conflicting Flows: (vph)		827
Potential Capacity: (pcph)		352
Major LT, Minor TH Impedance Factor:		0.98
Adjusted Impedance Factor:		0.98
Capacity Adjustment Factor due to Impeding Movements		0.98
Movement Capacity: (pcph)		343

Intersection Performance Summary

Movement		Flow Rate (pcph)	Move Cap (pcph)	Shared Cap (pcph)	Avg. Total Delay (sec/veh)	95% Queue Length (veh)	LOS	Approach Delay (sec/veh)
EB	L	110	343 >	451	13.7	2.3	C	13.7
EB	R	78	813 >					
NB	L	19	973		3.8	0.0	A	0.2

Intersection Delay = 1.6 sec/veh

Parsons Brinckerhoff Quade & Douglas
Pacific Tower, Suite 3000
1001 Bishop Street
Honolulu, HI 96813-
Ph: (808) 531-7094

Streets: (N-S) Imi Kala Street (E-W) Wili Pa/Eha Street
Major Street Direction.... NS
Length of Time Analyzed... 60 (min)
Analyst..... Miyamoto
Date of Analysis..... 1/16/98
Other Information.....Year 2000, w/ Project, Eha St. Open, AM
Two-way Stop-controlled Intersection

	Northbound			Southbound			Eastbound			Westbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	> 1	< 0	0	> 1	< 0	0	> 1	< 0	0	> 1	< 0
Stop/Yield			N			N						
Volumes	65	0	69	0	0	0	0	10	30	141	20	0
PHF	.77	1	.5	1	1	1	1	.95	.589	.563	.95	1
Grade		0			0			0			0	
MC's (%)												
SU/RV's (%)												
CV's (%)												
PCE's	1.10			1.10			1.10	1.10	1.10	1.10	1.10	1.10

Adjustment Factors

Vehicle Maneuver	Critical Gap (tg)	Follow-up Time (tf)
Left Turn Major Road	5.00	2.10
Right Turn Minor Road	5.50	2.60
Through Traffic Minor Road	6.00	3.30
Left Turn Minor Road	6.50	3.40

Worksheet for TWSC Intersection

Step 1: RT from Minor Street	WB	EB
Conflicting Flows: (vph)	69	0
Potential Capacity: (pcph)	1278	1385
Movement Capacity: (pcph)	1278	1385
Prob. of Queue-Free State:	1.00	0.96
Step 2: LT from Major Street	**SB**	**NB**
Conflicting Flows: (vph)	138	0
Potential Capacity: (pcph)	1473	1714
Movement Capacity: (pcph)	1473	1714
Prob. of Queue-Free State:	1.00	0.95
TH Saturation Flow Rate: (pcphpl)	1700	1700
RT Saturation Flow Rate: (pcphpl)	1700	1700
Major LT Shared Lane Prob. of Queue-Free State:	1.00	0.94
Step 3: TH from Minor Street	**WB**	**EB**
Conflicting Flows: (vph)	153	222
Potential Capacity: (pcph)	907	834
Capacity Adjustment Factor due to Impeding Movements	0.94	0.94
Movement Capacity: (pcph)	854	785
Prob. of Queue-Free State:	0.97	0.98
Step 4: LT from Minor Street	**WB**	**EB**
Conflicting Flows: (vph)	184	164
Potential Capacity: (pcph)	828	851
Major LT, Minor TH Impedance Factor:	0.93	0.92
Adjusted Impedance Factor:	0.94	0.94
Capacity Adjustment Factor due to Impeding Movements	0.91	0.94
Movement Capacity: (pcph)	750	796

Intersection Performance Summary

Movement		Flow Rate (pcph)	Move Cap (pcph)		Shared Cap (pcph)	Avg. Total Delay (sec/veh)	95% Queue Length (veh)	LOS	Approach Delay (sec/veh)
EB	L	0	796	>					
EB	T	12	785	>	1220	3.1	0.0	A	3.1
EB	R	56	1385	>					
WB	L	275	750	>					
WB	T	23	854	>	757	7.8	2.2	B	7.8
WB	R	0	1278	>					
NB	L	92	1714			2.2	0.0	A	1.1
SB	L	0	1473			2.4	0.0	A	0.0

Intersection Delay = 4.6 sec/veh

Parsons Brinckerhoff Quade & Douglas
Pacific Tower, Suite 3000
1001 Bishop Street
Honolulu, HI 96813-
Ph: (808) 531-7094

Streets: (N-S) Imi Kala Street (E-W) Wili Pa/Eha Street
Major Street Direction.... NS
Length of Time Analyzed... 60 (min)
Analyst..... Miyamoto
Date of Analysis..... 1/16/98
Other Information.....Year 2000, w/ Project, Eha St. Open, PM
Two-way Stop-controlled Intersection

	Northbound			Southbound			Eastbound			Westbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	> 1	< 0	0	> 1	< 0	0	> 1	< 0	0	> 1	< 0
Stop/Yield			N			N						
Volumes	20	0	126	0	0	0	0	20	70	162	20	0
PHF	.825	1	.7	1	1	1	1	.25	.658	.656	.95	1
Grade		0			0			0			0	
MC's (%)												
SU/RV's (%)												
CV's (%)												
PCE's	1.10			1.10			1.10	1.10	1.10	1.10	1.10	1.10

Adjustment Factors

Vehicle Maneuver	Critical Gap (tg)	Follow-up Time (tf)
Left Turn Major Road	5.00	2.10
Right Turn Minor Road	5.50	2.60
Through Traffic Minor Road	6.00	3.30
Left Turn Minor Road	6.50	3.40

Worksheet for TWSC Intersection

Step 1: RT from Minor Street	WB	EB
Conflicting Flows: (vph)	90	0
Potential Capacity: (pcph)	1247	1385
Movement Capacity: (pcph)	1247	1385
Prob. of Queue-Free State:	1.00	0.92

Step 2: LT from Major Street	SB	NB
Conflicting Flows: (vph)	180	0
Potential Capacity: (pcph)	1407	1714
Movement Capacity: (pcph)	1407	1714
Prob. of Queue-Free State:	1.00	0.98
TH Saturation Flow Rate: (pcphpl)	1700	1700
RT Saturation Flow Rate: (pcphpl)	1700	1700
Major LT Shared Lane Prob. of Queue-Free State:	1.00	0.98

Step 3: TH from Minor Street	WB	EB
Conflicting Flows: (vph)	114	204
Potential Capacity: (pcph)	951	853
Capacity Adjustment Factor due to Impeding Movements	0.98	0.98
Movement Capacity: (pcph)	935	839
Prob. of Queue-Free State:	0.98	0.90

Step 4: LT from Minor Street	WB	EB
Conflicting Flows: (vph)	207	124
Potential Capacity: (pcph)	803	897
Major LT, Minor TH Impedance Factor:	0.88	0.96
Adjusted Impedance Factor:	0.91	0.97
Capacity Adjustment Factor due to Impeding Movements	0.83	0.97
Movement Capacity: (pcph)	668	869

Intersection Performance Summary

Movement		Flow Rate (pcph)	Move Cap (pcph)	Shared Cap (pcph)	Avg. Total Delay (sec/veh)	95% Queue Length (veh)	LOS	Approach Delay (sec/veh)
EB	L	0	869 >					
EB	T	88	839 >	1083	4.1	0.8	A	4.1
EB	R	117	1385 >					
WB	L	272	668 >					
WB	T	23	935 >	683	9.3	2.5	B	9.3
WB	R	0	1247 >					
NB	L	26	1714		2.1	0.0	A	0.3
SB	L	0	1407		2.6	0.0	A	0.0

Intersection Delay = 5.0 sec/veh

Appendix D

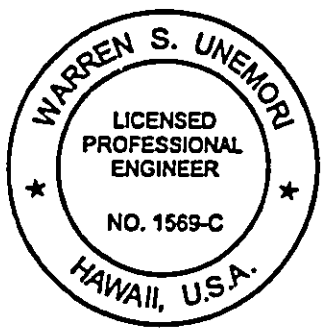
Preliminary Engineering Report for Proposed Wailuku Parkside Project

Preliminary Engineering Report for

PROPOSED
WAILUKU PARKSIDE PROJECT

Wailuku, Maui, Hawaii

Developer: Standford S. Carr Development Corporation
Address: Davies Pacific Center Suite 2118
841 Bishop Street
Honolulu, Hawaii 86813



WARREN S. UNEMORI ENGINEERING, INC.
Civil and Structural Engineers - Land Surveyors
Wells Street Professional Center - Suite 403
2145 Wells Street
Wailuku, Maui, Hawaii 96793

Date: February, 1998

Established 1969

N:\coreldata\ooyrcd\98\98010000.cdr

TABLE OF CONTENTS

Preliminary Engineering Report
for
Proposed Wailuku Parkside Project

1.0 INTRODUCTION

The proposed Wailuku Parkside Project is situated in Wailuku, between Iao Stream and Lower Main Street. It is bordered on the east by Iao Parkside (a multi-family residential project) and single family residences to the west. The area to the south borders on a mixture of single family residential units, office buildings, and light industrial uses.

The report provides a brief description and evaluation of existing infrastructure in the vicinity of the project site. It also provides a brief overview of probable infrastructural improvements that may be needed to support the proposed single family residential project.

2.0 EXISTING INFRASTRUCTURE

2.1 Water System

Water for Wailuku in Central Maui is provided by deep wells at Mokuhau in Iao Valley and in Upper Waiehu. These wells draw water from the basal lens referred to as the Iao Aquifer.

The Department of Water Supply (DWS) recently developed two new deep wells in North Waihee. These wells, with a pumping capacity of approximately 1.0 MGD each, are currently drawing water from the heretofore undeveloped North Waihee

aquifer and pumping it into the Central Maui system at Waihee Village. With the completion of the new 24-inch transmission line and the one million gallon storage reservoir and pumping facility now under construction in North Waihee, water will be pumped from the North Waihee aquifer to the Central Maui system in Upper Waiehu, supplementing water being drawn from the Iao aquifer sources mentioned above.

The Department of Water Supply is also planning to drill two additional wells in North Waihee. According to them bids have been received to drill these two exploratory wells at Kanoa and Kupaa. Drilling is expected to commence soon. These wells are expected to be completely operational and productive sometime in year 2000 or 2001.

Storage for the project site and vicinity is provided by a 3.0 MG storage reservoir presently under construction at Mokuhau in Iao Valley, approximately 400 feet inland of the well source there. The floor elevation of this reservoir is 358 feet above mean sea level. Water will be conveyed from this 3.0 MG reservoir to the project vicinity by a series of existing 24, 18, and 12 inch lines. At the project site, there is a 12 inch line on Eha Street, which runs through the northerly portion of the project. Another 12 inch line runs along Lower Main Street on the southerly side of the proposed project. These two lines are

interconnected at Imi Kala Street in the Millyard located mauka of the project site and at Waena Street, the main entrance to Iao Parkside and the Wailuku Community Center located 900 feet to the east. This distribution network enables the project site to be fed from multiple directions.

2.2 Sewer System

There are two gravity interceptors that run through the project site. The first is a 12-inch line that runs along the southern boundary of the Petition area. The second is a 10-inch line that was recently installed on Eha Street and through Iao Parkside Phase IV to the intersection of Waena Street on Lower Main Street. A new 15 inch gravity line was also installed at that time between Waena Street and Mamo Lane on Lower Main Street.

Expansion of the Kahului Wastewater Reclamation Facility (KWRF) was recently completed by the County of Maui, increasing its capacity from 6.0 MGD to 7.9 MGD. According to the County's Department of Public Works and Waste Management, presently there is approximately 786,000 gpd of capacity allocation left for affordable housing at the KWRF.

2.3 Drainage

Current onsite runoff from the project site (Drainage Areas 1 and 2) for a 50-year recurrent interval rainfall is 33 cfs. Offsite runoff from Lower Main Street southwest of the project site (Drainage Area 3) is estimated to be 77 cfs. Offsite runoff from the residential area above the project site (Drainage Area 4) is currently about 29 cfs. Total onsite/offsite runoff is presently being directed into a 66-inch drain line that was installed in conjunction with the Iao Parkside multi-family residential project. This line discharges into Iao Stream 1,250 feet northeast of the proposed project site.

2.4 Roadway

Access to the project site will be provided by Eha Street. This fully improved collector street will soon be dedicated to the County. It provides a east/west connection between Imi Kala Street in the Millyard and Waiehu Beach Road. Waena Street located 900 feet east of the project site provides the closest north/south linkage between Lower Main Street and Eha Street. Eha Street has a 60 feet wide right-of-way and a 44 feet (curb to curb) travelway. Since this is a collector street, individual driveway connections to it will not be permitted.

2.5 Electricity, Telephone and CATV

Underground ducts, pullboxes and manholes were installed on Eha Street for electrical, telephone and CATV distribution systems in conjunction with the road improvements. There also are overhead distribution systems for these utilities on Lower Main Street south of the project site.

3.0 PROBABLE INFRASTRUCTURAL IMPROVEMENTS

3.1 Water System

The projected average daily water demand for the 120 lot single family residential project is 72,000 gpd. This translates to a max daily demand of 108,000 gpd. Fire flow demand for single family residential project is 1,000 gpm. The existing storage and transmission system both have the capacity to satisfy these requirements. Such being the case, the project's prorata share of source development, storage and transmission costs will be paid for as part of the comprehensive water meter assessment for each lot.

3.2 Sewer System

The proposed single residential project is expected to generate approximately 42,000 gpd of wastewater. This quantity of wastewater can be readily handled by the existing 10 inch interceptor line on Eha Street and the existing 12 inch line along

the south boundary of the project site. As stated earlier, the Kahului Wastewater Reclamation Facility still has unused capacity to receive and process wastewater generated by the project. In accordance with the provisions of the County Ordinance, the Petitioner's contribution towards the expansion of the wastewater facility will be in a form of an assessment at a rate of $4.57 per gallon of wastewater generated.

3.3 Drainage

Post development runoff from this single family residential project for a 50-year recurrent rainfall is estimated to be about 67 cfs. Approximately 59 cfs of this onsite runoff (Drainage Area 1) will be directed into the existing storm drain system that runs through Phase IV of Iao Parkside. As stated earlier, this system was designed to handle onsite post development flow from area south of Eha Street and also the offsite runoff from Lower Main Street and the residential subdivision above the project. The remaining 8 cfs of onsite surface runoff (Drainage Area 2) will be intercepted by the existing storm drain system on Eha Street Extension, which also ties in to the storm drain system for Iao Parkside. Based on the available drainage improvements in the project vicinity, there will be no adverse drainage-related impacts to downstream or surrounding properties.

3.4 Roadways

All internal subdivision streets will be connected to Eha Street. Subdivision streets will be constructed to County minor street standards. These streets will have a right-of-way of 44 feet and a curb-to-curb travelway of 28 feet. A four (4) feet wide sidewalk will be installed on one side of the street. (For project-generated impact on Eha Street and other regional highways and intersections see Traffic Impact Study prepared for the project by Parsons Brinckerhoff dated _____, 1998.)

3.5 Electricity, Telephone and CATV

Underground distribution systems for electricity, telephone and cable TV will be extended into the project from Eha Street along the subdivision streets, all in accordance with the provisions of the County Subdivision Standards.

4.0 CONCLUSION

Based on the foregoing it is reasonable to conclude that any project related impact on the infrastructure can be readily mitigated. Infrastructural improvements anticipated are those normally associated with residential developments and are not extraordinarily excessive or unusual.

APPENDIX A
DRAINAGE CALCULATIONS

W.S. UNEMORI ENGINEERING, INC.
2145 Wells Street Suite 403
Wailuku, Maui, Hawaii 96793

BY: DDY
DATE: February 23, 1998

HYDROLOGIC STUDY
FOR
WAILUKU INDUSTRIAL PARK - PHASE II

Wailuku, Maui, Hawaii

ONSITE BEFORE DEVELOPMENT RUNOFF

(Drainage Areas 1 & 2)

RECURRENCE INTERVAL:	50 years	HYDRAULIC LENGTH:	1000.0 ft.
ONE-HOUR RAINFALL:	3.25 inches	ELEV'N. DIFFERENTIAL:	35.00 ft.
		HYDRAULIC SLOPE:	0.035 ft./ft.
WEIGHTED RUNOFF COEFFICIENT, C:	0.29	TIME OF CONCENTRATION:	30.0 min.
INTENSITY, I:	4.60 inches		
AREA, A:	24.40 acres	SUB BASINS CONSIDERED:	1

Q = C*I*A = 32.55 cfs

COMMENTS:

W.S. UNEMORI ENGINEERING, INC.
2145 Wells Street Suite 40
Wailuku, Maui, Hawaii 9679

BY: DDY
DATE: February 23, 1998

WAILUKU INDUSTRIAL PARK - PHASE II
[continued]

TABULATION OF RUNOFF COEFFICIENTS & AREAS:

SUB-BASIN 1 OF 1 : Agricultural Area

INFILTRATION:	Slow	0.14	
RELIEF:	Flat (0-5%)	0.00	>>> COMPOSITE C = 0.20
VEGETAL COVER:	High (50-90%)	0.00	>>> AREA = 24.400 acres
DEVELOPMENT:	Agricultural	0.15	

W.S. UNEMORI ENGINEERING, INC.
2145 Wells Street Suite 403
Wailuku, Maui, Hawaii 96793

BY: DDY
DATE: February 23, 1998

HYDROLOGIC STUDY
FOR
WAILUKU INDUSTRIAL PARK - PHASE II

Wailuku, Maui, Hawaii

ONSITE AFTER DEVELOPMENT RUNOFF

(AREA SOUTH OF EHA STREET)
(Drainage Area 1)

RECURRENCE INTERVAL:	50 years	HYDRAULIC LENGTH:	1000.0 ft.
ONE-HOUR RAINFALL:	3.25 inches	ELEV'N. DIFFERENTIAL:	35.00 ft.
		HYDRAULIC SLOPE:	0.035 ft./ft.
WEIGHTED RUNOFF COEFFICIENT, C:	0.50	TIME OF CONCENTRATION:	17.5 min.
INTENSITY, I:	5.60 inches		
AREA, A:	21.00 acres	SUB BASINS CONSIDERED:	1

Q = C*I*A = 58.80 cfs

COMMENTS:

W.S. UNEMORI ENGINEERING, INC
2145 Wells Street Suite 403
Wailuku, Maui, Hawaii 9679

BY: DDY
DATE: February 23, 1998

WAILUKU INDUSTRIAL PARK - PHASE II
[continued]

TABULATION OF RUNOFF COEFFICIENTS & AREAS:

SUB-BASIN 1 OF 1 : Residential Area

INFILTRATION:	Medium	0.07	
RELIEF:	Flat (0-5%)	0.00	>>> COMPOSITE C = 0.500
VEGETAL COVER:	Good (10-50%)	0.03	>>> AREA = 21.000 acres
DEVELOPMENT:	Residential	0.40	

W.S. UNEMORI ENGINEERING, INC.
2145 Wells Street Suite 403
Wailuku, Maui, Hawaii 96793

BY: DDY
DATE: February 23, 1998

HYDROLOGIC STUDY
FOR
WAILUKU INDUSTRIAL PARK - PHASE II

Wailuku, Maui, Hawaii

ONSITE AFTER DEVELOPMENT RUNOFF

(AREA NORTH OF EHA STREET)
(Drainage Area 2)

RECURRENCE INTERVAL:	50 years	HYDRAULIC LENGTH:	600.0 ft.
ONE-HOUR RAINFALL:	3.25 inches	ELEV'N. DIFFERENTIAL:	20.00 ft.
		HYDRAULIC SLOPE:	0.033 ft./ft.
WEIGHTED RUNOFF			
COEFFICIENT, C:	0.50	TIME OF CONCENTRATION:	24.0 min.
INTENSITY, I:	5.00 inches		
AREA, A:	3.40 acres	SUB BASINS CONSIDERED:	1

Q = C*I*A = 8.50 cfs

COMMENTS:

W.S. UNEMORI ENGINEERING, INC.
2145 Wells Street Suite 40x
Wailuku, Maui, Hawaii 9679

BY: DDY
DATE: February 23, 1998

WAILUKU INDUSTRIAL PARK - PHASE II
[continued]

TABULATION OF RUNOFF COEFFICIENTS & AREAS:

SUB-BASIN 1 OF 1 : Residential Area

INFILTRATION:	Medium	0.07	
RELIEF:	Flat (0-5%)	0.00	>>> COMPOSITE C = 0.500
VEGETAL COVER:	Good (10-50%)	0.03	>>> AREA = 3.400 acr s
DEVELOPMENT:	Residential	0.40	

W.S. UNEMORI ENGINEERING, INC.
2145 Wells Street Suite 403
Wailuku, Maui, Hawaii 96793

BY: DDY
DATE: February 23, 1998

HYDROLOGIC STUDY
FOR
WAILUKU INDUSTRIAL PARK - PHASE II

Wailuku, Maui, Hawaii

OFFSITE RUNOFF FROM LOWER MAIN ST./MILL ST.

(Drainage Area 3)

RECURRENCE INTERVAL:	50 years	HYDRAULIC LENGTH:	2075.0 ft.
ONE-HOUR RAINFALL:	3.25 inches	ELEV'N. DIFFERENTIAL:	146.00 ft.
		HYDRAULIC SLOPE:	0.070 ft./ft.
WEIGHTED RUNOFF			
COEFFICIENT, C:	0.44	TIME OF CONCENTRATION:	19.5 min.
INTENSITY, I:	5.40 inches		
AREA, A:	31.93 acres	SUB BASINS CONSIDERED:	4

Q = C*I*A = 76.63 cfs

COMMENTS:

W.S. UNEMORI ENGINEERING, INC.
2145 Wells Street Suite 4C
Wailuku, Maui, Hawaii 9679

BY: DDY
DATE: February 23, 1998

WAILUKU INDUSTRIAL PARK - PHASE II
[continued]

TABULATION OF RUNOFF COEFFICIENTS & AREAS:

SUB-BASIN 1 OF 4 : INDUSTRIAL/BUSINESS AREA

INFILTRATION:	Medium	0.07	
RELIEF:	Flat (0-5%)	0.00	>>> COMPOSITE C = 0.6 0
VEGETAL COVER:	Good (10-50%)	0.03	>>> AREA = 2.710 acres
DEVELOPMENT:	Industrial / Business	0.55	

SUB-BASIN 2 OF 4 : Cemetery

INFILTRATION:	Medium	0.07	
RELIEF:	Rolling (5-15%)	0.03	>>> COMPOSITE C = 0.250
VEGETAL COVER:	High (50-90%)	0.00	>>> AREA = 10.880 acres
DEVELOPMENT:	Cemetery	0.15	

SUB-BASIN 3 OF 4 : Residential Area

INFILTRATION:	Medium	0.07	
RELIEF:	Flat (0-5%)	0.00	>>> COMPOSITE C = 0.5 0
VEGETAL COVER:	Good (10-50%)	0.03	>>> AREA = 7.560 acres
DEVELOPMENT:	Residential	0.40	

SUB-BASIN 4 OF 4 : St. Anthony/Hale Makua

INFILTRATION:	Medium	0.07	
RELIEF:	Flat (0-5%)	0.00	>>> COMPOSITE C = 0.550
VEGETAL COVER:	Good (10-50%)	0.03	>>> AREA = 10.780 acres
DEVELOPMENT:	Church/Ret. Home	0.45	

W.S. UNEMORI ENGINEERING, INC.
2145 Wells Street Suite 403
Wailuku, Maui, Hawaii 96793

BY: DDY
DATE: February 23, 1998

HYDROLOGIC STUDY
FOR
WAILUKU INDUSTRIAL PARK - PHASE II

Wailuku, Maui, Hawaii

OFFSITE RUNOFF FROM EXISTING RESIDENTIAL AREA

(Drainage Area 4)

RECURRENCE INTERVAL:	50 years	HYDRAULIC LENGTH:	750.0 ft.
ONE-HOUR RAINFALL:	3.25 inches	ELEV'N. DIFFERENTIAL:	25.00 ft.
		HYDRAULIC SLOPE:	0.033 ft./ft.
WEIGHTED RUNOFF COEFFICIENT, C:	0.50	TIME OF CONCENTRATION:	15.0 min.
INTENSITY, I:	6.00 inches		
AREA, A:	9.54 acres	SUB BASINS CONSIDERED:	1

Q = C*I*A = 28.62 cfs

COMMENTS:

W.S. UNEMORI ENGINEERING, INC.
2145 Wells Street Suite 40
Wailuku, Maui, Hawaii 9679

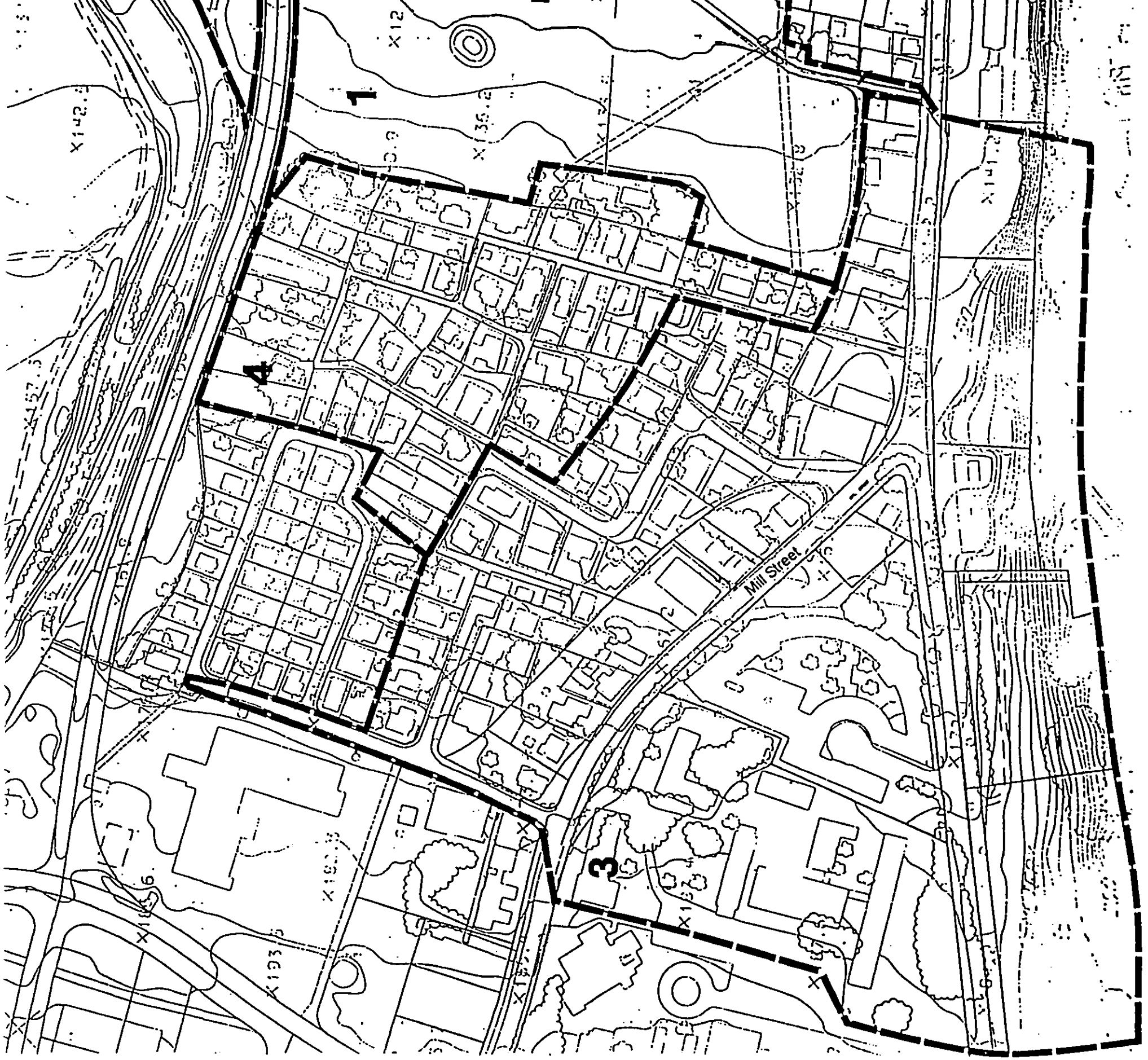
BY: DDY
DATE: February 23, 1998

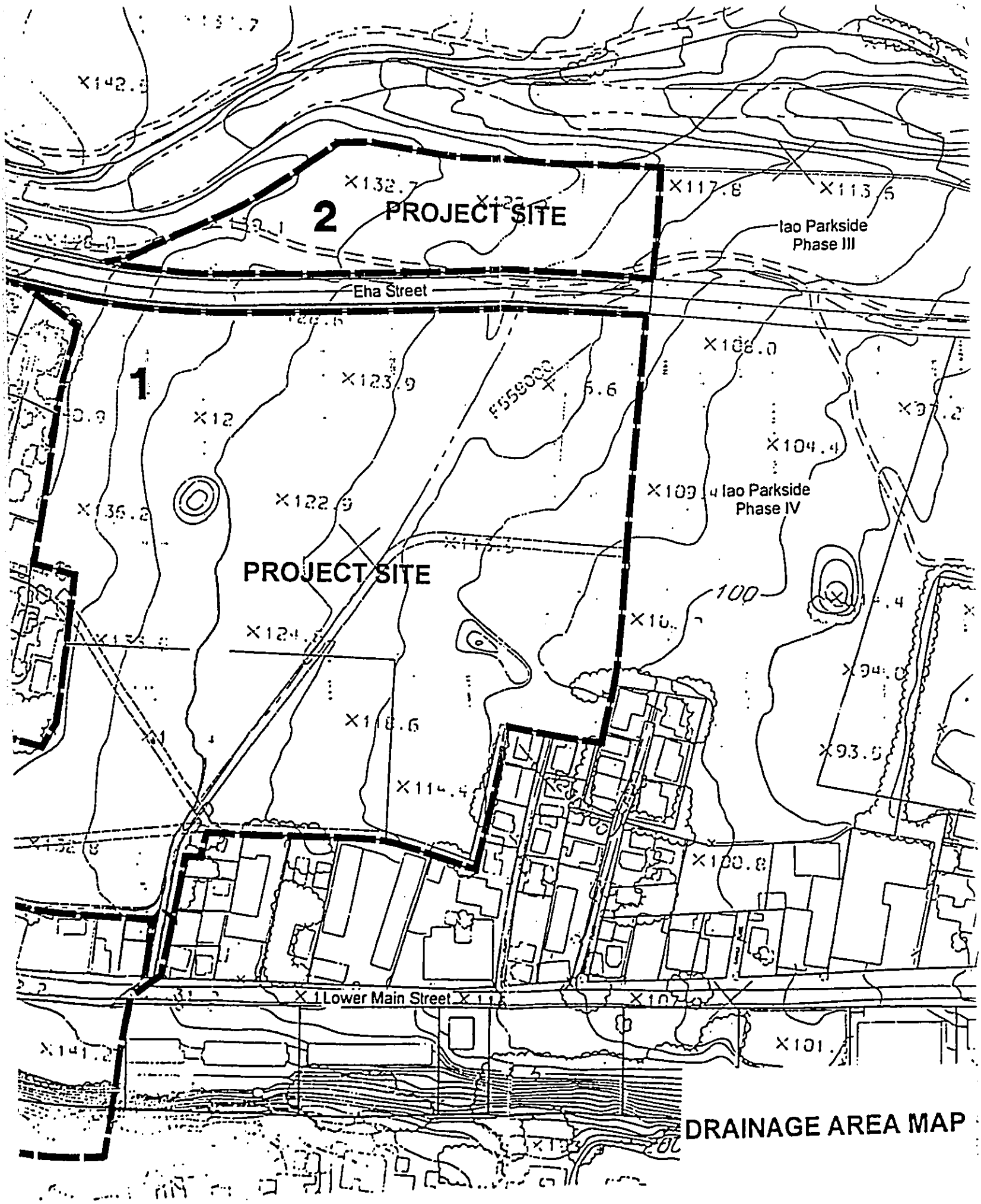
WAILUKU INDUSTRIAL PARK - PHASE II
[continued]

TABULATION OF RUNOFF COEFFICIENTS & AREAS:

SUB-BASIN 1 OF 1 : Residential Area

INFILTRATION:	Medium	0.07	
RELIEF:	Flat (0-5%)	0.00	>>> COMPOSITE C = 0.5( )
VEGETAL COVER:	Good (10-50%)	0.03	>>> AREA = 9.540 acres
DEVELOPMENT:	Residential	0.40	


1
2
3
4
Mill Street



DRAINAGE AREA MAP

APPENDIX B
ORDER-OF-MAGNITUDE ESTIMATE OF CONSTRUCTION COSTS

ORDER OF MAGNITUDE ESTIMATE
WAILUKU PARKSIDE

SUMMARY OF COSTS

2/24/98

DESCRIPTION OF MAJOR ITEMS		COST
• General Site Work	$	678,900
• Roadway	$	487,540
• Water System	$	393,990
• Drainage System	$	516,400
• Sewer System	$	447,100
• Electrical, Telephone, and CATV Systems	$	540,000
SUM OF ALL MAJOR ITEMS:	$	3,063,930
15% CONTINGENCY:	$	459,590
*PROBABLE CONSTRUCTION COST:	$	3,523,520

*Does not include MECO charges, County assessments and landscape costs.

x:\xldata\sfox\l98010001.EST

ORDER OF MAGNITUDE ESTIMATE
WAILUKU PARKSIDE

2/24/98

Description	Approx. Quan.	Unit		Unit Price		Total
GENERAL SITE WORK						
Mobilization				Allow	$	30,000
Clearing and Grubbing	24.2	Ac.	$	4,500	$	108,900
Excavation	40,000	c.y.	$	6	$	240,000
Embankment	30,000	c.y.	$	4	$	120,000
Grassing (Rye)	20	Ac.	$	3000	$	60,000
Dust Abatement				Allow	$	120,000
				Subtotal:	$	678,900
ROADWAY						
Fine Grading	3,900	l.f.	$	5	$	19,500
2" AC	1,280	ton	$	75	$	96,000
6" UTB	3,850	ton	$	30	$	115,500
Primer	4,100	gal.	$	3	$	12,300
Sidewalk 4' Wide (one side only)	4,010	l.f.	$	16	$	64,160
Curb and Gutter	7,500	l.f.	$	16	$	120,000
Curb Cut	1	each	$	1000	$	1,000
Wheel Chair Ramp	20	each	$	500	$	10,000
2½" AC	32	ton	$	90	$	2,880
4" ATB	50	ton	$	78	$	3,900
6" SBC	75	ton	$	40	$	3,000
Pavement Marking		L.S.			$	7,000
Regulatory Sign	24	each	$	500	$	12,000
Primary Street Monument	6	each	$	800	$	4,800

Description	Approx. Quan.	Unit		Unit Price		Total
Secondary Street Monument	21	each	$	500	$	10,500
Traffic Control				Allow	$	5,000
				Subtotal:	$	487,540
WATER SYSTEM						
8" DI Pipe w/Polywrap Cl. 52	3,800	l.f.	$	50	$	190,000
4" DI Pipe w/Polywrap Cl. 52	1,070	ton	$	32	$	34,240
12" GV w/SVB	6	each	$	1200	$	7,200
8" GV w/SVB	14	each	$	900	$	12,600
4" GV w/SVB	6	each	$	600	$	3,600
12x8 Tee	2	each	$	450	$	900
12x8 Cross	1	each	$	475	$	475
8" Tee	2	each	$	350	$	700
8" Cross	1	each	$	375	$	375
8x4 Tee	6	each	$	350	$	2,100
8" Bends (Horizontal)	7	each	$	300	$	2,100
8" Bends (Vertical)	32	each	$	300	$	9,600
12" Solid Sleeve	3	each	$	300	$	900
8" Solid Sleeve	4	each	$	250	$	1,000
4" Solid Sleeve	3	each	$	150	$	450
Concrete Thrust Block	51	each	$	250	$	12,750
Concrete Anchor Block	16	each	$	350	$	5,600
Fire Hydrants	12	each	$	3000	$	36,000
Air Release Valve	2	each	$	1800	$	3,600
Double Service Lateral	56	each	$	1000	$	56,000
Single Service Lateral	8	each	$	850	$	6,800
Testing and Chlorination		L.S.			$	4,000
DWS Field Charges				Allow	$	3,000
				Subtotal:	$	393,990

Description	Approx. Quan.	Unit		Unit Price		Total
DRAINAGE SYSTEM						
60-inch SRAP	310	l.f.	$	140	$	43,400
54-inch SRAP	400	l.f.	$	125	$	50,000
48-inch SRAP	620	l.f.	$	115	$	71,300
42-inch SRAP	170	l.f.	$	105	$	17,850
30-inch SRAP	350	l.f.	$	95	$	33,250
24-inch SRAP	1,010	l.f.	$	80	$	80,800
18-inch SRAP	300	l.f.	$	70	$	21,000
Catch Basin (Curb Inlet)	15	each	$	7000	$	105,000
Grated Catch Basin	2	each	$	5000	$	10,000
Replace Existing CB (Lower Main)	1	each	$	8000	$	8,000
SDMH (Conc.) Std.	10	each	$	3500	$	35,000
SDMH (Conc.) Deep	6	each	$	6000	$	36,000
Fabricated Bends:						
60"	1	each	$	1200	$	1,200
30"	1	each	$	800	$	800
24"	4	each	$	700	$	2,800
				Subtotal:	$	516,400
SEWER SYSTEM						
12" PVC Sewer Line	580	l.f.	$	70	$	40,600
10" PVC Sewer Line	300	l.f.	$	60	$	18,000
8" PVC Sewer Line	3,280	l.f.	$	50	$	164,000
SSL	118	each	$	1000	$	118,000
SSL Connected to Existing Sewer Line	2	each	$	1500	$	3,000
SMH (Std.)	22	each	$	3000	$	66,000
SMH over Existing Sewer Line	7	each	$	5000	$	35,000
Cutting into Existing SMH	1	each	$	2500	$	2,500
				Subtotal:	$	447,100

Description	Approx. Quan.	Unit	Unit Price	Total
ELECTRICAL, TELEPHONE AND CATV SYSTEMS				
Underground ducts, pullboxes, manholes, street light bases, concrete encasement, etc., exclusive of MECO charges.	120	each	$ 4,500	$ 540,000
			Subtotal:	$ *540,000*

SUM OF ALL MAJOR ITEMS:	$ 3,063,930
15% CONTINGENCY:	$ 459,590
PROBABLE CONSTRUCTION COST:	$ 3,523,520

Appendix E

Market Assessment for Single-Family Residential Development at Wailuku Parkside

C O R P O R A T I O N

February 16, 1998

Mr. Stanford Carr
Stanford S. Carr Development Corporation
841 Bishop Street, Suite 2118
Honolulu, HI 96813

Subject: **MARKET ASSESSMENT FOR SINGLE-FAMILY DEVELOPMENT AT WAILUKU PARKSIDE, MAUI**

Dear Mr. Carr:

Mikiko Corporation is pleased to present this market assessment for single-family development at Wailuku Parkside on the island of Maui. This letter describes the study background and key conclusions. The attached report is divided into three sections, as follows:

1. Economic and Demographic Overview
2. Single-Family Residential Supply and Sales Trends
3. Market Assessment for Wailuku Parkside

STUDY BACKGOUND AND PROJECT OVERVIEW

Stanford S. Carr Development Corporation (SCD) has an agreement to purchase an appoximately 25-acre site in Central Maui from C. Brewer Homes. The site was formerly known as "Iao Parkside II." SCD proposes to develop some 24 acres of the property into a residential community with 119 single-family homes, in a project to be known as Wailuku Parkside.

The site has frontage on Iao Stream, various commercial and residential uses that face Lower Main Street, the Iao Parkside multifamily development, and an older single-family residential community. It offers views of Iao Valley, undeveloped lands, and neighboring developments. It also affords distant views of Kahului Bay and Haleakala. The residential portion of the site would be accessed from Eha Street, which also runs through the existing Iao Parkside multifamily subdivision.

2300 Pauahi Tower 1001 Bishop Street Honolulu, Hawaii 96813
Telephone 808 942 5493 Telefax 808 942 7638 Email mikiko@pixi.com
Development planning and tourism advisory services in Hawai'i, Asia, and the Pacific

Units are proposed to be developed as house-and-lot packages, with lot sizes ranging from about 6,500 to 10,000 square foot, or typically about 7,000 square feet. Finished units would include two- and three-bedroom units, with prices ranging from about $185,000 to $260,000, depending on the model type and the lot size for any particular unit.

On average, however, sales prices are expected to range from about $210,000 for a three bedroom, two-bath unit, to about $235,000 for a four bedroom, two-and-a-half bath unit, as shown on the following table:

SUMMARY OF PROPOSED MODEL TYPES AND UNIT PRICING AT WAILUKU PARKSIDE

MODEL	BDRM./ BATH	NET INTERIOR AREA (S.F.)	AVERAGE PRICE (1998 $)	AV. PRICE PER S.F.
1	3/2	1,300	$210,000	$161
2	3/2.5	1,375	$220,000	$160
3	4/2.5	1,500	$235,000	$157

Source: Stanford S. Carr Development Corporation.

The development would require various State and County entitlements. In this respect, you have engaged Mr. Eric Maehara, Esq., to process the required land use petitions, asked Mikiko Corporation to prepare this assessment of the sales absorption of the proposed single-family homes, based on the unit characteristics and pricing provided by SCD.

This report is intended to be included in a Petition for Land Use District Boundary Amendment, and possibly related other entitlement documents.

OVERVIEW OF MAUI ECONOMIC AND RESIDENTIAL MARKET INDICATORS

The State of Hawaii has been experiencing recessionary conditions since the early 1990s. However, Maui Island (the Island) has fared better than the State as a whole, as evidenced in population trends, job creation trends, building permitting activity, and recent residential real estate sales trends. Positive indicators for the Island include:

- Unemployment averaged 6.6% in 1997, well below its 8.3% peak of 1992; unemployment has been trending downward since 1995.

- The Island's average monthly non-agricultural and salaried job count was 51,800 in 1997, an all-time high. This represented over 1,000 jobs created on the Island since 1996.

- Median household income for fiscal year 1997 was estimated at $55,500, according to the national forecasting company UDS/NDS Data Systems. This represents a 4.8% per annum increase since the $39,875 median observed in 1990. The Honolulu consumer price index over a similar period averaged 3.6% annual inflation.

- Although the visitor industry for the State as a whole is facing an uncertain 1998 with respect to Eastbound arrivals, Maui has less exposure to this market, since Eastbound visitors represent only about 20% of its arrivals currently.

- The County expects to see completion of the Kahului Airport runway lengthening and strengthening project by about 2000. This major capital improvement would allow direct nonstop flights to Maui Island from more distant points such as Japan and the Midwestern U.S., significantly improving the convenience, and possibly lessening the costs, of a Maui vacation for many.

- The Hawaii Convention Center is expected to open later this year, and to generate significant spill-over business activity for all neighbor islands. With its many attractions and strong name recognition, Maui Island stands to benefit greatly.

- The Maui Ocean Center is planned to open in Ma'alaea Harbor in March 1997. This will be the first major new visitor attraction to open in the State in many years.

- The median price of a single-family home sold on Maui in 1997 was about $302,600, or 3% more than in 1996, on a base of 10% more sold units.

- The increasing pace of sales and firming of prices could signal a turn in the marketplace, and may encourage investors who have been delaying a purchase to seek products to buy.

- Other new residential subdivisions in the Central Maui area have reported increased rates of sales, particularly since Fall 1997.

SUMMARY OF PROJECTED RESIDENTIAL ABSORPTION

The assessment of Wailuku Parkside's anticipated rate of absorption is based on numerous considerations and assumptions. These include the factors are noted above, and further detailed in the attached report, as well as SCD's expectations that it could bring the single-family product at

Wailuku Parkside to market by January 1999. Key assumptions to the assessment are also noted at the end of this letter.

Considering these factors, Wailuku Parkside is expected to experience average monthly sales of about five units per month initially, increasing to about 7 to 8 per month within a year. This would lead to the sell-out of the 119 units by about mid-2000:

PROJECTED SALES ABSORPTION AT THE PROPOSED WAILUKU PARKSIDE DEVELOPMENT

PERIOD/ (MONTHS)	AVERAGE SALES/MO.	NO. OF SALES IN PERIOD	CUMULATIVE UNIT SALES
Jan-Jun 1999/ (6)	5.0	30	30
Jul-Dec 1999/ (6)	6.0	36	66
Jan-Jul 2000/ (7)	7.5	53	119

Source: Mikiko Corporation.

KEY ASSUMPTIONS

The conclusions presented above are further based on a number of general assumptions regarding regional conditions and project characteristics. The key assumptions include:

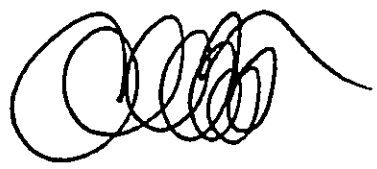
- Continued gradual improvement in the County's economic conditions;
- Completion of the planned Kahului Airport runway projects within the next few years;
- Interest rates remaining at or below about 8% during the project's marketing period;
- Development and pricing of the project along the parameters noted herein (with allowances for future price adjustments according to market changes); and
- A high quality of building development and professional, effective marketing efforts at the project.

* * * * * *

Thank you for the privilege of assisting you in this matter.

Very truly yours,

MIKIKO CORPORATION



Ann M. Bouslog
President and CEO

Enclosures

MARKET ASSESSMENT FOR SINGLE-FAMILY RESIDENTIAL DEVELOPMENT AT WAILUKU PARKSIDE, MAUI

Wailuku, Maui, Hawaii

Prepared for:
Stanford S. Carr Development Corporation

FINAL REPORT

February 16, 1998

2300 Pauahi Tower 1001 Bishop Street Honolulu, Hawaii 96813
Telephone 808 942 5493 Telefax 808 942 7638 Email mikiko@pixi.com

Development planning and tourism advisory services in Hawai'i, Asia and the Pacific

MARKET ASSESSMENT FOR WAILUKU PARKSIDE

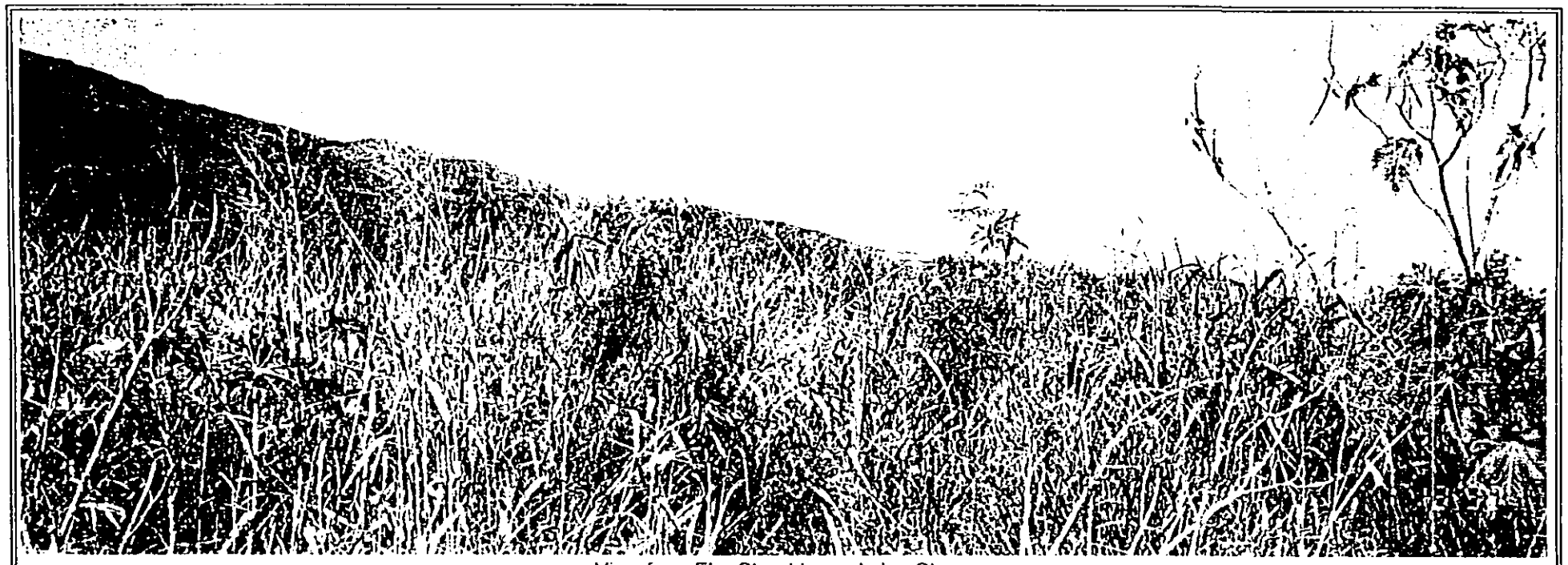
Site Photos

1. Economic and Demographic Overview

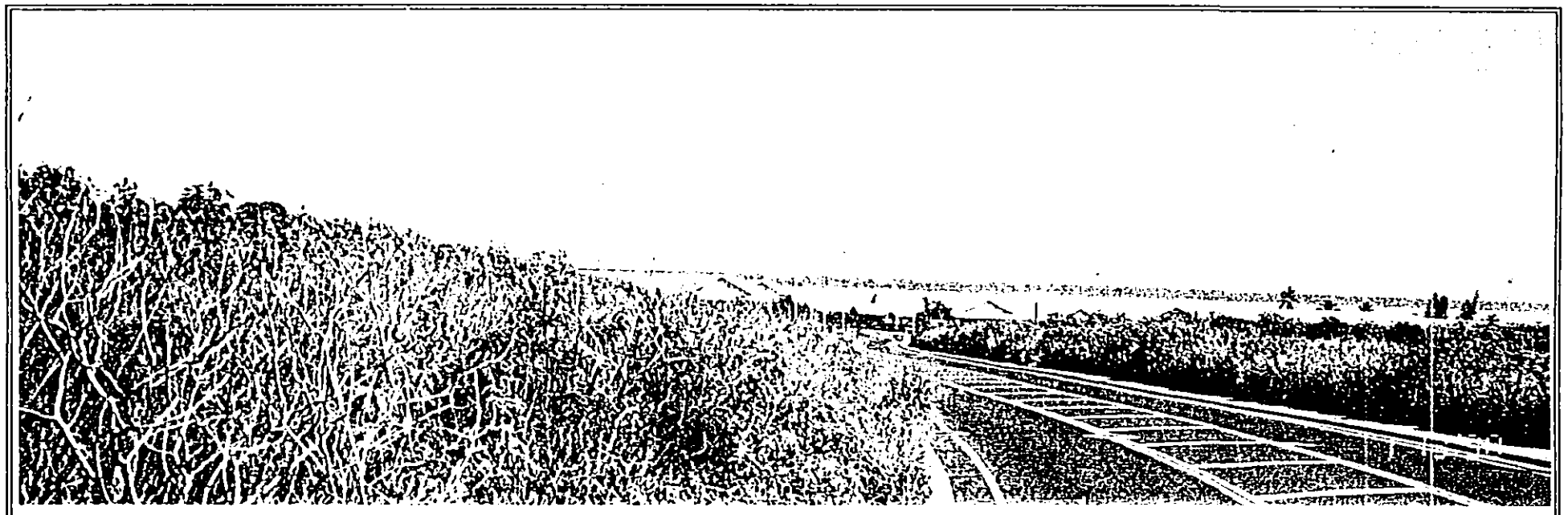
2. Single-Family Residential Supply and Sales Trends

3. Market Assessment for Wailuku Parkside

Photos of Wailuku Parkside Site: January 13, 1998



View from Eha Street towards Iao Stream



View from Eha Street towards ocean.

Photos of Wailuku Parkside Site: January 13, 1998

View of Iao Valley from near area of proposed park.

View from Eha Street towards Lower Main Street; Haleakala in distance.

MARKET ASSESSMENT FOR WAILUKU PARKSIDE

Site Photos

1. Economic and Demographic Overview

2. Single-Family Residential Supply and Sales Trends

3. Market Assessment for Wailuku Parkside

1 - ECONOMIC AND DEMOGRAPHIC OVERVIEW

The State of Hawaii has four counties: Kauai, Honolulu, Maui and Hawaii. Wailuku Parkside is located in the Wailuku area of Maui island, within Maui County. While the State as a whole has been in a recession since the early part of the decade, Maui County, particularly the island of Maui, has out-performed the State on most economic indicators. As summarized by First Hawaiian Bank's *Economic Research Department*, "Maui's performance has exceeded other counties during the state's ongoing string of job losses that began in late 1992 . . ." (Economic Indicators, September/October 1997).

This section provides context for the ***demand assessment*** for Wailuku Parkside via an examination of the resident population and economy of the State and Maui County (or, as data permits, Maui Island.)

POPULATION AND HOUSEHOLDS

Resident Population for the State (Exhibit 1.1)

The State of Hawaii experienced rapid growth following World War II and the advent of Statehood. Between 1950 and 1980, resident population for the State increased from 497,980 to 968,500 persons, equating to a compound rate of change of 2.2% per annum. Resident population continued to demonstrate a stable rate of growth for the next 10 year period through 1990. Although the growth rate was slightly slower, averaging 1.4% per annum, a favorable economy contributed to Hawaii's attractiveness as a place to reside on a permanent basis.

In 1995, however, State population growth slowed to less than 1.0 percent and preliminary estimates are that it may have declined by a nominal amount in 1996.

Resident Population for Maui County (Exhibit 1.2)

On the other hand, the County of Maui, which includes the islands of Maui, Molokai, and Lanai, has experienced much more rapid population growth than the State, with an average 3.3% per annum increase between 1980 and 1995 and annual increases of more than 3.5% during the 1982 to 1984 and 1988 to 1990 periods. Although the County's population growth is believed to have slowed in 1996, it does not appear to have reversed, as did the State's.

As a result, while in 1980 Maui County was home to 7.4% of State residents, it now houses nearly 10%.

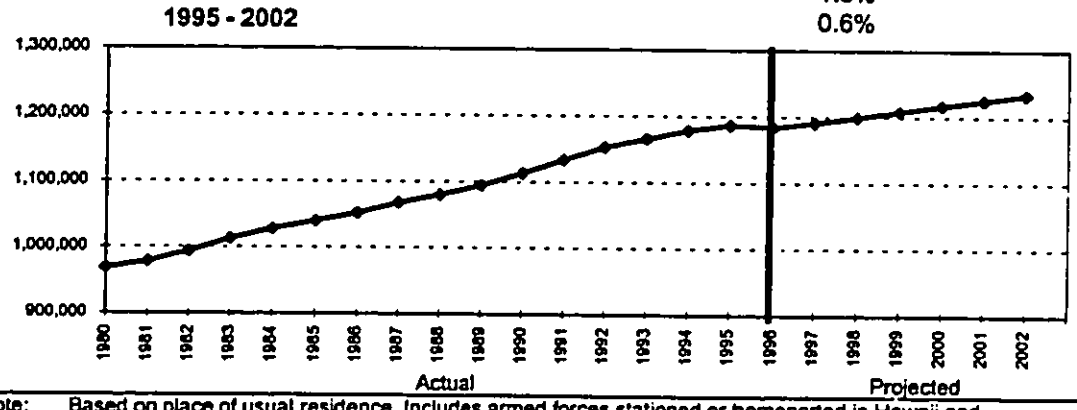
Maui Island Population

Some 91,000 persons, or 90% of Maui County's population lived on the island of Maui as of the last U.S. Census in 1990. Current estimates and near-term projections were evaluated from two sources, the national private data supplier NDS/UDS Data Services (NDS), which annually updates its forecasts of various population, household and economic indicators; and

Exhibit 1.1

Historical and Projected Resident Population
State of Hawaii
1980 to 2002

Year	*State of Hawaii*	*Percentage change*
Historical [1] **:**		
1980	968,500	--
1981	978,200	1.0%
1982	993,800	1.6%
1983	1,012,700	1.9%
1984	1,027,900	1.5%
1985	1,039,700	1.1%
1986	1,051,800	1.2%
1987	1,067,900	1.5%
1988	1,079,800	1.1%
1989	1,094,600	1.4%
1990	1,112,900	1.7%
1991	1,133,800	1.9%
1992	1,153,000	1.7%
1993	1,165,500	1.1%
1994	1,178,600	1.1%
1995	1,186,815	0.7%
Estimated [2] **:**		
1996	1,183,700	-0.3%
Projected [3] **:**		
1997	1,190,662	0.6%
2002	1,233,856	0.7%
Compound annual percentage increase:		
1980 - 1990		1.4%
1990 - 1996		1.0%
1980 - 1996		1.3%
1995 - 2002		0.6%



Note: Based on place of usual residence. Includes armed forces stationed or homeported in Hawaii and residents temporarily absent; excludes visitors present.

[1] Federal-State Cooperative Program for Population Estimates.

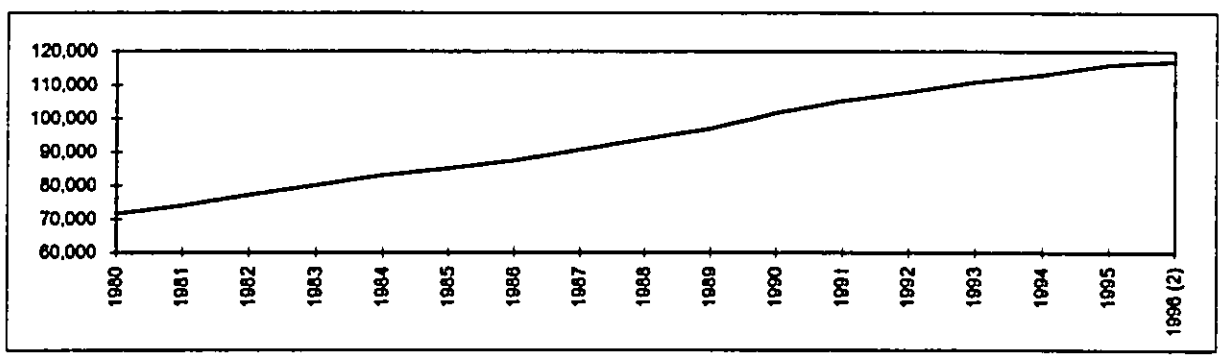
[2] Preliminary estimate for July 1, 1997, by First Hawaiian Bank, *Economic Indicators*, November/December 1997.

[3] Estimates and projections by NDS/UDS Data Systems, January 1998.

Exhibit 1.2

Historical and Estimated Resident Population
Maui County
1980 to 1996

Year	*Maui County*	*Percentage change*	*Maui County as a percent of State*
Historical [1]**:**			
1980	71,600	--	7.4%
1981	74,000	3.4%	7.6%
1982	77,100	4.2%	7.8%
1983	80,100	3.9%	7.9%
1984	83,000	3.6%	8.1%
1985	85,100	2.5%	8.2%
1986	87,400	2.7%	8.3%
1987	90,500	3.5%	8.5%
1988	93,800	3.6%	8.7%
1989	96,800	3.2%	8.8%
1990	101,600	5.0%	9.1%
1991	105,200	3.5%	9.3%
1992	107,800	2.5%	9.3%
1993	110,800	2.8%	9.5%
1994	113,000	2.0%	9.6%
1995	115,955	2.6%	9.8%
1996 [2]	117,000	0.9%	9.9%
Compound annual percentage increase:			
1980 - 1990		2.4%	
1990 - 1996		2.7%	
1980 - 1996		3.3%	



Notes: Based on place of usual residence. Includes armed forces stationed or homeported in Hawaii and residents temporarily absent; excludes visitors present.

[1] Federal-State Cooperative Program for Population Estimates.

[2] Preliminary Estimate for July 1, 1997 by First Hawaiian Bank, November/December 1997.

Community Resources, Inc. (CRI), a Honolulu-based socio-economic consulting firm that prepared forecast studies for the County Planning Department in 1994.

According to these sources, resident population may have increased 2.1% to 2.2% per annum since 1990, and could grow another 1.7% to 1.9% annually over the coming years:

MAUI ISLAND RESIDENT POPULATION TRENDS AND PROJECTIONS

	1990 CENSUS	CURRENT ESTIMATE	FUTURE PROJECTION
Historical [1]	91,361		
Projections:			
NDS (1998) [2]		105,600 ('97)	115,900 ('02)
CRI (1994) [3]		104,300 ('96)	112,300 ('00)
			121,600 ('05)
Compound annual percent change:			
NDS		2.1% ('90-'97)	1.9% ('97-'02)
CRI		2.2% ('90-'96)	1.9% ('96-'00)
			1.7% ('96-'05)

[1] U.S. Census, 1990.
[2] NDS/UDS Data Services, January 1998.
[3] Community Resources, Inc., *Maui Socio-Economic Forecast Study*, January 1994.

Maui Island Neighborhoods (Exhibit 1.3)

Within the island, more than one-third of residents lived in the Central area Census Designated Places (CDPs) of Wailuku, Kahului, and Waihee-Waiehu, according to the 1990 U.S. Census. These areas are favored for their concentration of cultural, social and employment opportunities, as well as their central location, which makes access to both West and East Maui destinations and employment centers relatively easy. To many long-term island residents, the Central districts also provide proximity to extended family.

The Wailuku area, in which Wailuku Parkside is located, was the fourth most populous area of the island. It housed 13,432 residents in 1990, or approximately 15% of the island's population. (The Census defines the Wailuku *area* more broadly than the Wailuku *CDP*).

Households in the State (Exhibit 1.4)

At the time of the 1990 US Census, 96% or 1.07 million of the State's residents lived in households, for a total count of 356,267 households, or 3.01 persons each. This represents a

Exhibit 1.3

Population Distribution and Density
Maui Island
1990

Neighborhood or region	*Population*		*Persons per sq. mile*
	Number	*Distribution*	
Haiku-Pauwela	5,695	6%	95.1
Hana	1,895	2%	10.5
Kahului	16,672	18%	2,874.5
Kihei	12,878	14%	331.9
Kula	8,021	9%	30.4
Lahaina	14,574	16%	152.0
Makawao-Paia	15,491	17%	357.8
Puunene	217	0%	47.2
Spreckelsville	213	0%	10.8
Waihee-Waikapu	2,273	2%	41.6
Wailuku	13,432	15%	2,534.3
Total	91,361	100%	118.6
Central area CDPs:			
Kahului CDP	16,839	18%	1,623.9
Waihee-Waiehu CDP	4,004	4%	931.2
Wailuku CDP	10,688	12%	2,095.7
Total/share of Island	31,581	35%	1,579.0

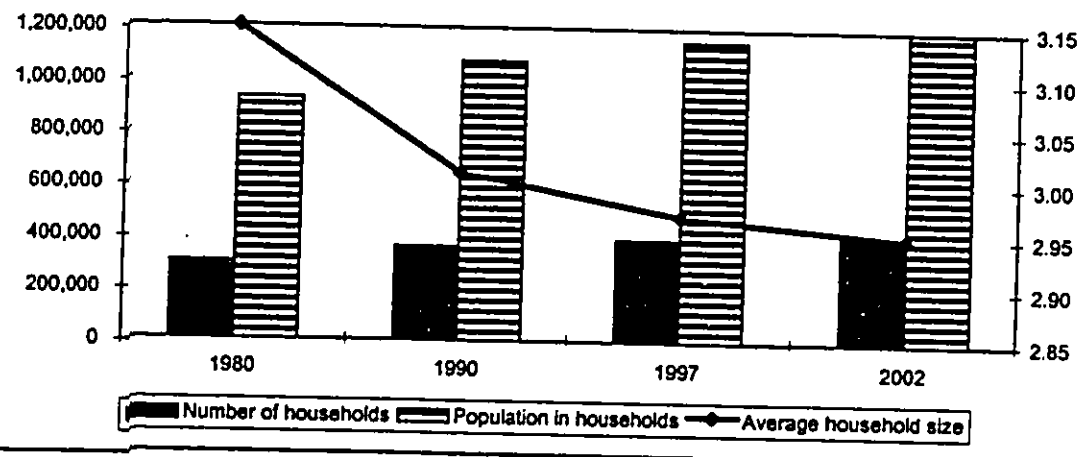
CDP = Census Designated Place.

Source: U.S. Bureau of the Census, "1990 Census of Population and Housing, Summary Population and Housing Characteristics, Hawaii," 1990 CPH-1-13 (August, 1991).

Exhibit 1.4

Household Characteristics
State of Hawaii
1980 to 2002

	Number	*Compound annual change since prior*
Number of households:		
1980 [1]	294,052	na
1990 [1]	356,267	1.9%
1997 [2]	387,900	1.2%
2002 [2]	406,000	0.9%
Population in households:		
1980 [1]	925,092	na
1990 [1]	1,070,597	1.5%
1997 [2]	1,152,100	1.1%
2002 [2]	1,198,000	0.8%
Average household size:		
1980 [1]	3.15	na
1990 [1]	3.01	-0.5%
1997 [2]	2.97	-0.2%
2002 [2]	2.95	-0.1%



[1] U.S. Bureu of the Census, Population and Housing.
[2] Estimate and projection by NDS/UDS Data Services, January 1998.
[2] Based on the average household size and number of households.

drop from 3.15 persons per household at the 1980 U.S. Census. According to estimates provided by NDS, average household size has continued to fall statewide, to an estimated 2.97 persons in 1997. NDS also forecasts that by 2002, the average State household will include only 2.95 persons.

Thus, although State population growth may have slowed or even reversed nominally in recent years, the number of households has increased more rapidly than resident population.

Households on Maui Island (Exhibit 1.5)

The 1990 Census also showed Maui Island to have some 29,400 households, or less than 10.0% of those Statewide. Maui has historically had a smaller average household size than the State as a whole. In 1990, it was estimated it had 2.99 persons per household as compared to 3.01 persons Statewide; in 1997 the Island's households are estimated to average 2.96 vs. 2.97 Statewide.

NDS projects that the Island will continue to see increases of about 2% per annum in the number of households, both as a result of increasing population and of decreasing average household size. This would result in some 38,900 households in 2002, or about 3,700 more than estimated currently, at an average future size of 2.95 persons per household.

EMPLOYMENT AND INCOME

Employment by Industry for the State

The State Department of Labor and Industrial Relations (DLIR) conducts monthly counts of non-agricultural wage and salary jobs by industry throughout the State. Compiling these findings into average annual counts shows that non-agricultural jobs peaked Statewide in 1992 at about 542,850, but fell to about 529,300 by 1996. As of December 1997, the DLIR reported approximately 532,900 non-agricultural wage and salary jobs in the State. This represents about 3,000 fewer than in December 1996.

The service sector comprises more than 90% of all jobs in the State. Within this sector, the largest industrial categories are "services and miscellaneous," which includes hotels and personal services industries, and "trade," the majority of which is retail employment. Government is also a large source of employment, averaging about 20% of non-agricultural wage and salary jobs since 1990.

Employment by Industry for Maui Island (Exhibit 1.6)

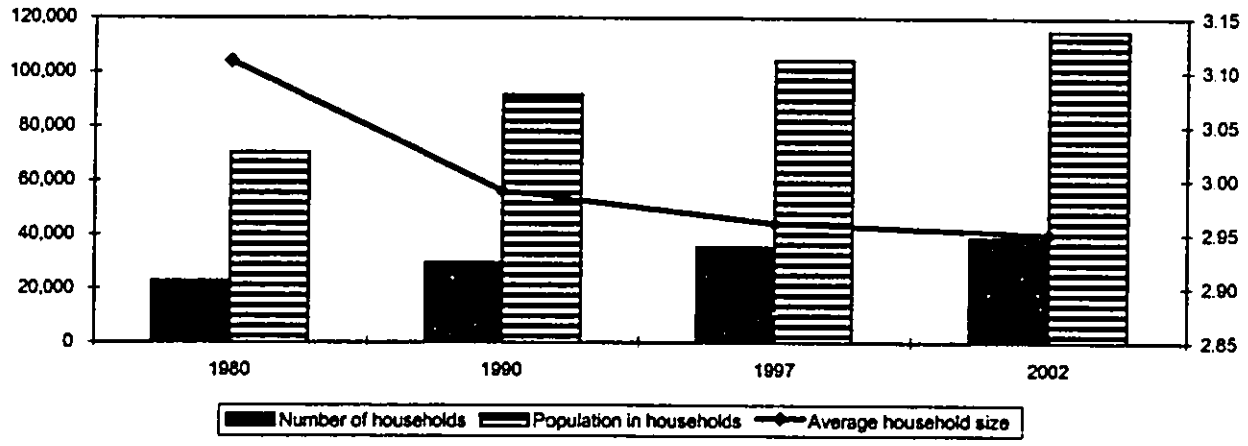
Maui has shown a relatively greater ability to create and sustain jobs than the State. The Island recorded job losses only between 1994 and 1995, when DLIR estimates some 450 jobs were lost. Since 1995, however, DLIR reports show renewed creation of jobs, with 1997 representing an all-time high of some 51,800 jobs. This represents over 1,000 jobs created on Maui since 1996, a 2.1% rate of increase.

Exhibit 1.5

Historical and Projected Household Characteristics
Island of Maui
1980 to 2005

	Historical [1]	*Estimated/projected* *CRI (2)*	*NDS* [3]	*Compound annual change since date shown*	
Number of households:					
1980	22,510			INA	na
1990	29,405			2.7%	since 1980
1996		34,900		2.9%	since 1990
1997			35,200	2.6%	since 1990
2000		38,000		2.6%	since 1990
2002			38,900	2.0%	since 1997
2005		42,000		2.0%	since 2000
Population in households:					
1980	70,008			INA	na
1990	91,360			2.7%	since 1980
1997			104,200	1.9%	since 1990
2002			115,000	2.0%	since 1997
Average household size:					
1980	3.11			INA	na
1990	2.99			-0.4%	since 1980
1997			2.96	-0.1%	since 1990
2002			2.95	-0.1%	since 1997

Selected Trends based on Census and NDS/UDS series



INA = information not available; na = not applicable.

(1) U.S. Bureau of the Census, Population and Housing Reports.

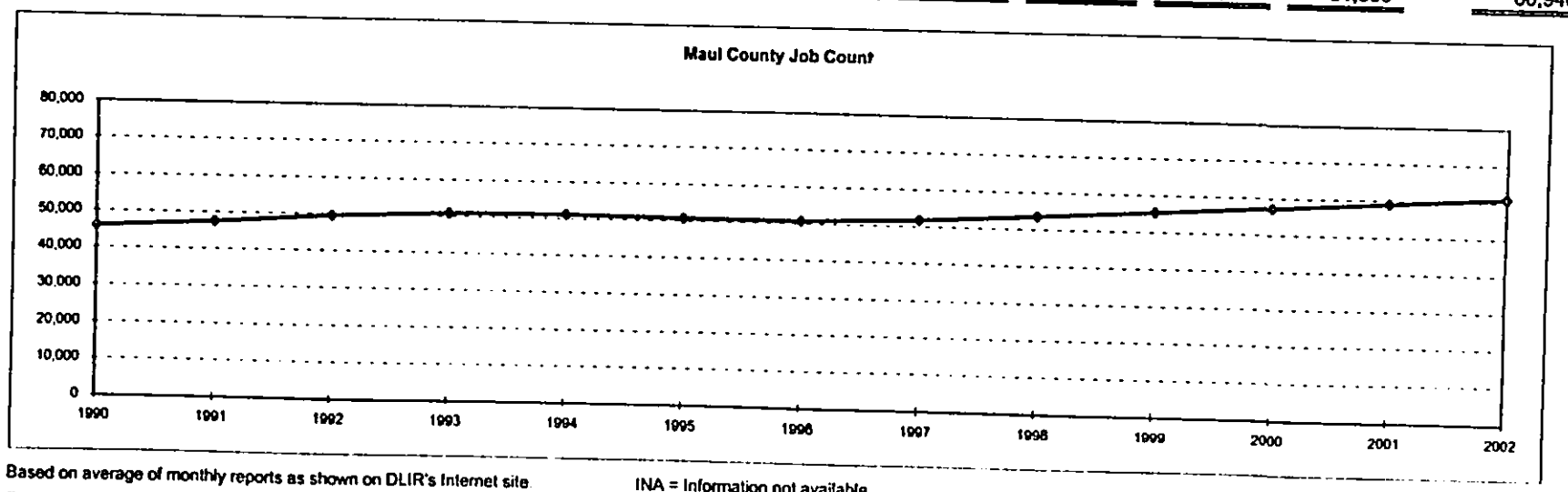
(2) Community Resources, Inc., *Maui Socio-Economic Forecast Study*, January 1994. (In Maui County Data Book, 1996-9
Population in households and household size not reported in Data Book.

(3) NDS/UDS Data Services, January 1998.

Exhibit 1.6

Average Annual Non-Agricultural Wage and Salary Job Count
by Industry for the Island of Maui
1990 to 1997; 2002 projected

	1990	*1991*	*1992*	*1993*	*1994*	*1995*	*1996*	*1997*[1]	*2002*[2]
Goods producing:									
Construction and mining	3,000	3,150	2,700	2,500	2,400	2,000	2,050	INA	INA
Manufacturing	2,000	2,150	2,300	2,150	1,800	1,750	1,750	INA	INA
Subtotal	5,000	5,300	5,000	4,650	4,200	3,750	3,800	3,600	INA
Service producing:									
Transportation, communication and utilities	2,950	3,000	3,050	3,050	3,250	3,300	3,550	3,500	4,600
Trade	13,400	13,700	14,100	14,200	14,350	14,650	14,400	14,900	14,800
Finance, insurance and real estate	3,050	2,850	2,600	2,650	2,600	2,600	2,550	2,600	3,400
Services and miscellaneous	16,350	17,050	18,800	20,000	20,150	19,750	19,750	20,300	19,800
Government	5,150	5,650	6,050	6,350	6,600	6,650	6,700	6,900	INA
Subtotal	40,900	42,250	44,600	46,250	46,950	46,950	46,950	48,200	INA
Total	45,900	47,550	49,600	50,900	51,150	50,700	50,750	51,800	60,940



[1] Based on average of monthly reports as shown on DLIR's Internet site. INA = Information not available.
[2] Estimated by NDS Data Services, January 1998.
Source: Department of Labor and Industrial Relations

Similar to the State as a whole, Maui island's main sources of employment are the services and trade categories. Government is a less significant source of jobs due to the concentration of State government jobs on Oahu.

Maui Island Labor Force Indicators (Exhibit 1.7)

Job creation on Maui has attracted more entrants to the Island's labor force, and strong growth in the numbers of employed persons. While the rest of the State experienced rather negative labor trends in the 1990s, Maui Island's labor force has increased by an average 3.1% per annum, while the number of employed persons has increased at a remarkable 2.7% per annum. Thus, both the average monthly labor force count and the number of employed persons were at all-time highs in 1997, at some 64,800 and 60,500 persons, respectively.

Unemployment averaged 6.6% in 1997, up from the 4.1% of 1990, but well below its 8.3% peak of 1992. Moreover, the Island's unemployment rate has been trending down since 1995.

Maui Island Household Income

The median household income on Maui island was estimated at $55,500 in 1997, according to NDS (January 1998). This represents a 4.8% per annum increase over the $39,875 observed at the time of the 1990 U.S. Census, or a significantly higher rate of increase than prevailing inflation rates in the State. According to NDS, the Island's household incomes in 1997 were distributed as follows:

- Less than 25,000: 18.1%
- $25,000 to 49,999: 25.8%
- $50,000 to 74,999: 24.3%
- $75,000 to 100,000: 14.7%
- Above $100,000: 17.0%

Home Purchase Affordability, Maui County (Exhibit 1.8)

Each year, the U.S. Department of Housing and Urban Development (HUD) estimates household income deciles by County (estimates are not available by island). In fiscal year 1998, HUD estimates that the County's median household income for a family of four is about $55,000. Considering the prevailing conventional residential lending terms at a mortgage interest rate of 8%, or higher than current rates, such a household could be able to afford to purchase a home ranging from about $170,000 to $195,000. This assumes the household has the available funds equivalent to down payments of 10% to 20%, as shown in **Exhibit 1.8**.

Exhibit 1.7

Average Annual Labor Force Indicators
Island of Maui
1990 to 1997

	Labor force	*Number employed*	*Percent unemployed*
1990	52,400	50,300	4.10%
1991	57,300	50,350	5.10%
1992	61,250	56,200	8.30%
1993	61,600	58,500	5.00%
1994	61,400	57,350	6.60%
1995	61,300	56,900	7.20%
1996	62,950	58,600	6.90%
1997 [1]	64,800	60,500	6.60%
Compound average annual percent change	3.10%	2.70%	

[1] Unadjusted average of reported preliminary monthly data.

Source: State of Hawaii, Department of Labor and Industrial Relations

Exhibit 1.8

Home Purchase Affordability
For Maui County Four-Person Household
Fiscal Year 1998

	Percent of County median household income			
	100%	120%	140%	200%
Maximum household income:				
Annual [1]	$55,500	$66,600	$77,700	$111,000
Monthly	$4,630	$5,550	$6,480	$9,250
Home purchase assumptions:				
Maximum monthly payment [2]	$1,340	$1,610	$1,880	$2,680
Less: Real property tax and insurance [3]	($210)	($240)	($320)	($450)
Maximum amount to principal and interest	$1,130	$1,370	$1,560	$2,230
Maximum mortgage amount [4]	$154,000	$187,000	$213,000	$304,000
Down payment amount:				
10% of purchase price	$17,100	$20,800	$23,700	$33,800
20% of purchase price	$38,500	$46,800	$53,300	$76,000
30% of purchase price	$66,000	$80,100	$91,300	$130,300
Home purchase affordability:				
10% down payment	$171,000	$208,000	$237,000	$338,000
20% down payment	$193,000	$234,000	$266,000	$380,000
30% down payment	$220,000	$267,000	$304,000	$434,000

[1] As established by the U. S. Department of Housing and Urban Development for Maui County in 1997, assuming a household size of four.
[2] Based on 29% of gross monthly income.
[3] Based on property taxes, insurance and maintenance fees of other competitive projects.
[4] Based on a 30-year mortgage with an interest rate of 7.5%, and payments to principal and interest as shown.

A similar analysis for higher income households, with varying assumptions regarding their accumulated equity available for use as a down payment, suggests homes priced at the following levels could be affordable:

HOME PURCHASE AFFORDABILITY BY HOUSEHOLD INCOME LEVEL: MAUI COUNTY, FY 1998

PERCENT OF MEDIAN INCOME	HOUSEHOLD INCOME	ASSUMED DOWN-PAYMENT	MAXIMUM AFFORDABLE HOME PRICE
100%	$55,500	10-20%	$170,000 - $195,000
120%	$66,600	10-20%	$210,000 - $235,000
140%	$77,700	20-30%	$265,000 - $305,000
200%	$111,000	20-30%	$380,000 - $435,000

Source: Mikiko Corporation, 1998.

VISITOR INDUSTRY OUTLOOK

Tourism is the major engine of Hawaii's economy, with approximately two-thirds of export earnings derived from it. Tourism also generates some $10 billion per year in visitor spending, and directly supports some 25% of State tax revenues and 32% of the Statewide workforce, according to PKF-Hawaii.

In summer and fall 1997, much of Asia was hurt by a series of currency declines and related economic downturns. This is of concern to Hawaii because "eastbound travelers," those arriving from Asia and the Pacific, represented over 2.6 million persons in 1997, or about 41% of visitor arrivals to the State (**Exhibit 1.9**). Among eastbound travelers, approximately 74%, are from Japan.

Statewide Trends (Exhibit 1.9)

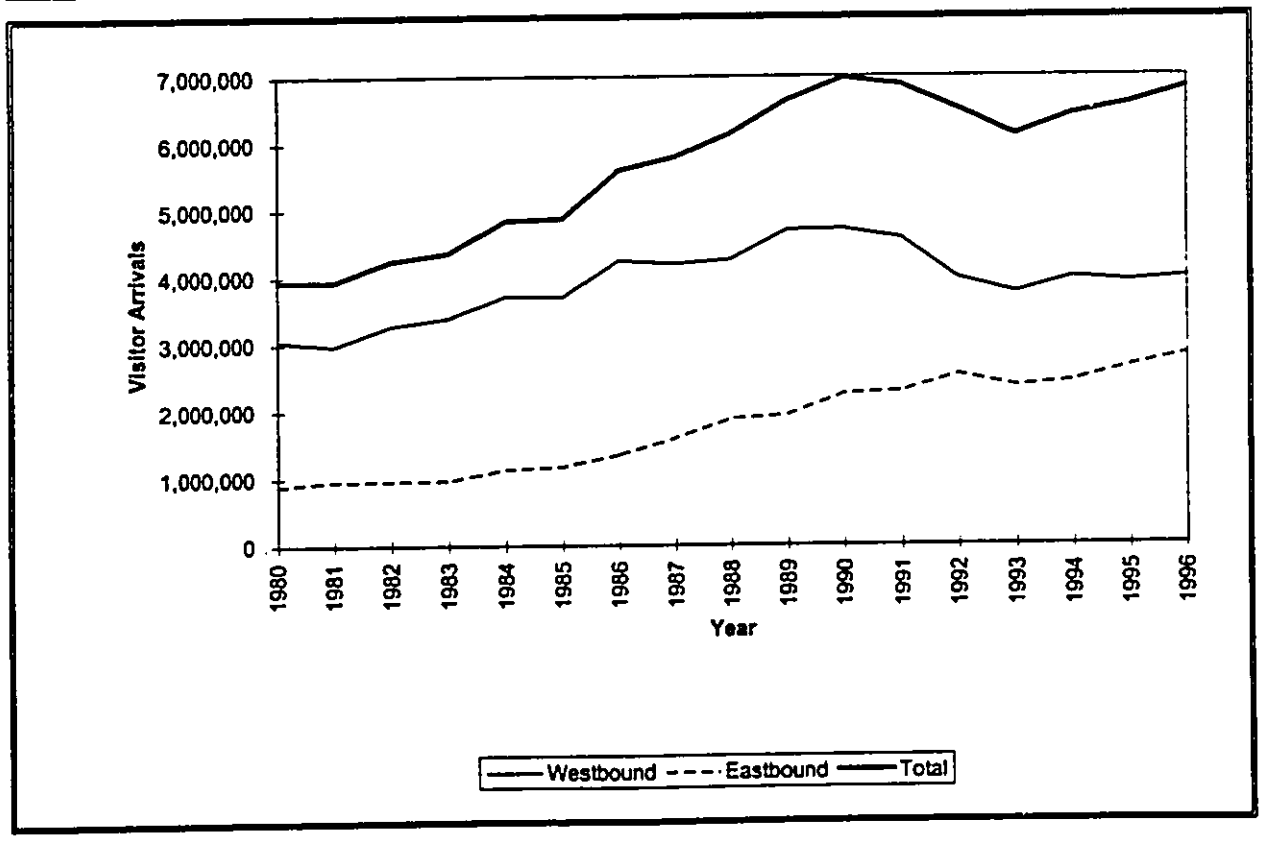
- **Arrivals from Japan** - Japanese travel to Hawaii will be hurt by the Asian developments, particularly the decline of the yen relative to the U.S. dollar. In addition to their exchange loss, earnings and consumer confidence in Japan have declined, and annual bonuses, typically paid after the end of the fiscal year in March, are anticipated to be lower this year.

  Hawaii began to see a decline in Japanese visitor arrivals in fall 1997. Travel agents reported bookings down 15% to 20% in January 1998. However, while United Airlines is pulling out of its unprofitable Japan to Hawaii routes, Japan Airlines, which currently flies about 70 planes to Hawaii per week, is seeking to pick them up. JAL has also announced its intention to increase service to the State, given Japan's recent settlement with the U.S. on bilateral airline pacts.

Exhibit 1.9

Historical Overnight Visitors
To the State of Hawaii
1980 to 1997

	Westbound		Eastbound		Total	
	Arrivals	*Increase(1)*	*Arrivals*	*Increase(1)*	*Arrivals*	*Increase(1)*
Historical:						
1980	3,046,132	–	888,372	–	3,934,504	–
1985	3,708,610	4.0%	1,175,500	5.8%	4,884,110	4.4%
1990 (2)	4,719,730	4.9%	2,251,450	13.9%	6,971,180	7.4%
1991 (2)	4,584,460	(2.9%)	2,289,430	1.7%	6,873,890	(1.4%)
1992	3,980,120	(13.2%)	2,533,760	10.7%	6,513,880	(5.2%)
1993	3,764,520	(5.4%)	2,359,710	(6.9%)	6,124,230	(6.0%)
1994	3,997,820	6.2%	2,432,480	3.1%	6,430,300	5.0%
1995	3,933,110	(1.6%)	2,656,020	9.2%	6,589,130	2.5%
1996	3,991,640	1.5%	2,831,490	6.6%	6,823,130	3.6%
1997 (3)	3,739,160	–	2,559,850	–	6,299,010	–
Compound annual percentage increase:						
1980 to 1990		4.5%		9.7%		5.9%
1990 to 1996		(2.8%)		3.9%		(0.4%)



(1) Compound average annual percentage change from preceeding date.
(2) Numbers currently under review by Hawaii Visitors and Conventions Bureau and the Department of Business Economic Development and Tourism and are expected to be revised downward.
(3) Year to date information as of October 1997, as provided by the Hawaii Visitors and Conventions Bureau.
Source: Hawaii Convention and Visitors Bureau.

For 1998 as a whole, the major wholesalers such as JTB and Kintetsu are projecting Japanese travel to Hawaii will be flat or as much as 4% down compared to 1997. However, many industry observers also anticipate that the Japanese market will return to growth mode within a few years.

- **Westbound visitor markets** - On the other hand, westbound visitation to the islands has been on the rebound since 1995, and was up about 12% in 1997, based on data for the first ten months of the year. The outlook for this market remains good, with positive economic projections for California and the nation as a whole.

  In January, Hawaii's largest inbound carrier, United Airlines, demonstrated its confidence in westbound travel when it announced the re-initiation of direct air service from Los Angles to Lihue, Kauai. United estimates this new service, to commence in June 1998, will require an investment of $21.5 million.

  United also announced plans to raise its Hawaii marketing budget from $3.2 to $5.7 million in 1998, in response to the State's recent two-year holiday on airline landing fees. Altogether, the airline plans to increase its Hawaii service from 115 flights per week to 122 this year.

- **Overall visitor arrivals** - Thanks to the anticipated growth from the U.S. markets, most projections for overall visitor arrivals to the State range from flat to about +2% for 1998, with greater increases thereafter.

Maui Outlook (Exhibit 1.10)

With only about 20% of its visitors arriving from Japan and other eastbound markets, Maui island is only half as dependent on the currently depressed Asian economies as the State as a whole. This should help to shelter it from the negative effects foreseen for the State in the near-term. However the island's strategy to increase its access to eastbound traffic in the longer-term by improving its airport facilities is still considered sound.

Over the next several years, Maui island's tourism is also anticipated to benefit from these developments:

- The anticipated completion of the **Kahului Airport** runway extension and strengthening project by 2000. This would open Maui to direct nonstop flights from Asia and the Midwestern U.S. According to the State Department of Transportation (DOT) and Governor Cayetano, the Environmental Impact Statement for the development is currently under review at the Federal (DOI and FAA) level, with approvals hoped for within a month. Thereafter, the State would have to deal with any legal challenges, and to secure various State and County land entitlements. However, DOT has expressed confidence that the project will be approved and could be completed by mid-2000.

- The opening of the **Hawai'i Convention Center** later this year, which is anticipated to generate pre- and post-convention events on the neighbor islands, as well as to potentially displace visitors from Oahu to the neighbor islands during very large events.

- The **Maui Ocean Center**, the State's first major new attraction in many years, is scheduled to open in Ma'alaea Harbor in March of this year.

Exhibit 1.10

Historical Overnight Visitors
To the Island of Maui
1985 to 1997

	Westbound		Eastbound			
	Number	Percent	Number	Percent	Total	Annual increase
Historical:						
1985 (1)	1,771,450		--		--	--
1990 (2)	1,954,770	83%	390,290	17%	2,345,060	(5.0%)
1991 (2)	1,881,830	80%	390,410	17%	2,345,180	0.0%
1992	1,812,200	79%	473,210	21%	2,285,410	(2.5%)
1993	1,746,200	79%	463,780	21%	2,209,980	(3.3%)
1994	1,852,710	80%	449,980	20%	2,302,690	4.2%
1995	1,801,130	80%	446,950	20%	2,248,080	(2.4%)
1996	1,766,840	78%	498,620	22%	2,265,460	0.8%
1997(3)	1,541,150	80%	378,850	20%	1,920,000	--
Compound annual percentage increase:						
1985 to 1990	2.0%		--			--
1990 to 1996	(1.7%)		4.2%			(0.6%)

(1) Information for westbound arrivals only, eastbound arrivals were not reported prior to 1989.
(2) Numbers currently under review by Hawaii Visitors and Conventions Bureau and the Department of Business Economic Development and Tourism; expected to be revised downward.
(3) Year to date information as of October 1997, as provided by the Hawaii Visitors and Conventions Bureau.
Source: Hawaii Visitors and Conventions Bureau.

- The new five-year contract to stage the annual **Hula Bowl** on Maui rather than on Oahu. The first game was held on January 18, 1998. Although the War Memorial Stadium in Wailuku accommodates only about 20,000 persons, the colorful Bowl results in national television exposure for the island during the important winter travel season.

MARKET ASSESSMENT FOR WAILUKU PARKSIDE

Site Photos

1. Economic and Demographic Overview

2. Single-Family Residential Supply and Sales Trends

3. Market Assessment for Wailuku Parkside

2 - SINGLE-FAMILY RESIDENTIAL SUPPLY AND SALES TRENDS

This chapter presents data related to the supply of new housing on Maui island, and tracks the single-family resale and new project sales markets in relevant areas of the island. This ***supply analysis*** is input to the market assessment for Wailuku Parkside that follows in Chapter 3.

RESIDENTIAL BUILDING PERMITS

The number of building permits for new single-family units proposed by private developers have declined significantly throughout the State since 1989, or just before the onset of the current recession **(Exhibit 2.1)**. This can be attributed to recognition in the public and private sectors that existing development plans oriented at resident markets (as most single-family development is) were already excessive, even given the over-heated market conditions of the time. In the multi-family market **(Exhibit 2.2)**, which is more affected by resort and off-shore market segments, the trends in building permits are much more erratic and do not turn clearly downward until 1991.

However, while the State has recorded nearly consistent annual declines in the number of residential permits since 1991, Maui County has had a few years of resurgence, despite the dramatically lower levels of permitting in recent years. Single-family building permits for the County increased by 27% from 473 to 601 between 1995 and 1996 and multi-family permits by 36% from 112 to 152 for the same time period.

SINGLE-FAMILY RESALES

County of Maui (Exhibit 2.3)

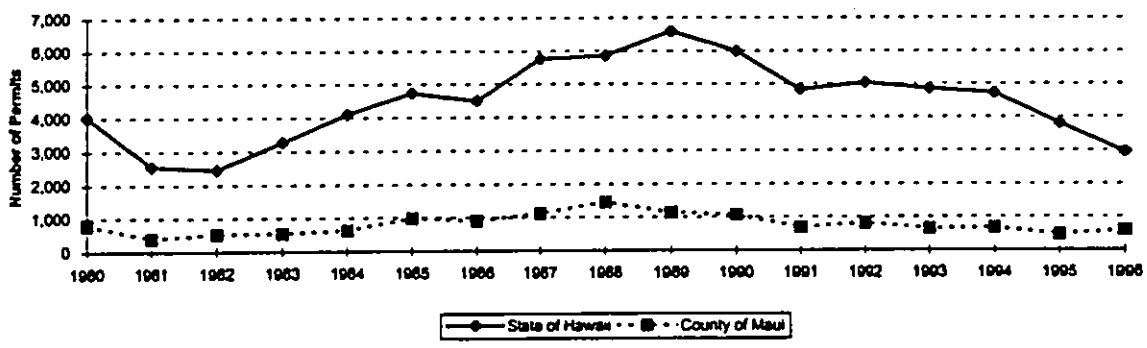
The number of single-family resales in Maui County peaked at 640 in 1990, while the median sales price continued to rise until peaking at $290,000 in 1992. This appreciation lead to a flood of new listings, however, and at the end of 1993, there were 825 listings County-wide, as compared to only 600 in 1990, or 325 in 1988.

Over the last 24 months, the number of sales has begun to rise, and the market has begun to whittle away at the overhang of properties listed for resale. The higher number of sales has been achieved at lower median sales prices, but Realtors believe that the market may be approaching an equilibrium again, and the elimination of excess listed inventory should eventually lead to a resurgence in purchase prices.

EXHIBIT 2.1

Private Single-Family New Building Permits
State of Hawaii and Maui County
1980 to 1996

	State of Hawaii			Maui County			Maui County permits as a percentage of State
	Number of permits	Percentage change	Average value of permit	Number of permits	Percentage change	Average value of permit	
1980	4,022	--	$47,900	803	--	$43,500	20.0%
1981	2,552	(36.5%)	$57,500	398	(50.4%)	$87,700	15.6%
1982	2,460	(3.6%)	$51,600	530	33.2%	$65,800	21.5%
1983	3,271	33.0%	$60,300	547	3.2%	$63,800	16.7%
1984	4,104	25.5%	$63,900	638	16.6%	$54,700	15.5%
1985	4,738	15.4%	$75,200	984	54.2%	$35,500	20.8%
1986	4,500	(5.0%)	$70,700	911	(7.4%)	$38,300	20.2%
1987	5,764	28.1%	$74,500	1,119	22.8%	$31,200	19.4%
1988	5,861	1.7%	$84,900	1,453	29.8%	$24,000	24.8%
1989	6,581	12.3%	$91,800	1,136	(21.8%)	$30,700	17.3%
1990	6,000	(8.8%)	$115,500	1,068	(6.0%)	$32,700	17.8%
1991	4,834	(19.4%)	$120,900	694	(35.0%)	$50,300	14.4%
1992	5,033	4.1%	$118,000	810	16.7%	$43,100	16.1%
1993	4,855	(3.5%)	$122,300	660	(18.5%)	$52,900	13.6%
1994	4,728	(2.6%)	$134,500	673	2.0%	$51,900	14.2%
1995	3,808	(19.5%)	$129,100	473	(29.7%)	$73,800	12.4%
1996	2,954	(22.4%)	$134,200	601	27.1%	$58,100	20.3%
Compound annual percentage increase: 1980 - 1996		(1.9%)			(1.8%)		

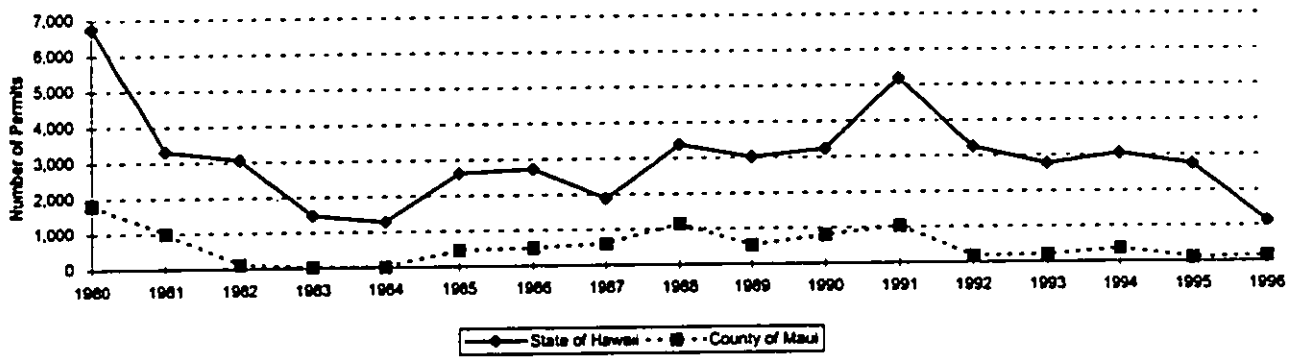


Source: Building Department, City & County of Honolulu; Department of Public Works, Hawaii County, Maui County and Kauai County.

Exhibit 2.2

Private Multifamily New Building Permits
State of Hawaii and Maui County
1980 to 1996

	State of Hawaii			Maui County			Maui County permits as a percentage of State
	Number of permits	Percentage change	Average value of permit	Number of permits	Percentage change	Average value of permit	
1980	6,758	--	$73,500	1,815	--	$94,400	26.9%
1981	3,321	(50.9%)	$76,800	1,001	(44.8%)	$86,200	30.1%
1982	3,070	(7.6%)	$50,100	122	(87.8%)	$40,100	4.0%
1983	1,479	(51.8%)	$66,800	24	(80.3%)	$138,100	1.6%
1984	1,280	(13.5%)	$48,900	6	(75.0%)	$63,300	0.5%
1985	2,633	105.7%	$54,800	457	7516.7%	$53,200	17.4%
1986	2,735	3.9%	$51,600	506	10.7%	$65,800	18.5%
1987	1,879	(31.3%)	$41,200	608	20.2%	$32,400	32.4%
1988	3,381	79.9%	$59,800	1,160	90.8%	$45,300	34.3%
1989	3,018	(10.7%)	$106,300	535	(53.9%)	$141,300	17.7%
1990	3,225	6.9%	$108,100	808	51.0%	$76,300	25.1%
1991	5,185	60.8%	$137,200	1,041	28.8%	$38,000	20.1%
1992	3,259	(37.1%)	$89,000	184	(82.3%)	$45,700	5.6%
1993	2,776	(14.8%)	$77,300	212	15.2%	$46,000	7.6%
1994	3,053	10.0%	$77,000	368	73.6%	$49,900	12.1%
1995	2,750	(9.9%)	$94,300	112	(69.6%)	$89,000	4.1%
1996	1,142	(58.5%)	$94,700	152	35.7%	$52,700	13.3%
Compound annual percentage increase: 1980 - 1996		(10.5%)			(14.4%)		

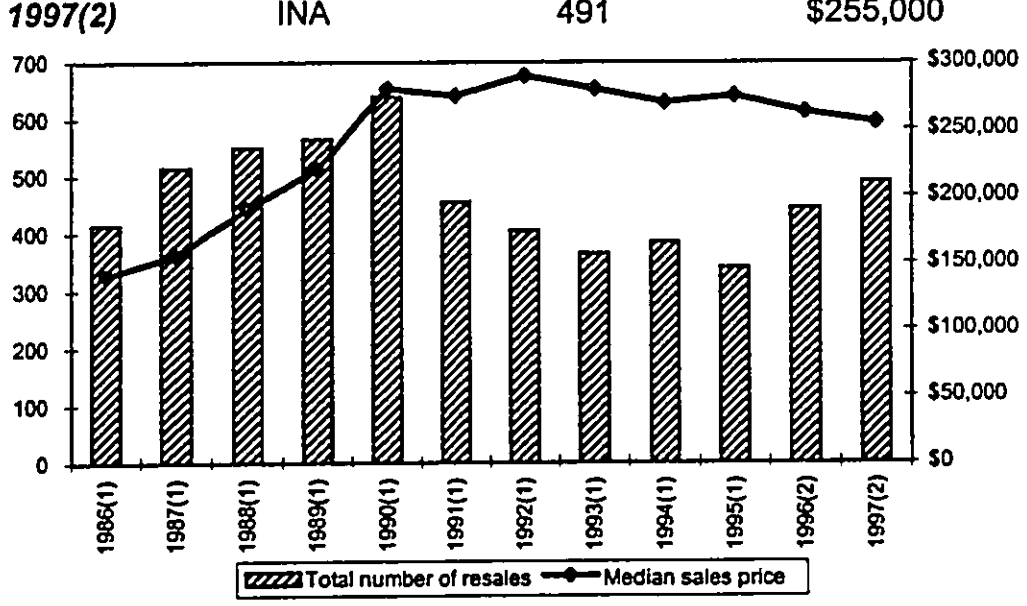


Source: Building Deptartment, City & County of Honolulu; Department of Public Works, Hawaii County, Maui County and Kauai County.

Exhibit 2.3

Maui County Single Family Residential Resales Indicators 1986 to 1997

	Number of listings at year end	*Total number of resales*	*Median sales price*
1986(1)	475	415	$140,000
1987(1)	350	515	$155,000
1988(1)	325	550	$190,000
1989(1)	375	565	$220,000
1990(1)	600	640	$280,000
1991(1)	675	455	$275,000
1992(1)	600	405	$290,000
1993(1)	825	365	$280,000
1994(1)	675	385	$270,000
1995(1)	775	340	$275,000
1996(2)	700	445	$263,000
1997(2)	INA	491	$255,000



INA = Information not available.

(1) Approximate take-offs based on graphed data, The Prudential Locations, *Hawaii Real Estate Indicators*, First Quarter, 1997.

(2) Maui Board of REALTORS, 1998.

Island of Maui (Exhibit 2.4)

When the impacts of Molokai and Lanai islands are eliminated from the County data, single-family resales on Maui Island are seen to be already increasing in both number and median price. According to the Maui Board of REALTORS, the island recorded 486 single-family home sales in 1997, or 10% more than in 1996, at a median price of $302,600, or a 3% increase over 1996.

These indicators for the resales market are strongest in the East and West Maui areas, and weaker in Central Maui neighborhoods. This could be partially attributed to the substantial new product inventory available in Central Maui, which could make some of the older (resales) inventory relatively less attractive.

NEW SINGLE-FAMILY DEVELOPMENTS

This section presents the results of a January 1998 survey of selected comparable single-family subdivisions that are now being marketed or have recently been marketed in the Central and South areas of the island.

New Project Characteristics (Exhibit 2.5)

Central Maui has seen three major single-family projects developed and marketed in recent years. These include:

- **The Greens**, an approximately 180-unit subdivision within the 3,300-unit master planned Maui Lani development being developed by Maui Lani Homes in Kahului. A portion of this subdivision fronts the planned Maui Lani Golf Course, which is now under construction. The Greens was first offered as a single-family development, but as of October 1997, the developer switched to selling lots only and offering third-party builder packages. Typical lots at The Greens range from about 5,600 to 9,000 square feet.

- **Kaimana**, 179-unit, small-lot development within C. Brewer's 2,400-unit Kehalani master-planned community, in Wailuku. This project was developed as house-and-lot packages, of which 127 homes are "courtyard" style, with typical lot sizes of 3,900 to 4,500 square feet, and the remaining 52 "perimeter lots" are about 4,500 to 5,000 square feet.

- **Halemalu**, a 30-unit house-and-lot subdivision, also in C. Brewer's Kehalani community in Wailuku. Compared to Kaimana, Halemalu offers significantly larger lots, with an average size of about 6,000 square feet and a range from 5,000 to 10,000 square feet.

New developments in Kihei (South Maui) are considered to represent indirect competition for the proposed Wailuku Parkside, due to their less favorable location for primary residency. However, the South Maui projects historically established a floor for home prices aimed at the primary residential market, while Central enjoyed a premium for its preferred location. In

Exhibit 2.4

Single-Family Home Resale Trends
Island of Maui
1996 and 1997

Area	Number of sales			Median sales price		
	1996	1997	Percentage change	1996	1997	Percentage change
Central	59	59	0%	$225,000	$180,000	(20%)
Haiku	39	53	36%	$255,000	$290,000	14%
Hana	8	6	(25%)	$287,500	$174,000	(39%)
Kaanapali	14	19	36%	$562,500	$650,000	16%
Kapalua	3	5	67%	$925,000	$1,100,000	19%
Kihei	80	110	38%	$240,000	$235,000	(2%)
Kipahulu	0	1	na	$0	$325,000	na
Kula/Ulupalakua/Kamaole	42	44	5%	$354,000	$368,000	4%
Lahaina	36	15	(58%)	$262,200	$235,000	(10%)
Makawao/Olinda/Halimaile	54	46	(15%)	$225,000	$229,000	2%
Maui Meadows	18	18	0%	$350,000	$395,500	13%
Nahiku	2	0	(100%)	$172,500	$0	na
Napili/Kahana/Honokowai	23	17	(26%)	$340,000	$385,000	13%
Pukalani	28	37	32%	$256,500	$229,000	(11%)
Spreckelsville/Paia/Kuau	15	24	60%	$257,500	$233,693	(9%)
Wailea/Makena	21	32	52%	$607,500	$562,500	(7%)
Total Island [1]	442	486	10%	$294,300	$302,600	3%

na = Not applicable.
(1) Island-wide sales price figures are weighted averages of the respective area medians.

Source: Maui Board of REALTORS, 1998.

EXHIBIT 2.5

CHARACTERISTICS OF SELECTED SINGLE-FAMILY SUBDIVISIONS ON MAUI
BASED ON INFORMATION AS OF JANUARY 1998

Subdivision	*Community*	*Developer*	*Date first marketed*	*Number of units*	*Unit type*	*Range of lot sizes, (square feet) Low*	*Typical*	*High*	*Comments*
Central Maui:									
The Greens Ph. I	Maui Lani	Maui Lani Homes	Oct-96	66	SF homes; lots	5,700	6,900	9,000	18 are golf front; developer offering lots only as of 10/97.
The Greens Ph. II	Maui Lani	Maui Lani Homes	INA	61	SF homes; lots	5,600	6,100	7,100	Size range based on first release of 21 lots.
The Greens Ph. III	Maui Lani	Maui Lani Homes	not yet	50-60	SF homes; lots	na	na	na	Still in planning stages.
Kaimana	Kehalani	C. Brewer Homes, Inc.	Dec-94	179	SF homes	3,600	4,400	6,670	Average reflects two distinct lot types. [1]
Halemalu	Kehalani	C. Brewer Homes, Inc.	Nov-95	30	SF homes	5,000	6,000	10,000	Contractor Fletcher Pacific.
		Central Maui total/average (rounded)		391		5,000	5,900	8,200	
South Maui:									
Meadowlands Ph. I	Kihei	Betsill Brothers [2]	Mar-96	32	SF homes	4,000	4,300	5,500	
Meadowlands Ph. IIA	Kihei	Betsill Brothers [3]	not yet	50	SF homes	4,000	5,200	6,300	
Meadowlands Ph. IIB	Kihei	Betsill Brothers [3]	not yet	38	SF homes	3,722	4,100	5,576	
Keala Hills	Kihei	Betsill Brothers	Jun-96	21	SF homes	7,500	8,600	10,600	Ohana-approved (inside and attached.)
Ka'ono'ulu Ph 1	Kihei	Betsill Brothers	INA [5]	55	SF homes	7,500	INA	10,000	
Ka'ono'ulu Ph. 2 [4]	Kihei	Betsill Brothers	Est. 2Q 98	53	SF homes	8,000	INA	9,500	
Ka'ono'ulu Ph. 3	Kihei	Betsill Brothers	Dec-94	30	SF homes	7,500	INA	10,000	
Piilani Village Ph. I	Kihei	Baldwin*Malaima	Dec-91	100	SF homes	5,300	7,000	10,400	Phase I is 26 acres.
		South Maui total/average (rounded)		379		5,900	5,800	8,500	

INA - Information not available; na - Not applicable.

[1] 127 of homes were "courtyard" style, with lots, typically 3,900 to 4,500 square feet; other 52 were "perimeter lots," typically 4,500 to 5,000 square feet.

[2] Developed in partnership with landowner GK South Maui Investments

[3] Developed with Goodfellow.

[4] Also known as Kenolio Ranch Estates.

[5] Originally marketed by Horita; project saw little activity for long period; marketing revived recently by Betsill Brothers.

Sources: Sales material; site visits; interviews with developers, project brokers, managers and State and County officials.

recent months, however, Central Maui developers have reacted by re-pricing their products to levels slightly below those now being offered in the Kihei area.

In Kihei, Betsill Brothers have marketed several relatively smaller projects, often with joint venture partners. Additionally, Baldwin*Malama recently completed sales on its Piilani Village Phase I project, where sales commenced at the end of 1991. The South Maui projects surveyed include:

- **The Meadowlands**, where the first 32 homes of a 120-unit subdivision have been marketed to date.
- **Keala Hills**, a 21-unit single-family home project.
- **Ka'ono'ulu**, where Phases 1 and 3, with a total of 85 homes, have been marketed to date.
- **Piilani Village**, Baldwin*Malama's 100-home Phase I of a community master-planned for 985 residential units.

Unit Mix and Offering Prices at Selected Comparable Projects (Exhibit 2.6)

By the first quarter of 1998, typical offering prices in Central Maui were slightly below those for similar product in South Maui, eliminating the prior price premium the Central Maui projects had commanded previously for their preferred location.

In Central Maui, the majority of inventory offered is three- and four-bedroom units. In Kihei, five-bedroom units are also common. As of January 1998, the Central Maui projects were priced approximately as follows:

- Three-bedroom units: $180,000 to $225,000
- Four-bedroom units: $210,000 to $230,000
- Five-bedroom units: $230,000 to $235,000

Sales Absorption at the Selected Comparable Projects (Exhibit 2.7)

Central Maui's lower prices and generally preferable location as compared to South Maui has reinforced the area's market dominance and resulted in dramatically stronger rates of sales absorption in the Central region. The Greens Phase I, Kaimana and Halemalu together averaged 3.8 sales per month, while the four South Maui projects averaged only 1.3 per month, or about one-third the Central Maui rate.

However, as for the Maui market as a whole, developers and marketing agents in both areas report significantly improved sales in recent months. For instance:

EXHIBIT 2.6

OFFERING PRICES AT SELECTED SINGLE-FAMILY SUBDIVISIONS ON MAUI
(BASED ON INVENTORY AVAILABLE IN JANUARY 1998 UNLESS STATED)

Subdivision	Number of units	2-Bedroom Low	2-Bedroom High	3-Bedroom Low	3-Bedroom High	4-Bedroom Low	4-Bedroom High	5-Bedroom Low	5-Bedroom High	Comments
Central Maui:										
The Greens Ph. I	66	$179,900	$199,000	$218,400	$ 274,800	$234,900	$296,230	na		Prices shown are as of May 1997.[1]
The Greens Ph. II	61	na		$177,000	$ 226,800	$225,500	$229,500	$230,800	$234,800	Based on packages offered with 3D Builders.[2]
The Greens Ph. III	50-60	na		na		na		na		Not marketed yet.
Kaimana	179	na		$186,000	$ 206,500	$212,500	$214,500	na		
Halemalu	30	na		$206,000	$ 210,000	$207,000	$215,000	na		Prices shown as of 5/97; no inventory in 1/98.
Central total/av. [3]	**391**	**na**	**na**	**$189,700**	**$ 214,400**	**$215,000**	**$219,700**	**$230,800**	**$234,800**	
South Maui:										
Meadowlands Ph. I	32	$169,900	INA	$ 176,000	INA	na		$235,000	INA	Average sold unit price about $195,000.
Meadowlands Ph. IIA	50	$175,500	$203,000	$ 193,800	$ 226,000	$222,000	$225,000	$227,800	$235,000	Expect average sales price about $200,000.
Meadowlands Ph. IIB	38	$183,000	$200,000	$ 195,300	$ 220,000	na		$233,000	$235,000	
Keala Hills	21	na		$ 229,000	$ 253,000	$249,000	$260,000	$262,000	$290,000	Homes feature central air conditioning.
Ka'ono'ulu Ph 1	55	na		na		na		na		No units remaining for sale in 1997/98.
Ka'ono'ulu Ph. 2 [4]	53	na		na		na		na		Not marketed yet.
Ka'ono'ulu Ph. 3	30	na		$ 195,000	INA	INA	INA	INA	$280,000	
Piilani Village Ph. I	100	na		$181,500	$ 234,000	$224,000	$229,000	na		Based on 18 sales between 1/97 and 5/97.
South total/average [3]	**379**	**$179,300**	**$201,500**	**$198,900**	**$ 233,300**	**$231,700**	**$238,000**	**$240,900**	**$260,000**	

na = Not applicable (unit type not offered). INA = Information not available.

[1] As of January 1998, only 3 golf-front lots available at $121,000 each; all with 7,108 square feet.
[2] Lots only offered at $121,000 for 7,150 square foot golf front sites; $85,000 to $87,000 for 5,893 to 6,524 square foot other sites.
[3] Averages exclude Greens Phase I and Piilani Village Phase I since both have little or no inventory in January 1998.
[4] Also known as Kenolio Ranch Estates.

Sources: Sales material; site visits; interviews with developers, project brokers, managers and State and County officials.

EXHIBIT 2.7

SALES ABSORPTION AT SELECTED SINGLE-FAMILY SUBDIVISIONS ON MAUI
AS OF JANUARY 1998 UNLESS STATED

Subdivision	Total units offered	Price range ($000's)	Sales: Reserved or sold	Sales: Available	Sales period: Begin	Sales period: End	Months in sales	Indicated monthly sales absorption	Comments
Central Maui:									
The Greens Ph. I	66	$180-296	62	4	Oct-96	Jan-98	15	4.1	Only golf-front lots remaining, 1 with model home.
The Greens Ph. II	61	$177-234	5	56	INA	Jan-98	INA	INA	
Kaimana	179	$182-270	156	23	Dec-94	Jan-98	38	4.2	Only 175 marketed to date; last 4 to market beginning 2/98.
Halemalu	30	$206-215	22	8	Nov-95	Jun-96	7	3.1	Effectively sold out by 6/96; last few closed 10/97.
Total/av. Central	**391**		**245**	**91**			**20**	**3.8**	
South Maui:									
Meadowlands Ph. I	32	$170-235	32	0	Mar-96	Dec-97	21	1.5	28 closed as of 2/10/98; rest expected by 3/98.
Keala Hills	21	$229-290	14	7	Nov-96	Jan-98	14	1.0	11 closed as of 2/10/98.
Ka'ono'ulu Ph. 3	30	$195-280	30	0	Jan-95	Dec-96	23	1.3	
Piilani Village Ph. I [1]	100	$190-350	96	4	Dec-91	May-97	66	1.5	Effectively sold out by May 1997. [2]
Total/av. South	**183**		**172**	**11**			**31**	**1.3**	

na = Not applicable; INA = Information not available.
[1] January to May 1997 sales reported by developer to average 3.8 per month.

Sources: Sales material; site visits; interviews with developers, project brokers, managers and State and County officials.

- **The Greens** reported about 20 unit sales within a two-month period immediately after lowering its prices and shifting from a home-sales program to a lot-sales program with optional home plans.

- **Keala Hills**, which had sold only six units from its first marketing in November 1996 to late January 1998, made five sales within three weeks during the late-January to early February 1998 period. The project's marketing agent attributes this step-up to the development of a model home, more sales staff and a more professional approach, in addition to general market conditions.

- **The Dowling Company** is reported to have sold 16, 10,000 square foot, ohana-zoned homesites at Kamaole Heights, Kihei, within a one-week period this year. The lots are priced in the $129,000 to $139,000 range, and Mr. Dowling reportedly expects to be able to sell the balance of the 40-lot project within the month.

- **At Piilani Village**, which was on the market approximately 6.5 years, project sales averaged 1.5 per month overall, but the developer reported January to May 1997 sales taken alone averaged 3.8 per month.

Buyer Origins of Selected Comparable Projects

Buyers from the Central Maui projects were almost exclusively existing Maui residents, with high appeal to families, first-time buyers and those who already had family ties to the populous Central Maui area.

In contrast, South Maui properties are reportedly attracting about 15% to 20% of their sales from U.S. mainland buyers, with primary residences from throughout the country, but particularly in California, Oregon and Washington. This is seen to reflect the relative proximity of Kihei to the island's beaches and resort areas. According to developers, since lowering their prices, U.S. mainland buyers have been comparing their single-family product to Kihei and Ma'alaea condominiums. Many are opting to trade the condominiums' resort-area locations for the single-family homes' more ample living areas and comfort, for relatively little difference in price.

MARKET ASSESSMENT FOR WAILUKU PARKSIDE

Site Photos

1. Economic and Demographic Overview

2. Single-Family Residential Supply and Sales Trends

3. Market Assessment for Wailuku Parkside

3 - MARKET ASSESSMENT FOR WAILUKU PARKSIDE

This chapter describes the Wailuku Parkside location, site and proposed development characteristics, and provides an assessment of the anticipated sales absorption of the single-family homes. This assessment is based on product characteristics and pricing parameters provided by Stanford S. Carr Development Corporation (SCD).

LOCATION AND SITE CHARACTERISTICS

Wailuku Parkside is located in the Central area of Maui, as shown on **Exhibit 3.1**. As indicated previously on Exhibit 1.3, the Wailuku and Kahului areas of Central Maui are the most densely populated districts of the Island. The area offers established communities, and proximity to many of the Island's services as well as its cultural, social and employment opportunities. With its mid-Island location, this area is also one of the most convenient for families with two or more workers who may be commuting in different directions each day.

Within Central Maui, Wailuku is preferred by many, due to:

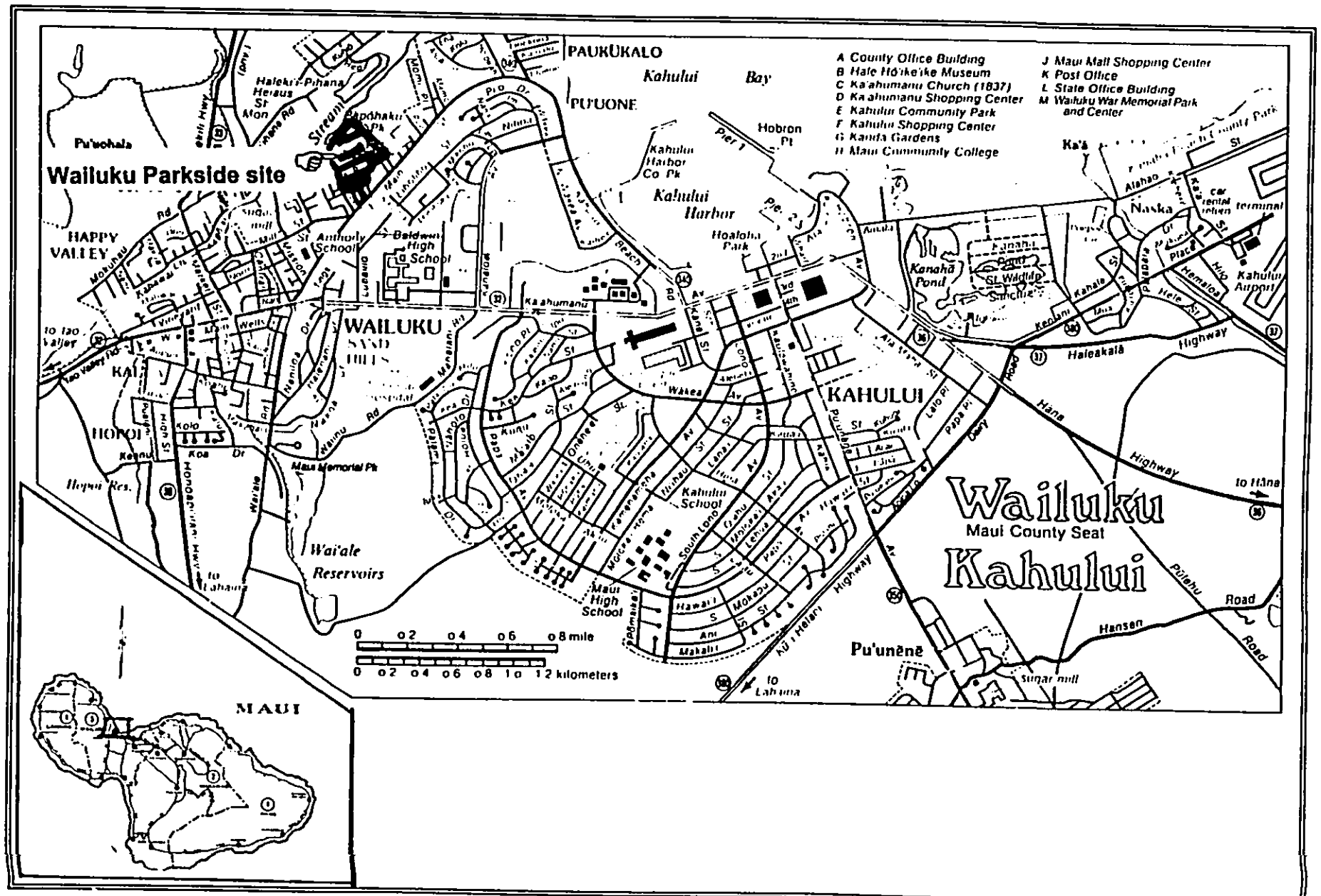
- Relatively calm wind conditions and cool weather patterns,
- Generally superior view opportunities, owing to its many hillside locations,
- Good soils conditions, (whereas large portions of other Central Maui have sandy soils, Wailuku tends to offer good growing conditions),
- Good public elementary schools,
- Concentration of government jobs, professional services and infrastructure, and
- The high quality of established communities with Wailuku addresses, including Wailuku Heights, Sand Hill and the old "managers' homes" along High Street.

SITE CHARACTERISTICS

The Wailuku Parkside site includes some 25 acres of former sugar lands located within the lower-Wailuku region. The site fronts residential and commercial uses that face Lower Main Street at its eastern boundary, Iao Stream at its western boundary, the Iao Parkside multifamily development to its north, and an older residential community to its south. The existing Eha Street, developed for Iao Parkside, runs through the site, as shown in **Exhibit 3.2**. SCD plans to develop about 24 acres of the site into a single-family residential community.

Exhibit 3.1

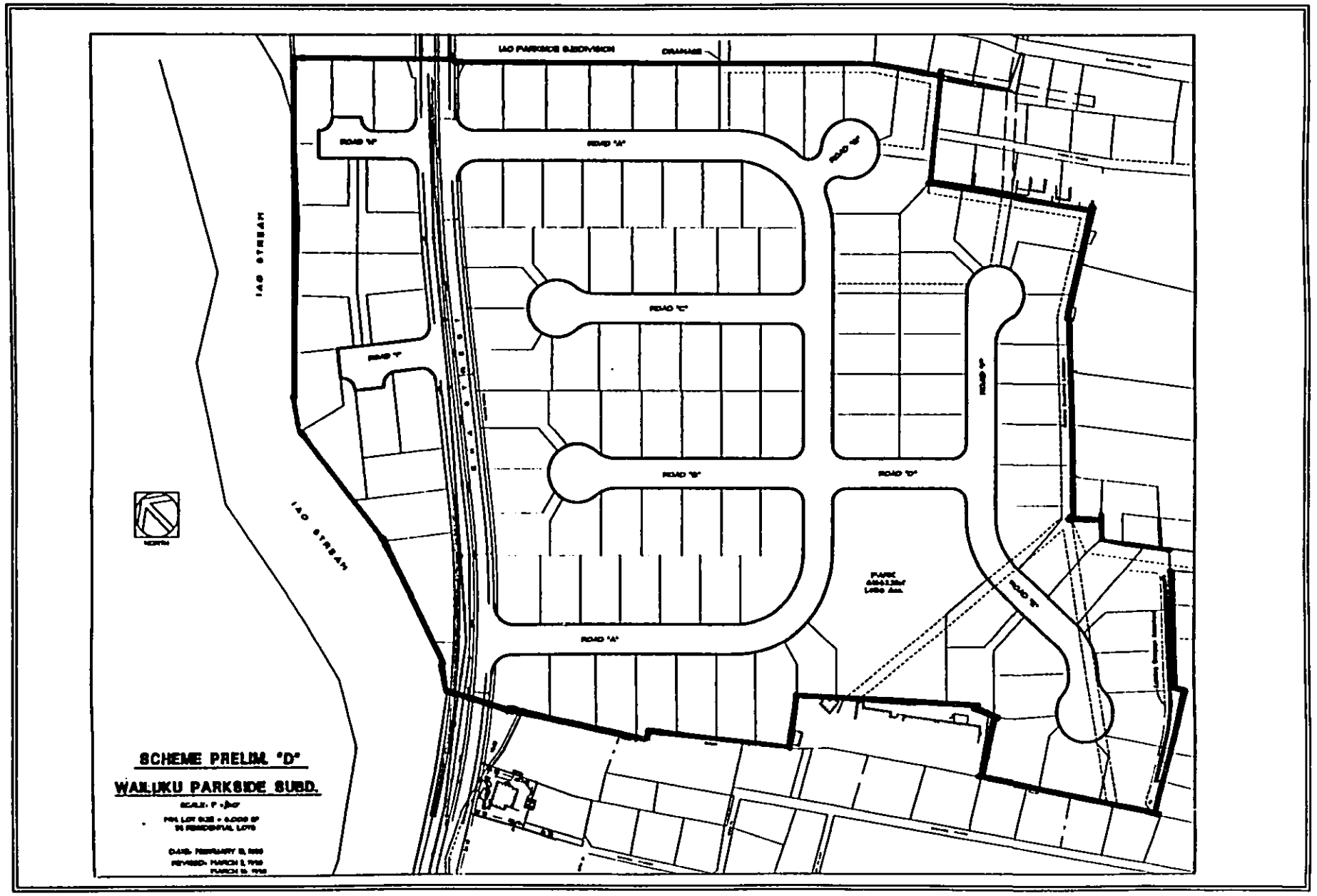
Location of Proposed Wailuku Parkside Development in Central Maui



Source: Stanford S. Carr Development Corporation, November 1997.

Exhibit 3.2

Preliminary Site Plan for Wailuku Parkside



Source: Stanford S. Carr Development Corporation, November 1997.

Entered from Eha Street, the site has a quiet and distinctly primary residential appeal. Looking *mauka*, the site offers excellent views of lush Iao Valley, while in other directions it provides distant views of the ocean and Haleakala **(see photos near front of report)**.

PROPOSED DEVELOPMENT CONCEPT AND PRODUCT TYPES

SCD proposes to develop the site into 119 single-family, entry-level homes. The concept is to provide high quality homes on relatively large lots, at high value points.

Based on preliminary site studies, lots could range from 6,500 to 10,000 square feet, with a typical homesite of about 7,000 square feet. Homes are planned in three model types, including three-bedroom, two-bath units; three-bedroom, two-and-a-half-bath units; and four bedroom, two-and-a-half-bath units. Unit sizes and pricing are preliminary planned as follows:

SUMMARY OF PROPOSED MODEL TYPES AND UNIT PRICING AT WAILUKU PARKSIDE

MODEL	BDRM./ BATH	NET INTERIOR AREA (S.F.)	AVERAGE PRICE (1998 $)	AV. PRICE PER S.F.
1	3/2	1,300	$210,000	$161
2	3/2.5	1,375	$220,000	$160
3	4/2.5	1,500	$235,000	$157

Source: Stanford S. Carr Development Corporation.

Considering the entire project and its range of lot sizes, however, home prices could range from about $185,000 to $260,000, in 1998 dollars, according to SCD.

The proposed lot sizes would position Wailuku Parkside among the largest lots of the selected comparables, or in a range matched only by Phase I of The Greens, Halemalu, Keala Hills and Piilani Village Phase I.

Considering the land use entitlements that need to be obtained prior to development at the site, SCD estimates that it could commence development of a model home by October 1998, and begin marketing production units by January 1999.

MARKET ASSESSMENT FOR SINGLE-FAMILY HOMES

Market Appeal

Wailuku Parkside is anticipated to appeal to families who are already established on Maui, and perhaps particularly to those who have ties to the Central Maui area. As targeted by the developer, and based on the sales experience of other Central Maui projects, a significant share of buyers could also be first-time homeowners.

The first-time buyer market segment is considered relatively "durable." So long as home prices remain affordable, the market for entry level housing is constantly replenished as new generations come of age and form their own households. Additionally, according to developers and Realtors on Maui, the Island's single-family market is exhibiting strong appeal to this market, since:

- With prices only slightly higher than for comparable bedroom counts in multifamily units, single-family homes typically offer greater privacy, area for outdoor play and entertaining, and land for home expansion.

- The multifamily market is generally considered a temporary ownership hold. The strategy of many multifamily buyers is to "move up" to a single-family residence once the multifamily unit's appreciation has helped the household to accumulate sufficient home equity for its down payment on the next buy. However, with competitive pricing and in a market of only gradual home price increases, first-time buyers appear to be increasingly moving directly to a single-family product.

Competitive Product

Based on its pricing, unit sizes and other project characteristics, Wailuku Parkside could compete most directly with future moderately-priced subdivisions at Maui Lani, and with future phases at Piilani Village in Kihei.

While C. Brewer has no immediate plans for future phases at its nearby Kehalani, the company is reportedly in the process of selling a site within the master-planned community, in a location near to Kaimana. This site, known as Nanea, is reportedly being sold to Maui developer Jesse Spencer, who intends to bring some 80 single-family homes onto the market in 1998. With average lot sizes of about 7,000 square feet and lot-and-home prices in the $180,000 to $250,000 range, this project could pose direct competition for the SCD development. Since the site is understood to be fully entitled, Nanea might begin marketing units as early as July 1998. Assuming an average rate of absorption of five units per month (see below), this project could be sold out by the end of 1999. In that case, it would directly impact only the first year or so of marketing at Wailuku Parkside.

Projected Sales Absorption

The Wailuku Parkside development is projected to achieve an average sales absorption of about five units per month initially, with sales accelerating to a pace of about seven to eight units per

month subsequently. This could result in sell-out of the project within approximately 19 months, or in mid-2000, assuming the January 1, 1999 marketing start date targeted by SCD:

PROJECTED SALES ABSORPTION AT THE PROPOSED WAILUKU PARKSIDE DEVELOPMENT

PERIOD/ (MONTHS)	AVERAGE SALES/MO.	NO. OF SALES IN PERIOD	CUMULATIVE UNIT SALES
Jan-Jun 1999/ (6)	5.0	30	30
Jul-Dec 1999/ (6)	6.0	36	66
Jan-Jul 2000/ (7)	7.5	53	119

Source: Mikiko Corporation.

The projected level and acceleration of sales absorption is considered reasonable based on the following:

1) **General economic trends:**

- The Maui economy appears to be solidifying, with a 2.1% increase in jobs in 1997.
- Assuming the Kahului Airport runway extension and strengthening project is completed as proposed, the Island could see even more rapid growth from 2000 and the years beyond, as direct flights from Japan and points further east in the U.S. become possible.

2) **Increasing demand:**

- Population growth on the Island is projected to amount to 1.7% to 1.9% increases per year over the anticipated sales period of the project, to approximately 112,000 persons by 2000, or up to 116,000 persons by 2002 (see page 1-2).
- The Island is projected to add about 3,700 new households over the next five years, as a result of both population increases and decreasing average household size. This would represent a 2.0% rate of increase over the estimated 35,200 households in 1997, or need for an average of 740 new homes per year.

3) **Residential real estate market firming:**

- The Island's real estate market is already evidencing signs of recovery, with the median price for a single-family home increasing 3% to $302,600 in 1997, on top of a 10% increase in the number of transaction. Realtors are further reporting significant increases in sales volume in Fall 1997 and the first two months of 1998.

- As the existing inventory of listed homes is gradually reduced through the market forces already underway, prices could rise more rapidly, and some potential buyers who have been "sitting on the sidelines" waiting for the market to show evidence of improvement would be motivated to buy.

4) **Appropriate planning and positioning of Wailuku Parkside:**

- As noted above, the entry-level housing market is considered a strong position so long as pricing is within affordable levels, and interest rates remain low.

- Given the proposed unit pricing of $185,000 to $260,000, the project should be appropriately priced to Island households earning between $55,000 and $78,000 (the 100% to 140% of median County income range). According to NDS's estimates of household income distribution on the Island, the $50,000 to $75,000 income bracket encompasses nearly 25% of the Island's households (see page 1-4 and Exhibit 1.8).

- The project is considered to offer good value compared to comparison products recently marketed. For instance, compared to The Greens Phase I, Wailuku Parkside would offer location in a preferred community, similarly sized lots, and a superior home at a lower price. The Greens Phase I averaged 4.1 sales per month during its 15-months of marketing.

- According to SCD, the project is planned to be professionally marketed, with a model home completed prior to production unit marketing, and high quality landscaping, signage, graphics, collateral materials and the like. As noted at Keala Hills, such factors can make a significant difference to sales absorption rates.

- The Nanea project could be fully sold out by late 1999, possibly leaving Wailuku Heights with no direct, Wailuku competitors in 2000.

KEY ASSESSMENT ASSUMPTIONS

The conclusions presented above are based on a number of general assumptions regarding regional conditions and project characteristics. The key assumptions include:

- Continued gradual improvement in the County's economic conditions;

- Completion of the planned Kahului Airport runway projects within the next few years;

- Interest rates remaining at or below about 8% during the project's marketing period;

- Development and pricing of the project along the parameters noted herein (with allowances for future price adjustments according to market changes); and

- A high quality of building development and professional, effective marketing efforts at the project.