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STATE OF HAWAII

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CHAIRMAN
HAWAIIAN HOMES COMMISSION

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STATE OF HAWAII
DEPARTMENT OF HAWAIIAN HOME LANDS
P.O. BOX 1879
HONOLULU, HAWAII 96805

March 28, 2001

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OF ENVIRONMENTAL
QUALITY CONTROL

To: The Honorable Bruce S. Anderson, Director
Department of Health

Attention: Genevieve Salmonson, Director
Office of Environmental Quality Control

From: Raynard C. Soon, Chairman
Hawaiian Homes Commission

Subject: Finding of No Significant Impact (FONSI) for the Kamehameha Schools Paukukalo Preschool and Related Improvements, Paukukalo, Maui, Tax Map Key No. (2) 3-3-5:86, 87 (portion)

The Department of Hawaiian Home Lands has reviewed the comments received during the 30-day public comment period on the draft environmental assessment for the above-referenced preschool project.

At its regular monthly meeting held January 23, 2001, the Hawaiian Homes Commission granted the determination of Finding of No Significant Impact (FONSI) for the Final Environmental Assessment, dated December 2000. Please publish this notice in the April 8, 2001, OEQC Environmental Notice.

A completed OEQC Publication Form and four copies of the Final Environmental Assessment report have already been delivered to your office. Should you have any questions, please call me at 586-3801, or Carolyn Darr, Land Agent, at 587-6430.

c: Kamehameha Schools/Allison Yue

2001-04-08-MA-FEA-

Final Environmental Assessment

PAUKUKALO PRESCHOOL AND RELATED IMPROVEMENTS

Prepared for:

Kamehameha Schools

January 2001

MUNEKIYO, ARAKAWA & HIRAGA, INC.

Final Environmental Assessment

PAUKUKALO PRESCHOOL AND RELATED IMPROVEMENTS

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Chapter I

Project Overview

I. PROJECT OVERVIEW

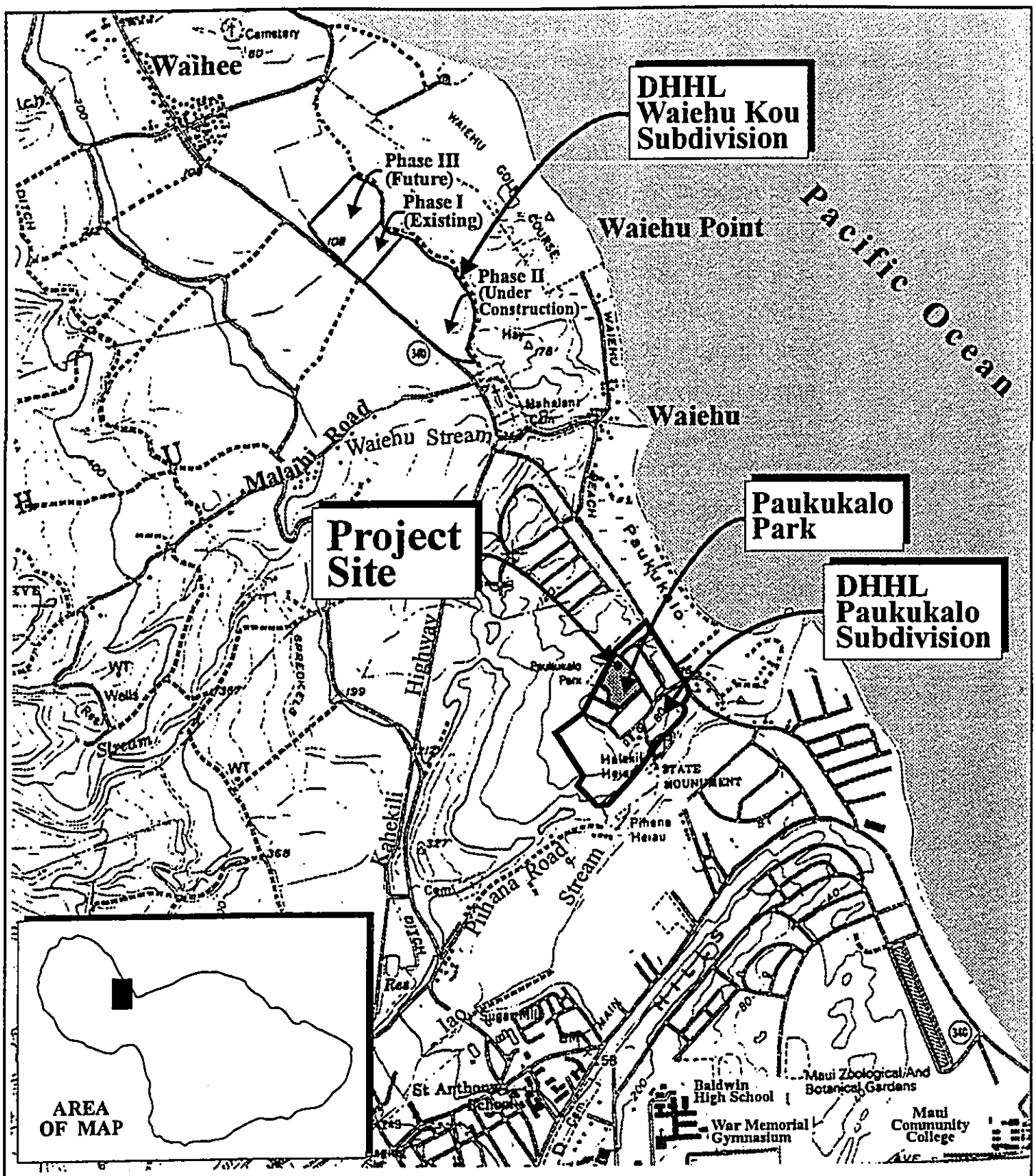
A. PROPERTY LOCATION, EXISTING USE, AND LAND OWNERSHIP

The applicant for the project is Kamehameha Schools and the State of Hawaii, Department of Hawaiian Home Lands (DHHL). Kamehameha Schools is proposing to develop a new preschool in Paukukalo, Maui, Hawaii. A new DHHL site office is also proposed as part of the project. See Figure 1. The proposed project is located within a portion of the approximately 6.37-acre Paukukalo Park and Community Center (TMK 3-3-5:86, 87). The park presently contains a ballfield, playground equipment, open air gymnasium, community center, and a restroom facility. There are 11 parking stalls adjacent to the community center and an additional 25 parking stalls located at the northern corner of the lot near the Kaumualii Street driveway entrance. The park and community center serve the surrounding DHHL Paukukalo single-family residential homestead development.

Kamehameha Schools presently operates a preschool at the Department of Education's Waihee Elementary School. The current operation consists of 20 four year-olds, a teacher and an aide who occupy one classroom. Since the classroom will be utilized by Waihee School in August 2001, a new preschool facility is needed.

The proposed project is intended to serve 3 to 4 year old preschoolers of native Hawaiian ancestry. The first enrollment priority is intended to be children from the DHHL Paukukalo development. Second priority would be children from DHHL's Waiehu Kou development. Third priority will be children from the Waihee Elementary School District. Any remaining openings could be filled by children of native Hawaiian ancestry living elsewhere in Maui.

There are approximately 183 homes within the Paukukalo DHHL



Source: U.S. Geological Survey

Figure 1

Paukukalo Pre-School and Related Improvements

Regional Location Map

0 500 1000 2000

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Prepared for: Kamehameha Schools

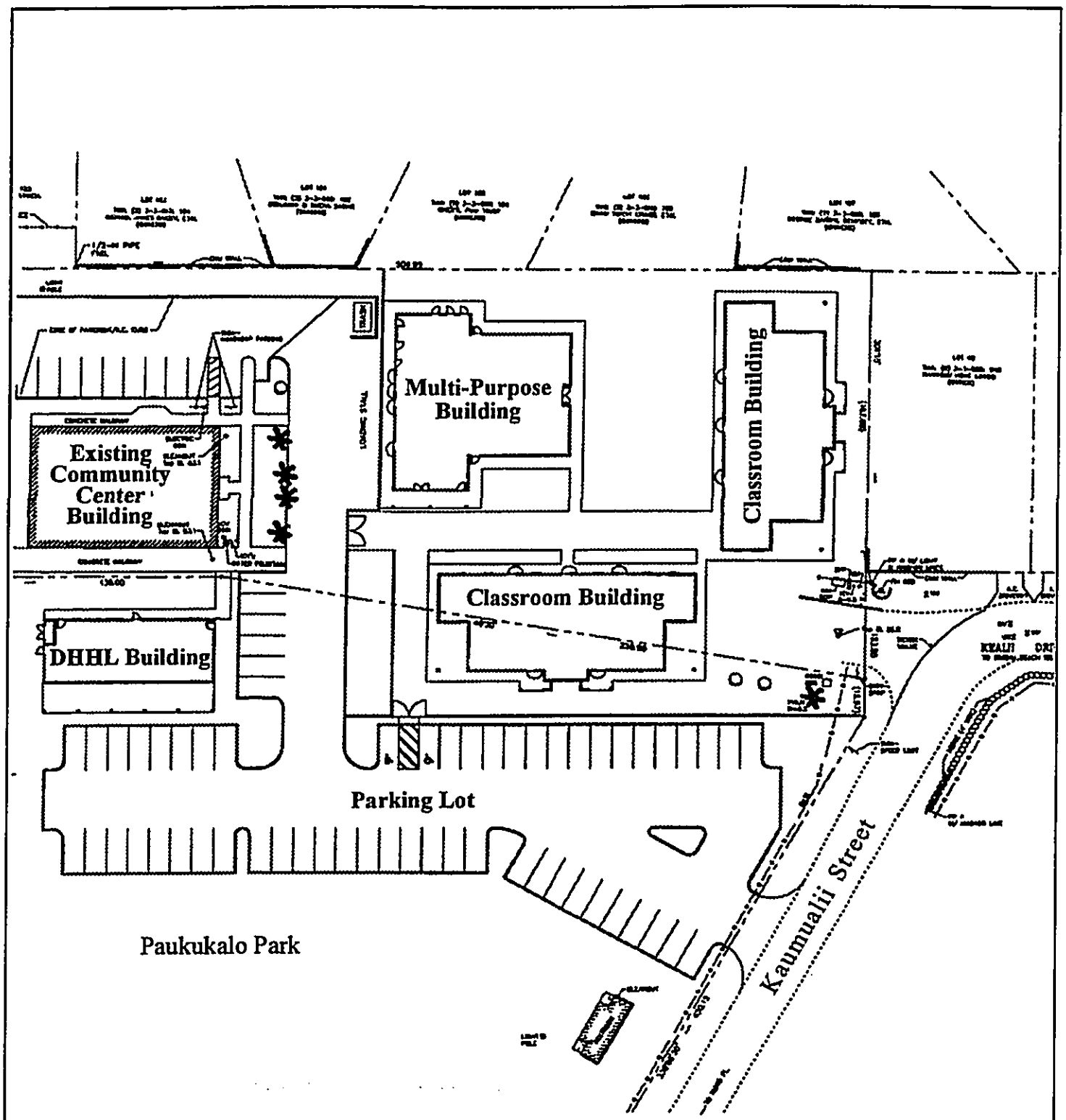
community. Within Waiehu Kou Phase I, there are 40 Hawaiian homestead single-family residential lots developed in 1993. Two parcels, one (1) north and one (1) south of the subdivision were purchased by the DHHL from Wailuku Agribusiness Company, Inc. in 1997. The southern parcel is identified as Phase II and the northern parcel is identified as Phase III. Approximately 110 single-family residential lots are under construction within Phase II. Phase III is contemplated for future development of 80 single-family lots.

The project site is located near the northern corner of Paukukalo Park. The site presently contains the 25 stall paved parking lot and a former DHHL site office. Land designated as TMK 3-3-5:86, 87 is owned by DHHL.

B. *PROPOSED IMPROVEMENTS*

The proposed preschool facility has a design enrollment of 80 students. See Figure 2, Figure 3, Figure 4, and Figure 5. A total of four (4) classrooms in two (2) separate structures are proposed. The preschool facility would also include a separate multi-purpose building which includes a kitchen. A children's play area is planned within the central portion of the preschool facility with the entire facility being secured by fencing.

The former DHHL office and the 25 stall parking lot are proposed to be demolished. A new DHHL on-site office of approximately 1,200 square feet is proposed to be constructed adjacent to the community center. Along with the eleven (11) remaining parking stalls, sixty (60) new paved parking stalls are proposed to be constructed to serve the preschool, DHHL office, community center and park. A new driveway connection would link the parking lot to Kaumualii Street.



Source: Otomo Engineering, Inc.

Figure 2

Paukukalo Pre-School and Related Improvements

Site Plan

NOT TO SCALE

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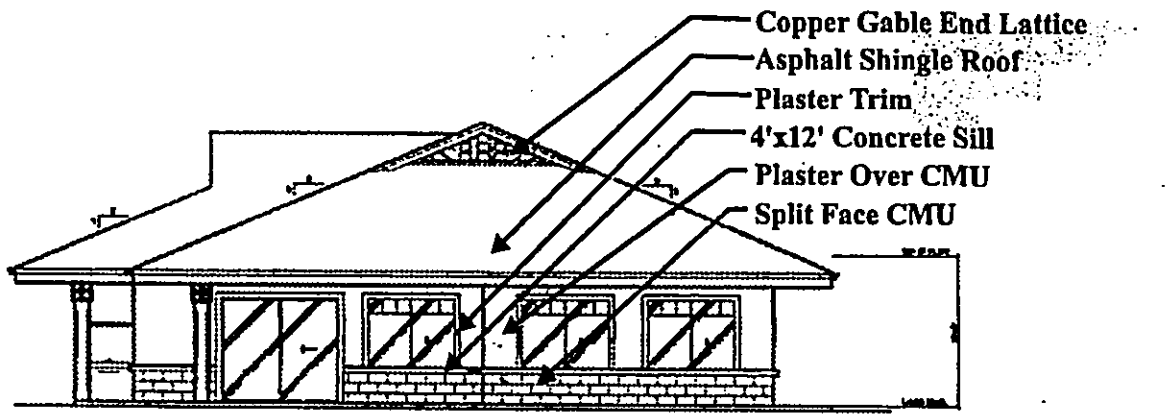
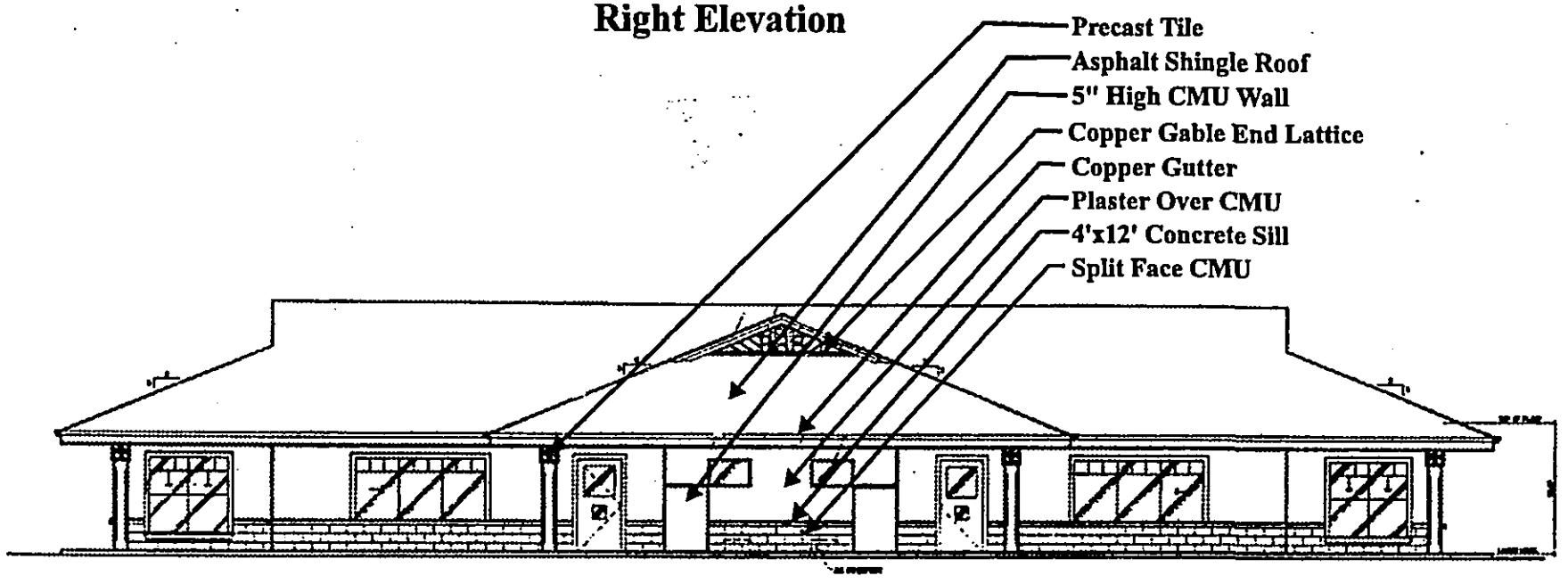
Prepared for: Kamehameha Schools



Right Elevation



Front Elevation

Source: Bayless Architects

Figure 3

Paukukalo Pre-School and Related Improvements

Classroom Building Elevations

NOT TO SCALE

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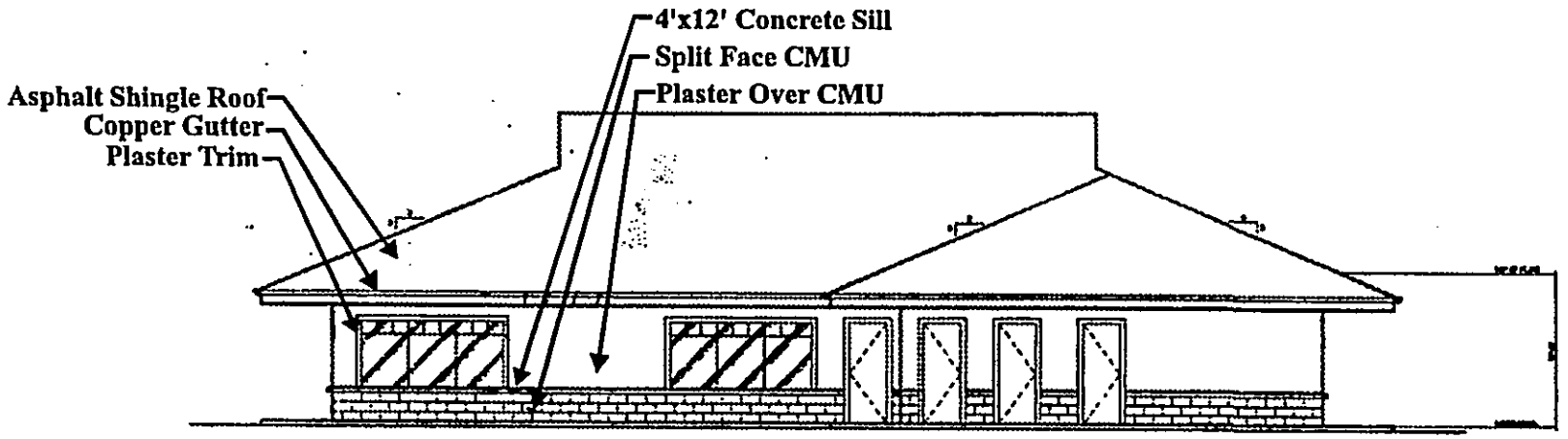
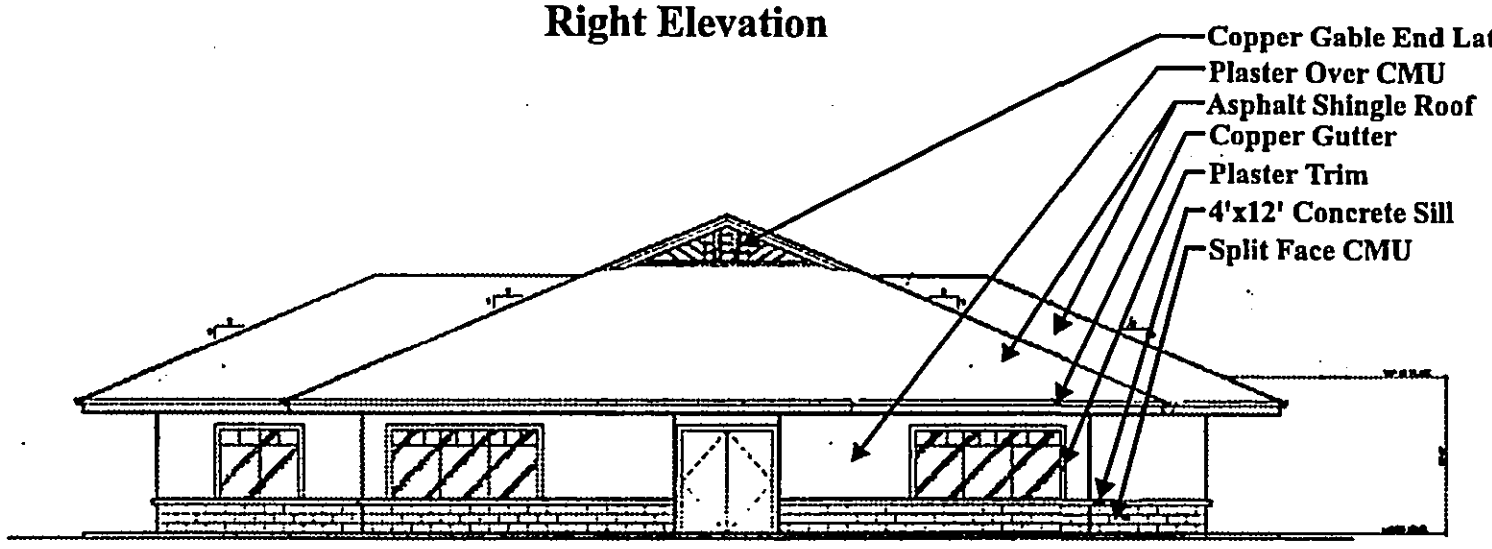
Prepared for: Kamehameha Schools



Right Elevation



Front Elevation

Source: Bayless Architects

Figure 4

Paukukalo Pre-School and Related Improvements

Multi-Purpose Building Elevations

NOT TO SCALE

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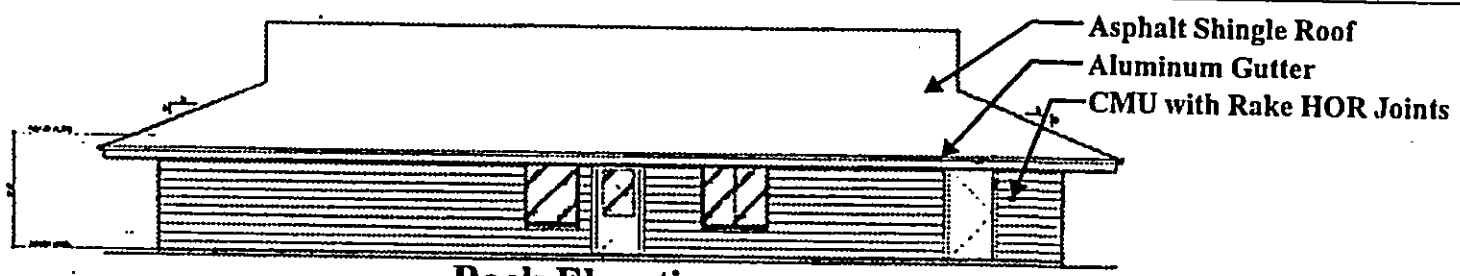
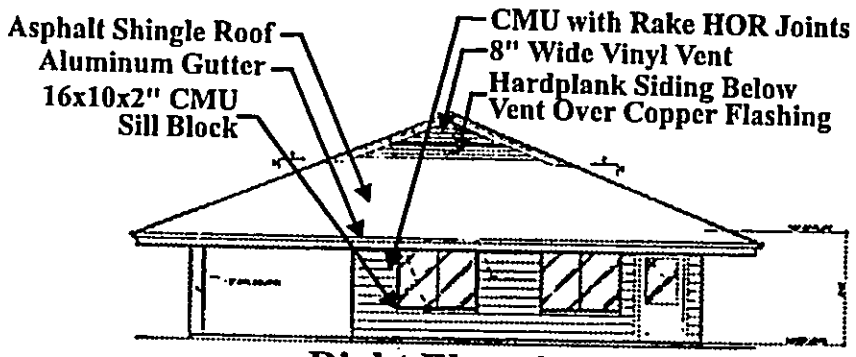
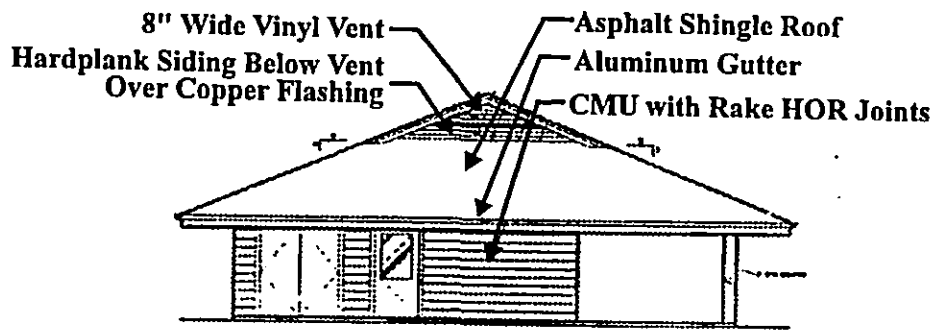
Prepared for: Kamehameha Schools



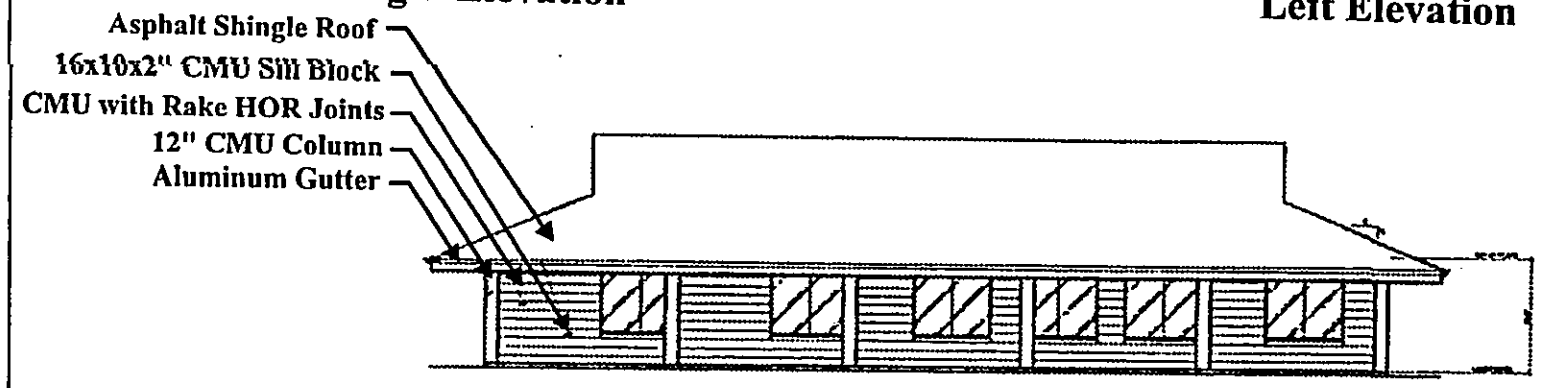
Back Elevation



Right Elevation



Left Elevation



Front Elevation

Source: Bayless Architects

Figure 5

Paukukalo Pre-School and Related Improvements

DHHL Office Elevations

NOT TO SCALE

Prepared for: Kamehameha Schools

MUNEKIYO, ARAKAWA & HIRAGA, INC.

All structures within the development are proposed to be one-story not exceeding 25 feet in height.

Since State lands are being utilized for the proposed action, an Environmental Assessment has been prepared as required by Chapter 343, Hawaii Revised Statutes. Development of the project is expected to commence in the first quarter of 2001 with completion by August 2001. Estimated construction costs are $1.5 million.

Chapter II

Description of Existing Environment

II. DESCRIPTION OF EXISTING ENVIRONMENT

A. PHYSICAL SETTING

1. Surrounding Land Use

The project site is located within the existing Paukukalo Park, a neighborhood park which primarily services the adjacent DHHL Paukukalo Subdivision. Also located within the parcel is the Paukukalo Community Center which includes an open air gymnasium.

The subject property is located in the Wailuku-Kahului region. To the north and west are the Waiehu Terrace and Waiehu Heights residential developments. To the south of the project site are the Halekii and Pihana Heiau. Further south are Iao Stream, Wailuku Industrial Park and the Iao Parkside townhome development. To the east of the project site across Waiehu Beach Road are single-family residential dwellings and the Pacific Ocean.

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***

The project site ranges from 48 to 60 feet above sea level and slopes approximately 5 percent lower from the west to the east.

Underlying the proposed site are soils of the Pulehu-Ewa-Jaucas association. See Figure 6. This soil association is characteristically deep and well-drained and located on alluvial fans and basins.

The specific soil type at the project site is Jaucas sand, 0 to 15 percent slopes (JaC). See Figure 7. In a representative profile, the soil is single grain, pale brown to very pale brown, sandy, and more than 60 inches deep. Permeability is rapid, and runoff is very slow to slow. The hazard of water erosion is slight, but wind erosion is a severe hazard where vegetation has been removed.

4. ***Flood Hazard***

The proposed project is designated by the Flood Insurance Rate Map as Zone C, an area of minimal flooding. See Figure 8. The site is also located beyond coastal inundation areas.

5. ***Flora and Fauna***

The project is within the existing Paukukalo Park. The park is grassed and maintained on a regular basis.

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

The project site has been grubbed, graded, and landscaped in the previous development of Paukukalo Park. Thus, there are no surface archaeological features present at the site.

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

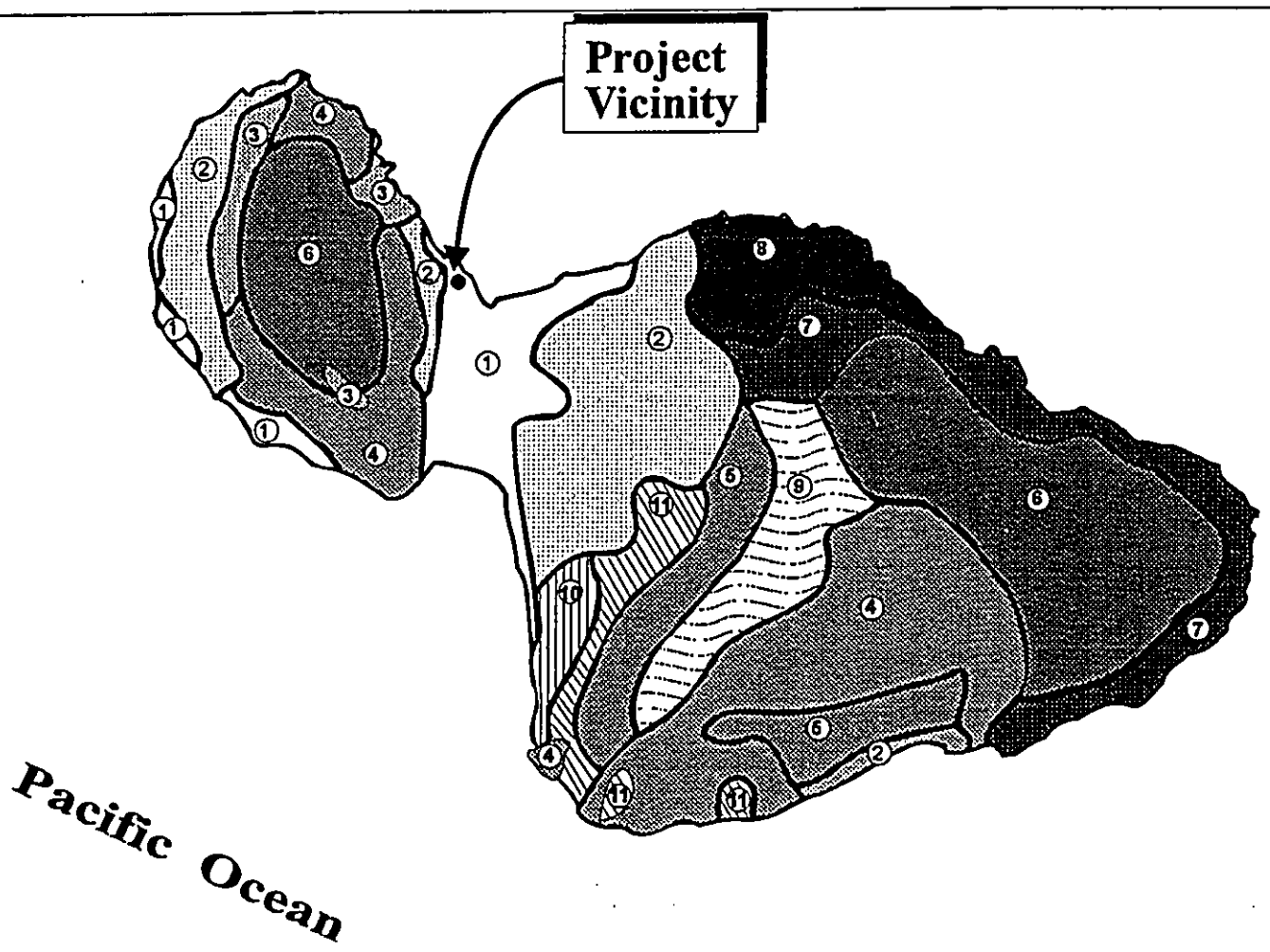


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Figure 6

Paukukalo Pre-School and Related Improvements

Soil Association Map

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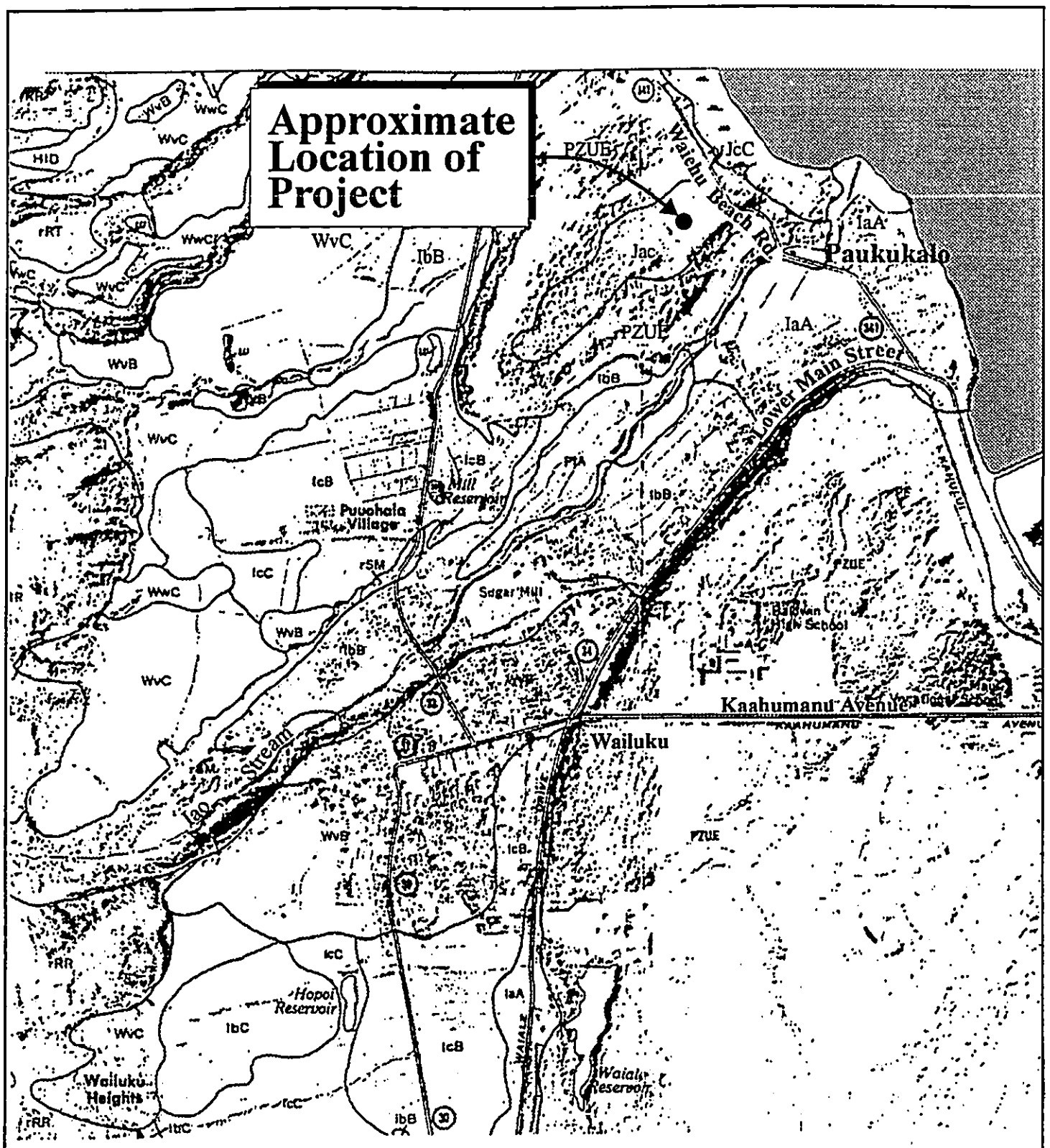
Prepared for: Kamehameha Schools



Source: Soil Conservation Service

Figure 7

Paukukalo Pre-School and Related Improvements

Soil Classification Map

1000
0
500
2000

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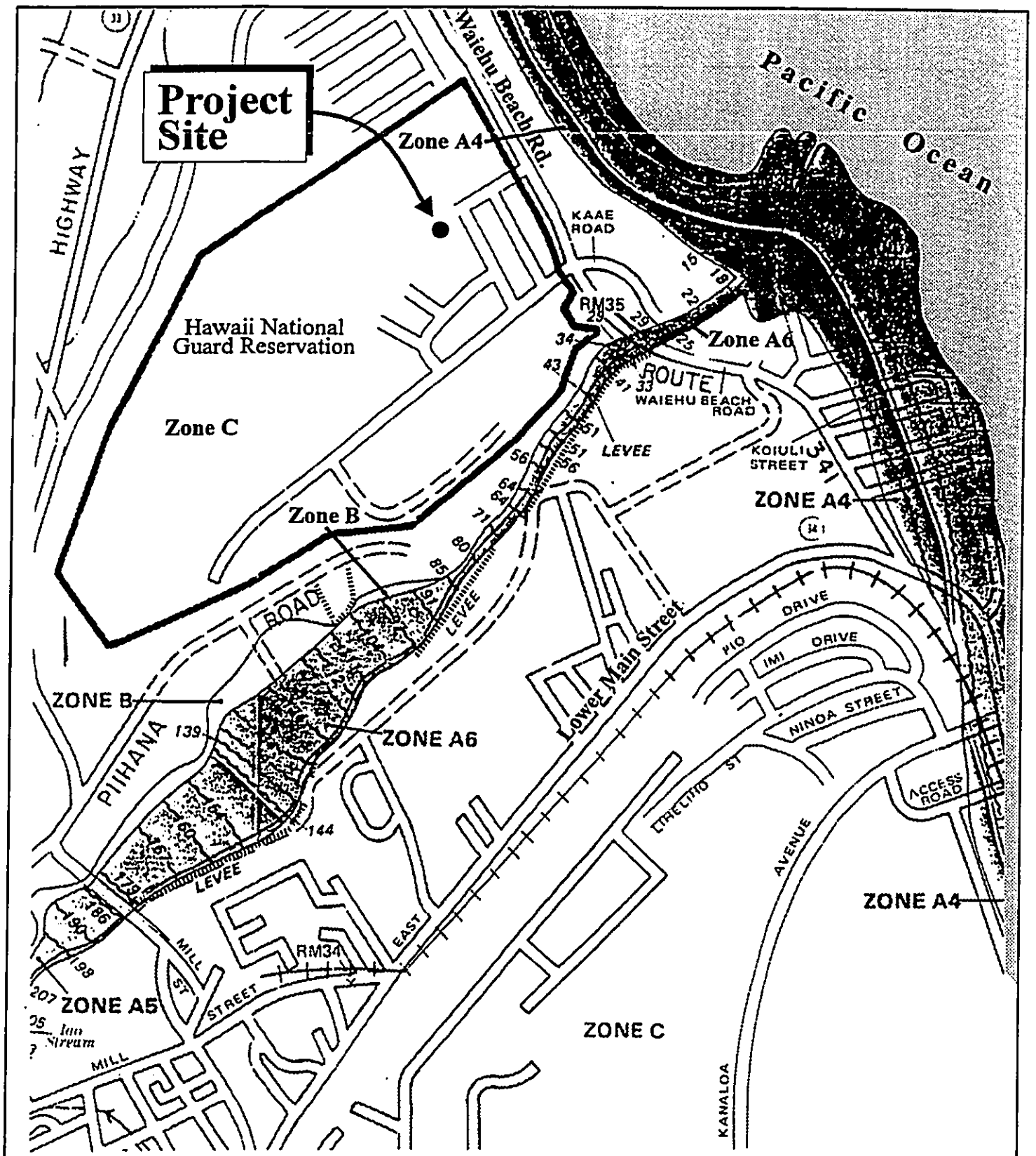


Source: Federal Emergency Management Agency

Figure 8

Paukukalo Pre-School and Related Improvements

Flood Insurance Rate Map

0 250 500 1000

MUNEKIYO, ARAKAWA & HIRAGA, INC.

Prepared for: Kamehameha Schools

7. *Air Quality*

There are no point sources of airborne emissions within close proximity of the project site. 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. There may be intermittent noise generated from activities at the gymnasium, community center and single-family residences.

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 exhibited relatively strong growth between the years of 1980 to 1990. The 1990 population of 100,504 reflects a 41.8 percent increase over the 1980 population of 70,847. The year 2000 population is estimated at 124,562, which is a 23.9 percent increase over 1990. The resident population for the year 2010 is projected to be 145,872 (Community Resources, Inc., 1994).

The Wailuku-Kahului region reflects similar growth characteristics.

The estimated 1990 population of Wailuku-Kahului was 32,816. The region's population shows a 23.3 percent increase to 40,452 in the year 2000. By the year 2010, population is anticipated to increase to 48,132 (Community Resources, Inc., 1994).

2. *Economy*

Paukukalo is located within the Wailuku region which 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, cultivated by Hawaiian Commercial & Sugar (HC&S), 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 on Mahalani Street. 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 Medical Center, the only major medical facility on the island, services the Wailuku-Kahului region. Acute, general and emergency care services are provided by the 194-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. ***Recreational 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 located within Paukukalo Park. It is also in close proximity to Waiehu Beach Park, Waihee Beach Park, Waiehu Golf Course, 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

Waiehu Beach Road is a two-lane State roadway which links the Waihee and Waiehu areas with the Wailuku industrial area. In the vicinity of the project, Waiehu Beach Road has two (2) 12-foot travel lanes, a center 10-foot, two-way turn lane and paved shoulders.

Kuhio Place is the primary collector road within the Paukukalo Subdivision. At the unsignalized cross-intersection with Waiehu Beach Road and Kaae Road, separate left-turn lanes are provided on Waiehu Beach Road. The Kuhio Place approach to the Waiehu Beach Road has sufficient width to allow two (2) separate queues for the right-turn movements and the left-turn/through movements. The Kaae Road approach, which is off-set from the Kuhio Place approach, also has sufficient width to allow right-turn movements to pass by waiting, left-turn/through movements.

Kealii Drive is a local two-lane road which also serves as a secondary access to the Paukukalo Subdivision. At the unsignalized T-intersection of Waiehu Beach Road and Kealii

Drive, a separate turn lane is designated for the northbound left turns and a two-way center turn lane is striped on the north side of the intersection.

Kaumualii Street is a two-lane local road which provides access to Paukukalo Park and residential uses. Kaumualii Street links to Waiehu Beach Road via Kuhio Place and Kealii Drive.

Paukukalo Park has two (2) designated bus stops, one on Kaumualii Street and the other on Kawananakoa Street. School buses for Waihee (Elementary) School, Iao (Middle) School and Baldwin High School, as well as Maui Economic Opportunity (MEO) buses utilize the bus stops.

2. ***Water System***

As of January 1, 2000, the rolling average groundwater withdrawals from the Iao Aquifer were 18.501 million gallons per day (mgd). These withdrawals are within the limits of the regulatory 20 mgd sustainable yield of this aquifer.

In addition, two (2) wells at North Waihee, pumping at a combined rate of 1.5 mgd, were brought on-line by the County of Maui Department of Water Supply, in July 1997. These wells draw water from the heretofore undeveloped North Waihee Aquifer and pumps it into the Central Maui system at Waihee Village.

In addition, two (2) new wells in the Waihee Aquifer, each with a pumping capacity of approximately 1.0 mgd, will provide additional sources to supplement water provided by the Iao Aquifer.

3. ***Wastewater***

The Paukukalo area is served by the County wastewater collection system. An 8-inch gravity interceptor is located on nearby Kuhio Place which extends to Waiehu Beach Road. The main collection route runs along a "spine" following the coast to the Kahului Wastewater Treatment Facility.

The Kahului Wastewater Treatment Facility was constructed in 1973 to serve as a regional wastewater treatment plant for Kahului and nearby areas, including Wailuku and Spreckelsville. The plant provides secondary treatment of sewage and features an activated sludge biological treatment process, secondary clarification and filtration. The final effluent is disposed of by four (4) gravity injection wells. The plant has a rated capacity of 7.9 million gallons per day.

4. ***Drainage***

Runoff from the project site presently sheet flows into Paukukalo Park. The park is a low-lying area with a grated catch basin located at the low point at the northwestern corner of the park. Runoff is intercepted from this area and conveyed across Waiehu Beach Road into the low area near the ocean. It is estimated that the existing 50-year storm runoff from the project site is 6.3 cubic feet per second (cfs.).

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

Electrical and telephone services are provided by Maui Electric Company and Verizon Hawaii, respectively.

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 the middle of the Paukukalo Hawaiian Home Lands residential development. Abutting the development to the north and west are the residential developments of Waiehu Terrace and Waiehu Heights. Further north near the coast is the Department of Hawaiian Home Lands Waiehu Kou residential development. To the south of the development beyond Iao Stream are the Wailuku and Kahului urban areas. East of Waiehu Beach Road are scattered single-family residences and the Pacific Ocean.

The development of a preschool and DHHL site office is consistent and complementary 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. Thus, the project should not result in any adverse impact to these components of the natural environment.

4. ***Archaeological Resources***

The project site has already been grubbed, graded and grassed with the development of Paukukalo Park and community center. Previous "no effect" letters were issued by the State Historic Preservation Division for the Paukukalo Community Center and playcourt. With regard to the subject project, the State Historic Preservation Division noted that it is unlikely that significant historic sites are present and did not recommend that an archaeological inventory survey be conducted. See Appendix A. However, in the event historic or archaeological materials are encountered during construction of the project, work will be halted in the area of the find and the SHPD will be notified to determine appropriate mitigation measures which should be implemented.

5. ***Air Quality***

Air quality impacts attributed to the project will include dust generated by short-term, construction-related activities. Site work such as filling and grading and utilities and parking lot construction, for example, will generate airborne particulates. Dust control measures, such as regular watering and sprinkling, will be implemented as needed to minimize wind-blown emissions.

The project will not generate a significant amount of traffic since an estimated 20 to 30 children are anticipated to come from families residing in the Paukukalo DHHL development. Thus, the day care facility is within convenient walking distance for many of the children and parents. Project-related emissions are not expected to adversely impact local and regional ambient air quality conditions.

6. *Noise*

As with air quality, ambient noise conditions will be impacted by construction activities. Construction equipment and machinery are anticipated to be the dominant source of noise during the development of the project. To mitigate the effects of construction noise upon surrounding uses, construction activities will be limited to daylight working hours.

On a long-term basis, the proposed project will not generate adverse noise conditions.

7. *Visual Resources*

The project will be fully landscaped to create a site visually and aesthetically integrated with Paukukalo Park and the surrounding residential neighborhood. The facilities are one story which are consistent with the low-rise nature of the neighborhood.

B. *IMPACTS TO COMMUNITY SETTING*

1. *Population and Local Economy*

On a short-term basis, the project will support construction and construction-related employment. Over the long term, the project will provide limited support to the service sector for project operations and maintenance. Direct on-site employment generated by the project will likely be limited to the day care facility staff of four (4) teachers and four (4) aides as well as three (3) staff at the DHHL site office.

2. *Police, Fire and Medical Services*

Police, fire and medical services are not expected to be adversely impacted by the proposed project. The project will not extend

existing service area limits for emergency services.

3. *Recreational and Social Services*

The proposed multi-purpose facility provides an additional amenity for the residents of the subdivision. It complements the existing community center located within Paukukalo Park. The proposed facility will not adversely affect the functional aspect of the park.

The proposed project will serve preschool age children of Hawaiian descent primarily in the Paukukalo, Waiehu and Waihee areas. Tuition is expected to be approximately $555 per year. In addition to being an affordable preschool alternative, the facility provides three (3) to four (4) year-olds invaluable skills in academic education as well as socialization.

4. *Solid Waste*

The proposed action will provide a new facility for an operation currently conducted at the Waihee Elementary School. In the long term, the new preschool facility will not have an adverse impact upon the County's solid waste disposal facilities. Regularly scheduled refuse collection will be provided by a private vendor.

C. *IMPACTS TO INFRASTRUCTURE*

1. *Roadways*

A traffic impact analysis report was prepared for the project. See Appendix B. Manual traffic count data were collected and field observations were conducted on October 3 to 4, 2000. The morning peak hour of traffic occurred between 6:45 to 7:45 a.m. This time period coincides with the starting time of 7:30 a.m. of the proposed preschool. The early afternoon hour of 2:00 to 3:00 p.m.

was selected for analysis as the proposed project traffic would be expected to peak at the preschool's ending time at 2:00 p.m.

The technical analysis of traffic conditions has been conducted for unsignalized intersections. Level of Service (LOS) is a qualitative measure used to describe the condition of traffic flow, ranging from free flow conditions at LOS A to congested conditions at LOS F.

The construction of the preschool and the DHHL office building is expected to be completed and occupied by August 2001. Thus, the traffic study calculated future traffic volumes with the project-generated traffic in the year 2001.

The traffic study includes findings and recommendations to accommodate existing traffic volumes and future traffic volumes with the project-generated traffic. The results of the unsignalized intersection analysis are summarized in Table 1.

Table 1

UNSIGNALIZED INTERSECTION ANALYSIS RESULTS

Intersection	Existing Conditions				Future Conditions Without Project				Future Conditions With Project			
	AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
	Seconds	LOS	Seconds	LOS	Seconds	LOS	Seconds	LOS	Seconds	LOS	Seconds	LOS
Waiehu Beach Road, Kuhio Place and Kaae Road												
Northbound Left Turn	6.3	B	3.9	A	6.7	B	4.0	A	6.9	B	4.2	A
Southbound Left Turn	3.0	A	3.7	A	3.1	A	3.9	A	3.1	A	3.9	A
Kuhio Place												
Left Turn/ Through Movement	20.3	D	15.5	C	22.5	D	16.8	C	24.4	D	18.3	C
Right Turn Movement	10.2	C	4.9	A	11.0	C	5.1	B	11.7	C	5.2	B
Kaae Road												
Left Turn/ Through Movement	36.6	E	18.3	C	42.4	E	20.1	D	47.5	F	21.5	D
Right Turn Movement	3.8	A	4.8	A	3.9	A	4.9	A	4.0	A	5.0	A
Overall Intersection	1.9	A	0.9	A	2.0	A	0.9	A	2.2	A	1.1	A
Waiehu Beach Road and Kealii Place												
Northbound Left Turn	5.5	B	3.5	A	5.8	B	3.6	A	6.1	B	3.7	A
Kealii Place Approach	12.3	C	9.7	B	13.5	C	10.4	C	14.7	C	12.0	C
Overall Intersection	0.3	A	0.2	A	0.3	A	0.2	A	0.6	A	0.6	A

a. ***Existing Conditions***

The overall traffic conditions at the intersections of Waiehu Beach Road/Kuhio Place/Kaae Road and Waiehu Beach Road/Kealii Drive are at LOS A. During the morning peak hour of traffic, the Kuhio Place left-turn/through movement is at LOS D and the Kaae Road left-turn/through movement operates at LOS E. The other movements at the two (2) study intersections are at LOS C or better during the morning and early afternoon peak hours of traffic.

b. ***Future Base Year 2001 Traffic Conditions Without Project***

The LOS conditions during the morning peak hour of traffic at the two (2) study intersections would remain the same as the existing conditions. Slightly longer delays (of less than two seconds) during the early afternoon peak hour of traffic would change LOS conditions at the intersection of Waiehu Beach Road/Kuhio Place/Kaae Road. The Kuhio Place right-turn movement would decrease from LOS A to LOS B while the Kaae Road left-turn/through movement would be lowered from LOS C to LOS D. For the intersection of Waiehu Beach Road and Kealii Drive, the Kealii Drive approach would drop from LOS B to LOS C. The other movements at this intersection would remain unchanged from the existing LOS during the early afternoon peak hour of traffic.

c. ***Future Year 2001 Traffic Conditions With Project-Generated Traffic***

Except for the Kaae Road left-turn/through movement, which would decrease from LOS E to LOS F during the morning peak hour of traffic, the future LOS conditions with the project are expected to remain the same as the future LOS

without the project.

Recommendations: There are no roadway improvements recommended at the study intersections for the project traffic. The analytical comparison of the future traffic conditions indicates there would be slightly longer delays with the project but, in general, the future LOS conditions with or without the project would be similar. Although there is existing queuing along Waiehu Beach Road in the southbound direction during the morning peak period, the southbound traffic flow is metered by the traffic signal at the Waiehu Beach Road/Eha Street intersection. The Kaae Road left-turn/through movements would incur the longest delays during the morning peak hour of traffic, but the traffic volumes are relatively low on this approach in comparison with the other movements at the Waiehu Beach Road/Kuhio Place/Kaae Road intersection.

2. ***Water***

Eight-inch waterlines extend along Kaumualii Street and Kealii Drive in close proximity to the project site. The project is not anticipated to have a significant impact upon the water source, storage and transmission system.

3. ***Wastewater***

An eight-inch sewerline extends near the project site on Kealii Drive. This incremental addition of effluent will not adversely affect existing collection, transmission and treatment capacities.

As required, a project sewer impact study will be prepared in coordination with the Department of Public Works and Waste

Management.

4. ***Drainage***

After the development of the proposed project, it is estimated that the 50-year storm runoff will be 7.7 cfs, a net increase of 1.4 cfs.

An onsite grated catch basin will collect the additional runoff generated from the project site and divert it to an onsite subsurface drainage system. There will be no additional runoff sheet flowing from the project site into Paukukalo Park. This is in accordance with Chapter 4, "Rules for the Design of Storm Drainage Facilities in the County of Maui".

Based on the Hawaii Environmental Simulation Laboratory (HESL) equations to estimate soil loss during the construction period, and complemented by the following erosion control plan, the soil loss during the construction period is well within the tolerable limits.

Based on the County Erosion Control Standards and Guidelines, the allowable erosion rate is 6,250 tons/acre/year for a 6-month grading period and the maximum tolerable severity rating number (H) is 50,000.

The following measures will be taken to control erosion during the site development period (estimated 6 months):

1. Minimize time of construction.
2. Retain existing ground cover until latest date to complete construction.
3. Early construction of drainage control features.
4. Use temporary area sprinklers in non-active construction areas when ground cover is removed.

5. Station water truck on site during construction period to provide for immediate sprinkling, as needed, in active construction zones (weekends and holidays included).
6. Use temporary berms and cut-off ditches, where needed, for control of erosion.
7. Graded areas shall be thoroughly watered after construction activity has ceased for the day and on weekends.
8. All cut and fill slopes shall be sodded or planted immediately after grading work has been completed.

The development project is provided with adequate facilities for drainage control and storm water disposal. This, together with ultimate ground cover, shall preclude any appreciable onsite erosion. *See Appendix C.*

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

Electrical power requirements associated with the proposed project will be supplied by Maui Electric Company, Ltd. Additional telephone system requirements generated by the project will be met by Verizon Hawaii.

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 districts are classified "Urban", "Rural", "Agricultural", and "Conservation". The project site is within the "Urban" District. See Figure 9.

Although the Department of Hawaiian Home Lands is exempt from the State Land Use Law, the proposed action involves the use of the property for a multi-purpose facility, day care center and office which are compatible with the "Urban" classification.

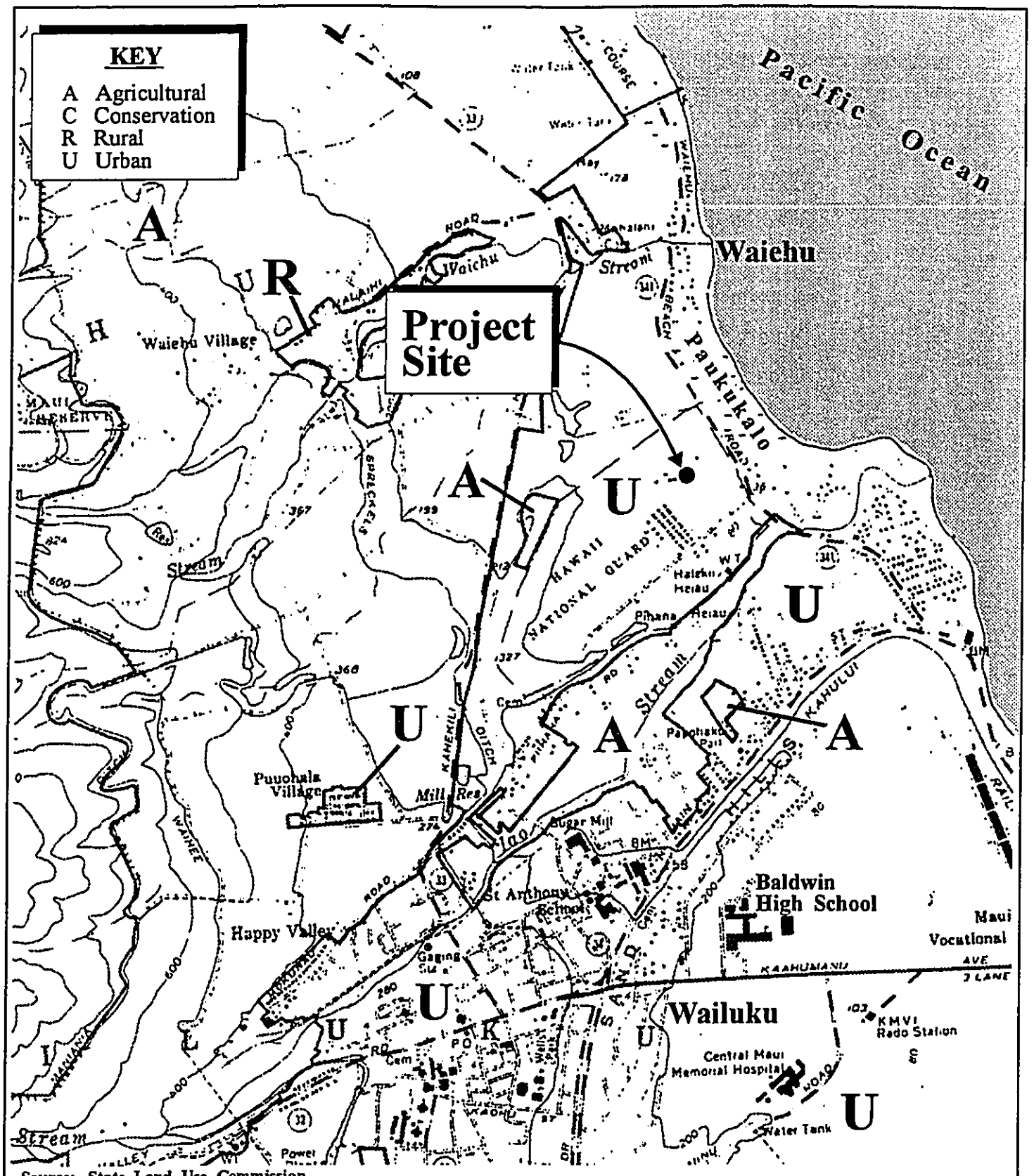
B. MAUI COUNTY GENERAL PLAN

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

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

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

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



Source: State Land Use Commission

Figure 9

Paukukalo Pre-School and Related Improvements

State Land Use Designations

0 500 1000 2000

MUNEKIYO, ARAKAWA & HIRAGA, INC.

Prepared for: Kamehameha Schools

Objective: To provide Maui residents with continually improving quality educational opportunities which can help them better understand themselves and their surroundings and help them realize their ambitions.

Policy: Seek continual improvement in the quality of education at all levels for all residents.

C. *WAILUKU-KAHULUI COMMUNITY PLAN*

The subject parcel is located in the Wailuku-Kahului Community Plan region which is one 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.

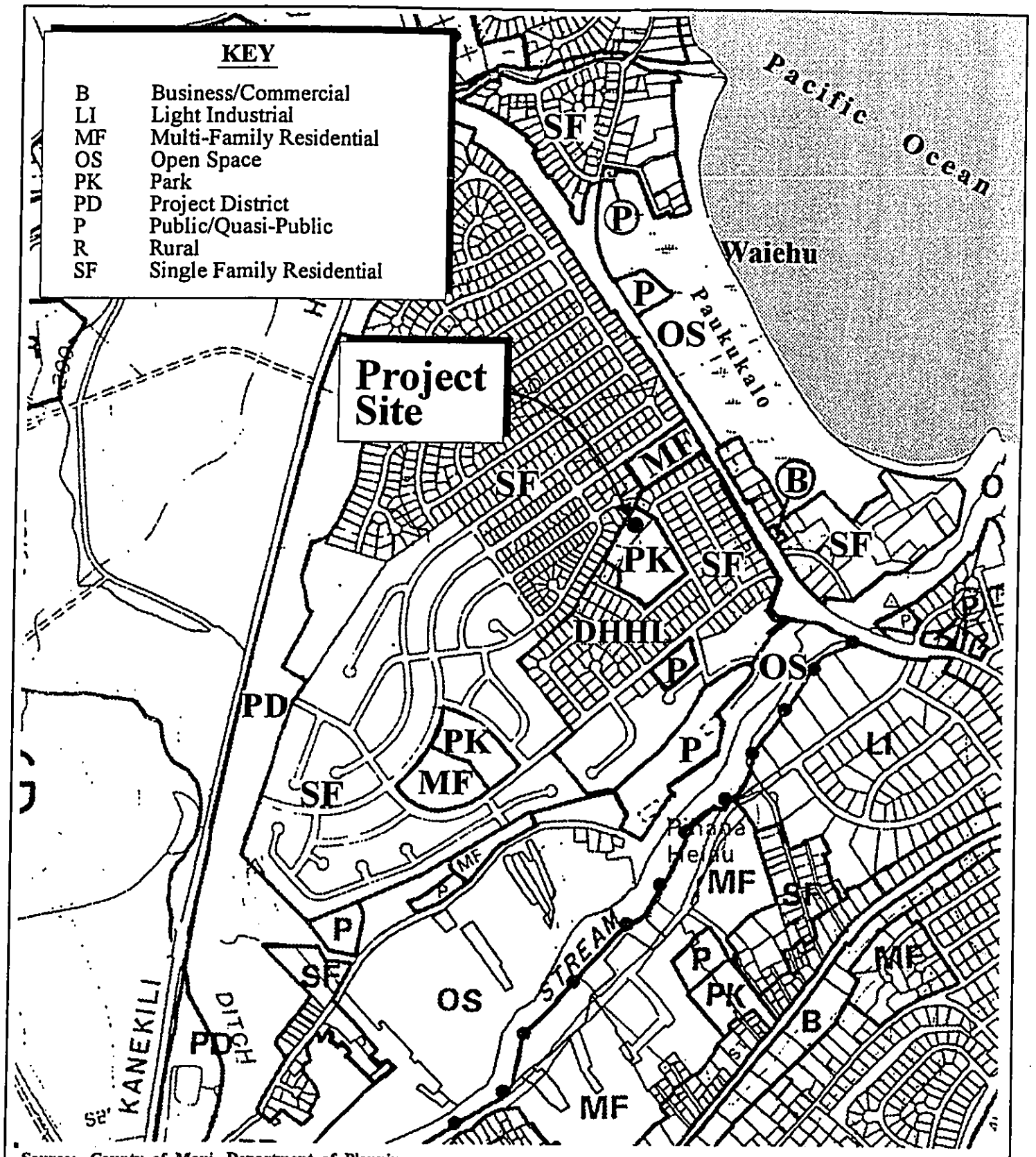
The proposed project site is designated as "Park" by the Wailuku-Kahului Community Plan. See Figure 10. Development on DHHL property is exempt from community plan provisions but the project does support the plan.

The proposed action supports the education aspects of the community plan by providing a preschool facility for native Hawaiian beneficiaries. This expands educational opportunities within the County.

The proposed action also provides a significant amenity for the Paukukalo neighborhood. This aids in preserving the long-term viability of the community.

D. *ZONING*

The subject property's underlying zoning is R-2 Residential District. A preschool is considered a County Special Use within the R-2 District.



Source: County of Maui, Department of Planning

Figure 10

Paukukalo Pre-School and Related Improvements

Wailuku-Kahului Community Plan

0 250 500 1000

MUNEKIYO, ARAKAWA & HIRAGA, INC.

Prepared for: Kamehameha Schools

Although a County Special Use Permit would normally be applicable where there are more than 12 children on lot sizes of 10,000 square feet or more, DHHL is not subject to County zoning rules and regulations.

E. *COASTAL ZONE MANAGEMENT OBJECTIVES AND POLICIES*

Pursuant to Chapter 205A, Hawaii Revised Statutes, all lands within the State are considered within the coastal zone. This section addresses the project's relationship to applicable coastal zone management considerations as set forth in Chapter 205A. It is noted that the project site is outside of the County Special Management Area.

Recreational Resources

Objective: Provide coastal recreational opportunities accessible to the public.

Policies:

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

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

   (i) Protecting coastal resources uniquely suited for recreational activities that cannot be provided in other areas;

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

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

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

(v) Ensuring public recreational use of county, state, and federally owned or controlled shoreline lands and waters having recreational value consistent with public safety standards and conservation of natural resources;

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

(vii) Developing new shoreline recreational opportunities, where appropriate, such as artificial lagoons, artificial beaches, and artificial reefs for surfing and fishing; and

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

Response: The proposed project is not located on the shoreline and is not anticipated to affect existing coastal or inland recreational resources.

Historic Resources

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

Policies:

a. Identify and analyze significant archeological resources;

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

c. Support state goals for protection, restoration, interpretation, and

display of historic resources.

Response: The project site has been previously disturbed in connection with the development of the park. However, should any cultural materials be uncovered during construction, the applicant intends to notify and work closely with the State Historic Preservation Division on implementing applicable mitigation measures.

Scenic and Open Space Resources

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

Policies:

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

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

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

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

Response: The proposed project will not adversely impact scenic or open space resources. The proposed project will not involve significant alteration to the existing topographic character of the site and will not significantly affect public views from the shoreline.

Coastal Ecosystems

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

Policies:

a. Improve the technical basis for natural resource management;

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

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

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

Response: The proposed improvements are not expected to adversely impact coastal ecosystems. The project will comply with applicable County drainage provisions. Erosion control measures will be implemented during construction to ensure that coastal ecosystems are not impacted.

Economic Uses

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

Policies:

a. Concentrate coastal dependent development in appropriate areas;

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

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

presently designated areas when:

(i) Use of presently designated locations is not feasible;

(ii) Adverse environmental effects are minimized; and

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

Response: The project would have a beneficial short-term impact on the economy during construction. In the long term, the project provides employment relating to the operation of the pre-school. The proposed action is not inconsistent with the objectives and policies for economic use.

Coastal Hazards

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

Policies

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

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

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

d. Prevent coastal flooding from inland projects; and

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

Response: Erosion control measures will be incorporated during the construction period to minimize soil loss and erosion hazards. No significant adverse drainage impacts to downstream properties will result

from the proposed project.

Managing Development

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

Policies:

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

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

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

Response:

Early consultation and public review are required as part of the Environmental Assessment process. Applicable State and County requirements will be adhered to in the design and construction of the proposed project.

Public participation

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

Policies:

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

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

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

Response: Comments are being solicited as part of the Environmental Assessment process. The proposed project is not contrary to the objective of public awareness, education and participation.

Beach protection

Objective: Protect beaches for public use and recreation.

Policies:

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

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

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

Response: The project site is not located adjacent to any beach or shoreline. Thus, there should be no adverse impact to this component of the environment.

Marine Resources

Objective: Implement the State's ocean resources management plan.

Policies:

a. Exercise an overall conservation ethic, and practice stewardship in

the protection, use, and development of marine and coastal resources;

b. Assure that the use and development of marine and coastal resources are ecologically and environmentally sound and economically beneficial;

c. Coordinate the management of marine and coastal resources and activities management to improve effectiveness and efficiency;

d. Assert and articulate the interests of the State as a partner with federal agencies in the sound management of ocean resources within the United States exclusive economic zone;

e. Promote research, study, and understanding of ocean processes, marine life, and other ocean resources in order to acquire and inventory information necessary to understand how ocean development activities relate to and impact upon ocean and coastal resources; and

f. Encourage research and development of new, innovative technologies for exploring, using, or protecting marine and coastal resources.

Response: The proposed project is not anticipated to have adverse effects upon marine and coastal resources in the vicinity.

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 use of the subject property.

A. ALTERNATIVE A

Alternative A represents the proposed action. This alternative provides a caring and professional environment for the education of pre-schoolers of native Hawaiian beneficiaries. This resource will aid in the development and socialization of children which lays the educational foundation for future success. In addition, the preschool is conveniently located within the Paukukalo neighborhood so that many beneficiaries may walk to drop off and pick up their children.

B. ALTERNATIVE B

The no action alternative would result in a net loss of classroom space for preschoolers since the Kamehameha School facility at Waihee School will be discontinued in August 2001. This may result in increased competition for limited space at other existing preschools. It may also result in some children not being able to receive the benefits of a preschool education.

Chapter VII

Irreversible and Irretrievable Commitment of Resources

VII. IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

The proposed project would involve the commitment of fuel, land, labor and material resources. Portions of the existing Paukukalo Park would be occupied by the project. Although green space and parking would be utilized, the project would provide amenities for the community in the form of a pre-school, multi-purpose facility, DHHL site office and replacement parking.

Chapter VIII

Findings and Conclusions

VIII. FINDINGS AND CONCLUSIONS

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

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

   The project site has already been altered through development of the Paukukalo Park and is within an area of urban development. There are no known rare, endangered or threatened species of flora, fauna, or avifauna within the project site.

   From an archaeological standpoint, the ground surface has already been altered by previous activities. However, if archaeological or cultural materials are found during construction, work in the vicinity will cease and the State Historic Preservation Division will be notified to ensure compliance with Chapter 6E, HRS.

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

   The project site is located within a landscaped open space and parking area. The commitment of land resources would not curtail 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 or Guidelines as Expressed in Chapter 344, Hawaii Revised Statutes***

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

Foster lifestyles compatible with the environment; preserve the variety of lifestyles traditional to Hawaii through the design and maintenance of neighborhoods which reflect the culture and mores of the community.

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

The proposed project provides a direct economic benefit during the construction phase of the project. In the long term, there would be support to the service sector. The project will have a beneficial effect upon the social welfare of the community.

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

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

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

The proposed project is not anticipated to have an effect upon the island's population base and should not place significant new demands on the island's public services.

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 mitigated. No substantial degradation of environmental quality resulting from the proposed project 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 larger actions which are linked to the proposed project. The proposed project is not anticipated to create any significant long-term environmental effects.

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

There are no known significant habitats or rare, endangered or threatened species of flora and fauna at the project site. The removal of existing flora and 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 and noise are minimized. The project should have no adverse effect upon water quality.

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 within or would not affect environmentally sensitive areas. The site is located in an area of minimal flooding and not subject to tsunami inundation. The underlying soils are not erosion-prone. There are no geologically hazardous lands, estuaries or coastal areas within or adjacent to the subject property.

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

The proposed structures will be one-story in height and compatible with building heights of surrounding structures. The grounds will also be fully landscaped. The proposed project will be complementary to the surrounding neighborhood and its scenic character.

13. ***The Proposed Action Would 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 substantial consumption of energy resources. In the long term, the project will create an additional demand for electricity. However, this demand is not substantive or

excessive within the context of the region's overall energy consumption.

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

Chapter IX

Agencies and Organizations Consulted Prior to the Preparation of the Draft Environmental Assessment

IX. AGENCIES AND ORGANIZATIONS CONSULTED PRIOR TO THE PREPARATION OF THE DRAFT ENVIRONMENTAL ASSESSMENT

The following agencies and organizations were consulted prior to the preparation of the Draft Environmental Assessment. Letters received and responses to substantive comments are included in this section.

1. David Blane, Director
State of Hawaii
Office of Planning
Department of Business, Economic, Development and Tourism
P.O. Box 2359
Honolulu, HI 96804

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

3. Timothy Johns, Director
State of Hawaii
Department of Land and Natural Resources
P. O. Box 621
Honolulu, HI 96809

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

5. Clayton Ishikawa, Chief
County of Maui
Department of Fire Control
200 Dairy Road
Kahului, HI 96732

6. Alice Lee, Director
County of Maui
Department of Housing and Human Concerns
200 S. High Street
Wailuku, HI 96793

7. Floyd Miyazono, Director
County of Maui
Department of Parks and Recreation
1580-C Kaahumanu Avenue
Wailuku, HI 96793

8. John Min, Director
County of Maui
Department of Planning
250 South High Street
Wailuku, HI 96793

9. Thomas Phillips, Chief
County of Maui
Police Department
55 Mahalani Street
Wailuku, HI 96793

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

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

12. Greg Kauhi
Maui Electric Company, Ltd.
P. O. Box 398
Kahului, HI 96732

13. Kalani Tassill, President
Paukukalo Community Association
P.O. Box 2424
Wailuku, HI 967932

It is noted that meetings between Kamehameha Schools and the Paukukalo Community Association were held on November 30, 1999 and December 7, 1999 to discuss project parameters.

DEPARTMENT OF
PARKS AND RECREATION
COUNTY OF MAUI

1580-C KAAHUMANU AVENUE WAILUKU, HAWAII 96793

JAMES "KIMO" APANA
Mayor

FLOYD S. MIYAZONO
Director

ELIZABETH D. MENOR
Deputy Director

(808) 270-7230
FAX (808) 270-7934

December 28, 1999

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

Dear Mr. Arakawa:

SUBJECT: PAUKUKALO PRE-SCHOOL AND RELATED IMPROVEMENTS

We have reviewed the summary for the above-referenced project and have no comments at this time. We would like further information on the design as the project progresses.

Thank you for the opportunity to review and comment. If there are further questions, please contact me or Mr. Patrick Matsui, Chief of Planning and Development, at 270-7387.

Sincerely,

FLOYD S. MIYAZONO
Director

c: Patrick Matsui, Chief of Planning and Development

BENJAMIN J. CAYETANO
GOVERNOR

JAN 0 4 2000

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

KAZU HAYASHIDA
DIRECTOR
HWY-M 2.465-99
DEPUTY DIRECTORS
BRIAN K. MINAAI
GLENN M. OKIMOTO

December 30, 1999

IN REPLY REFER TO:

MEMORANDUM

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

FROM: Paul M. Chung
State Highways

SUBJECT: PAUKUKALO PRE-SCHOOL AND RELATED IMPROVEMENTS
I.D. NO. ME 99-68

Please submit a traffic assessment for our review in identifying impacts the referenced project will have on the state highway system and recommendations to mitigate.

If you have any questions, please call me at 873-3535.

PMC:dmf

Maui Electric Company, Ltd. • [illegible] West Kamehameha Avenue • PO Box 398 • K[illegible]ului, Maui, HI 96733-6898 • (808) 871-8461

JAN 0 4 2000

January 3, 2000

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

Subject: Paukukalo Pre-School and Related Improvements
Paukukalo, Maui, Hawaii
TMK: 3-3-5: por.86, por.87

Dear Mr. Arakawa,

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

Maui Electric Company's distribution facilities are located in the vicinity of the subject project. We have no comments at this time. However, we suspect that our review of the subject project's power requirements must be obtained to complete this project. We would like to take this opportunity to bring to your attention that a design submittal and project timeframe from your consultant would be greatly appreciated.

Should you have any further questions, please contact me at (808) 871-2366.

Sincerely,

Gregorysenn Kauhi

Gregorysenn Kauhi
Distribution Engineering Supervisor

GK:gk

JAN 0 6 2000

POLICE DEPARTMENT
COUNTY OF MAUI

JAMES "KIMO" APANA
MAYOR

OUR REFERENCE

YOUR REFERENCE

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

THOMAS M. PHILLIPS
CHIEF OF POLICE

CHARLES H.P. HALL
DEPUTY CHIEF OF POLICE

January 4, 2000

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

Dear Mr. Arakawa:

SUBJECT: Paukukalo Pre-School and Related Improvements

Thank you for your letter of December 22, 1999 requesting comments on the above subject.

We have reviewed the proposed summary and have enclosed our comments and recommendations. Thank you for giving us the opportunity to comment on the proposed project.

Very truly yours,

Assistant Chief Robert Tam Ho
for: Thomas M. Phillips
Chief of Police

Enclosure

c: John E. Min, Planning Department

TO : THOMAS PHILLIPS, CHIEF OF POLICE

VIA : CHANNELS

FROM : RYAN RODRIGUES, COMMUNITY POLICE OFFICER - KAHULUI

SUBJECT : PAUKUKALO PRE-SCHOOL AND RELATED IMPROVEMENTS

Sir, this communication is in regards to the above mentioned subject matter.

I have reviewed the attached project summary related to the development of the Paukukalo Pre-School. Because this report is just an over view of what is planned for this area, I am unable to make an assessment on this project.

I am requesting that a detailed map of the project site and the adjacent roadways leading to and from the area be included. I would also like to see the suggested roadway improvements related to this project, and how these improvements would impact traffic.

My concern with this project is it's impact on traffic in this area and Waiehu Beach Road. At present Waiehu Beach Road can no longer handle any more development in this area unless improvements are made on this roadway.

Your understanding on these matters is greatly appreciated.

RYAN RODRIGUES /E#0312
01/03/99 0958 HOURS

It appears a full plan would be needed to make a proper assessment. This area has heavy traffic + advanced planning will be needed to keep traffic under control. Suggest this be returned to request complete Project Proposal.
Sgt Roy R. 0947
1-3-00

Concur,
1 01/03/00

BENJAMIN J. CAYETANO
GOVERNOR

JAN 0 6 2000

BRUCE S. ANDERSON, Ph.D., M.P.H.
DIRECTOR OF HEALTH

ALFRED M. ARENSDORF, M.D.
DISTRICT HEALTH OFFICER

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

January 4, 2000

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

Dear Mr. Arakawa:

Subject: Paukukalo Pre-School and Related Improvements
TMK: (2) 3-3-5: por. 86, por. 87

We have no comments to offer at this time; however, we would like to have the opportunity to review and comment on the completed Environmental Assessment on this project.

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

Sincerely,

HERBERT S. MATSUBAYASHI
District Environmental Health Program Chief

DEPARTMENT OF
HOUSING AND HUMAN CONCERNS
COUNTY OF MAUI

JAN 0 6 2000

JAMES "KIMO" APANA
Mayor
ALICE L. LEE
Director
PRISCILLA P. MIKELL
Deputy Director

200 SOUTH HIGH STREET • WAILUKU, HAWAII 96793 • PHONE (808) 270-7805 • FAX (808) 270-7165

December 28, 1999

Mr. Milton Arakawa, A.I.C.P.
Project Manager
Munekiyo, Arakawa & Hiraga
305 High Street, Suite 104
Wailuku, Hawaii 96793

Dear Mr. Arakawa:

Subject: Paukukalo Pre-School and
Related Improvements

We have reviewed the project summary that was attached to your December 22, 1999 letter, and wish to inform you that we fully support the development of the new pre-school and related improvements at Paukukalo.

Thank you for the opportunity to comment.

Very truly yours,

ALICE L. LEE
Director of Housing and
Human Concerns

ETO:hs

c: Housing Administrator

JAMES "KIMO" APANA
MAYOR

JAN 14 2000

CLAYTON T. ISHIKAWA
CHIEF

FRANK E. FERNANDEZ, JR.
DEPUTY CHIEF

COUNTY OF MAUI
DEPARTMENT OF FIRE CONTROL

200 DAIRY ROAD
KAHULUI, MAUI, HAWAII 96732
(808) 243-7561
FAX (808) 243-7919

January 12, 2000

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

RE: Paukukalo Pre-School and Related Improvements; TMK: 3-3-05:por. 86, por. 87

Dear Mr. Arakawa,

Thank you for the opportunity to comment on the proposal for Paukukalo Pre-School and related improvements.

The Department of Fire Control has no comment at this time, but wishes to retain the right to comment when plans and specifications are submitted for review.

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

Sincerely,

LEONARD F NIEMCZYK
Captain, Fire Prevention Bureau

JAN 2 4 2000

Kalani Tassill, President PHHCA

January 20, 2000

Department of Hawaiian Home Lands
Mr. Raynard Soon, Director
P.O. Box 1879
Honolulu, HI 96805

Aloha Mr. Soon,

We, the Paukukalo Hawaiian Homestead Community Association and the community are in favor of KSBE building the proposed Kamehameha Preschool here in our homestead. Several members of this community have raised our awareness as to the benefits of this proposal and we hope the Department of Hawaiian Homes will help to make this a reality. We appreciate Kamehameha Schools Interim Board of Trustees desire to build this preschool here in Paukukalo.

We believe strongly that education is the key to a better future for our Native Hawaiian children; henceforth, the building of this preschool is viewed as a significant benefit to the children who reside in our community.

You will agree it is important for all concerns and ideas to be explored so that all involved arrive at a plateau that is compatible and progressive. May we, therefore, share our mana'o with you before we embark on this endeavor and invite you to do the same. I feel it important to mention that some changes were to be made to the proposed site plan: namely the construction of the DHHL office. The proposed office is where the park bathrooms exist; we propose it be built on the hill next to Hale Pomaika'i, or the large hall. This matter, as well as a few others, need to be discussed. With your approval, I should like to propose the possibility of DHHL and KSBE assisting the community in the renovation of the open-air gym. If this area were enclosed, it could be used to better advantages than at present. Although these are concerns that need to be addressed, we are still in favor of the preschool being built. Any assistance you may render would be greatly appreciated. Be assured we do look forward to the building of our preschool with great anticipiation. We feel confident this will accomodate the needs of our "kamali'i" and the betterment of this homestead community. Thank you again for all of your kokua and concern. We hope to hear from you soon.

Mahalo Nui Loa,

Kalani Tassill, President PHHCA

xc: Walter Thoemmes, III, Kamehameha Schools
Susie Aki, KSBE Preshools, Maui Office
John Tomoso, DHHL Maui Commissioner
Greg Bayless, Architect
Milton Arakawa, Developer
Kamehameha Schools Interim Trustees

MUNEKIYO, ARAKAWA & HIRAGA, INC.

November 7, 2000

Kalani Tassill, President
Paukukalo Hawaiian Homestead
Community Association
P.O. Box 2424
Wailuku, Hawaii 96793

SUBJECT: Paukukalo Pre-school

Dear Mr. Tassill:

We have received your January 20, 2000 letter to Mr. Raynard Soon of the Department of Hawaiian Home Lands (DHHL) on the subject project.

On behalf of the applicant for the project, Kamehameha Schools, we would like to note that the project is moving ahead in concert with the DHHL. We appreciate your support of the project and agree that the construction of the pre-school will represent a significant benefit to the Paukukalo homestead community.

As you have suggested, the DHHL site office has been relocated next to Hale Pomaika'i. We also understand that Kamehameha Schools is in discussion with the DHHL regarding the possible renovation of the open air gymnasium. We hope that this matter will be resolved satisfactorily in the near future.

Thank you for your interest and concern. If you have any questions, please feel free to call me.

Very truly yours,

Milton Arakawa

Milton Arakawa, A.I.C.P.
Project Manager

MA:cc
cc: Allison Yue, Kamehameha Schools
Carolyn Darr, DHHL
ks:be\paukalo\phhcaltr.001

305 High Street, Suite 104 • Wailuku, Hawaii 96793 • ph: (808)244-2015 • fax: (808)244-8729 • email: mahinc@aloha.net

JAMES "KIMO" APANA
Mayor

JOHN E. MIN
Director

CLAYTON I. YOSHIDA
Deputy Director

JAN 2 4 2000

COUNTY OF MAUI
DEPARTMENT OF PLANNING

January 20, 2000

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

Dear Mr. Arakawa:

RE: Preliminary Consultation for and Environmental Assessment - Paukukalo Preschool and Related Improvements, Kamehameha Schools, Department of Hawaiian Home Lands, Tax Map Key: 3-3-005:Portion 86 and Portion 87, Paukukalo, Maui, Hawaii

The Maui Planning Department (Department) received your letter of December 22, 1999, requesting preliminary review and comments on the above subject. Kamehameha Schools is proposing to construct two separate structures with four (4) preschool classrooms. The preschool facility will include offices, a kitchen, and a multipurpose facility. A children's play area is planned within the central portion of the preschool facility with the entire facility being secured by fencing.

The Department has no comments at this time. Should you have any questions, please call Ms. Julie Higa, Staff Planner, of this office at 270-7814.

Very truly yours,

JOHN E. MIN
Planning Director

JEM:JH:cmb
c: Clayton Yoshida, AICP, Deputy Planning Director
Julie Higa, Staff Planner
Project File
General File
S:\ALL\JULIE\ENVIRONM\PAUKUKAL.SCH

JAN 2 0 2000

DEPARTMENT OF WATER SUPPLY
COUNTY OF MAUI
P.O. BOX 1109
WAILUKU, MAUI, HAWAII 96793-6109
Telephone (808) 270-7816 • Fax (808) 270-7833

1949 - 1999 Celebrating 50 Years of Service

January 14, 2000

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

SUBJECT: Paukukalo Pre-School and Related Improvements, TMK: 3-3-05: por. 086, por. 087

Dear Mr. Arakawa,

Thank you for the opportunity to provide comments in preparation of the environmental assessment (EA).

The EA should include the sources and expected potable and non-potable water usage. Based on empirical data, water demand for pre-schools average approximately 2,464 gallons per day, but varies widely.

This project is served by the Central Maui System. The major source of water for this system is the Iao Aquifer. Rolling annual average groundwater withdrawals from the Iao Aquifer as of January 1, 2000 were 18.501 MGD. The regulatory sustainable yield of this aquifer is 20 MGD. On August 13, 1997, the State Commission on Water Resource Management (CWRM) elected not to designate Iao Aquifer as a State Groundwater Management Area. However, if rolling annual average withdrawals exceed 20 mgd, CWRM will designate Iao Aquifer. Two wells in North Waihee, pumping at a combined rate of 1.5 mgd, were brought on-line in July 1997. We anticipate completion of another well to produce about 1 MGD by the first quarter of 2000. The Department is continuing to implement a plan to bring new sources on-line and to mitigate withdrawals. Nevertheless, the applicants should be made aware that the timing of this project may be affected with possible delays until new sources can be brought on-line. No guarantee of water is granted or implied as a result of these comments or the approval of the requested permits. Water availability will be reviewed at the time of application for meter or meter reservation.

Enclosed is a portion of our water system map pertaining to the project area. Domestic, fire, and irrigation calculations will be reviewed in detail during the development process. Fire system improvements may be

required during the building permit process. Actual fire demand for structures is determined by fire flow calculations performed by a certified engineer. DWS-approved fire flow calculation methods are contained in "Fire Flow" - Hawaii Insurance Bureau, 1991. The applicants should contact our engineering division early in the design process at 270-7835.

It is required by County Code that water conservation practices be incorporated into project design. As much of the water demand as possible should be delivered from non-potable sources (reclaimed or brackish). Where appropriate, the applicants should consider these measures:

Eliminate Single-Pass Cooling: Single-pass, water-cooled systems should be eliminated per Maui County Code Subsection 14.21.20. Although prohibited by code, single-pass water cooling is still manufactured into some models of air conditioners, freezers, and commercial refrigerators.

Utilize Low-Flow Fixtures and Devices: Maui County Code Subsection 16.20A.680 requires the use of low flow water fixtures and devices in faucets, showerheads, urinals, water closets and hose bibs. Water conserving washing machines, ice-makers and other units are also available.

Maintain Fixtures to Prevent Leaks: A simple, regular program of repair and maintenance can prevent the loss of hundreds or even thousands of gallons a day. Refer to the attached handout, "The Costly Drip". The applicant should establish a regular maintenance program.

Use Climate-adapted Plants: Native plants adapted to the area, conserve water and further protect the watershed from degradation due to invasive alien species. The project site is located in "Maui County Planting Plan" - Plant Zones 4 and 5. Please refer to the attached document "Saving Water in the Yard: What & How to Plant in Your Area".

Prevent Over-Watering By Automated Systems: For all common areas, provide rain-sensors on all automated irrigation controllers. Check and reset controllers at least once a month to reflect the monthly changes in evapotranspiration rates at the site. As an alternative, provide the more automated, soil-moisture sensors on controllers.

The project overlies the Iao aquifer. The Department of Water Supply strives to protect the integrity of surface water and groundwater resources by encouraging applicants to adopt best management practices (BMPs) relevant to potentially polluting activities. We list a few BMP references here. Additional information can be obtained from the State Department of Health.

"Water Quality Best Management Practices Manual For Commercial and Industrial Business", Prepared for the City of Seattle by Resource Planning Associates, June 30, 1989.

"The Megamanual - Nonpoint Source Management Manual - A Guidance Document for Municipal Officials." Massachusetts Department of Environmental Protection.

"Guidance Specifying Management Measures For Sources of Nonpoint Pollution In Coastal Waters." United States Environmental Protection Agency, Office of Water.

Should you have any questions, please call our Water Resources and Planning Division at (808) 270-7199.

Sincerely,

David Craddick
Director
emb

cc: engineering division

By Water All Things Find Life

attachments:

"The Costly Drip"
Ordinance 2108 - An ordinance amending Chapter 16.20 of the Maui County Code, pertaining to the plumbing code"
"A Checklist for Water Conservation Ideas for Cooling"
"A Checklist for Water Conservation Ideas for the Home"
"Saving Water in the Yard: What & How to Plant in Your Area"
"A Checklist for Water Conservation Ideas for Schools and Public Buildings"

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By Water All Things Find Life

FEB 0 7 2000

JAMES "KIMO" APANA
Mayor

CHARLES JENCKS
Director

DAVID C. GOODE
Deputy Director

Telephone: (808) 270-7845
Fax: (808) 270-7955

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

RON R. RISKA, P.E.
Wastewater Reclamation Division

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

BRIAN HASHIRO, P.E.
Highways Division

ANDREW M. HIROSE
Solid Waste Division

February 1, 2000

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

Dear Mr. Arakawa:

SUBJECT: EARLY CONSULTATION
PAUKUKALO PRE-SCHOOL
TMK: (2) 3-3-005:086(PORTION), 087(PORTION)

Dear Mr. Arakawa:

We have reviewed the subject proposed project and have the following comments.

1. Comments from the Wastewater Reclamation Division:

   a. The Wastewater Reclamation Division cannot insure that wastewater capacity will be available for this project.

   b. The developer shall pay assessment fees for treatment plant expansion costs and wastewater transmission line upgrades and fund any necessary off-site improvements to the collection system and wastewater pump stations.

   c. A sewer impact study must be provided to substantiate that the existing wastewater system is adequate to serve this project. Plans should show the installation of an advance riser at each lot. Wastewater calculations are required before a building permit is issued.

   d. A signed Hold Harmless Agreement is required before the Wastewater Reclamation Division will give recommendations for final subdivision approval.

4. Comments from the Engineering Division:

   a. Traffic and drainage impacts need to be assessed. No comments can be given as no reports were given.

3. Comments from the Land Use and Codes Administration:

   a. Off-street parking, loading spaces, and landscaping shall be provided per Maui County Code Chapter 19.36.

   b. Public Law 101-336, Americans with Disabilities Act – Title III, requires all places of public accommodation and commercial facilities be accessible to people with disabilities.

If you have any questions, please call David Goode at 270-7845.

Sincerely,

DAVID GOODE
Deputy Director of Public Works
and Waste Management

DG:msc/mt

S:\LUCA\CZM\pauku.wpd

MUNEKIYO, ARAKAWA & HIRAGA, INC.

November 8, 2000

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

SUBJECT: Paukukalo Pre-school

Dear Mr. Goode:

Thank you for your letter of February 1, 2000 relating to a request for early consultation comments on the subject project. On behalf of the applicant, Kamehameha Schools, we would like to provide a response.

We understand that the Wastewater Reclamation Division cannot ensure wastewater capacity at this juncture. Our intent is to comply with all applicable requirements for payment of assessments for treatment plant expansion, transmission line upgrades and off-site improvements. As required, we will work with the Wastewater Reclamation Division in formulating a sewer impact study as well as a Hold Harmless Agreement prior to issuance of the initial building permit for the project.

Traffic and drainage studies are being formulated and will be included in the Environmental Assessment for your review.

Our intent is to comply with all applicable County Code provisions relating to off-street parking, loading and landscaping as well as applicable Americans with Disabilities Act provisions.

Thank you for your interest and concern. If you have any questions, please feel free to call me.

Very truly yours,

Milton Arakawa, A.I.C.P.
Project Manager

MA:cc
cc: Allison Yue, Kamehameha Schools
ks:be\paukukalokdpwwm.ltr

305 High Street, Suite 104 • Wailuku, Hawaii 96793 • ph: (808)244-2015 • fax: (808)244-8729 • email: mahinc@aloha.net

Chapter X

Letters Received During the Draft Environmental Assessment Public Comment Period and Responses to Substantive Comments

DEPARTMENT OF
HOUSING AND HUMAN CONCERNS
COUNTY OF MAUI

NOV 29 2000

JAMES "KIMO" APANA
Mayor

ALICE L. LEE
Director

PRISCILLA P. MIKELL
Deputy Director

200 SOUTH HIGH STREET • WAILUKU, HAWAII 96793 • PHONE (808) 270-7805 • FAX (808) 270-7165

November 24, 2000

Mr. Milton Arakawa, A.I.C.P.
Project Manager
Munekiyo, Arakawa & Hiraga, Inc.
305 High Street
Wailuku, Hawaii 96793

Dear Mr. Arakawa:

Subject: Paukukalo Preschool and
Related Improvements

We have reviewed the draft Environmental Assessment for the subject project and wish to inform you that we have no comments to offer.

Thank you for the opportunity to comment.

Very truly yours,

ALICE L. LEE
Director of Housing
and Human Concerns

ETO:df

c: Housing Administrator

DEC 2 1 2000

DEPARTMENT OF WATER SUPPLY
COUNTY OF MAUI
P.O. BOX 1109
WAILUKU, MAUI, HAWAII 96793-6109
Telephone (808) 270-7816 • Fax (808) 270-7833

December 6, 2000

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

SUBJECT: Paukukalo Pre-School and Related Improvements, TMK: 3-3-05: por. 086, por. 087

Dear Mr. Arakawa,

Thank you for the opportunity to review this Draft Environmental Assessment. Please find attached a copy of Department of Water Supply comments dated January 14, 2000 for the same project. We have no further comments to offer at this time.

Should you have any questions, please call our Water Resources and Planning Division at 270-7199.

Sincerely,

David Craddick
Director
emb

cc: engineering division

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By Water All Things Find Life

DEPARTMENT OF WATER SUPPLY
COUNTY OF MAUI
P.O. BOX 1109
WAILUKU, MAUI, HAWAII 96793-6109
Telephone (808) 270-7816 • Fax (808) 270-7833

1949 - 1999 Celebrating 50 Years of Service

January 14, 2000

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

SUBJECT: Paukukalo Pre-School and Related Improvements, TMK: 3-3-05: por. 086, por. 087

Dear Mr. Arakawa,

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The EA should include the sources and expected potable and non-potable water usage. Based on empirical data, water demand for pre-schools average approximately 2,464 gallons per day, but varies widely.

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It is required by County Code that water conservation practices be incorporated into project design. As much of the water demand as possible should be delivered from non-potable sources (reclaimed or brackish). Where appropriate, the applicants should consider these measures:

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Maintain Fixtures to Prevent Leaks: A simple, regular program of repair and maintenance can prevent the loss of hundreds or even thousands of gallons a day. Refer to the attached handout, "The Costly Drip". The applicant should establish a regular maintenance program.

Use Climate-adapted Plants: Native plants adapted to the area, conserve water and further protect the watershed from degradation due to invasive alien species. The project site is located in "Maui County Planting Plan" - Plant Zones 4 and 5. Please refer to the attached document "Saving Water in the Yard: What & How to Plant in Your Area".

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The project overlies the Iao aquifer. The Department of Water Supply strives to protect the integrity of surface water and groundwater resources by encouraging applicants to adopt best management practices (BMPs) relevant to potentially polluting activities. We list a few BMP references here. Additional information can be obtained from the State Department of Health.

"Water Quality Best Management Practices Manual For Commercial and Industrial Business", Prepared for the City of Seattle by Resource Planning Associates, June 30, 1989.
"The Megamanual - Nonpoint Source Management Manual - A Guidance Document for Municipal Officials." Massachusetts Department of Environmental Protection.
"Guidance Specifying Management Measures For Sources of Nonpoint Pollution In Coastal Waters." United States Environmental Protection Agency, Office of Water.

Should you have any questions, please call our Water Resources and Planning Division at (808) 270-7199.

Sincerely,

David Craddick
Director
emb

cc: engineering division

By Water All Things Find Life

JAMES "KIMO" APANA
MAYOR

OUR REFERENCE
ty
YOUR REFERENCE

POLICE DEPARTMENT
COUNTY OF MAUI

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

THOMAS M. PHILLIPS
CHIEF OF POLICE

KEKUHAUPIO R. AKANA
DEPUTY CHIEF OF POLICE

December 12, 2000

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

Dear Mr. Arakawa:

SUBJECT: Paukukalo Preschool
TMK 3-3-5:86, 87

Thank you for your letter of November 21, 2000 requesting comments on the above subject.

We have reviewed the proposed summary and have no comments or recommendations. We are also returning the project packet to you at this time. Thank you for giving us the opportunity to comment on the proposed project.

Very truly yours,

Assistant Chief Robert Tam Ho
for: Thomas M. Phillips
Chief of Police

Enclosure

c: John E. Min, Planning Department

DEPARTMENT OF
PARKS AND RECREATION
COUNTY OF MAUI

1580-C KAAHUMANU AVENUE WAILUKU, HAWAII 96793

JAMES "KIMO" APANA
Mayor

FLOYD S. MIYAZONO
Director

ELIZABETH D. MENOR
Deputy Director

(808) 270-7230
FAX (808) 270-7934

DEC 19 2000

December 13, 2000

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

Dear Mr. Arakawa:

SUBJECT: PAUKUKALO PRESCHOOL

Thank you for the opportunity to review the Draft Environmental Assessment for the subject project. At this time, we have no comments or objections to the proposed action.

Please contact me or Mr. Patrick Matsui, Chief of Parks Planning and Development, at 270-7387 if there are any questions.

Sincerely,

FLOYD S. MIYAZONO
Director

c: Patrick Matsui, Chief of Planning and Development

BENJAMIN 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

December 14, 2000

IN REPLY REFER TO:
HWY-M2.403-00

MEMORANDUM

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

FROM: **Paul M. Chung**
State Highways

SUBJECT: **Paukukalo Preschool**
ME 99-68

Thank you for giving us the opportunity to review and comment on the Draft Environmental Assessment for the subject project. Based on our review, the proposed project does not appear to significantly impact our facilities, therefore, we have no comments to offer at this time.

If there are any questions or concerns, please call me at 873-3535.

/pmc

DEC 2 2 20[illegible]

JAMES "KIMO" APANA
Mayor

JOHN E. MIN
Director

CLAYTON I. YOSHIDA
Deputy Director

COUNTY OF MAUI
DEPARTMENT OF PLANNING

December 19, 2000

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

Dear Mr. Arakawa:

RE: **DRAFT ENVIRONMENTAL ASSESSMENT FOR PAUKUKALO PRESCHOOL**

We have reviewed the above referenced project and understand that the new preschool is designed for an enrollment of 80 students. The development will have four classrooms located in two structures and will also include a multipurpose building with a kitchen. In addition, a 1,200 sq. ft. office building is proposed to be constructed adjacent to the community center.

Our review of the assessment indicates that the traffic analysis is based upon normal school hours with the preschool ending at 2:00 p.m. It is assumed that the preschool will be open until 2:00 p.m. similar to school operations at its current location at Waihee School. However, preschools are normally operated on a much longer basis from, 7:00 a.m. to 5:00 p.m., in order to accommodate working parents. If the change in location also brings a change in operating hours then the traffic analysis should include the late afternoon traffic.

Another concern is the potential noise related impacts on the adjacent residential community. One of the preschool buildings and multipurpose building are in close proximity with minimum setbacks from the boundary with existing residences. These residences are at a higher elevation and noise has a tendency to travel upward and may adversely impact these residences especially at night when the multipurpose building may be in use.

Appropriate noise mitigation measures should be incorporated into the plan to reduce such impacts. Consideration should be given to re-siting the multipurpose building away from the residential boundary and utilizing the rear of the classroom buildings with minimum openings as a noise attenuation measure as well as landscaping.

Thank you for the opportunity to comment on the proposed project. If additional clarification is required, please contact Ms. Colleen Suyama, Staff Planner, of this office at 270-7735.

Very truly yours,

JOHN E. MIN
Planning Director

JEM:CMS:cmp
cc: Clayton Yoshida, AICP, Deputy Planning Director
Colleen Suyama, Staff Planner
Project File
General File S:\ALL\COLLEEN\PaukukaloPreschoolEA.wpd

MUNEKIYO, ARAKAWA & HIRAGA, INC.

December 27, 2000

John E. Min, Director
Department of Planning
County of Maui
250 South High Street
Wailuku, Hawaii 96793

SUBJECT: Paukukalo Preschool and Related Improvements

Dear Mr. Min:

Thank you for your letter of December 19, 2000 relating to the subject project. On behalf of the applicants for the project, the Department of Hawaiian Home Lands and Kamehameha Schools, we would like to provide the following response.

It is noted that the operating hours of the preschool are from 7:30 a.m. to 2:00 p.m. Like the existing operation at Waihee School, extended operating hours to 5:00 p.m. are not currently planned.

With regard to potential noise related impacts, it is anticipated that the multi-purpose building and classroom buildings would not be utilized for night time activities. The multi-purpose building and classroom buildings are oriented inward toward the central play area rather than outward toward the adjacent residential community which helps to control possible noise impacts. In regards to the suggestion of alternative siting of the structures away from the residential boundary, this would result in the loss of additional park space which was not deemed desirable.

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

Very truly yours,

Gwen Hiraga

Gwen Hiraga
Project Manager

GOH:cc
ka:be\paukalo\mintr.001

305 High Street, Suite 104 • Wailuku, Hawaii 96793 • ph: (808)244-2015 • fax: (808)244-8729 • email: mahinc@aloha.net

References

References

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

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

County of Maui, Wailuku-Kahului Community Plan, December 1987.

County of Maui, Office of Economic Development, Maui County Data Book 2000, June 2000.

Munekiyo & Arakawa, Inc., Final Environmental Assessment-Luana Gardens II Community Building and Child Day Care Facility, August 1995.

Munekiyo, Arakawa & Hiraga, Inc., Final Environmental Assessment-Waiehu Kou Off-Site Water System Improvements, June 1999.

Munekiyo, Arakawa & Hiraga, Inc., Final Environmental Assessment-Maui Community College-Building "N" and Related Improvements, April 1998.

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

University of Hawaii at Hilo, Department of Geography, Atlas of Hawaii, Third Edition, 1998.

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

Appendices

Appendix A

Letters from SHPD Dated June 1, 1992, July 5, 1996 and August 4, 1999

JOHN WAIHEE
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

WILLIAM W. PATY, CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES

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JOHN P. KEPPELER, II
DONA L. HANAIKE

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

June 1, 1992

LOG NO: 5434
DOC NO: 2298A

Mr. Bert Ratte, Engineer
Department of Public Works
Division of Land Use and Code Administration
250 South Street
Wailuku, Maui, Hawaii 96793

Dear Mr. Ratte:

SUBJECT: Historic Preservation Review of the Building Permit Application for the Paukukalo Community Center
Paukukalo, Wailuku, Maui
TMK: 3-3-5: 87

Thank you for the opportunity to review the plans for the construction of a new building and parking lots at the existing Paukukalo Community Center.

A review of our records indicates the absence of known historic sites on this property. This parcel is on a sand dune which has gone through extensive modification when the Department of Hawaiian Home Lands constructed the homestead subdivision. It is not likely that significant historic sites are still present. Therefore, we believe that the proposed project will have "no effect" on significant historic sites.

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

Sincerely,

DON HIBBARD, Administrator
State Historic Preservation Division

AG:jen

JUN - 2 1992

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

STATE OF HAWAII

DEPARTMENT OF LAND AND NATURAL RESOURCES

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

BOARD OF LAND AND NATURAL RESOURCES

DEPUTY
GILBERT COLOMA-AGARAN

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

July 5, 1996

Mr. Bert Ratte, Engineer
Department of Public Works
Land Use and Codes Administration
250 South High Street
Wailuku, Hawaii 96793

LOG NO: 17601
DOC NO: 9606KD31

Dear Mr. Ratte:

SUBJECT: **Chapter 6E-42, Historic Preservation Review of Construction Plans for the Paukukalo Community Center Playcourt**
Paukukalo, Wailuku District, Island of Maui
TMK: 3-3-05: 87 (Appl. No. 96/0961)

Thank you for the opportunity to review the construction and grading plans for a basketball court, to be located south of the existing community center in Paukukalo. The proposed project area consists of a previously graded lot which has no standing structures or existing improvements. The lot is located within the area of the Waiehu sand dunes, and within the existing Hawaiian Homelands subdivision. The area was previously graded in connection with the subdivision development and construction of the community center.

Our records indicate that human skeletal remains and burials have been identified in a number of locations within the Hawaiian Homelands and adjacent Waiehu Terrace subdivision. These remains tend to occur along the eroding slopes of intact dunes, where previous construction cuts were made.

The proposed project site was inspected by Historic Preservation Division staff on June 26, 1996. The surface of the lot was fully visible at the time of the inspection. No evidence of historic sites was observed. The sand matrix is mixed with soil fill material, indicating that it has been previously disturbed. A backfilled excavation, which appears to be a recent *imu* pit is present near the center of the lot.

The topography surrounding the community center park area suggests that this area was cut during subdivision development. In addition, the sand within the project area has been previously disturbed to an unknown depth. The existing grade of the lot is at or very near the proposed finished grade of the playcourt, and very little cutting will be required.

Based on the location of the proposed project away from intact dune remnants, and based on the limited amount of excavation that will occur for this project, we believe that it will have "no effect" on historic sites.

If evidence of human skeletal remains is observed during construction, the contractor should follow the instructions as given on page C-3 of the construction plans.

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

Aloha,

DON HIBBARD, Administrator
State Historic Preservation Division

KD:jen

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

AUG 1 2 1999

TIMOTHY E. JOHNS, CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES

DEPUTIES
JANET E. KAWELO

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

STATE OF HAWAII

DEPARTMENT OF LAND AND NATURAL RESOURCES

HISTORIC PRESERVATION DIVISION
Kakuhihewa Building, Room 555
601 Kamokila Boulevard
Kapolei, Hawaii 96707

August 4, 1999

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

LOG NO: 23912 ✓
DOC NO: 9906CD13

Dear Mr. Arakawa,

SUBJECT: **Inquiry as to Whether an Archaeological Inventory Survey is Warranted for the Proposed New Paukualo Preschool and Offices**
Wai'ehu Ahupua'a, Wailuku District, Island of Maui TMK: 3-3-05:086 and 087

Thank you for your inquiry as to whether or not an archaeological inventory survey is warranted for the proposed new Paukukalo Preschool and offices. Our response is based on reports, maps and aerial photographs maintained at the State Historic Preservation Office.

Our records show that the subject parcels have not been subject to an archaeological inventory survey. Our records also indicate that human skeletal remains have been identified in a number of locations within the Hawaiian Homelands adjacent Wai'ehu Terrace subdivision. These remains tend to occur along the eroding slopes of intact dunes, where previous construction cuts were made.

A site inspection was conducted of parcel 87 in 1996 [SHPD DOC NO: 9606KD31], by Ms. Theresa Donham, previous Maui Island Archaeologist. At that time Ms. Donham stated no evidence of historic sites was observed; the deposit appeared to be a mix of the naturally occurring sand matrix with soil fill material; and evidence of recent disturbance was present. In addition, Ms. Donham stated that the topography surrounding the community center park area suggested that the area was altered during subdivision development and that the sand within parcel 87 has been previously disturbed to an undetermined depth (SHPD DOC NO: 9606KD31). According to our maps, parcel 86 appears to have been previously disturbed as a result of being graded and has been used in the recent past as a community park, making it unlikely that significant historic sites remain.

Given the above information, it is unlikely that significant historic sites are present within the proposed project area and an archaeological inventory survey is not recommended.

Please call Cathleen Dagher at 692-8023 if you have any questions.

Aloha,

Don Hibbard, Administrator
State Historic Preservation Division

CD:jen

c: Greg Bayless, Bayless Architects AIA

Appendix B

Traffic Impact Analysis Report

PAUKUKALO PRESCHOOL
TRAFFIC IMPACT ANALYSIS REPORT
Paukukalo, Maui, Hawaii

November 2000

Prepared for

Kamehameha Schools

Austin, Tsutsumi & Associates, Inc.
Civil Engineers • Surveyors
501 Sumner Street, Suite 521
Honolulu, Hawaii 96817-5031
Telephone: (808) 533-3646
Facsimile: (808) 526-1267
Honolulu • Wailuku, Hawaii

PAUKUKALO PRESCHOOL
TRAFFIC IMPACT ANALYSIS REPORT

Paukukalo, Maui, Hawaii

PREPARED FOR:

Kamehameha Schools

PREPARED BY:

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

November 2000

AUSTIN, TSUTSUMI & ASSOCIATES, INC. CIVIL ENGINEERS • SURVEYORS
CONTINUING THE ENGINEERING PRACTICE FOUNDED BY H. A. R. AUSTIN IN 1934

TED S. KAWAHIGASHI, P.E., FACEC
KENNETH K. KUROKAWA, P.E.
DONOHUE M. FUJII, P.E.
STANLEY T. WATANABE
TERRANCE S. ARASHIRO, P.E.
MERNA S. KIBE

PAUKUKALO PRESCHOOL

TRAFFIC IMPACT ANALYSIS REPORT

I. INTRODUCTION

This report documents the findings of the traffic impact analysis study conducted by Austin, Tsutsumi & Associates, Inc. to evaluate the potential traffic impact resulting from the vehicular traffic generated by the proposed preschool and office building to be located at the Paukukalo Park in Wailuku, Maui.

A. Project Description

Kamehameha Schools (KS) proposes to construct a preschool for a maximum of 80 children. The preschool includes two classroom buildings and one multi-purpose building. Preschool hours will be from 7:30 a.m. to 2:00 p.m. In the morning children may be dropped off from 7:30 a.m. and in the afternoon, children may be picked up from 12:00 p.m. to 2:00 p.m. Preference will be given to children living in Paukukalo Subdivision and in the nearby areas of Waiehu Kou and Waihee; children with Hawaiian ancestry living elsewhere would be able to fill the remaining openings. The preschool will employ four teachers and four teaching assistants.

Additionally, the State of Hawaii Department of Hawaiian Home Lands (DHHL) plans to construct a new office building of 1,200 square feet at Paukukalo Park. The existing DHHL office is located in Puuone Plaza in Wailuku; the current staff of two people will relocate to the new building and there is potential to add a third staff member. Office hours will be 7:30 a.m. to 4:30 p.m.

REPLY TO:
501 SUMNER STREET, SUITE 521 • HONOLULU, HAWAII 96817-5031
PHONE (808) 533-3646 • FAX (808) 526-1267 • EMAIL: atahnl@earthlink.net

OFFICES IN:
HONOLULU, HAWAII
WAILUKU, MAUI, HAWAII

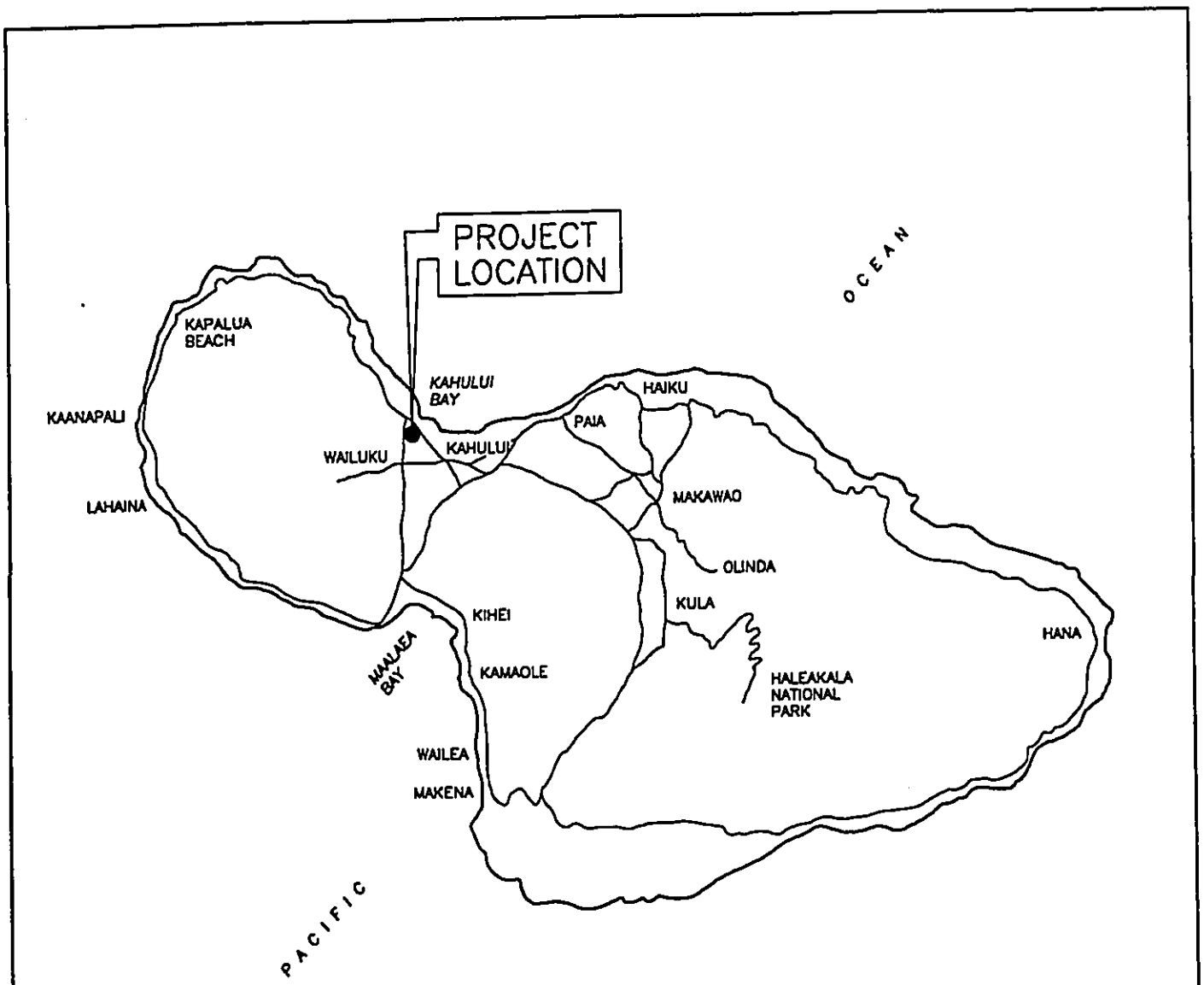
Construction of the KS preschool and the DHHL office building are expected to be completed and occupied by August 2001. Hence, the Year 2001 is utilized for future conditions when the project is expected to be fully operational.

The proposed project is located at Paukukalo, Maui as shown in Figure 1 and the vicinity map in Figure 2. The preliminary project site plan is provided in Figure 3. The tax map key reference is (2) 3-3-005: 086 and 087. The project access will be relocated approximately 135 feet south of the existing parking lot driveway at its connection to Kaumualii Street and Kealii Drive.

B. Study Methodology

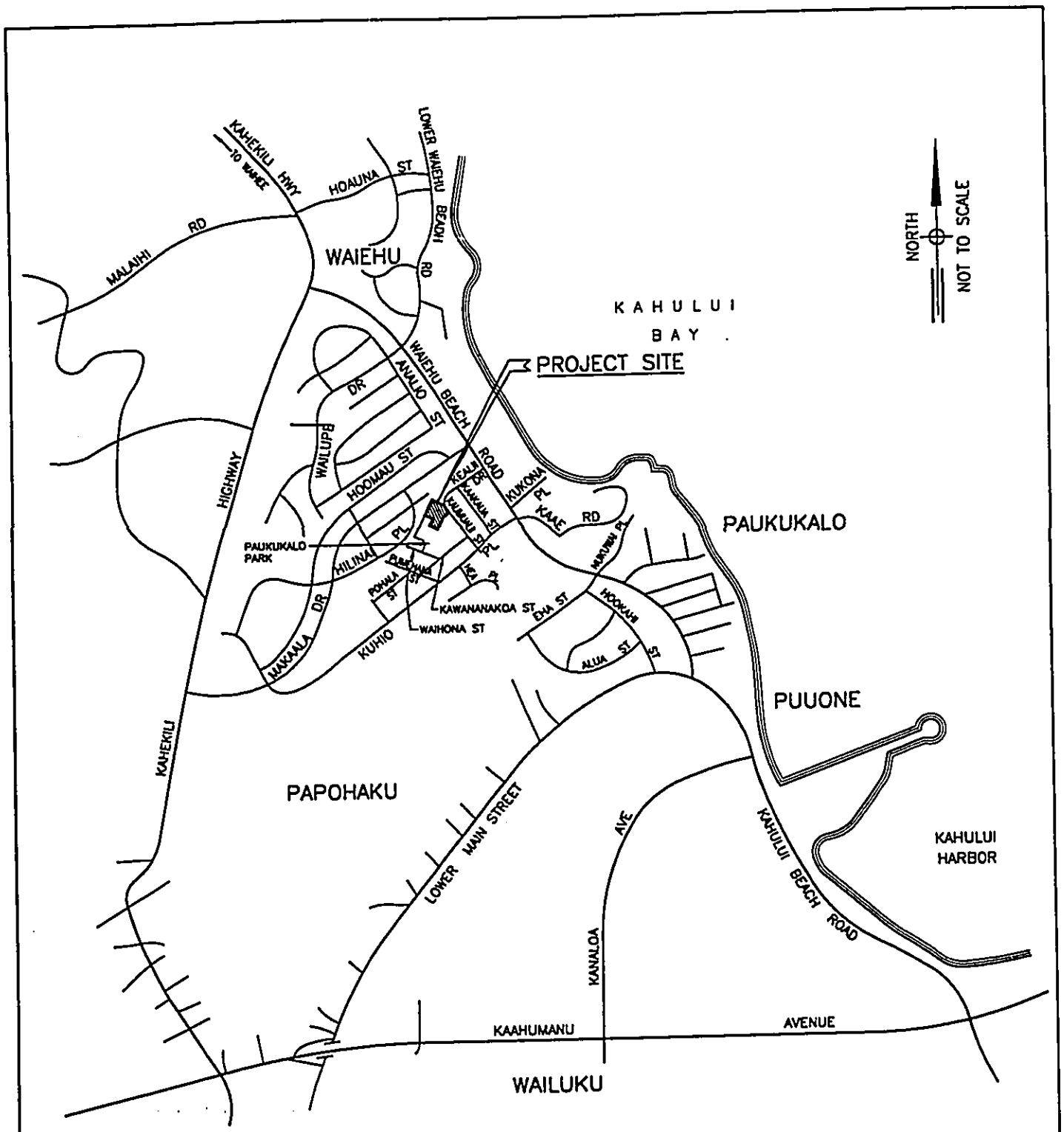
The purpose of this study is to identify, quantify and mitigate the potential traffic impacts at the intersections of Waiehu Beach Road and Kuhio Place and Waiehu Beach Road and Kealii Drive by the vehicular trips generated by the preschool and office building. The roadway improvements which would be required to accommodate the future regional traffic growth, as well as the project-generated traffic, are identified, as needed.

Traffic counts were taken on Waiehu Beach Road, Kuhio Place and Kealii Drive to quantify existing traffic operations during the morning and afternoon peak periods of traffic. Field observations along Waiehu Beach Road and in the vicinity of the project were also conducted during the same time periods as the traffic counts. In order to assess the traffic impacts of the KS Paukukalo Preschool and the DHHL office building in context with the regional traffic growth in the area, future traffic volumes were forecasted without and with the project-generated traffic. The traffic impacts of the proposed project were determined through the analytical comparison of these two future traffic assignments.



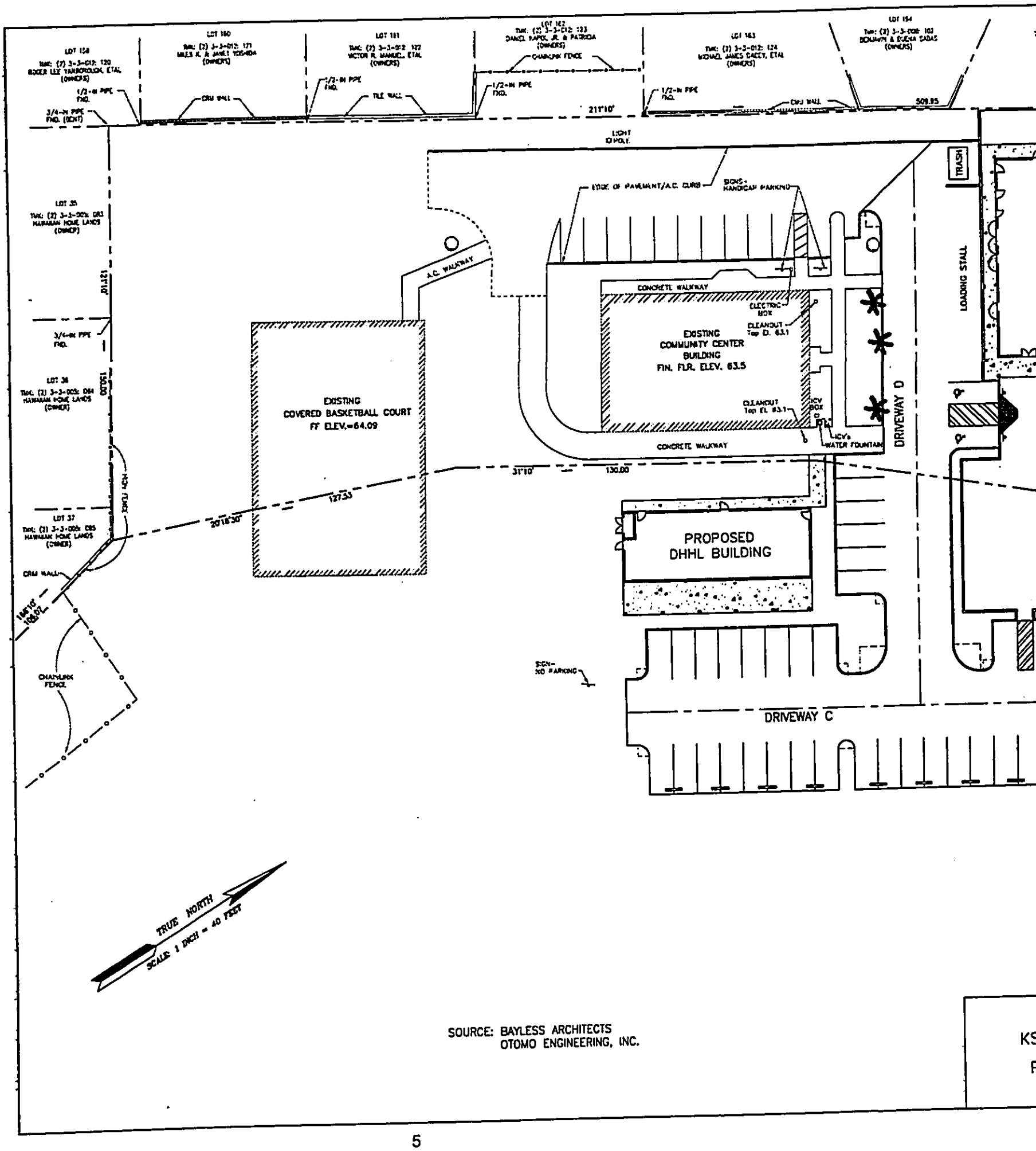
KS PAUKUKALO PRESCHOOL PAUKUKALO, MAUI, HAWAII	AUSTIN, TSUTSUMI & ASSOCIATES, INC. ENGINEERS,SURVEYORS • HONOLULU,HAWAII LOCATION MAP	FIGURE 1

FN: 00-088\FIGURE1



KS PAUKUKALO PRESCHOOL PAUKUKALO, MAUI, HAWAII	AUSTIN, TSUTSUMI & ASSOCIATES, INC. ENGINEERS, SURVEYORS • HONOLULU, HAWAII VICINITY MAP	FIGURE 2

FN: 00-088\FIGURE2



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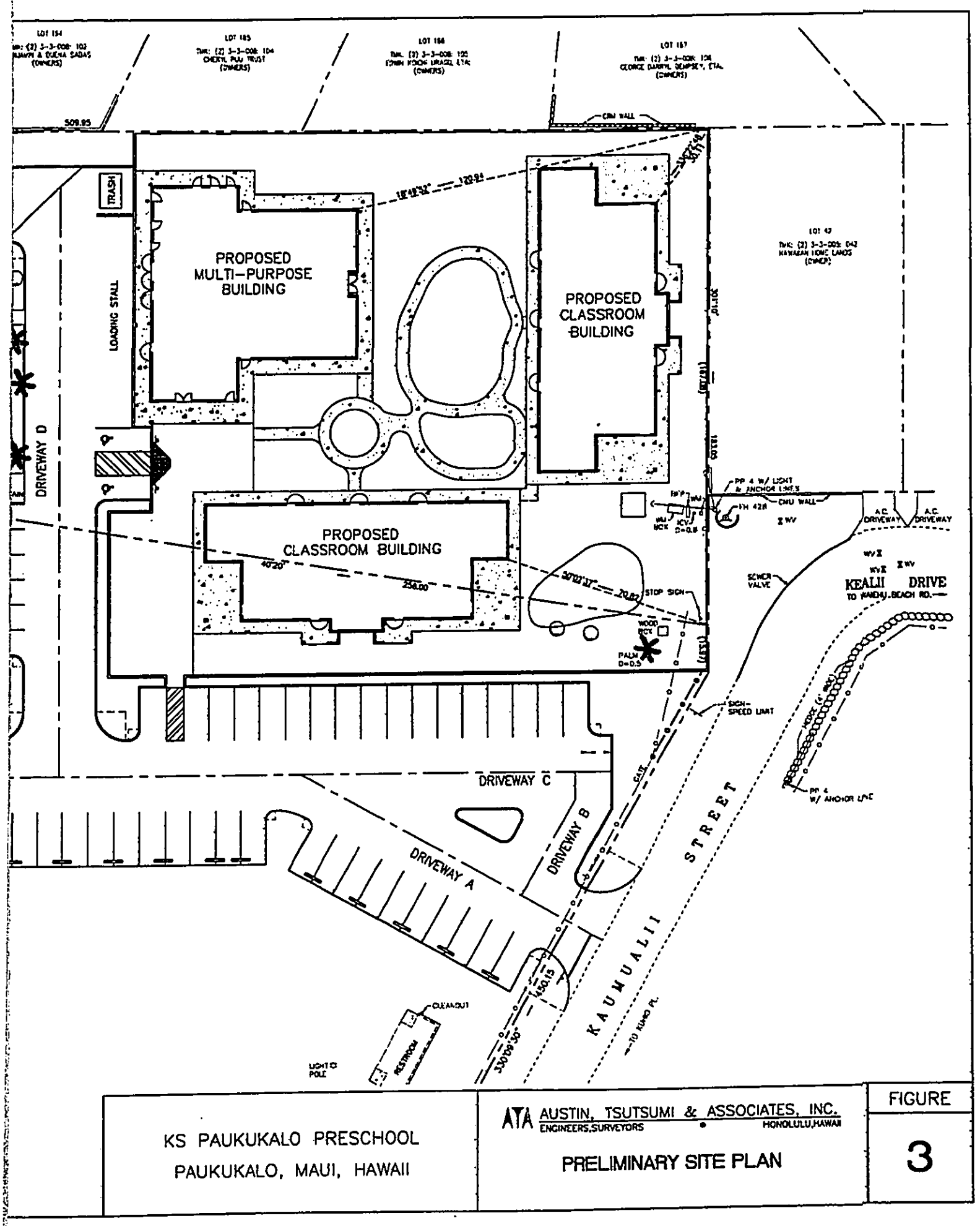
OTOMO ENGINEERING, INC.



KS PAUKUKALO PRESCHOOL

PAUKUKALO, MAUI, HAWAII

AUSTIN, TSUTSUMI & ASSOCIATES, INC.
ENGINEERS, SURVEYORS • HONOLULU, HAWAII

PRELIMINARY SITE PLAN

FIGURE 3

II. EXISTING CONDITIONS

The project site presently contains a vacant building and parking lot. The vacated building and the parking lot will be demolished for the new preschool and office building. New parking areas will be constructed in areas which are currently grassed. The existing parking lot is located at the connection of Kealii Drive and Kaumualii Street.

A. Existing Roadway System

Waiehu Beach Road is a two-lane State roadway which links the Waihee and Waiehu areas with the lower, industrialized area of Wailuku. In the vicinity of the project, Waiehu Beach Road has two 12-foot travel lanes, a center 10-foot two-way turn lane and paved shoulders.

Kuhio Place is the primary collector road within the Paukukalo Subdivision. At the unsignalized cross-intersection with Waiehu Beach Road and Kaae Road, separate left-turn lanes are provided on Waiehu Beach Road. The Kuhio Place approach to the Waiehu Beach Road has sufficient width to allow two separate queues for the right-turn movements and the left-turn/through movements. The Kaae Road approach, which is off-set from the Kuhio Place approach, also has sufficient width to allow right-turn movements to pass by waiting, left-turn/through movements.

Kealii Drive is a local two-lane road which also serves as a secondary access to the Paukukalo Subdivision. At the unsignalized T-intersection of Waiehu Beach Road and Kealii Drive, a separate turn lane is designated for the northbound left turns and a two-way center turn lane is striped on the north side of the intersection.

Kaumualii Street is a two-lane local road which provides access to Paukukalo Park and residential uses. Kaumualii Street links to Waiehu Beach Road via Kuhio Place and Kealii Drive.

Paukukalo Park has two designated bus stops, one on Kaumualii Street and the other on Kawananakoa Street. School buses for Waihee (Elementary) School, Iao (Middle) School and Baldwin High School, as well as Maui Economic Opportunity (MEO) buses utilize the bus stops.

B. Existing Traffic Operations

The following sections present the existing peak hour traffic volumes and a description of the methodology utilized to analyze the intersection operating conditions.

1. Existing Traffic Volumes

Manual traffic count data were collected and field observations were conducted on October 3-4, 2000. Existing traffic volumes during the morning and afternoon peak hours of traffic are provided in Figure 4. The traffic count data is supplied in Appendix A. The morning peak hour of traffic occurred between 6:45 – 7:45 a.m.; this time period coincides with the starting time of 7:30 a.m. of the proposed preschool. The early afternoon hour of 2:00 – 3:00 p.m. was selected for analysis as the proposed project traffic would be expected to peak at the preschool's ending time at 2:00 p.m.

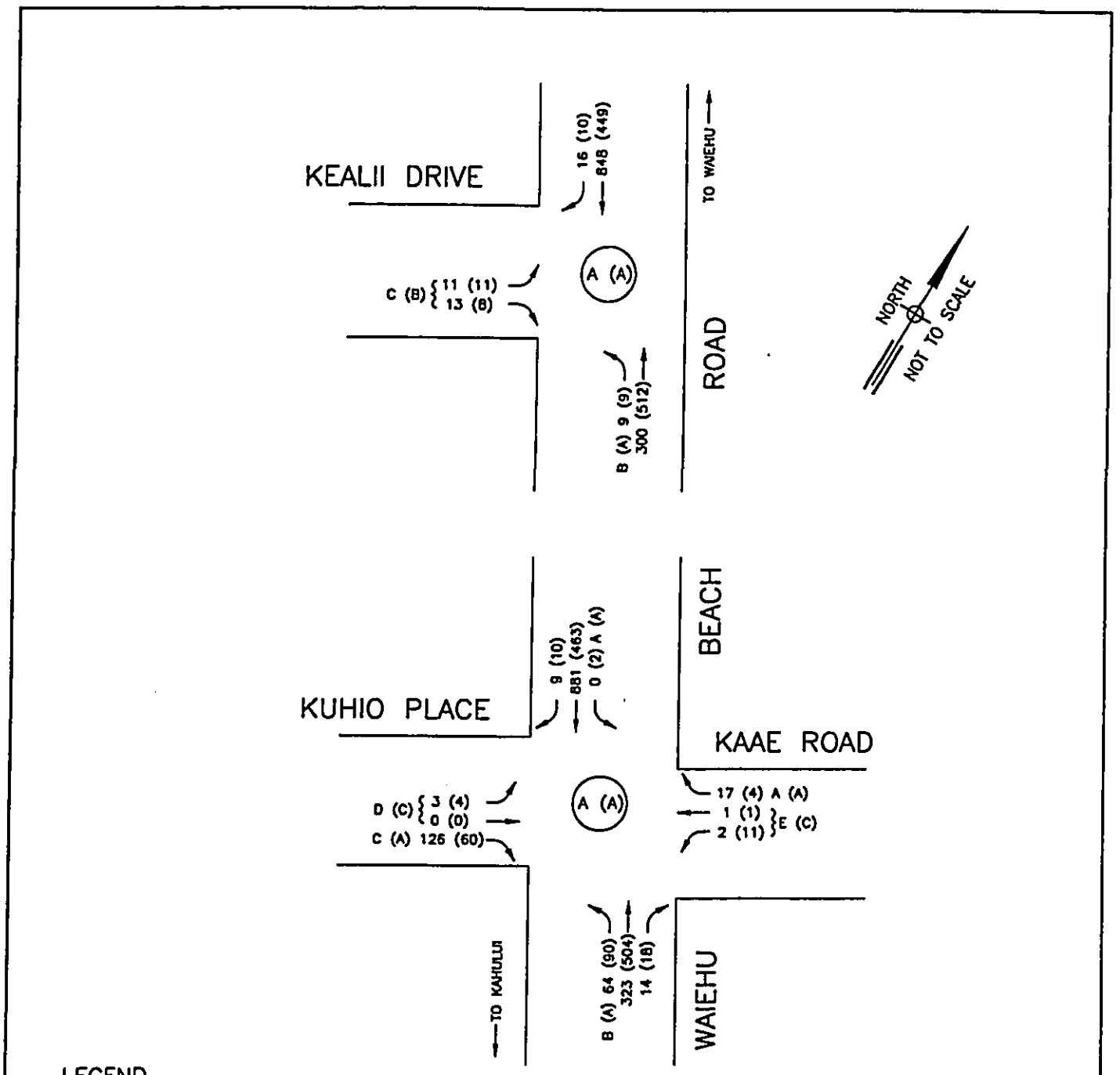
2. Technical Analysis

The technical analysis of traffic conditions is described in this section for unsignalized intersections. Level of Service (LOS) is a qualitative measure used to describe the condition of traffic flow, ranging from free flow conditions at LOS A to congested conditions at LOS F. Appendix B contains detailed descriptions of LOS for unsignalized intersections.

Unsignalized intersections are controlled by stop or yield signs on minor street approaches. The "Two-Way Stop Control" method described in the 1994 Highway Capacity Manual was employed to determine the delay and LOS for unsignalized intersections.

3. Analysis Results

The overall traffic conditions at the intersection of Waiehu Beach Road/Kuhio Place/Kaae Road are at LOS A. During the morning peak hour of traffic, the Waiehu Beach Road northbound left-turn movement is at LOS B. The Kuhio Place left-turn/through movement is at



KS PAUKUKALO PRESCHOOL PAUKUKALO, MAUI, HAWAII	AUSTIN, TSUTSUMI & ASSOCIATES, INC. ENGINEERS,SURVEYORS • HONOLULU,HAWAII EXISTING TRAFFIC CONDITIONS	FIGURE 4

FN: 00-088\FIGURE4

LOS D and the right-turn movement is at LOS C. The Kaae Road left-turn/through movement incurs the longest delay during the morning peak hour of traffic as it operates at LOS E. During the early afternoon peak hour of traffic, the Kuhio Place left-turn/through movement and the Kaae Road left-turn/through movement are at LOS C; the remaining movements at this intersection are at LOS A.

The overall traffic operations at the intersection of Waiehu Beach Road and Kealii Drive are at LOS A. During the morning peak hour of traffic, the Waiehu Beach Road northbound left-turn movement is at LOS B and the Kealii Drive approach is at LOS C. During the early afternoon peak hour of traffic, the northbound left-turn movement is at LOS A while the Kealii Drive approach operates at LOS B.

Observations of the morning peak hour of traffic noted that queuing occurred in the southbound direction of Waiehu Beach Road. The southbound queue extended from the Waiehu Beach Road/Eha Street intersection to approximately midway between Makaala Drive and the Wailupe Drive/Lower Waiehu Beach Road intersections. The southbound traffic flow was sluggish as it passed through the Kealii Drive and Kuhio Place/Kaae Road intersection. The intersection of Waiehu Beach Road and Eha Street is the first signalized intersection in the southbound direction and the traffic signal serves to meter traffic flow from Waiehu Beach Road into the lower Wailuku area.

In general, the Waiehu Beach Road two-way, center-turning lane and left-turn bays are effective in serving as a refuge area for turning traffic which would otherwise delay through traffic. However, a couple of school buses were observed to stop in the northbound travel lane to pick up school children and block the flow of northbound traffic.

III. FUTURE BASE YEAR 2001 CONDITIONS WITHOUT THE PROJECT

For the future conditions without the project, Year 2001 was selected as the future year. Current plans indicated construction would be completed by August 2001. The preschool and office building are expected to be opened for the Fall 2001 school year.

A. Background Traffic Growth

Traffic volumes in the vicinity of the project are expected to increase due to land use changes and accompanying growth in regional traffic volumes. A review of projects in the area indicate the second phase of the nearby Waiehu Kou project, which contains 110 single-family units, is presently under construction. Approximately one-third of the Phase 2 units has been completed and fully occupied; the remaining units are expected to be completed in the next few months. The third phase of the Waiehu Kou project is in the planning stage and is not scheduled for construction at the time of this study.

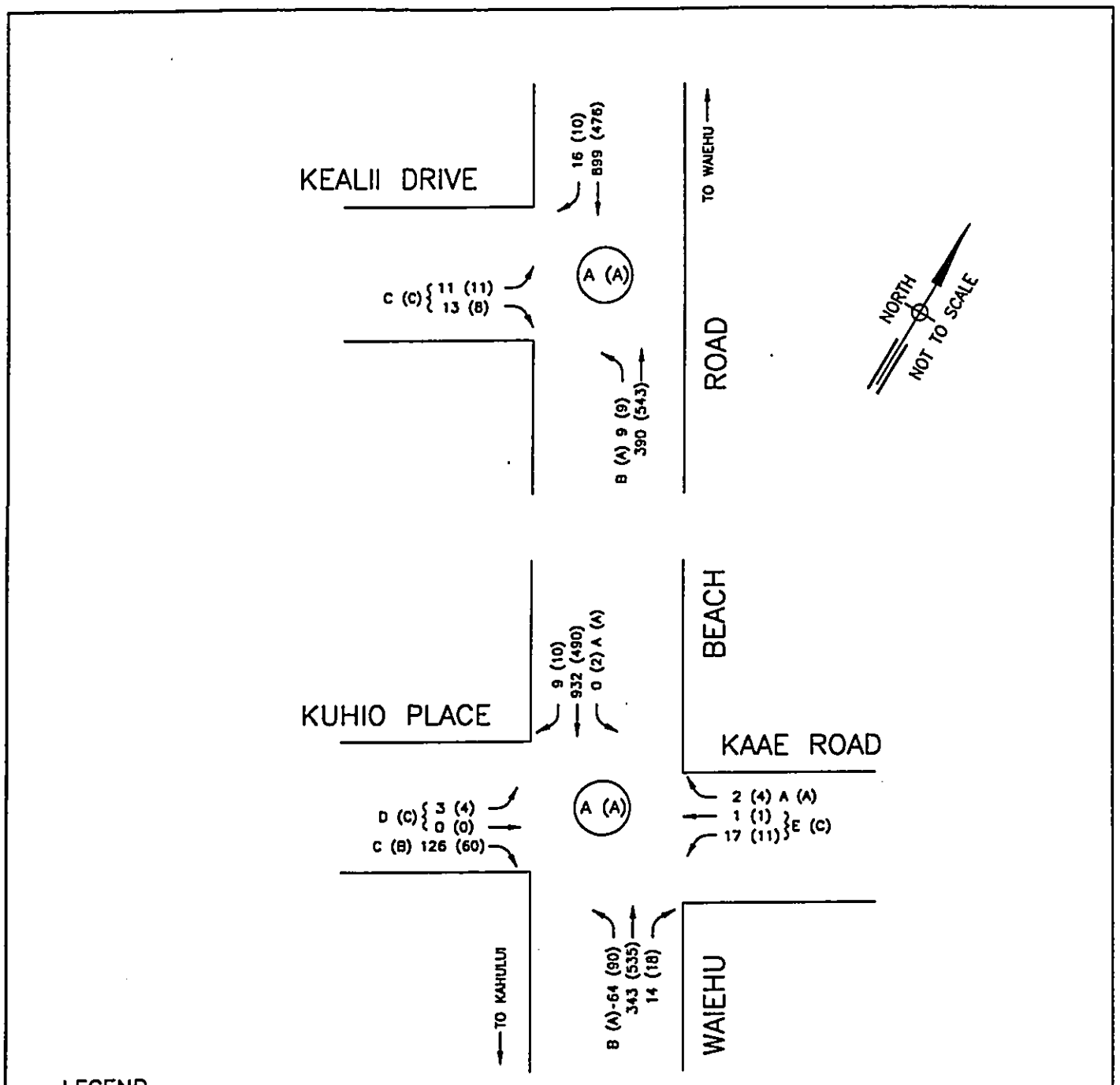
An analysis of recent State Department of Transportation historical traffic data shows a growth rate of 5.0 percent. This study assumes the near-term growth trend would be similar to the recent historical trend and that the traffic generated by nearby projects, such as the Waiehu Kou project, would be included in the regional growth in traffic volumes. The growth rate of 5.0 percent was applied to the existing traffic volumes to estimate future Year 2001 baseline traffic volumes without the project.

B. Base Roadway Improvements

There are no roadway improvements planned by the State Department of Transportation or the County of Maui that would affect the existing laneage at the study intersections.

C. Future Base Traffic Volumes and Level of Service Analysis

The traffic assignment showing the future base traffic volumes without the project is shown in Figure 5. The results of the unsignalized intersection analysis indicate the morning peak hour of traffic LOS conditions at the two study intersections would remain the same as the existing conditions.



LEGEND

123 (456)	AM (PM) PEAK HOUR TRAFFIC VOLUMES
A (A)	AM (PM) LOS FOR STOP OR YIELD CONTROL MOVEMENT AT UNSIGNALIZED INTERSECTION
(A (A))	AM (PM) LOS FOR OVERALL UNSIGNALIZED INTERSECTION

KS PAUKUKALO PRESCHOOL
PAUKUKALO, MAUI, HAWAII

ATA AUSTIN, TSUTSUMI & ASSOCIATES, INC.
ENGINEERS, SURVEYORS • HONOLULU, HAWAII

FUTURE BASE YEAR 2001
TRAFFIC CONDITIONS WITHOUT PROJECT

FIGURE 5

FN: 00-068\FIGURES

During the early afternoon peak hour of traffic at the intersection of Waiehu Beach Road, Kuhio Place and Kaae Road, the Kuhio Place right-turn movement would drop from LOS A to LOS B and the Kaae Road left-turn/through movement would decrease from LOS C to LOS D. At the intersection of Waiehu Beach Road and Kealii Drive, the Kealii Drive approach would drop from LOS B to LOS C.

IV. PROJECT-GENERATED TRAFFIC VOLUMES

The project-generated traffic is determined through three sequential steps: trip generation, trip distribution and traffic assignment. Trip generation quantifies the number of project-generated trips. Trip distribution determines the direction of travel for the project-generated trips. Traffic assignment identifies the roadways that would be utilized by the project-generated trips

A. Trip Generation

The estimate of project-generated traffic volumes is developed by applying trip rates according to the appropriate land use parameters. Trip generation rates for the project were derived from trip rates compiled by the Institute of Transportation Engineers (ITE), Trip Generation, 6th Edition. The ITE trip rates are provided in Table 1 and the project-generated traffic volumes are shown in Table 2.

Table 1

TRIP GENERATION RATES

	Daily	AM Peak Hour		PM Peak Hour	
		Enter	Exit	Enter	Exit
Preschool					
80 Children	4.52	0.43	0.38	0.40	0.46
Office Building					
1,200 Square Feet	11.57	1.58	0.20	0.26	1.46

Table 2

PROJECT-GENERATED TRAFFIC VOLUMES

	Daily	AM Peak Hour		PM Peak Hour	
		Enter	Exit	Enter	Exit
Preschool	362	35	30	32	37
Office Building	14	2	0	0	2
Total	376	37	30	32	39

The preschool and office building will have the same starting time of 7:30 a.m.; thus, the morning peak hour of these land uses is expected to occur during the existing traffic peak hour of 6:45 - 7:45 a.m. The ending time of the preschool will be 2:00 p.m. and the office hours will end at 4:30 p.m. The preschool is expected to generate higher volumes of traffic at its ending time of 2:00 p.m. than the traffic volumes generated by the office building at 4:30 p.m. Thus, the early afternoon peak hour of 2:00 - 3:00 p.m. is utilized to analyze the impact of the project-generated traffic. The office building is expected to serve clients and generate low volumes of traffic during the early afternoon peak hour.

B. Trip Distribution

Trip distribution identifies the direction of travel of trips to and from the project site by determining the likely external origins and destinations of the project-generated trips. The trip distribution was derived from the preschool waiting list, review of existing and projected population and employment data for the Wailuku area as well as the distribution of north and southbound traffic on Waiehu Beach Road.

First priority for the preschool students will be given to an estimated 20-30 children that live in the Paukukalo Subdivision; many of these students would be expected to walk to school with their parents or grandparents. The students living in the Paukukalo Subdivision could also be dropped off or picked up by parents on their way to/from work; the vehicular trips between home and the preschool would occur internally within the Paukukalo Subdivision and would not be expected to increase the vehicle trips on Waiehu Beach Road as these preschool trips would be linked to existing work trips.

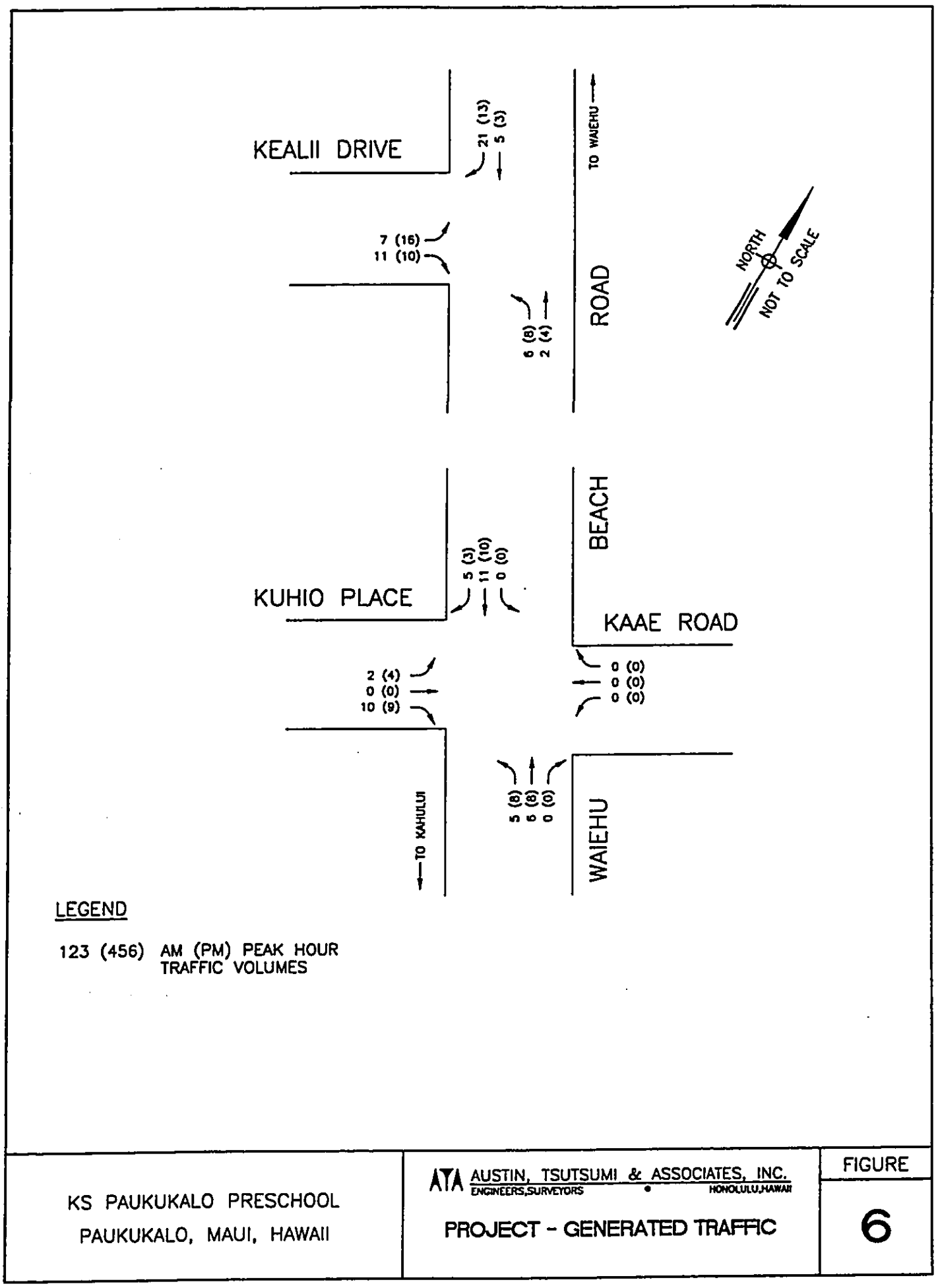
Second priority for the preschool students will be children from the Waiehu Kou Subdivision and third priority is for children from the Waihee Elementary School district area. Children of Hawaiian ancestry living elsewhere would fill the remaining openings at the preschool. Table 3 presents the trip distribution for the project-generated traffic for students/employees/clients of the preschool and office building that live external to the Paukukalo Subdivision.

Table 3
TRIP DISTRIBUTION

Direction	AM	PM
North	30%	50%
South	70%	50%
Total	100%	100%

C. Traffic Assignment

The traffic assignment determines the routes traveled by the project-generated traffic. The project-generated trips must utilize Kaumualii Street to access the project site. Figure 6 shows the project-generated traffic assignment.



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PROJECT - GENERATED TRAFFIC

FIGURE
6

FN: 00-088\FIGURE6

V. FUTURE YEAR 2001 CONDITIONS WITH THE PROJECT

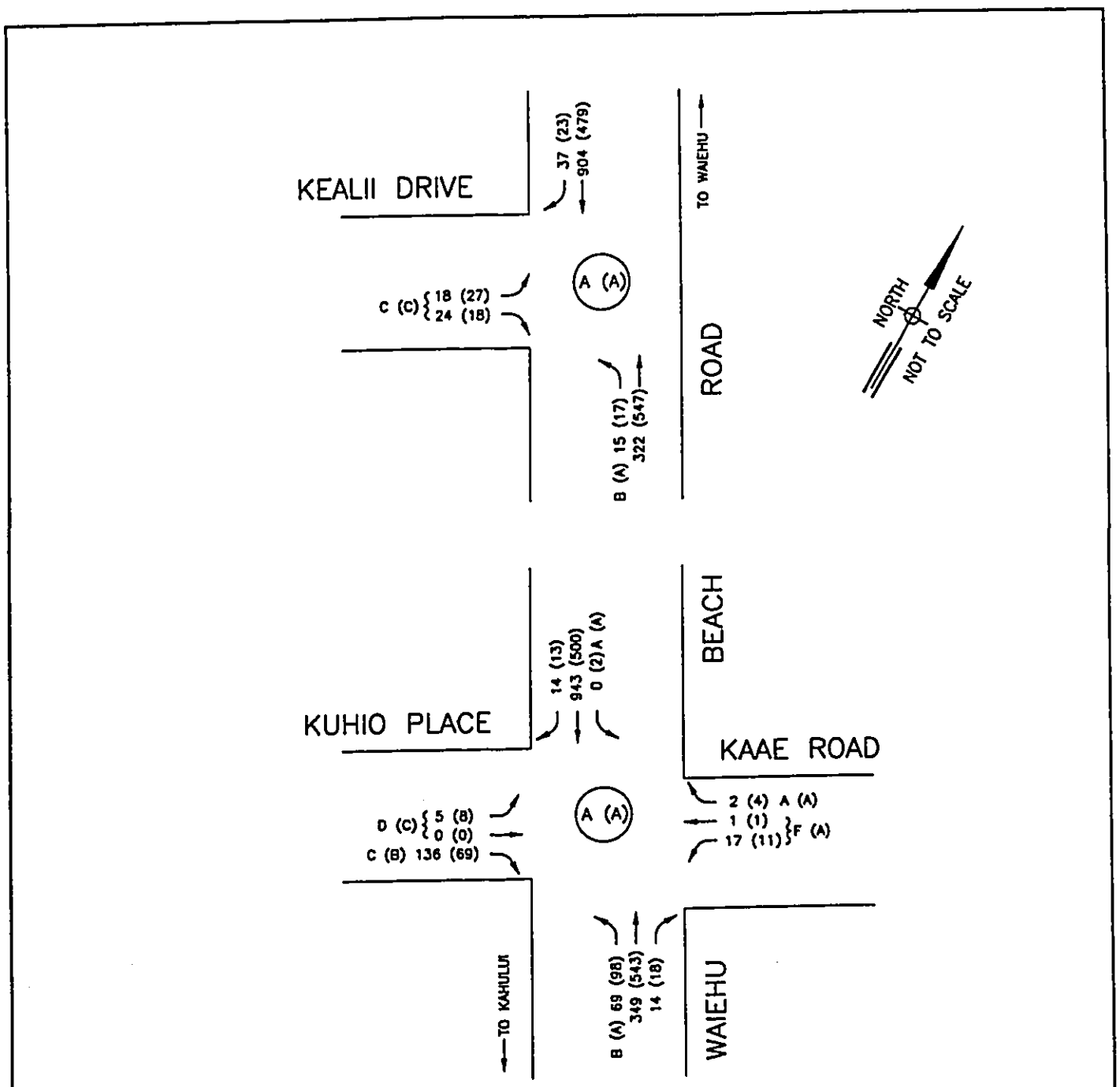
The future traffic conditions with the project-generated traffic are derived by adding the project-generated traffic volumes to the Year 2001 baseline traffic volumes.

A. Future Traffic Volumes with Project-Generated Traffic

The future traffic assignment with the project-generated traffic is shown in Figure 7.

B. Analysis Results

Longer delays are expected with the project traffic and, generally, the future LOS conditions with the project are expected to remain the same as the future LOS without the project. The Kaae Road left-turn/through movement is the exception as it is expected to decrease from LOS E to LOS F during the morning peak hour of traffic; however, traffic volumes on this approach are low (20 vehicles per hour) and account for only 1.3% of the vehicles entering the intersection in the morning peak hour of traffic.



LEGEND

123 (456)	AM (PM) PEAK HOUR TRAFFIC VOLUMES
A (A)	AM (PM) LOS FOR STOP OR YIELD CONTROL MOVEMENT AT UNSIGNALIZED INTERSECTION
(A (A))	AM (PM) LOS FOR OVERALL UNSIGNALIZED INTERSECTION

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FUTURE YEAR 2001
TRAFFIC CONDITIONS WITH PROJECT

FIGURE 7

FN: 00-088\FIGURE7

VI. SUMMARY OF FINDINGS AND RECOMMENDATIONS

The findings of this traffic study and recommendations to accommodate existing traffic volumes and the future traffic volumes with the project-generated traffic are as follows.

A. Findings

The results of the unsignalized intersection analysis are summarized in Table 4.

1. Existing Conditions

The overall traffic conditions at the intersections of Waiehu Beach Road/Kuhio Place/Kaae Road and Waiehu Beach Road/Kealii Drive are at LOS A. During the morning peak hour of traffic, the Kuhio Place left-turn/through movement is at LOS D and the Kaae Road left-turn/through movement operates at LOS E. The other movements at the two study intersections are at LOS C or better during the morning and early afternoon peak hours of traffic.

2. Future Base Year 2001 Traffic Conditions without Project

The LOS conditions during the morning peak hour of traffic at the two study intersections would remain the same as the existing conditions. Slightly longer delays (of less than two seconds) during the early afternoon peak hour of traffic would change LOS conditions at the intersection of Waiehu Beach Road/Kuhio Place/Kaae Road; the Kuhio Place right-turn movement would decrease from LOS A to LOS B while the Kaae Road left-turn/through movement would be lowered from LOS C to LOS D. For the intersection of Waiehu Beach Road and Kealii Drive, the Kealii Drive approach would drop from LOS B to LOS C; the other movements at this intersection would remain unchanged from the existing LOS during the early afternoon peak hour of traffic.

Table 4
UNSIGNALIZED INTERSECTIONS ANALYSIS RESULTS

Intersection	Existing Conditions AM Peak Hour Seconds	LOS	Existing Conditions PM Peak Hour Seconds	LOS	Future Conditions without Project AM Peak Hour Seconds	LOS	Future Conditions without Project PM Peak Hour Seconds	LOS	Future Conditions with Project AM Peak Hour Seconds	LOS	Future Conditions with Project PM Peak Hour Seconds	LOS
Waiehu Beach Road, Kuhio Place and Kaae Road												
Northbound Left Turn	6.3	B	3.9	A	6.7	B	4.0	A	6.9	B	4.2	A
Southbound Left Turn	3.0	A	3.7	A	3.1	A	3.9	A	3.1	A	3.9	A
Kuhio Place												
Left Turn/Through Movement	20.3	D	15.5	C	22.5	D	16.8	C	24.4	D	18.3	C
Right Turn Movement	10.2	C	4.9	A	11.0	C	5.1	B	11.7	C	5.2	B
Kaae Road												
Left Turn/Through Movement	36.6	E	18.3	C	42.4	E	20.1	D	47.5	F	21.5	D
Right Turn Movement	3.8	A	4.8	A	3.9	A	4.9	A	4.0	A	5.0	A
Overall Intersection	1.9	A	0.9	A	2.0	A	0.9	A	2.2	A	1.1	A
Waiehu Beach Road and Kealii Place												
Northbound Left Turn	5.5	B	3.5	A	5.8	B	3.6	A	6.1	B	3.7	A
Kealii Place Approach	12.3	C	9.7	B	13.5	C	10.4	C	14.7	C	12.0	C
Overall Intersection	0.3	A	0.2	A	0.3	A	0.2	A	0.6	A	0.6	A

3. Future Year 2001 Traffic Conditions with Project-Generated Traffic

Except for the Kaae Road left-turn/through movement, which would decrease from LOS E to LOS F during the morning peak hour of traffic, the future LOS conditions with the project are expected to remain the same as the future LOS without the project.

B. Recommendations

There are no roadway improvements recommended at the study intersection for the project traffic. The analytical comparison of the future traffic conditions indicates there would be slightly longer delays with the project but, in general, the future LOS conditions with or without the project would be similar. Although there is existing queuing along Waiehu Beach Road in the southbound direction during the morning peak period, the southbound traffic flow is metered by the traffic signal at the Waiehu Beach Road/Eha Street intersection. The Kaae Road left-turn/through movements would incur the longest delays during the morning peak hour of traffic, but the traffic volumes are relatively low on this approach in comparison with the other movements at the Waiehu Beach Road/Kuhio Place/Kaae Road intersection.

REFERENCES

Institute of Transportation Engineers, Trip Generation, Sixth Edition, Washington, D.C., 1997.

Transportation Research Board, National Research Council, Highway Capacity Manual, Special Report 209, Third Edition, Washington, D.C., 1994.

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APPENDICES

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APPENDIX A
EXISTING TRAFFIC COUNT DATA

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PAUKUKALO TRAFFIC COUNTS
Waiehu Beach Road, Kuhio Place and Kaae Road
AM Peak Period

	WAIEHU BEACH ROAD						KUHIO PLACE			KAAE ROAD		
	Northbound			Southbound			Eastbound			Westbound		
TIME PERIOD	Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right
6:30 - 6:45 am	11	77	2	0	170	1	0	0	22	4	0	0
6:45 - 7:00	16	67	4	0	217	5	0	0	29	5	1	1
7:00 - 7:15	18	87	5	0	196	0	0	0	24	4	0	0
7:15 - 7:30	11	67	3	0	248	3	0	0	30	1	0	1
7:30 - 7:45	19	102	2	0	222	1	3	0	43	7	0	0
7:45 - 8:00	20	99	3	1	195	2	1	0	18	6	0	4
8:00 - 8:15	14	94	1	0	105	2	2	0	17	1	0	0
8:15 - 8:30 am	20	83	2	0	132	3	3	1	19	2	0	1
6:45 - 7:45 am	64	323	14	0	881	9	3	0	126	17	1	2
Total	129	676	22	1	1483	17	9	1	202	30	1	7

	WAIEHU BEACH ROAD				KUHIO PLACE		KAAE ROAD		TOTAL
	Northbound		Southbound		Eastbound		Westbound		ENTERING
TIME PERIOD	Approach	Departure	Approach	Departure	Approach	Departure	Approach	Departure	INTERSECTION
6:30 - 6:45 am	90	77	171	196	22	2	4	12	287
6:45 - 7:00	87	68	222	251	29	4	7	22	345
7:00 - 7:15	110	87	196	224	24	5	4	18	334
7:15 - 7:30	81	68	249	277	30	3	2	14	362
7:30 - 7:45	123	105	223	272	46	2	7	20	399
7:45 - 8:00	122	104	198	219	19	4	10	22	349
8:00 - 8:15	109	96	107	123	19	1	1	16	236
8:15 - 8:30 am	105	87	135	153	23	3	3	23	266
6:45 - 7:45 am	401	328	890	1024	129	14	20	74	1440
Total	827	692	1501	1715	212	24	38	147	2578

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PAUKUKALO TRAFFIC COUNTS
Waiehu Beach Road, Kuhio Place and Kaae Road
PM Peak Period

	WAIEHU BEACH ROAD						KUHIO PLACE			KAAE ROAD		
	Northbound			Southbound			Eastbound			Westbound		
TIME PERIOD	Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right
1:30 - 1:45 pm	16	81	3	0	94	3	2	0	10	0	0	0
1:45 - 2:00	11	87	2	0	106	1	3	0	15	1	0	0
2:00 - 2:15	28	109	0	0	96	4	0	0	11	0	0	0
2:15 - 2:30	16	141	3	1	116	4	1	0	14	3	0	1
2:30 - 2:45	19	123	10	0	143	4	2	0	17	3	0	0
2:45 - 3:00	27	131	5	1	108	0	1	0	18	5	1	0
3:00 - 3:15	29	137	4	0	107	1	0	0	19	2	1	0
3:15 - 3:30 pm	25	143	4	1	112	5	1	0	12	5	0	3
2:00 - 3:00 pm	74	460	15	1	461	13	6	0	57	7	0	1
Total	171	952	31	3	882	22	10	0	116	19	2	4

	WAIEHU BEACH ROAD				KUHIO PLACE		KAAE ROAD		TOTAL
	Northbound		Southbound		Eastbound		Westbound		ENTERING
TIME PERIOD	Approach	Departure	Approach	Departure	Approach	Departure	Approach	Departure	INTERSECTION
1:30 - 1:45 pm	100	83	97	104	12	3	0	19	209
1:45 - 2:00	100	90	107	122	18	2	1	12	226
2:00 - 2:15	137	109	100	107	11	0	0	32	248
2:15 - 2:30	160	143	121	133	15	4	4	20	300
2:30 - 2:45	152	125	147	163	19	10	3	23	321
2:45 - 3:00	163	132	109	131	19	6	6	28	297
3:00 - 3:15	170	137	108	128	19	4	3	31	300
3:15 - 3:30 pm	172	147	118	129	13	5	8	30	311
2:00 - 3:00 pm	549	467	475	525	63	16	8	87	1095
Total	1154	966	907	1017	126	34	25	195	2212

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PAUKUKALO TRAFFIC COUNTS
Waiehu Beach Road and Kealii Drive
AM Peak Period

	WAIEHU BEACH ROAD				KEALII DRIVE	
	Northbound		Southbound		Eastbound	
TIME PERIOD	Left	Through	Through	Right	Left	Right
6:30 - 6:45 am	0	71	164	2	2	3
6:45 - 7:00	2	67	212 *	2	2	4
7:00 - 7:15	4	80	209 *	1	1	0
7:15 - 7:30	1	63	220 *	3	4	3
7:30 - 7:45	2	90 *	207 *	10	4	6
7:45 - 8:00	1	94 *	186 *	1	2	0
8:00 - 8:15	0	97	101	5	0	1
8:15 - 8:30 am	0	80	123	1	1	0
6:45 - 7:45 am	9	300	848	16	11	13
Total	10	642	1422	25	16	17

	WAIEHU BEACH ROAD				KEALII DRIVE		TOTAL ENTERING INTERSECTION
	Northbound		Southbound		Eastbound		
TIME PERIOD	Approach	Departure	Approach	Departure	Approach	Departure	
6:30 - 6:45 am	71	73	166	167	5	2	242
6:45 - 7:00	69	69	214	216	6	4	289
7:00 - 7:15	84	81	210	209	1	5	295
7:15 - 7:30	64	67	223	223	7	4	294
7:30 - 7:45	92	94	217	213	10	12	319
7:45 - 8:00	95	96	187	186	2	2	284
8:00 - 8:15	97	97	106	102	1	5	204
8:15 - 8:30 am	80	81	124	123	1	1	205
6:45 - 7:45 am	309	311	864	861	24	25	1197
Total	652	658	1447	1439	33	35	2132

* Adjusted for traffic counts at intersection of Waiehu Beach Road, Kuhio Place and Kaae Road

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PAUKUKALO TRAFFIC COUNTS
Waiehu Beach Road and Kealii Drive
PM Peak Period

	WAIEHU BEACH ROAD				KEALII DRIVE	
	Northbound		Southbound		Eastbound	
TIME PERIOD	Left	Through	Through	Right	Left	Right
1:30 - 1:45 pm	1	77	89	3	3	3
1:45 - 2:00	1	87	103	1	0	3
2:00 - 2:15	1	101	94	2	1	2
2:15 - 2:30	3	140	111	2	4	2
2:30 - 2:45	2	131	143	2	2	3
2:45 - 3:00	3	140	101	4	4	1
3:00 - 3:15	1	128	106	4	4	1
3:15 - 3:30 pm	0	145	118	3	2	3
2:00 - 3:00 pm	9	512	449	10	11	8
Total	12	949	865	21	20	18

	WAIEHU BEACH ROAD				KEALII DRIVE		TOTAL
	Northbound		Southbound		Eastbound		ENTERING
TIME PERIOD	Approach	Departure	Approach	Departure	Approach	Departure	INTERSECTION
1:30 - 1:45 pm	78	80	92	92	6	4	176
1:45 - 2:00	88	87	104	106	3	2	195
2:00 - 2:15	102	102	96	96	3	3	201
2:15 - 2:30	143	144	113	113	6	5	262
2:30 - 2:45	133	133	145	146	5	4	283
2:45 - 3:00	143	144	105	102	5	7	253
3:00 - 3:15	129	132	110	107	5	5	244
3:15 - 3:30 pm	145	147	121	121	5	3	271
2:00 - 3:00 pm	521	523	459	457	19	19	1042
Total	961	969	886	883	38	33	1885

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APPENDIX B
LEVEL OF SERVICE (LOS) DEFINITIONS

LEVEL OF SERVICE CRITERIA FOR UNSIGNALIZED INTERSECTIONS (HCM 1994)

The level of service criteria for unsignalized intersections is defined as the average total delay, in seconds per vehicle. As used here, total delay is defined as the total elapsed time from when a vehicle stops at the end of the queue until the vehicle departs from the stop line, this time includes the time required for the vehicle to travel from the last-in-queue position to the first-in-queue position.

While the criteria for level of service for two-way stop-controlled (TWSC) and all-way stop-controlled (AWSC) intersections are the same, procedures to calculate the average total delay may differ.

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

Level of Service	Average Total Delay Vehicle (sec/veh)
A	≤ 5.0
B	>5.0 and ≤ 10.0
C	>10.0 and ≤ 20.0
D	>20.0 and ≤ 30.0
E	>30.0 and ≤ 45.0
F	> 45.0

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APPENDIX C
LEVEL OF SERVICE CALCULATIONS

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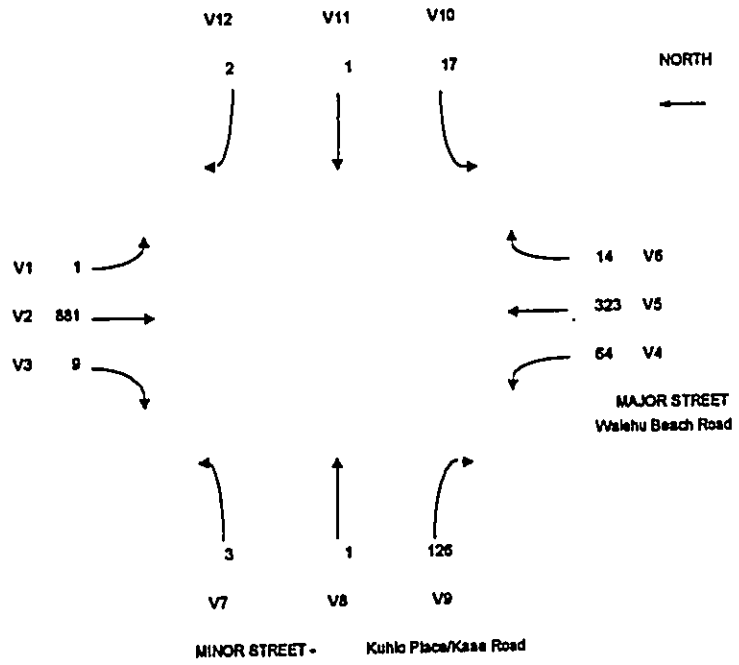
APPENDIX C
LEVEL OF SERVICE CALCULATIONS
- Existing Conditions

ATA Inc. TWO-WAY STOP CONTROLLED INTERSECTION LEVEL OF SERVICE ANALYSIS 1994 HCM

Major Street:	Waiehu Beach Road	Print Date:	31-Oct-00
Minor Street:	Kuhio Place/Kaae Road	Analyst:	SMU
Peak Hour:	AM PEAK (6:45 - 7:45 am)	File Name:	waiehu bch-kuhio-kaae exist
Scenario:	Existing		

Peak Hour Factor:	1.00
——MAJOR STREET——	
Num of Lanes - V2:	1
Excl LT - V1 (Y/N):	Y
Excl RT - V3 (Y/N):	N
Stop/Yield - V3 (Y/N):	N
Grade - V1,V2,V3:	0
Num of Lanes - V5:	1
Excl LT - V4 (Y/N):	Y
Excl RT - V6 (Y/N):	N
Stop/Yield - V6 (Y/N):	N
Grade - V4,V5,V6:	0
——MINOR STREET——	
Num of Lanes - V8:	2
Grade - V7,V8,V9:	0
Shared Lane-V7,8,9:	1
(0=N,1=LT,2=TR,3=LTR)	
Num of Lanes - V11:	2
Grade - V10,V11,V12:	0
Shared Lane-V10,11,12	1
(0=N,1=LT,2=TR,3=LTR)	



VOLUME ADJUSTMENTS												
MOVEMENT NO.	1	2	3	4	5	6	7	8	9	10	11	12
HOURLY FLOW RATE, V(vph)	1	881	9	64	323	14	3	1	126	17	1	2
VOLUME, v (pcph)	1	881	9	70	323	14	3	1	139	19	1	2

STEP 1: RT FROM MINOR STREET					
Conflicting Flows:	Vc9 = 1/2 V3 + V2 =	886	vhp	Vc12 = 1/2 V6 + V5 =	330 vhp
Potential Capacity:	Cp,9 =	493	pcph	Cp,12 =	942 pcph
Movement Capacity:	Cm,9=Cp,9=	493	pcph	Cm,12=Cp,12=	942 pcph
Prb. of Queu-free State:	po,9=1-v9/Cm,9=	0.72		po,12=1-v12/Cm,12=	1.00
STEP 2: LT FROM MAJOR STREET					
Conflicting Flows:	Vc,4 = V2 + V3 =	890	vhp	Vc,1 = V5 + V6 =	337 vhp
Potential Capacity:	Cp,4 =	646	pcph	Cp,1 =	1184 pcph
Movement Capacity:	Cm,4=Cp,4=	646	pcph	Cm,1=Cp,1=	1184 pcph
Prb. of Queu-free State:	po,4=1-v4/Cm4=	0.89		po,1=1-v1/Cm1=	1.00
Major Left Shared Lane Prob. of Queue-free State	p*o,4=	NA		p*o,1=	NA

—continued —

ATA Inc. TWO-WAY STOP CONTROLLED INTERSECTION LEVEL OF SERVICE ANALYSIS 1994 HCM

Major Street:	Waiehu Beach Road	DATE:	31-Oct-00
Minor Street:	Kuhio Place/Kaae Road	Analyst:	SMU
Peak Hour:	AM PEAK (6:45 - 7:45 am)	File Name:	waiehu bch-kuhio-kaae exist
Scenario:	Existing		

STEP 3: TH FROM MINOR STREET					
Conflicting Flows:	Vc,8 = 1/2V3+V2+V1+V6+V5+V4 =	1288	vph	Vc,11 = 1/2V6+V5+V4+V3+V2+V1 =	1285 vph
Potential Capacity:	Cp,8 =	230	pcph	Cp,11 =	231 pcph
Capacity Adj Factor:	f8 = po,4*po,1 =	0.89		f11 = po,4*po,1 =	0.89
Movement Capacity:	Cm,8 = Cp,8*f8 =	205	pcph	Cm,11 = Cp,11*f11 =	206 pcph
Prob. of Queue-free State:	po,8 = 1-v8/Cm,8 =	1.00		po,11 = 1-v11/Cm,11 =	1.00

STEP 4: LT FROM MINOR STREET					
Conflicting Flows:	Vc,7 = 1/2V3+V2+V1+1/2V6+V5+V4+ 1/2(V11+V12) =	1282	vph	Vc,10 = 1/2V6+V5+V4+1/2V3+V2+V1+ 1/2(V8+V9) =	1344 vph
Potential Capacity:	Cp7 =	192	pcph	Cp10 =	176 pcph
Major Left, Minor Through Impedance Factor:	P*7=po,11*f11 =	0.89		P*10=po,8*f8 =	0.89
Major Left, Minor Through Adjusted Impedance Factor:	p'7 =	0.91		p'10 =	0.91
Capacity Adjustment Factor:	f7 = p'7*po,12 =	0.91		f10 = p'10*po,9 =	0.66
Movement Capacity:	Cm,7 = f7*Cp,7 =	175	pcph	Cm,10 = f10*Cp,10 =	116 pcph

DELAY AND LEVEL OF SERVICE SUMMARY

MOVEMENT	v(pcph)	cm(pcph)	csh(pcph)	AVG TOTAL DELAY	LOS
MINOR LEFT TURN (7)	3	175	SHRD	SHRD	—
MINOR THROUGH (8)	1	205	181	20.30	D
MINOR RIGHT TURN (9)	139	493	--NA--	10.15	C
MINOR LEFT TURN (10)	19	116	SHRD	SHRD	—
MINOR THROUGH (11)	1	206	118	36.55	E
MINOR RIGHT TURN (12)	2	942	--NA--	3.83	A
MAJOR LEFT (1)	1	1184	--NA--	3.04	A
MAJOR LEFT (4)	70	646	--NA--	6.25	B
MINOR APPROACH (7)(8)(9)	-	-	-	10.43	C
MINOR APPROACH (10)(11)(12)	-	-	-	33.58	E
MAJOR APPROACH (1)(2)(3)	-	-	-	0.00	—
MAJOR APPROACH (4)(5)(6)	-	-	-	1.07	A
TOTAL INTERSECTION (1-12)	-	-	-	1.85	A

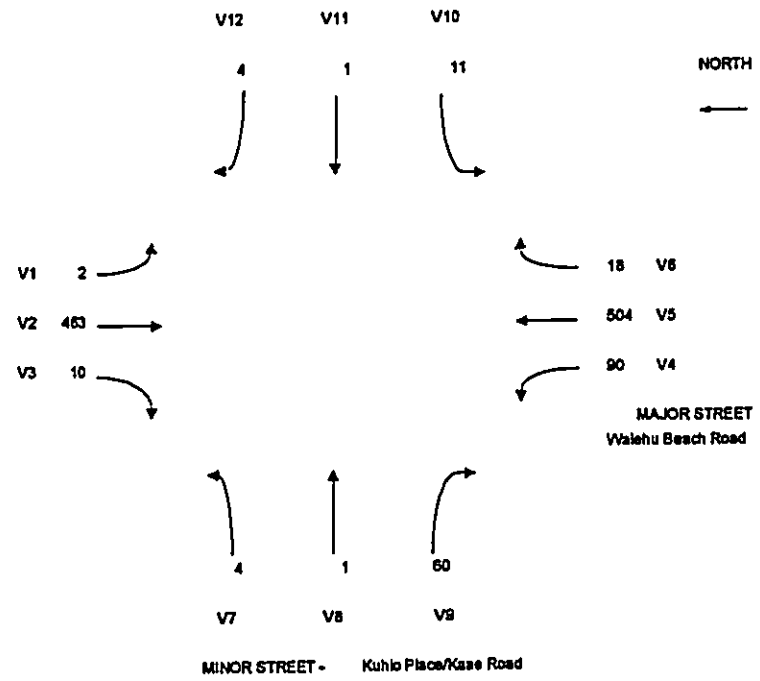
LEVEL OF SERVICE CRITERIA

LEVEL OF SERVICE	AVG TOTAL DELAY (SEC/VEH)
A	<=5
B	>5&<=10
C	>10&<=20
D	>20&<=30
E	>30&<=45
F	>45

ATA Inc. TWO-WAY STOP CONTROLLED INTERSECTION LEVEL OF SERVICE ANALYSIS 1994 HCM

Major Street:	Waiehu Beach Road	Print Date:	31-Oct-00
Minor Street:	Kuhio Place/Kase Road	Analyst:	SMU
Peak Hour:	PM PEAK (2:00 - 3:00 pm)	File Name:	waiehu bch-kuhio-kase exist
Scenario:	Existing	Intesection #:	

Peak Hour Factor:	1.00
MAJOR STREET	
Num of Lanes - V2:	1
Excl LT - V1 (Y/N):	Y
Excl RT - V3 (Y/N):	N
Stop/Yield - V3 (Y/N):	N
Grade - V1,V2,V3:	0
Num of Lanes - V5:	1
Excl LT - V4 (Y/N):	Y
Excl RT - V6 (Y/N):	N
Stop/Yield - V6 (Y/N):	N
Grade - V4,V5,V6:	0
MINOR STREET	
Num of Lanes - V8:	2
Grade - V7,V8,V9:	0
Shared Lane-V7,8,9: (0=N,1=LT,2=TR,3=LTR)	1
Num of Lanes - V11:	2
Grade - V10,V11,V12:	0
Shared Lane-V10,11,12: (0=N,1=LT,2=TR,3=LTR)	1



VOLUME ADJUSTMENTS

MOVEMENT NO.	1	2	3	4	5	6	7	8	9	10	11	12
HOURLY FLOW RATE, V(vph)	2	463	10	90	504	18	4	1	60	11	1	4
VOLUME, v (pcph)	2	463	10	99	504	18	4	1	66	12	1	4

STEP 1: RT FROM MINOR STREET					
Conflicting Flows:	Vc9 = 1/2 V3 + V2 =	468	vhp	Vc12 = 1/2 V6 + V5 =	513 vhp
Potential Capacity:	Cp,9 =	802	pcph	Cp,12 =	761 pcph
Movement Capacity:	Cm,9=Cp,9=	802	pcph	Cm,12=Cp,12=	761 pcph
Prb. of Queu-free State:	po,9=1-v9/Cm,9=	0.92		po,12=1-v12/Cm,12=	0.99

STEP 2: LT FROM MAJOR STREET					
Conflicting Flows:	Vc,4 = V2 + V3 =	473	vhp	Vc,1 = V5 + V6 =	522 vhp
Potential Capacity:	Cp,4 =	1020	pcph	Cp,1 =	967 pcph
Movement Capacity:	Cm,4=Cp,4=	1020	pcph	Cm,1=Cp,1=	967 pcph
Prb. of Queu-free State:	po,4=1-v4/Cm4=	0.90		po,1=1-v1/Cm1=	1.00
Major Left Shared Lane Prob. of Queue-free State	p*o,4=	NA		p*o,1=	NA

—continued—

ATA Inc. TWO-WAY STOP CONTROLLED INTERSECTION LEVEL OF SERVICE ANALYSIS 1994 HCM

Major Street:	Waiehu Beach Road	DATE:	31-Oct-00
Minor Street:	Kuhio Place/Kase Road	Analyst:	SMU
Peak Hour:	PM PEAK (2:00 - 3:00 pm)	File Name:	waiehu bch-kuhio-kase exist
Scenario:	Existing		

STEP 3: TH FROM MINOR STREET						
Conflicting Flows:	Vc,8 = 1/2V3+V2+V1+V6+V5+V4 =	1082	vph	Vc,11 = 1/2V6+V5+V4+V3+V2+V1 =	1078	vph
Potential Capacity:	Cp,8 =	295	pcph	Cp,11 =	297	pcph
Capacity Adj Factor:	f8 = po,4*po,1 =	0.90		f11 = po,4*po,1 =	0.90	
Movement Capacity:	Cm,8 = Cp,8*f8 =	266	pcph	Cm,11 = Cp,11*f11 =	267	pcph
Prob. of Queue-free State:	po,8 = 1-v8/Cm,8 =	1.00		po,11 = 1-v11/Cm,11 =	1.00	

STEP 4: LT FROM MINOR STREET						
Conflicting Flows:	Vc,7 = 1/2V3+V2+V1+1/2V6+V5+V4+ 1/2(V11+V12) =	1076	vph	Vc,10 = 1/2V6+V5+V4+1/2V3+V2+V1+ 1/2(V8+V9) =	1104	vph
Potential Capacity:	Cp7 =	252	pcph	Cp10 =	243	pcph
Major Left, Minor Through Impedance Factor:	P*7=po,11*f11 =	0.90		P*10=po,8*f8 =	0.90	
Major Left, Minor Through Adjusted Impedance Factor:	p'7 =	0.92		p'10 =	0.92	
Capacity Adjustment Factor:	f7 = p'7*po,12 =	0.92		f10 = p'10*po,9 =	0.85	
Movement Capacity:	Cm,7 = f7*Cp,7 =	231	pcph	Cm,10 = f10*Cp,10 =	206	pcph

DELAY AND LEVEL OF SERVICE SUMMARY

MOVEMENT	v(pcph)	cm(pcph)	csh(pcph)	AVG TOTAL DELAY	LOS
MINOR LEFT TURN (7)	4	231	SHRD	SHRD	—
MINOR THROUGH (8)	1	266	238	15.48	C
MINOR RIGHT TURN (9)	56	602	--NA--	4.89	A
MINOR LEFT TURN (10)	12	206	SHRD	SHRD	—
MINOR THROUGH (11)	1	267	209	18.33	C
MINOR RIGHT TURN (12)	4	761	--NA--	4.76	A
MAJOR LEFT (1)	2	967	--NA--	3.73	A
MAJOR LEFT (4)	99	1020	--NA--	3.91	A
MINOR APPROACH (7)(8)(9)	-	-	-	5.64	B
MINOR APPROACH (10)(11)(12)	-	-	-	15.14	C
MAJOR APPROACH (1)(2)(3)	-	-	-	0.02	A
MAJOR APPROACH (4)(5)(6)	-	-	-	0.62	A
TOTAL INTERSECTION (1-12)	-	-	-	0.90	A

LEVEL OF SERVICE CRITERIA

LEVEL OF SERVICE	AVG TOTAL DELAY (SEC/VEH)
A	<=5
B	>5&<=10
C	>10&<=20
D	>20&<=30
E	>30&<=45
F	>45

ATA Inc. STOP CONTROLLED T-INTERSECTION LEVEL OF SERVICE ANALYSIS 1994 HCM

Major Street: Waiehu Beach Road
Minor Street: Kealii Drive
Peak Hour: AM (6:45 - 7:45 am)
Scenario: Existing

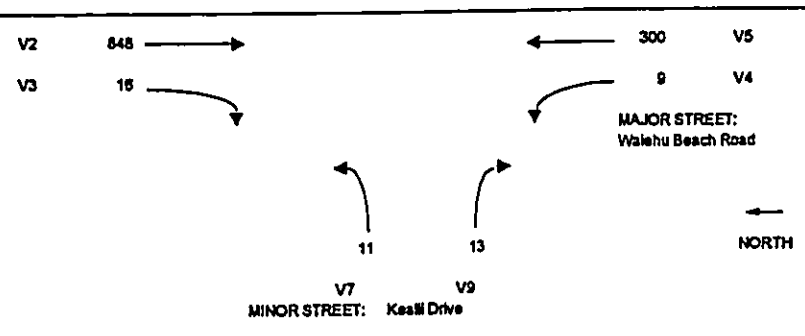
Print Date: 31-Oct-00
Analyst: SMU
File Name: waiehu bch-kealii exist

Peak Hour Factor: 1.00

MAJOR STREET
Num of Lanes - V2: 1
Excl RT - V3 (Y/N): N
Stop/Yield - V3 (Y/N): N
% Grade - V2,V3: 0

Num of Lanes - V5: 1
Excl LT - V4 (Y/N): Y
% Grade - V4,V5: 0

MINOR STREET
Num of Lanes - V7,V9: 1
Shared Lane (Y/N): Y
% Grade - V7&V9: 0



VOLUME ADJUSTMENTS

MOVEMENT NO.	2	3	4	5	7	9
VOLUME, V (vph)	848	16	9	300	11	13
VOLUME, v (pcph)	848	16	10	300	12	14

STEP 1: RT FROM MINOR STREET - V9

Conflicting Flows: Vc,9 = 1/2*V3+V2 = 8 + 848 = 856 vph
Potential Capacity: Cp,9 = 510 pcph
Movement Capacity: Cm,p = Cp,9 = 510 pcph

STEP 2: LT FROM MAJOR STREET - V4

Conflicting Flows: Vc,4 = V3+V2 = 16 + 848 = 864 vph
Potential Capacity: Cp,4 = 664 pcph
Movement Capacity: Cm,4 = Cp,4 = 664 pcph
Prob. of Queue-free State: po,4 = 1-v4/Cm,4 = 0.99
Major Left Shared Lane Prob. of Queue-free State: p*o,4 = NA

STEP 3: LT FROM MINOR STREET - V7

Conflicting Flows: Vc,7 = 1/2V3+V2+V5+V4 = 1165 vph
Potential Capacity: Cp,7 = 224 pcph
Capacity Adjustment Factor Due To Impeding Movements: f7=po,4= 0.99
Movement Capacity: Cm,7 = Cp,7 = 221 pcph

DELAY AND LEVEL OF SERVICE SUMMARY

Movement	v(vcph)	cm(pcph)	csh (pcph)	AVG TOTAL DELAY	LOS
MINOR LEFT TURN (7)	12	221	SHRD	SHRD	SHRD
MINOR RIGHT TURN (9)	14	510	319	12.32	C
MAJOR LEFT TURN (4)	10	664	—	5.50	B

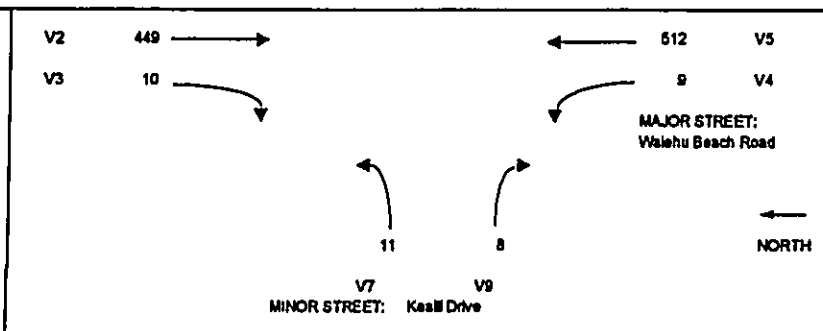
AVERAGE MINOR APPROACH DELAY = 12.32 sec/veh
LEVEL OF SERVICE = C

AVERAGE TOTAL INTERSECTION DELAY = 0.32 sec/veh
LEVEL OF SERVICE = A

ATA Inc. STOP CONTROLLED T-INTERSECTION LEVEL OF SERVICE ANALYSIS 1994 HCM

Major Street:	Waiehu Beach Road	Print Date:	31-Oct-00
Minor Street:	Kealii Drive	Analyst:	SMU
Peak Hour:	PM (2:00 - 3:00 pm)	File Name:	waiehu bch-kealii exist
Scenario:	Existing		

Peak Hour Factor:	1.00
——MAJOR STREET——	
Num of Lanes - V2:	1
Excl RT - V3 (Y/N):	N
Stop/Yield - V3 (Y/N):	N
% Grade - V2,V3:	0
Num of Lanes - V5:	1
Excl LT - V4 (Y/N):	Y
% Grade - V4,V5:	0
——MINOR STREET——	
Num of Lanes - V7,V9:	1
Shared Lane (Y/N):	Y
% Grade - V7&V9:	0



VOLUME ADJUSTMENTS

MOVEMENT NO.	2	3	4	5	7	9
VOLUME, V (vph)	449	10	9	512	11	8
VOLUME, v (pcph)	449	10	10	512	12	9

STEP 1: RT FROM MINOR STREET - V9

Conflicting Flows:	Vc,9 = 1/2*V3+V2 =	5	+	449	=	454 vph
Potential Capacity:	Cp,9 =					815 pcph
Movement Capacity:	Cm,p = Cp,9 =					815 pcph

STEP 2: LT FROM MAJOR STREET - V4

Conflicting Flows:	Vc,4 = V3+V2 =	10	+	449	=	459 vph
Potential Capacity:	Cp,4 =					1036 pcph
Movement Capacity:	Cm,4 = Cp,4 =					1036 pcph
Prob. of Queue-free State:	po,4 = 1-v4/Cm,4 =					0.99
Major Left Shared Lane Prob. of Queue-free State:	p*o,4 =					NA

STEP 3: LT FROM MINOR STREET - V7

Conflicting Flows:	Vc,7 = 1/2V3+V2+V5+V4 =	975	vph
Potential Capacity:	Cp,7 =	289	pcph
Capacity Adjustment Factor Due To Impeding Movements:	f7=po,4=	0.99	
Movement Capacity:	Cm,7 = Cp,7 =	286	pcph

DELAY AND LEVEL OF SERVICE SUMMARY

Movement	v(vcph)	cm(pcph)	csh (pcph)	AVG TOTAL DELAY	LOS
MINOR LEFT TURN (7)	12	286	SHRD	SHRD	SHRD
MINOR RIGHT TURN (9)	9	815	393	9.66	B
MAJOR LEFT TURN (4)	10	1036	—	3.51	A

AVERAGE MINOR APPROACH DELAY =	9.66	sec/veh	AVERAGE TOTAL INTERSECTION DELAY = 0.24 sec/veh
LEVEL OF SERVICE =	B		LEVEL OF SERVICE = A

AUSTIN, TSUTSUMI & ASSOCIATES, INC.
CIVIL ENGINEERS • SURVEYORS

APPENDIX C

LEVEL OF SERVICE CALCULATIONS

- Future Year 2001 Without Project Conditions

ATA Inc. | TWO-WAY STOP CONTROLLED INTERSECTION LEVEL OF SERVICE ANALYSIS | 1994 HCM

Major Street:	Waiehu Beach Road	Print Date:	31-Oct-00
Minor Street:	Kuhio Place/Kase Road	Analyst:	SMU
Peak Hour:	AM PEAK	File Name:	waiehu bch-kuhio-kase fwop
Scenario:	Future Conditions without Project		

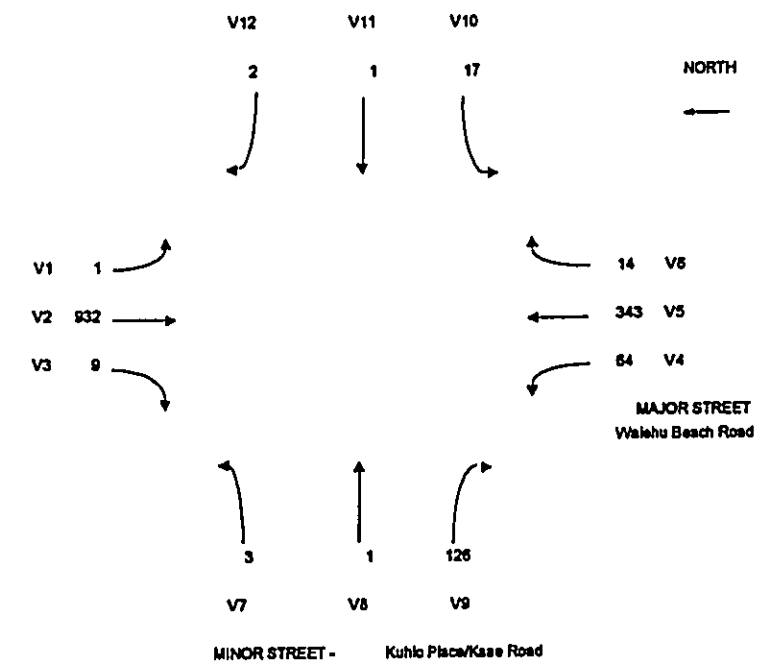
Peak Hour Factor: 1.00

MAJOR STREET

Num of Lanes - V2:	1
Excl LT - V1 (Y/N):	Y
Excl RT - V3 (Y/N):	N
Stop/Yield - V3 (Y/N):	N
Grade - V1,V2,V3:	0
Num of Lanes - V5:	1
Excl LT - V4 (Y/N):	Y
Excl RT - V6 (Y/N):	N
Stop/Yield - V6 (Y/N):	N
Grade - V4,V5,V6:	0

MINOR STREET

Num of Lanes - V8:	2
Grade - V7,V8,V9:	0
Shared Lane-V7,8,9: (0=N,1=LT,2=TR,3=LTR)	1
Num of Lanes - V11:	2
Grade - V10,V11,V12:	0
Shared Lane-V10,11,12 (0=N,1=LT,2=TR,3=LTR)	1



VOLUME ADJUSTMENTS

MOVEMENT NO.	1	2	3	4	5	6	7	8	9	10	11	12
HOURLY FLOW RATE, V(vph)	1	932	9	64	343	14	3	1	126	17	1	2
VOLUME, v (pcph)	1	932	9	70	343	14	3	1	139	19	1	2

STEP 1: RT FROM MINOR STREET

Conflicting Flows:	Vc9 = 1/2 V3 + V2 =	937	vhp	Vc12 = 1/2 V6 + V5 =	350	vhp
Potential Capacity:	Cp,9 =	464	pcph	Cp,12 =	920	pcph
Movement Capacity:	Cm,9=Cp,9=	464	pcph	Cm,12=Cp,12=	920	pcph
Prb. of Queu-free State:	po,9=1-v9/Cm,9=	0.70		po,12=1-v12/Cm,12=	1.00	

STEP 2: LT FROM MAJOR STREET

Conflicting Flows:	Vc,4 = V2 + V3 =	941	vhp	Vc,1 = V5 + V6 =	357	vhp
Potential Capacity:	Cp,4 =	610	pcph	Cp,1 =	1159	pcph
Movement Capacity:	Cm,4=Cp,4=	610	pcph	Cm,1=Cp,1=	1159	pcph
Prb. of Queu-free State:	po,4=1-v4/Cm4=	0.89		po,1=1-v1/Cm1=	1.00	
Major Left Shared Lane Prob. of Queue-free State	p*o,4=	NA		p*o,1=	NA	

—continued —

Major Street:	Waiehu Beach Road	DATE:	31-Oct-00
Minor Street:	Kuhio Place/Kase Road	Analyst:	SMU
Peak Hour:	AM PEAK	File Name:	waiehu bch-kuhio-kase fwop
Scenario:	Future Conditions without Project		

STEP 3: TH FROM MINOR STREET					
Conflicting Flows:	Vc,8 = 1/2V3+V2+V1+V6+V5+V4 =	1359	vph	Vc,11 = 1/2V6+V5+V4+V3+V2+V1 =	1356 vph
Potential Capacity:	Cp,8 =	211	pcph	Cp,11 =	212 pcph
Capacity Adj Factor:	f8 = po,4*po,1 =	0.88		f11 = po,4*po,1 =	0.88
Movement Capacity:	Cm,8 = Cp,8*f8 =	187	pcph	Cm,11 = Cp,11*f11 =	187 pcph
Prob. of Queue-free State:	po,8 = 1-v8/Cm,8 =	0.99		po,11 = 1-v11/Cm,11 =	0.99

STEP 4: LT FROM MINOR STREET					
Conflicting Flows:	Vc,7 = 1/2V3+V2+V1+1/2V6+V5+V4+ 1/2(V11+V12) =	1353	vph	Vc,10 = 1/2V6+V5+V4+1/2V3+V2+V1+ 1/2(V8+V9) =	1415 vph
Potential Capacity:	Cp7 =	174	pcph	Cp10 =	160 pcph
Major Left, Minor Through Impedance Factor:	P*7=po,11*f11 =	0.88		P*10=po,8*f8 =	0.88
Major Left, Minor Through Adjusted Impedance Factor:	p*7 =	0.91		p*10 =	0.91
Capacity Adjustment Factor:	f7 = p*7*po,12 =	0.91		f10 = p*10*po,9 =	0.64
Movement Capacity:	Cm,7 = f7*Cp,7 =	158	pcph	Cm,10 = f10*Cp,10 =	102 pcph

DELAY AND LEVEL OF SERVICE SUMMARY

MOVEMENT	v(pcph)	cm(pcph)	csh(pcph)	AVG TOTAL DELAY	LOS
MINOR LEFT TURN (7)	3	158	SHRD	SHRD	—
MINOR THROUGH (8)	1	187	164	22.46	D
MINOR RIGHT TURN (9)	139	464	--NA--	11.03	C
MINOR LEFT TURN (10)	19	102	SHRD	SHRD	—
MINOR THROUGH (11)	1	187	104	42.44	E
MINOR RIGHT TURN (12)	2	920	--NA--	3.92	A
MAJOR LEFT (1)	1	1159	--NA--	3.11	A
MAJOR LEFT (4)	70	610	--NA--	6.66	B
MINOR APPROACH (7)(8)(9)	-	-	-	11.35	C
MINOR APPROACH (10)(11)(12)	-	-	-	38.94	E
MAJOR APPROACH (1)(2)(3)	-	-	-	0.00	—
MAJOR APPROACH (4)(5)(6)	-	-	-	1.09	A
TOTAL INTERSECTION (1-12)	-	-	-	1.95	A

LEVEL OF SERVICE CRITERIA

LEVEL OF SERVICE	AVG TOTAL DELAY (SEC/VEH)
A	<=5
B	>5&<=10
C	>10&<=20
D	>20&<=30
E	>30&<=45
F	>45

ATA Inc. TWO-WAY STOP CONTROLLED INTERSECTION LEVEL OF SERVICE ANALYSIS 1994 HCM

Major Street:	Waiehu Beach Road	Print Date:	31-Oct-00
Minor Street:	Kuhio Place/Kaae Road	Analyst:	SMU
Peak Hour:	PM PEAK	File Name:	waiehu bch-kuhio-kaae fwop
Scenario:	Future Conditions without Project	Intesection #:	

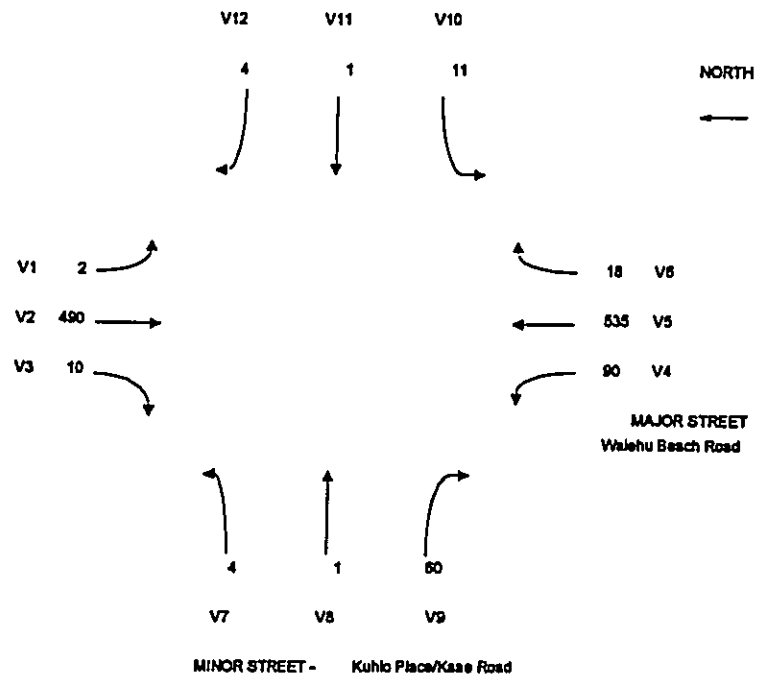
Peak Hour Factor: 1.00

——MAJOR STREET——

Num of Lanes - V2:	1
Excl LT - V1 (Y/N):	Y
Excl RT - V3 (Y/N):	N
Stop/Yield - V3 (Y/N):	N
Grade - V1,V2,V3:	0
Num of Lanes - V5:	1
Excl LT - V4 (Y/N):	Y
Excl RT - V6 (Y/N):	N
Stop/Yield - V6 (Y/N):	N
Grade - V4,V5,V6:	0

——MINOR STREET——

Num of Lanes - V8:	2
Grade - V7,V8,V9:	0
Shared Lane-V7,8,9: (0=N,1=LT,2=TR,3=LTR)	1
Num of Lanes - V11:	2
Grade - V10,V11,V12:	0
Shared Lane-V10,11,12: (0=N,1=LT,2=TR,3=LTR)	1



VOLUME ADJUSTMENTS

MOVEMENT NO.	1	2	3	4	5	6	7	8	9	10	11	12
HOURLY FLOW RATE, V(vph)	2	490	10	90	535	18	4	1	60	11	1	4
VOLUME, v (pcph)	2	490	10	99	535	18	4	1	66	12	1	4

STEP 1: RT FROM MINOR STREET					
Conflicting Flows:	Vc9 = 1/2 V3 + V2 =	495	vhp	Vc12 = 1/2 V6 + V5 =	544 vhp
Potential Capacity:	Cp,9 =	777	pcph	Cp,12 =	734 pcph
Movement Capacity:	Cm,9=Cp,9=	777	pcph	Cm,12=Cp,12=	734 pcph
Prb. of Queu-free State:	po,9=1-v9/Cm,9=	0.92		po,12=1-v12/Cm,12=	0.99

STEP 2: LT FROM MAJOR STREET					
Conflicting Flows:	Vc,4 = V2 + V3 =	500	vhp	Vc,1 = V5 + V6 =	553 vhp
Potential Capacity:	Cp,4 =	990	pcph	Cp,1 =	934 pcph
Movement Capacity:	Cm,4=Cp,4=	990	pcph	Cm,1=Cp,1=	934 pcph
Prb. of Queu-free State:	po,4=1-v4/Cm4=	0.90		po,1=1-v1/Cm1=	1.00
Major Left Shared Lane Prob. of Queue-free State	p*o,4=	NA		p*o,1=	NA

—continued—

ATA Inc. TWO-WAY STOP CONTROLLED INTERSECTION LEVEL OF SERVICE ANALYSIS 1994 HCM

Major Street:	Waiehu Beach Road	DATE:	31-Oct-00
Minor Street:	Kuhio Place/Kaae Road	Analyst:	SMU
Peak Hour:	PM PEAK	File Name:	waiehu bch-kuhio-kaae fwop
Scenario:	Future Conditions without Project		

STEP 3: TH FROM MINOR STREET					
Conflicting Flows:	Vc,8 = 1/2V3+V2+V1+V6+V5+V4 =	1140	vph	Vc,11 = 1/2V6+V5+V4+V3+V2+V1 =	1135 vph
Potential Capacity:	Cp,8 =	275	pcph	Cp,11 =	276 pcph
Capacity Adj Factor:	f8 = po,4*po,1 =	0.90		f11 = po,4*po,1 =	0.90
Movement Capacity:	Cm,8 = Cp,8*f8 =	247	pcph	Cm,11 = Cp,11*f11 =	248 pcph
Prob. of Queue-free State:	po,8 = 1-v8/Cm,8 =	1.00		po,11 = 1-v11/Cm,11 =	1.00

STEP 4: LT FROM MINOR STREET					
Conflicting Flows:	Vc,7 = 1/2V3+V2+V1+1/2V6+V5+V4+ 1/2(V11+V12) =	1134	vph	Vc,10 = 1/2V6+V5+V4+1/2V3+V2+V1+ 1/2(V8+V9) =	1162 vph
Potential Capacity:	Cp7 =	234	pcph	Cp10 =	225 pcph
Major Left, Minor Through Impedance Factor:	P*7=po,11*f11 =	0.89		P*10=po,8*f8 =	0.89
Major Left, Minor Through Adjusted Impedance Factor:	p'7 =	0.92		p'10 =	0.92
Capacity Adjustment Factor:	f7 = p*7*po,12 =	0.91		f10 = p'10*po,9 =	0.84
Movement Capacity:	Cm,7 = f7*Cp,7 =	214	pcph	Cm,10 = f10*Cp,10 =	189 pcph

DELAY AND LEVEL OF SERVICE SUMMARY

MOVEMENT	v(pcph)	cm(pcph)	csh(pcph)	AVG TOTAL DELAY	LOS
MINOR LEFT TURN (7)	4	214	SHRD	SHRD	—
MINOR THROUGH (8)	1	247	220	18.78	C
MINOR RIGHT TURN (9)	66	777	--NA--	5.06	B
MINOR LEFT TURN (10)	12	189	SHRD	SHRD	—
MINOR THROUGH (11)	1	248	193	20.02	D
MINOR RIGHT TURN (12)	4	734	--NA--	4.93	A
MAJOR LEFT (1)	2	934	--NA--	3.86	A
MAJOR LEFT (4)	99	990	--NA--	4.04	A
MINOR APPROACH (7)(8)(9)	-	-	-	5.89	B
MINOR APPROACH (10)(11)(12)	-	-	-	16.47	C
MAJOR APPROACH (1)(2)(3)	-	-	-	0.02	A
MAJOR APPROACH (4)(5)(6)	-	-	-	0.61	A
TOTAL INTERSECTION (1-12)	-	-	-	0.90	A

LEVEL OF SERVICE CRITERIA

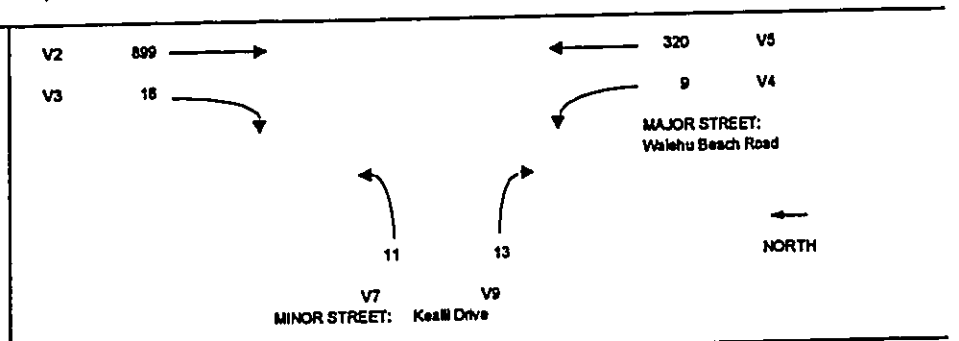
LEVEL OF SERVICE	AVG TOTAL DELAY (SEC/VEH)
A	<=5
B	>5&<=10
C	>10&<=20
D	>20&<=30
E	>30&<=45
F	>45

ATA Inc. STOP CONTROLLED T-INTERSECTION LEVEL OF SERVICE ANALYSIS 1994 HCM

Major Street: Waiehu Beach Road
Minor Street: Kealii Drive
Peak Hour: AM PEAK
Scenario: Future Conditions without Project

Print Date: 31-Oct-00
Analyst: SMU
File Name: waiehu bch-kealii fwop

Peak Hour Factor:	1.00
——MAJOR STREET——	
Num of Lanes - V2:	1
Excl RT - V3 (Y/N):	N
Stop/Yield - V3 (Y/N):	N
% Grade - V2,V3:	0
Num of Lanes - V5:	1
Excl LT - V4 (Y/N):	Y
% Grade - V4,V5:	0
——MINOR STREET——	
Num of Lanes - V7,V9:	1
Shared Lane (Y/N):	Y
% Grade - V7&V9:	0



VOLUME ADJUSTMENTS

MOVEMENT NO.	2	3	4	5	7	9
VOLUME, V (vph)	899	16	9	320	11	13
VOLUME, v (pcph)	899	16	10	320	12	14

STEP 1: RT FROM MINOR STREET - V9

Conflicting Flows:	Vc,9 = 1/2*V3+V2 =	8	+	899	=	907	vph
Potential Capacity:	Cp,9 =					481	pcph
Movement Capacity:	Cm,p = Cp,9 =					481	pcph

STEP 2: LT FROM MAJOR STREET - V4

Conflicting Flows:	Vc,4 = V3+V2 =	16	+	899	=	915	vph
Potential Capacity:	Cp,4 =					628	pcph
Movement Capacity:	Cm,4 = Cp,4 =					628	pcph
Prob. of Queue-free State:	po,4 = 1-v4/Cm,4 =					0.98	
Major Left Shared Lane Prob. of Queue-free State:	p*o,4 =					NA	

STEP 3: LT FROM MINOR STREET - V7

Conflicting Flows:	Vc,7 = 1/2V3+V2+V5+V4 =					1236	vph
Potential Capacity:	Cp,7 =					204	pcph
Capacity Adjustment Factor Due To Impeding Movements:	f7*po,4=					0.98	
Movement Capacity:	Cm,7 = Cp,7 =					201	pcph

DELAY AND LEVEL OF SERVICE SUMMARY

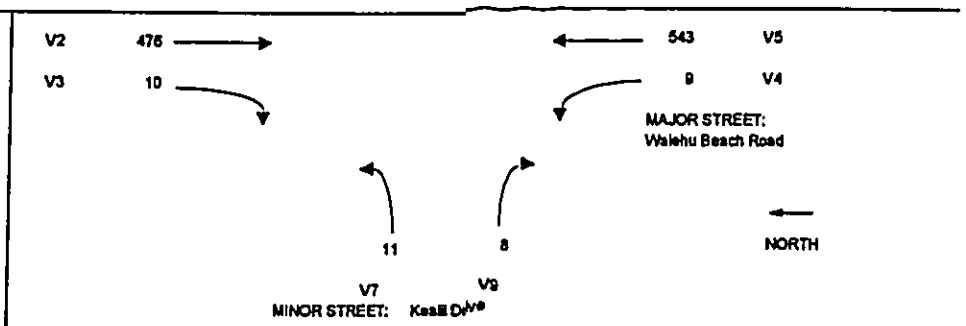
Movement	v(vph)	cm(pcph)	csh (pcph)	AVG TOTAL DELAY	LOS
MINOR LEFT TURN (7)	12	201	SHRD	SHRD	SHRD
MINOR RIGHT TURN (9)	14	481	293	13.50	C
MAJOR LEFT TURN (4)	10	628	——	5.62	B

AVERAGE MINOR APPROACH DELAY =	13.50	sec/veh	AVERAGE TOTAL INTERSECTION DELAY =	0.33 sec/veh
LEVEL OF SERVICE =	C		LEVEL OF SERVICE =	A

ATA Inc. STOP CONTROLLED T-INTERSECTION LEVEL OF SERVICE ANALYSIS 1994 HCM

Major Street:	Waiehu Beach Road	Prnt Date:	31-Oct-00
Minor Street:	Kealii Drive	Analyst:	SMU
Peak Hour:	PM PEAK	File Name:	waiehu bch-kealii fwop
Scenario:	Future Conditions without Project		

Peak Hour Factor:	1.00
—MAJOR STREET—	
Num of Lanes - V2:	1
Excl RT - V3 (Y/N):	N
Stop/Yield - V3 (Y/N):	N
% Grade - V2,V3:	0
Num of Lanes - V5:	1
Excl LT - V4 (Y/N):	Y
% Grade - V4,V5:	0
—MINOR STREET—	
Num of Lanes - V7,V9:	1
Shared Lane (Y/N):	Y
% Grade - V7&V9:	0



VOLUME ADJUSTMENTS

MOVEMENT NO.	2	3	4	5	7	9
VOLUME, V (vph)	476	10	9	543	11	8
VOLUME, v (pcph)	476	10	10	543	12	9

STEP 1: RT FROM MINOR STREET - V9

Conflicting Flows:	Vc,9 = 1/2*V3+V2 =	5	+	476	=	481	vph
Potential Capacity:	Cp,9 =					790	pcph
Movement Capacity:	Cm,p = Cp,9 =					790	pcph

STEP 2: LT FROM MAJOR STREET - V4

Conflicting Flows:	Vc,4 = V3+V2 =	10	+	476	=	486	vph
Potential Capacity:	Cp,4 =					1006	pcph
Movement Capacity:	Cm,4 = Cp,4 =					1006	pcph
Prob. of Queue-free State:	po,4 = 1-v4/Cm,4 =					0.99	
Major Left Shared Lane Prob. of Queue-free State:	p*o,4 =					NA	

STEP 3: LT FROM MINOR STREET - V7

Conflicting Flows:	Vc,7 = 1/2V3+V2+V5+V4 =	1033	vph
Potential Capacity:	Cp,7 =	267	pcph
Capacity Adjustment Factor Due To Impeding Movements:	f7=po,4=	0.99	
Movement Capacity:	Cm,7 = Cp,7 =	264	pcph

DELAY AND LEVEL OF SERVICE SUMMARY

Movement	v(vcph)	cm(pcph)	csh (pcph)	AVG TOTAL DELAY	LOS
MINOR LEFT TURN (7)	12	264	SHRD	SHRD	SHRD
MINOR RIGHT TURN (9)	9	790	367	10.39	C
MAJOR LEFT TURN (4)	10	1006	—	3.61	A

AVERAGE MINOR APPROACH DELAY =	10.39	sec/veh	AVERAGE TOTAL INTERSECTION DELAY = 0.24 sec/veh
LEVEL OF SERVICE =	C		LEVEL OF SERVICE = A

AUSTIN, TSUTSUMI & ASSOCIATES, INC.
CIVIL ENGINEERS • SURVEYORS

APPENDIX C

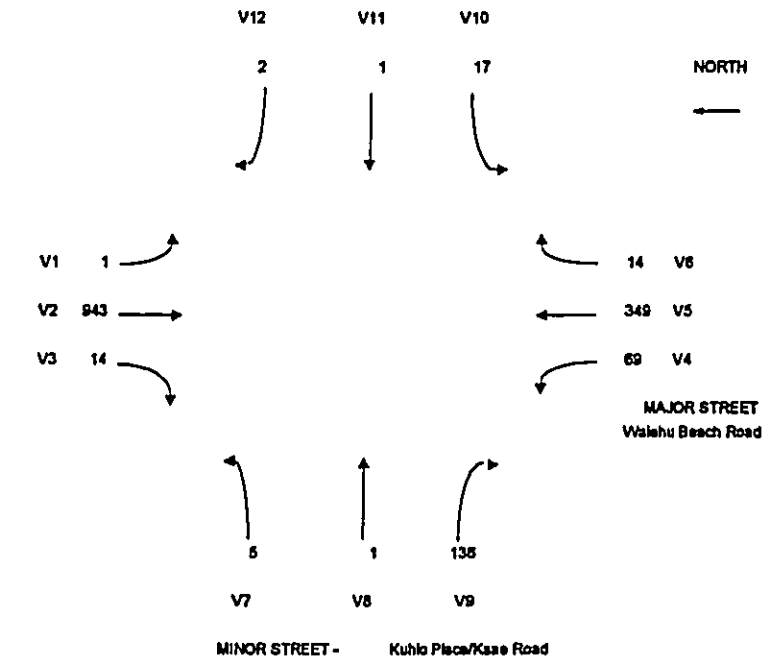
LEVEL OF SERVICE CALCULATIONS

- Future Year 2001 With Project Conditions

ATA Inc. TWO-WAY STOP CONTROLLED INTERSECTION LEVEL OF SERVICE ANALYSIS 1994 HCM

Major Street:	Waiehu Beach Road	Print Date:	31-Oct-00
Minor Street:	Kuhio Place/Kaae Road	Analyst:	SMU
Peak Hour:	AM PEAK	File Name:	waiehu bch-kuhio-kaae fwp
Scenario:	Future Conditions with Project		

Peak Hour Factor:	1.00
------MAJOR STREET------	
Num of Lanes - V2:	1
Excl LT - V1 (Y/N):	Y
Excl RT - V3 (Y/N):	N
Stop/Yield - V3 (Y/N):	N
Grade - V1,V2,V3:	0
Num of Lanes - V5:	1
Excl LT - V4 (Y/N):	Y
Excl RT - V6 (Y/N):	N
Stop/Yield - V6 (Y/N):	N
Grade - V4,V5,V6:	0
------MINOR STREET------	
Num of Lanes - V8:	2
Grade - V7,V8,V9:	0
Shared Lane-V7,8,9: (0=N,1=LT,2=TR,3=LTR)	1
Num of Lanes - V11:	2
Grade - V10,V11,V12:	0
Shared Lane-V10,11,12 (0=N,1=LT,2=TR,3=LTR)	1



VOLUME ADJUSTMENTS												
MOVEMENT NO.	1	2	3	4	5	6	7	8	9	10	11	12
HOURLY FLOW RATE, V(vph)	1	943	14	69	349	14	5	1	136	17	1	2
VOLUME, v (pcph)	1	943	14	76	349	14	6	1	150	19	1	2

STEP 1: RT FROM MINOR STREET						
Conflicting Flows:	Vc9 = 1/2 V3 + V2 =	950	vhp	Vc12 = 1/2 V6 + V5 =	356	vhp
Potential Capacity:	Cp,9 =	457	pcph	Cp,12 =	914	pcph
Movement Capacity:	Cm,9=Cp,9=	457	pcph	Cm,12=Cp,12=	914	pcph
Prb. of Queu-free State:	po,9=1-v9/Cm,9=	0.67		po,12=1-v12/Cm,12=	1.00	
STEP 2: LT FROM MAJOR STREET						
Conflicting Flows:	Vc,4 = V2 + V3 =	957	vhp	Vc,1 = V5 + V6 =	363	vhp
Potential Capacity:	Cp,4 =	600	pcph	Cp,1 =	1151	pcph
Movement Capacity:	Cm,4=Cp,4=	600	pcph	Cm,1=Cp,1=	1151	pcph
Prb. of Queu-free State:	po,4=1-v4/Cm4=	0.87		po,1=1-v1/Cm1=	1.00	
Major Left Shared Lane Prob. of Queue-free State	p*o,4=	NA		p*o,1=	NA	

—continued —

ATA Inc. TWO-WAY STOP CONTROLLED INTERSECTION LEVEL OF SERVICE ANALYSIS 1994 HCM

Major Street:	Waiehu Beach Road	DATE:	31-Oct-00
Minor Street:	Kuhio Place/Kase Road	Analyst:	SMU
Peak Hour:	AM PEAK	File Name:	waiehu bch-kuhio-kase fwp
Scenario:	Future Conditions with Project		

STEP 3: TH FROM MINOR STREET					
Conflicting Flows:	Vc,8 = 1/2V3+V2+V1+V6+V5+V4 =	1383	vph	Vc,11 = 1/2V6+V5+V4+V3+V2+V1 =	1383 vph
Potential Capacity:	Cp,8 =	205	pcph	Cp,11 =	205 pcph
Capacity Adj Factor:	f8 = po,4*po,1 =	0.87		f11 = po,4*po,1 =	0.87
Movement Capacity:	Cm,8 = Cp,8*f8 =	179	pcph	Cm,11 = Cp,11*f11 =	179 pcph
Prob. of Queue-free State:	po,8 = 1-v6/Cm,8 =	0.99		po,11 = 1-v11/Cm,11 =	0.99

STEP 4: LT FROM MINOR STREET					
Conflicting Flows:	Vc,7 = 1/2V3+V2+V1+1/2V6+V5+V4+ 1/2(V11+V12) =	1378	vph	Vc,10 = 1/2V6+V5+V4+1/2V3+V2+V1+ 1/2(V8+V9) =	1445 vph
Potential Capacity:	Cp7 =	169	pcph	Cp10 =	154 pcph
Major Left, Minor Through Impedance Factor:	P*7=po,11*f11 =	0.87		P*10=po,8*f8 =	0.87
Major Left, Minor Through Adjusted Impedance Factor:	p*7 =	0.90		p*10 =	0.90
Capacity Adjustment Factor:	f7 = p*7*po,12 =	0.90		f10 = p*10*po,9 =	0.60
Movement Capacity:	Cm,7 = f7*Cp,7 =	151	pcph	Cm,10 = f10*Cp,10 =	93 pcph

DELAY AND LEVEL OF SERVICE SUMMARY

MOVEMENT	v(pcph)	cm(pcph)	csh(pcph)	AVG TOTAL DELAY	LOS
MINOR LEFT TURN (7)	6	151	SHRD	SHRD	—
MINOR THROUGH (8)	1	179	155	24.37	D
MINOR RIGHT TURN (9)	150	457	--NA--	11.68	C
MINOR LEFT TURN (10)	19	93	SHRD	SHRD	—
MINOR THROUGH (11)	1	179	95	47.46	F
MINOR RIGHT TURN (12)	2	914	--NA--	3.95	A
MAJOR LEFT (1)	1	1151	--NA--	3.13	A
MAJOR LEFT (4)	76	600	--NA--	6.87	B
MINOR APPROACH (7)(8)(9)	-	-	-	12.25	C
MINOR APPROACH (10)(11)(12)	-	-	-	43.50	E
MAJOR APPROACH (1)(2)(3)	-	-	-	0.00	—
MAJOR APPROACH (4)(5)(6)	-	-	-	1.19	A
TOTAL INTERSECTION (1-12)	-	-	-	2.19	A

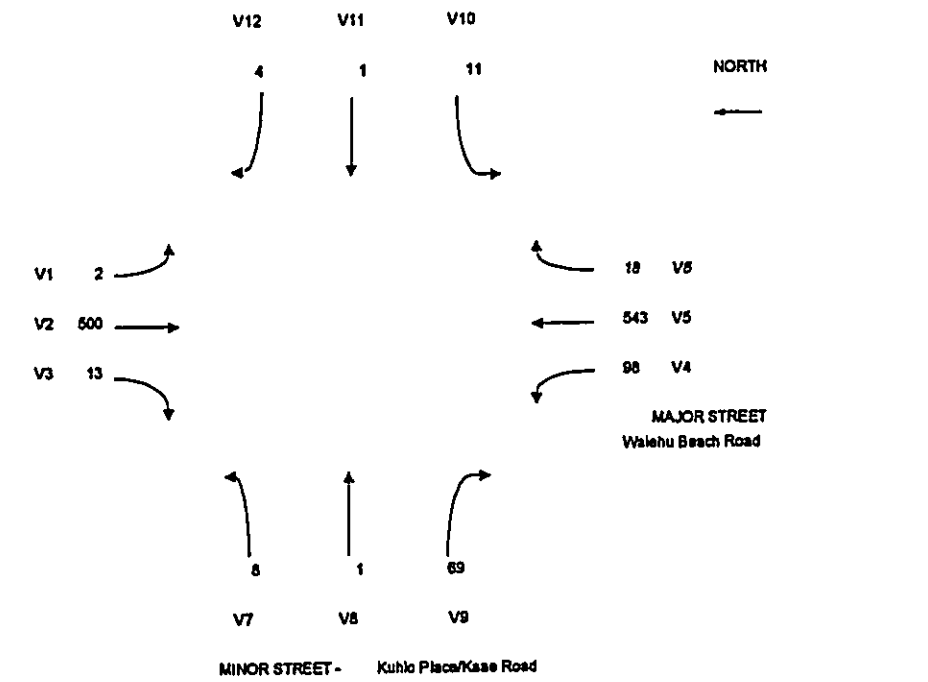
LEVEL OF SERVICE CRITERIA

LEVEL OF SERVICE	AVG TOTAL DELAY (SEC/VEH)
A	<=5
B	>5&<=10
C	>10&<=20
D	>20&<=30
E	>30&<=45
F	>45

ATA Inc. TWO-WAY STOP CONTROLLED INTERSECTION LEVEL OF SERVICE ANALYSIS 1994 HCM

Major Street:	Waiehu Beach Road	Print Date:	31-Oct-00
Minor Street:	Kuhio Place/Kaae Road	Analyst:	SMU
Peak Hour:	PM PEAK	File Name:	waiehu bch-kuhio-kaae fwp
Scenario:	Future Conditions with Project	Intesection #:	

Peak Hour Factor:	1.00
MAJOR STREET	
Num of Lanes - V2:	1
Excl LT - V1 (Y/N):	Y
Excl RT - V3 (Y/N):	N
Stop/Yield - V3 (Y/N):	N
Grade - V1,V2,V3:	0
Num of Lanes - V5:	1
Excl LT - V4 (Y/N):	Y
Excl RT - V6 (Y/N):	N
Stop/Yield - V6 (Y/N):	N
Grade - V4,V5,V6:	0
MINOR STREET	
Num of Lanes - V8:	2
Grade - V7,V8,V9:	0
Shared Lane-V7,8,9: (0=N,1=LT,2=TR,3=LTR)	1
Num of Lanes - V11:	2
Grade - V10,V11,V12:	0
Shared Lane-V10,11,12: (0=N,1=LT,2=TR,3=LTR)	1



VOLUME ADJUSTMENTS												
MOVEMENT NO.	1	2	3	4	5	6	7	8	9	10	11	12
HOURLY FLOW RATE, V(vph)	2	500	13	98	543	18	8	1	69	11	1	4
VOLUME, v (pcph)	2	500	13	108	543	18	9	1	76	12	1	4

STEP 1: RT FROM MINOR STREET					
Conflicting Flows:	Vc9 = 1/2 V3 + V2 =	507	vhp	Vc12 = 1/2 V6 + V5 =	552 vhp
Potential Capacity:	Cp,9 =	767	pcph	Cp,12 =	727 pcph
Movement Capacity:	Cm,9=Cp,9=	767	pcph	Cm,12=Cp,12=	727 pcph
Prb. of Queu-free State:	po,9=1-v9/Cm,9=	0.90		po,12=1-v12/Cm,12=	0.99
STEP 2: LT FROM MAJOR STREET					
Conflicting Flows:	Vc,4 = V2 + V3 =	513	vhp	Vc,1 = V5 + V6 =	561 vhp
Potential Capacity:	Cp,4 =	976	pcph	Cp,1 =	926 pcph
Movement Capacity:	Cm,4=Cp,4=	976	pcph	Cm,1=Cp,1=	926 pcph
Prb. of Queu-free State:	po,4=1-v4/Cm4=	0.89		po,1=1-v1/Cm1=	1.00
Major Left Shared Lane Prob. of Queue-free State	p*o,4=	NA		p*o,1=	NA

—continued —

ATA Inc. TWO-WAY STOP CONTROLLED INTERSECTION LEVEL OF SERVICE ANALYSIS 1994 HCM

Major Street:	Waiehu Beach Road	DATE:	31-Oct-00
Minor Street:	Kuhio Place/Kaae Road	Analyst:	SMU
Peak Hour:	PM PEAK	File Name:	waiehu bch-kuhio-kaae fwp
Scenario:	Future Conditions with Project		

STEP 3: TH FROM MINOR STREET						
Conflicting Flows:	Vc,8 = 1/2V3+V2+V1+V6+V5+V4 =	1168	vph	Vc,11 = 1/2V6+V5+V4+V3+V2+V1 =	1165	vph
Potential Capacity:	Cp,8 =	266	pcph	Cp,11 =	267	pcph
Capacity Adj Factor:	f8 = po,4*po,1 =	0.89		f11 = po,4*po,1 =	0.89	
Movement Capacity:	Cm,8 = Cp,8*f8 =	236	pcph	Cm,11 = Cp,11*f11 =	237	pcph
Prob. of Queue-free State:	po,8 = 1-v8/Cm,8 =	1.00		po,11 = 1-v11/Cm,11 =	1.00	

STEP 4: LT FROM MINOR STREET						
Conflicting Flows:	Vc,7 = 1/2V3+V2+V1+1/2V6+V5+V4+ 1/2(V11+V12) =	1161	vph	Vc,10 = 1/2V6+V5+V4+1/2V3+V2+V1+ 1/2(V8+V9) =	1194	vph
Potential Capacity:	Cp7 =	225	pcph	Cp10 =	216	pcph
Major Left, Minor Through Impedance Factor:	P*7=po,11*f11 =	0.88		P*10=po,8*f8 =	0.88	
Major Left, Minor Through Adjusted Impedance Factor:	p'7 =	0.91		p'10 =	0.91	
Capacity Adjustment Factor:	f7 = p'7*po,12 =	0.91		f10 = p'10*po,9 =	0.62	
Movement Capacity:	Cm,7 = f7*Cp,7 =	204	pcph	Cm,10 = f10*Cp,10 =	177	pcph

DELAY AND LEVEL OF SERVICE SUMMARY

MOVEMENT	v(pcph)	cm(pcph)	csh(pcph)	AVG TOTAL DELAY	LOS
MINOR LEFT TURN (7)	9	204	SHRD	SHRD	—
MINOR THROUGH (8)	1	236	207	18.29	C
MINOR RIGHT TURN (9)	76	757	--NA--	5.21	B
MINOR LEFT TURN (10)	12	177	SHRD	SHRD	—
MINOR THROUGH (11)	1	237	180	21.49	D
MINOR RIGHT TURN (12)	4	727	--NA--	4.98	A
MAJOR LEFT (1)	2	926	--NA--	3.89	A
MAJOR LEFT (4)	108	976	--NA--	4.15	A
MINOR APPROACH (7)(8)(9)	-	-	-	6.73	B
MINOR APPROACH (10)(11)(12)	-	-	-	17.61	C
MAJOR APPROACH (1)(2)(3)	-	-	-	0.02	A
MAJOR APPROACH (4)(5)(6)	-	-	-	0.67	A
TOTAL INTERSECTION (1-12)	-	-	-	1.05	A

LEVEL OF SERVICE CRITERIA

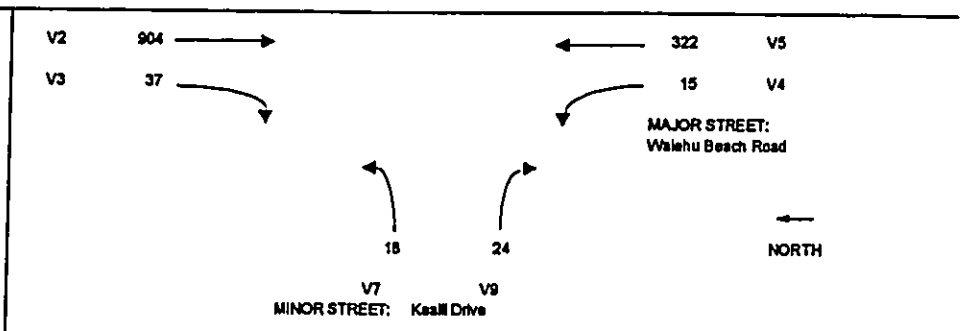
LEVEL OF SERVICE	AVG TOTAL DELAY (SEC/VEH)
A	<=5
B	>5&<=10
C	>10&<=20
D	>20&<=30
E	>30&<=45
F	>45

ATA Inc. STOP CONTROLLED T-INTERSECTION LEVEL OF SERVICE ANALYSIS 1994 HCM

Major Street: Waiehu Beach Road
Minor Street: Kaalii Drive
Peak Hour: AM PEAK
Scenario: Future Conditions with Project

Print Date: 31-Oct-00
Analyst: SMU
File Name: waiehu bch-kaalii fap

Peak Hour Factor:	1.00
——MAJOR STREET——	
Num of Lanes - V2:	1
Excl RT - V3 (Y/N):	N
Stop/Yield - V3 (Y/N):	N
% Grade - V2,V3:	0
Num of Lanes - V5:	1
Excl LT - V4 (Y/N):	Y
% Grade - V4,V5:	0
——MINOR STREET——	
Num of Lanes - V7,V9:	1
Shared Lane (Y/N):	Y
% Grade - V7&V9:	0



VOLUME ADJUSTMENTS

MOVEMENT NO.	2	3	4	5	7	9
VOLUME, V (vph)	904	37	15	322	18	24
VOLUME, v (pcph)	904	37	17	322	20	26

STEP 1: RT FROM MINOR STREET - V9

Conflicting Flows:	Vc,9 = 1/2*V3+V2 =		19	+	904	=	923 vph
Potential Capacity:	Cp,9 =						472 pcph
Movement Capacity:	Cm,p = Cp,9 =						472 pcph

STEP 2: LT FROM MAJOR STREET - V4

Conflicting Flows:	Vc,4 = V3+V2 =		37	+	904	=	941 vph
Potential Capacity:	Cp,4 =						610 pcph
Movement Capacity:	Cm,4 = Cp,4 =						610 pcph
Prob. of Queue-free State:	po,4 = 1-v4/Cm,4 =						0.97
Major Left Shared Lane Prob. of Queue-free State:	p*o,4 =						NA

STEP 3: LT FROM MINOR STREET - V7

Conflicting Flows:	Vc,7 = 1/2V3+V2+V5+V4 =	1260	vph
Potential Capacity:	Cp,7 =	197	pcph
Capacity Adjustment Factor Due To Impeding Movements:	f7=po,4=	0.97	
Movement Capacity:	Cm,7 = Cp,7 =	192	pcph

DELAY AND LEVEL OF SERVICE SUMMARY

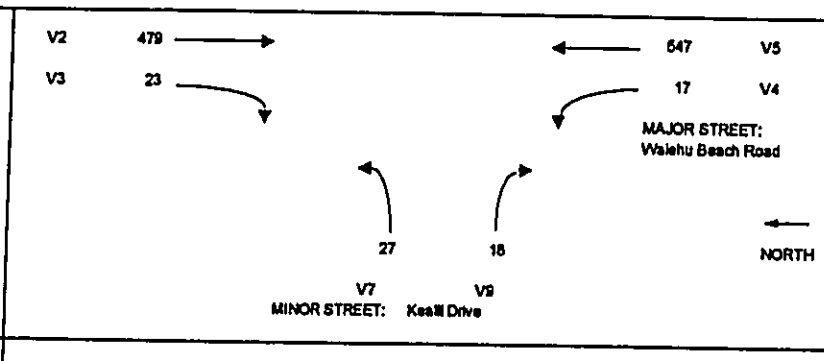
Movement	v(vph)	cm(pcph)	csh (pcph)	AVG TOTAL DELAY	LOS
MINOR LEFT TURN (7)	20	192	SHRD	SHRD	SHRD
MINOR RIGHT TURN (9)	26	472	291	14.72	C
MAJOR LEFT TURN (4)	17	610	——	6.06	B

AVERAGE MINOR APPROACH DELAY =	14.72	sec/veh	
LEVEL OF SERVICE =	C		
AVERAGE TOTAL INTERSECTION DELAY =	0.59	sec/veh	
LEVEL OF SERVICE =	A		

ATA Inc. STOP CONTROLLED T-INTERSECTION LEVEL OF SERVICE ANALYSIS 1994 HCM

Major Street:	Waiehu Beach Road	Print Date:	31-Oct-00
Minor Street:	Kealii Drive	Analyst:	SMU
Peak Hour:	PM PEAK	File Name:	waiehu bch-kealii fwp
Scenario:	Future Conditions with Project		

Peak Hour Factor:	1.00
——MAJOR STREET——	
Num of Lanes - V2:	1
Excl RT - V3 (Y/N):	N
Stop/Yield - V3 (Y/N):	N
% Grade - V2,V3:	0
Num of Lanes - V5:	1
Excl LT - V4 (Y/N):	Y
% Grade - V4,V5:	0
——MINOR STREET——	
Num of Lanes - V7,V9:	1
Shared Lane (Y/N):	Y
% Grade - V7&V9:	0



VOLUME ADJUSTMENTS

MOVEMENT NO.	2	3	4	5	7	9
VOLUME, V (vph)	479	23	17	547	27	18
VOLUME, v (pcph)	479	23	19	547	30	20

STEP 1: RT FROM MINOR STREET - V9

Conflicting Flows:	Vc,9 = 1/2*V3+V2 =	12	+	479	=	491	vph
Potential Capacity:	Cp,9 =					781	pcph
Movement Capacity:	Cm,p = Cp,9 =					781	pcph

STEP 2: LT FROM MAJOR STREET - V4

Conflicting Flows:	Vc,4 = V3+V2 =	23	+	479	=	502	vph
Potential Capacity:	Cp,4 =					988	pcph
Movement Capacity:	Cm,4 = Cp,4 =					988	pcph
Prob. of Queue-free State:	po,4 = 1-v4/Cm,4 =					0.98	
Major Left Shared Lane Prob. of Queue-free State:	p*o,4 =					NA	

STEP 3: LT FROM MINOR STREET - V7

Conflicting Flows:	Vc,7 = 1/2V3+V2+V5+V4 =					1055	vph
Potential Capacity:	Cp,7 =					260	pcph
Capacity Adjustment Factor Due To Impeding Movements:	f7=po,4=					0.98	
Movement Capacity:	Cm,7 = Cp,7 =					255	pcph

DELAY AND LEVEL OF SERVICE SUMMARY

Movement	v(vph)	cm(pcph)	csh (pcph)	AVG TOTAL DELAY	LOS
MINOR LEFT TURN (7)	30	255	SHRD	SHRD	SHRD
MINOR RIGHT TURN (9)	20	781	349	12.03	C
MAJOR LEFT TURN (4)	19	988	——	3.71	A

AVERAGE MINOR APPROACH DELAY =	12.03	sec/veh	
LEVEL OF SERVICE =	C		
AVERAGE TOTAL INTERSECTION DELAY =	0.60	sec/veh	
LEVEL OF SERVICE =	A		

Appendix C

Drainage and Erosion Control Report

DRAINAGE AND SOIL EROSION CONTROL REPORT

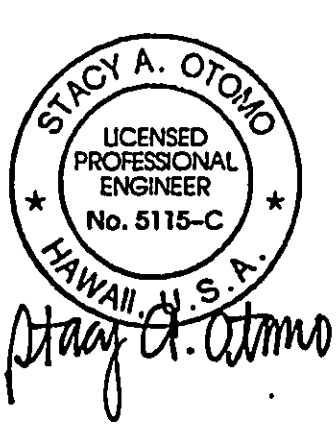
FOR

KSBE PAUKUKALO PRE-SCHOOL
Wailuku, Maui, Hawaii

T.M.K.: (2) 3-3-005: 086 & 087

Prepared For:

BAYLESS ARCHITECTS
305 S. High Street, Suite 101
Wailuku, Maui, Hawaii 96793



Prepared By:

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October, 2000

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DRAINAGE AND SOIL EROSION CONTROL REPORT
FOR
KSBE Paukukalo Pre-School
Wailuku, Maui, Hawaii

I. INTRODUCTION

The purpose of this report is to examine both the existing and proposed drainage conditions for the proposed project.

In addition, this examination and plan has been prepared to determine the potential movement of soil due to rainfall and surface runoff from the project site, and to prepare for measures which will control erosion therefrom. This is in accordance with Chapter 20.08 "Soil Erosion and Sediment Control" of the Maui County Code as part of the application for the grading and building permits.

II. SITE LOCATION AND PROJECT DESCRIPTION

The subject parcels are identified as T.M.K.: (2)3-3-005: 086 and 087 which encompasses an area of 206,612 and 70,982 square feet, respectively. The project site is bordered by the Paukukalo Residence Lots and Kaumualii Street to the north, Paukukalo Park to the east, the existing Community Center building and covered basketball court to the south, and the Waiehu Terrace Subdivision to the west.

Associated improvements include the demolition of an existing building and parking area, paved parking areas, walkways, drainage system, utility connections, and landscaping.

III. EXISTING TOPOGRAPHY AND SOIL CONDITIONS

The project site is developed with the original Community Center building, the new Community Center building, covered basketball court, and paved parking. The remainder of the site is overgrown with weeds and a few trees. It is estimated that the ground slopes approximately 5% in a west to east direction.

According to the "Soil Survey of Islands of Kauai, Oahu, Maui, Molokai, and Lanai, State of Hawaii (August, 1972)," prepared by the United States Department of Agriculture Soil Conservation Service, the soil within the project site is classified as Puuone sand (PZUE). Puuone sand is characterized as having rapid permeability above the cemented layer, slow runoff, and a moderate to severe erosion hazard due to wind.

IV. EXISTING DRAINAGE CONDITIONS

Runoff from the project site presently sheet flows into Paukukalo Park. The park is a low-lying area with a grated catch basin located at the low point at the northwestern corner of the park. Runoff is intercepted from this area and conveyed across Waiehu Beach Road into the low area near the ocean.

It is estimated that the existing 50-year storm runoff from the project site is 6.3 cfs.

V. FLOOD AND TSUNAMI ZONE

According to Panel Number 150003 0190 D of the Flood Insurance Rate Map, March 16, 1995, prepared by the United States Federal Emergency Management Agency, the project site is situated in Flood Zone C. Flood Zone C represents areas of minimal flooding.

VI. PROPOSED DRAINAGE PLAN

After the development of the proposed project, it is estimated that the 50-year storm runoff will be 7.7 cfs, a net increase of 1.4 cfs.

An onsite grated catch basin will collect the additional runoff generated from the project site and divert it to an onsite subsurface drainage system. There will be no additional runoff sheet flowing from the project site into Paukukalo Park. This is in accordance with Chapter 4, "Rules for the Design of Storm Drainage Facilities in the County of Maui."

VII. HYDROLOGIC CALCULATIONS

The hydrologic calculations are based on the "Drainage Master Plan for the County of Maui," and the "Rainfall Frequency Atlas of the Hawaiian Islands," Technical Paper No. 43, U.S. Department of Commerce, Weather Bureau.

Rational Formula Used: $Q = CIA$

Where Q = rate of flow (cfs)

C = rainfall coefficient

I = rainfall intensity for a duration equal to the time of concentration (inches/hour)

A = drainage area (Acres)

See Appendix A for Hydrologic Calculations

VIII. SOIL EROSION CONTROL PLAN

A. General:

Based on the Hawaii Environmental Simulation Laboratory (HESL) equations to estimate soil loss during the construction period, and complemented by the following erosion control plan, the soil loss during the construction period is well within the tolerable limits (See Appendix B).

Based on the County Erosion Control Standards and Guidelines, the allowable erosion rate is 6,250 tons/acre/year for a 6-month grading period and the maximum tolerable severity rating number (H) is 50,000.

B. Erosion Control Plan:

The following measures will be taken to control erosion during the site development period (estimated 6 months).

1. Minimize time of construction.
2. Retain existing ground cover until latest date to complete construction.
3. Early construction of drainage control features.
4. Use temporary area sprinklers in non-active construction areas when ground cover is removed.
5. Station water truck on site during construction period to provide for *immediate sprinkling, as needed, in active construction zones (weekends* and holidays included).
6. Use temporary berms and cut-off ditches, where needed, for control of erosion.
7. Graded areas shall be thoroughly watered after construction activity has ceased for the day and on weekends.
8. All cut and fill slopes shall be sodded or planted immediately after grading work has been completed.

The development project is provided with adequate facilities for drainage control and storm water disposal. This, together with ultimate ground cover, shall preclude any appreciable onsite erosion.

IX. CONCLUSION

The proposed development is expected to generate a 50-year storm runoff of 7.7 cfs, with an increase of 1.4 cfs. The runoff will be intercepted by an onsite grated catch basin and conveyed to an onsite subsurface drainage system. No additional runoff will sheet flow into Paukukalo Park.

Based on our calculations, the sedimentation hazard to coastal waters and downstream properties is minimal (see Exhibit B). The soil loss per unit area and severity rating computed for the proposed development are well within the tolerable limits.

Therefore, it is our professional opinion that the proposed development will not have an adverse effect on the adjoining properties downstream.

X. REFERENCES

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

B. Erosion and Sediment Control Guide for Hawaii, prepared by U.S. Department of Agriculture, Soil Conservation Service, March, 1981.

C. Rainfall-Frequency Atlas of the Hawaiian Islands, Technical Paper No. 43, U.S. Department of Commerce, Weather Bureau, 1962.

D. Flood Insurance Rate Maps of the County of Maui, March, 1995.

E. Chapter 4, Rules for the Design of Storm Drainage Facilities in the County of Maui, prepared by the Department of Public Works and Waste Management, County of Maui, 1995.

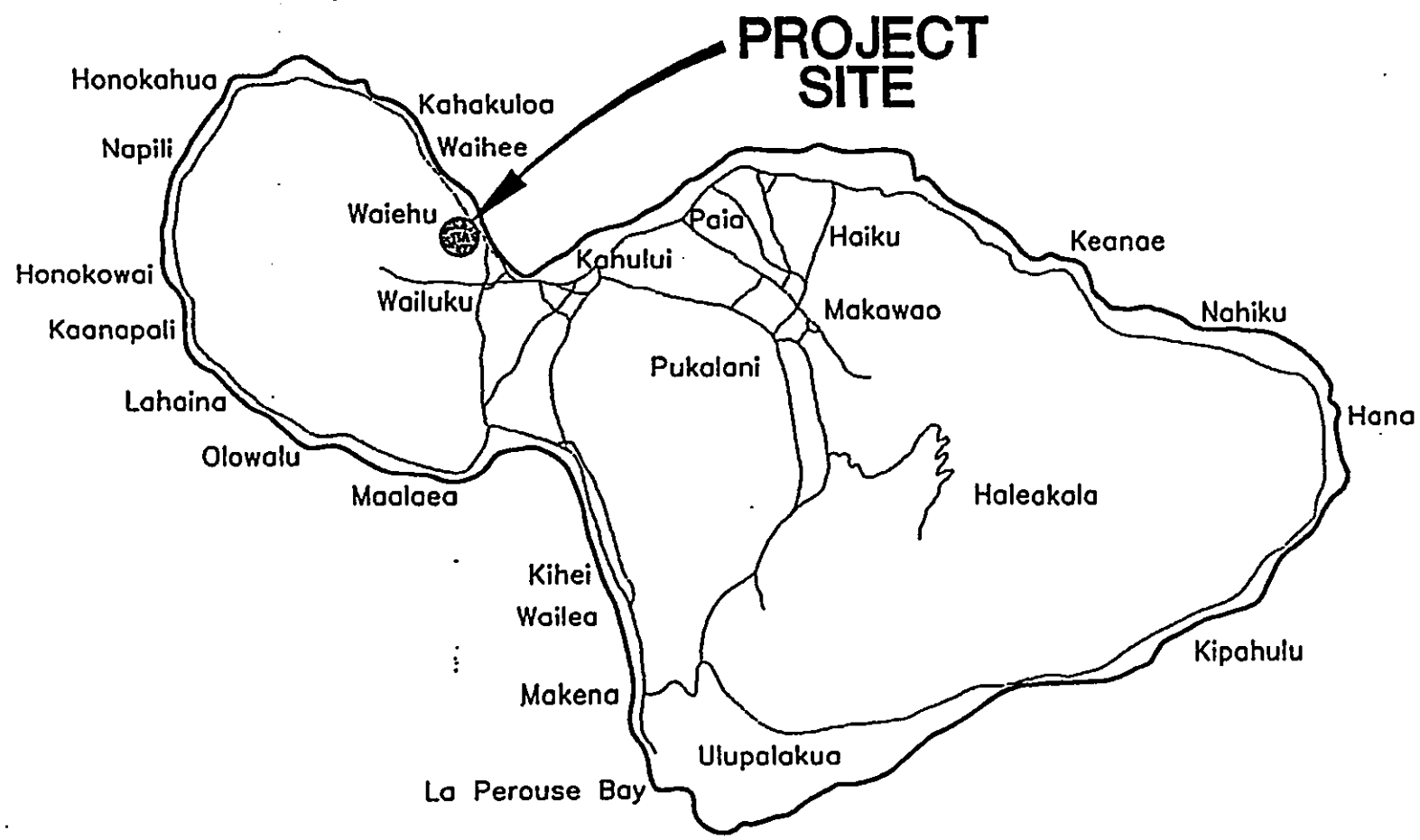
EXHIBITS

1 Location Map

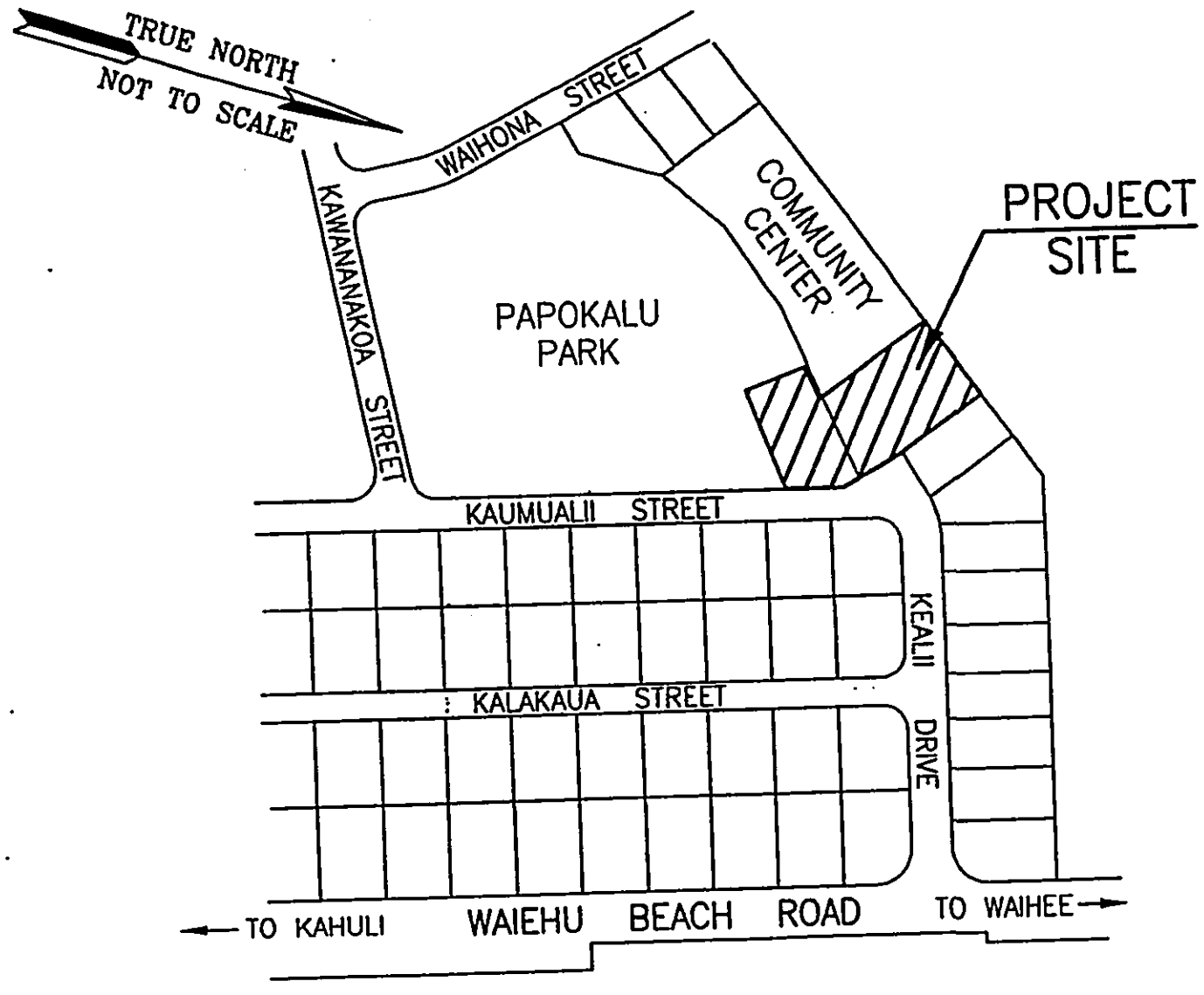
2 Vicinity Map

3 Soil Survey Map

4 Flood Insurance Rate Map



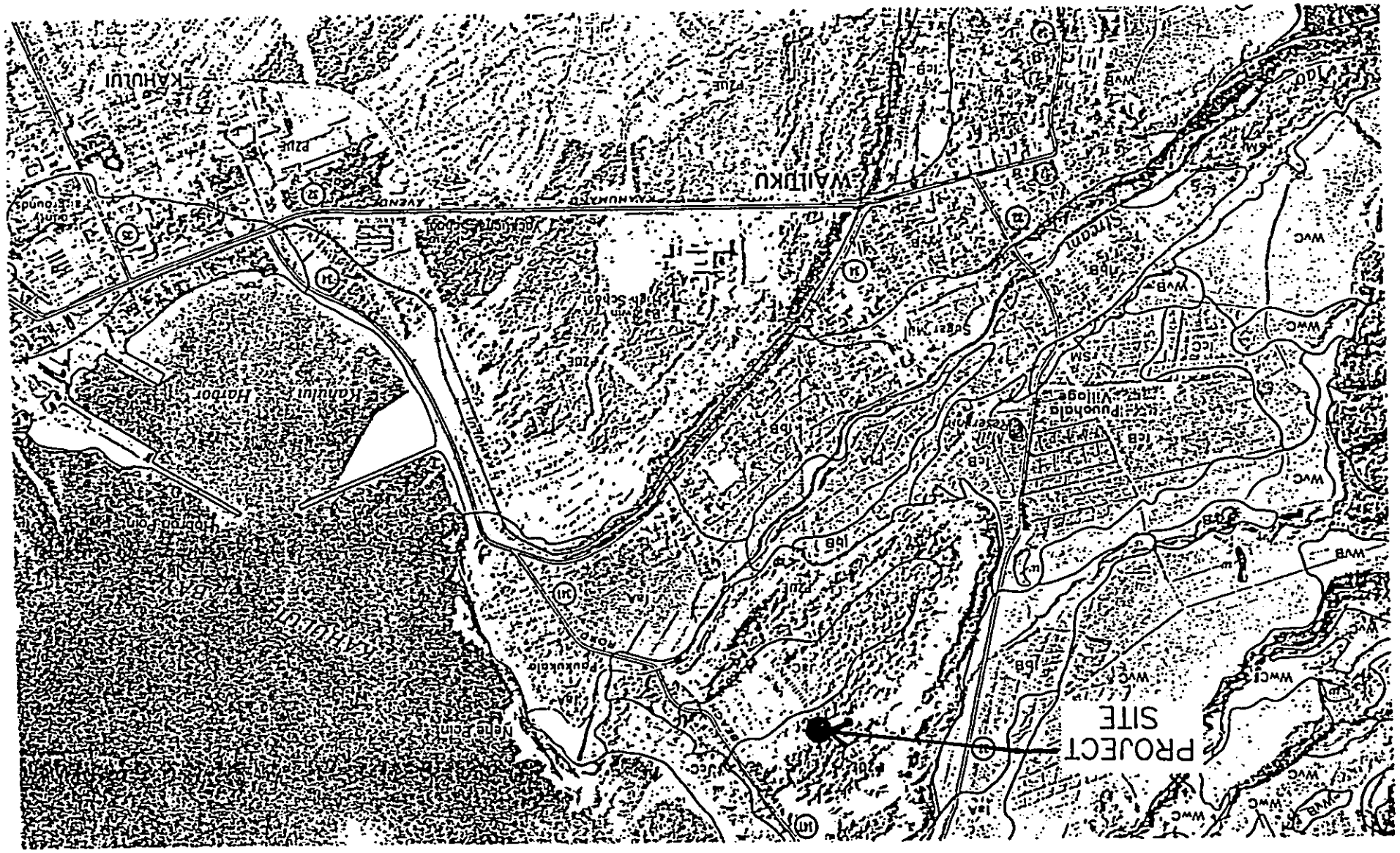
LOCATION MAP
EXHIBIT 1

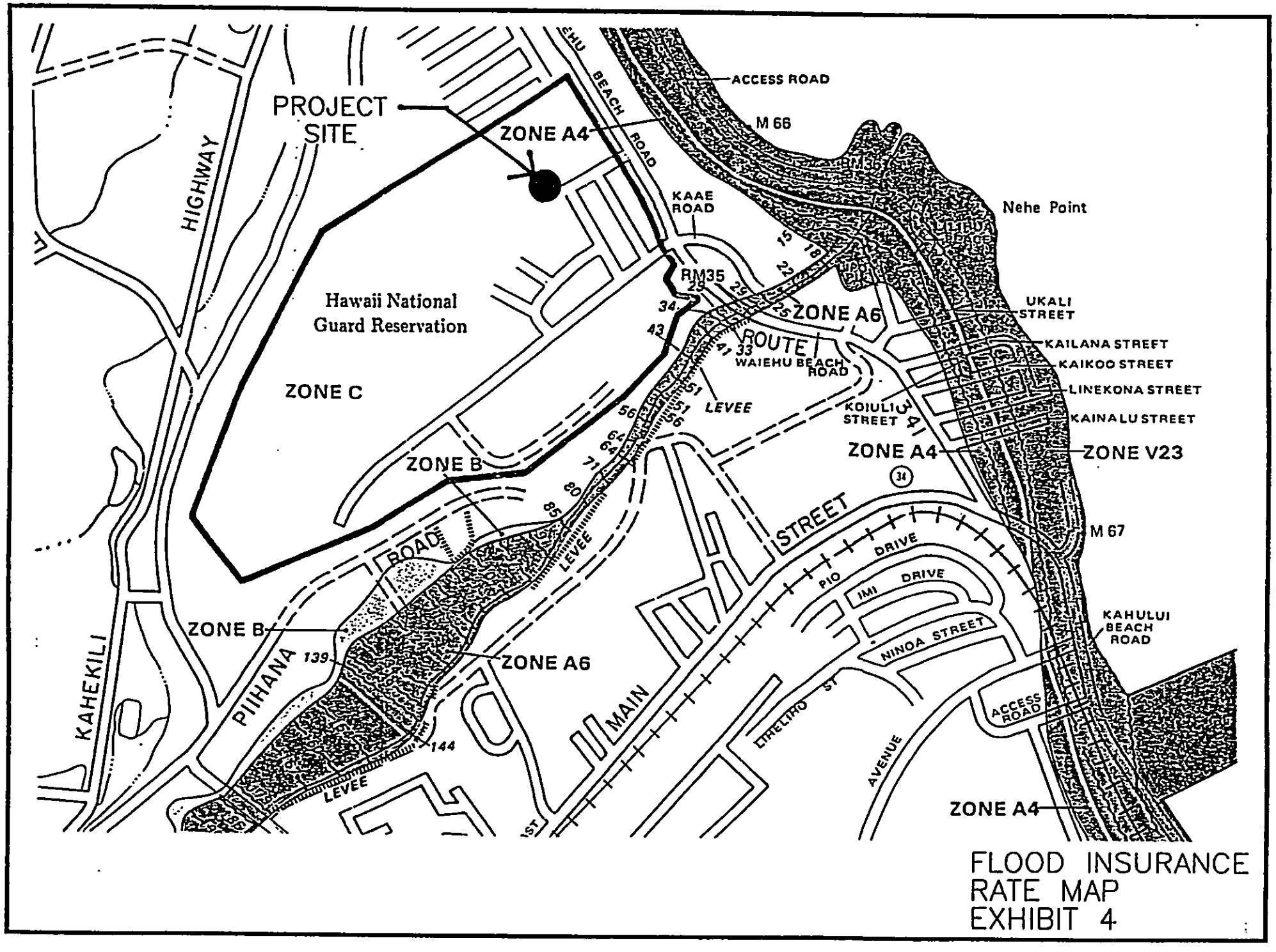


VICINITY MAP
NOT TO SCALE

VICINITY MAP
EXHIBIT 2

SOIL SURVEY MAP
EXHIBIT 3





APPENDIX A

HYDROLOGIC AND HYDRAULIC CALCULATIONS

Hydrologic Calculations

Purpose: Determine the increase in surface runoff from the development of the proposed project based on a 50-year storm.

A. Determine the Runoff Coefficient (C):

PAVEMENT AREAS:

Infiltration (Negligible)	= 0.20
Relief (Flat)	= 0.00
Vegetal Cover (None)	= 0.07
Development Type (Commercial)	= 0.55
C	= 0.82

ROOF AREAS:

Infiltration (Negligible)	= 0.20
Relief (Steep)	= 0.08
Vegetal Cover (None)	= 0.07
Development Type (Commercial)	= 0.55
C	= 0.90

LANDSCAPED AREAS:

Infiltration (Medium)	= 0.07
Relief (Flat)	= 0.00
Vegetal Cover (High)	= 0.00
Development Type (Open)	= 0.15
C	= 0.22

EXISTING CONDITION:

Pavement Areas = 0.59 Acres

Roof Areas = 0.33 Acres

Landscaped Areas = 1.58 Acres

WEIGHTED C = 0.45

DEVELOPED CONDITIONS:

Pavement Areas = 0.91 Acres

Roof Areas = 0.42 Acres

Landscaped Areas = 1.17 Acres

WEIGHTED C = 0.55

B. Determine the 50-year 1-hour rainfall:

i_{50} = 3.0 inches

Adjust for time of concentration to compute Rainfall Intensity (I):

Existing Condition:

T_c = 14 minutes

I = 5.6 inches/hour

Developed Condition:

T_c = 14 minutes

I = 5.6 inches/hour

C. Drainage Area (A) = 2.50 Acres (Affected Area)

D. Compute the 50-year storm runoff volume (Q):

Q = CIA

Existing Conditions:

Q = (0.45)(5.6)(2.50)

= 6.3 cfs

Developed Conditions:

$$Q = (0.55)(5.6)(2.50)$$

$$= 7.7 \text{ cfs}$$

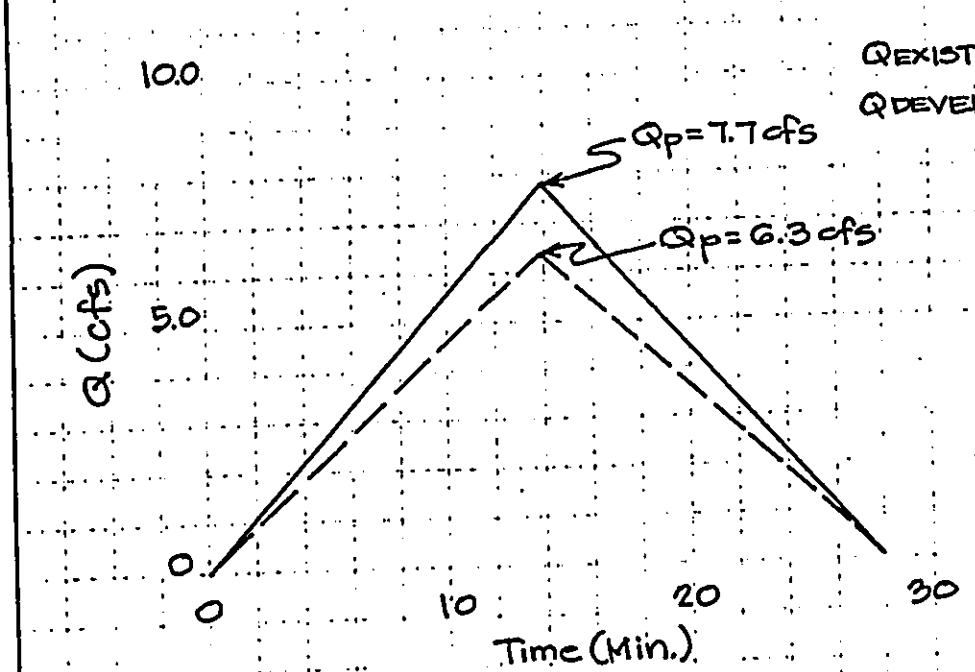
The increase in runoff due to the proposed development is 7.7 - 6.3 = 1.4 cfs.

Project KSBE - Pre-School

Calculated by S.A.O. Date 10-23-00

OTOMO ENGINEERING, INC.
CONSULTING CIVIL ENGINEERS

Determine the storage volume required for a subsurface drainage system to handle the increase in runoff from the project site for a 50-year storm. Per County of Maui drainage standards, the increase in runoff will be handled by the subsurface drainage system.



$Q_{EXISTING} = 6.3$ cfs, $T_c = 14$ min.

$Q_{DEVELOPED} = 7.7$ cfs, $T_c = 14$ min.

Existing Volume = $(6.3\ ft^3/sec)(14\ min)(60\ sec/min) = 5,292\ ft^3$

Developed Volume = $(7.7\ ft^3/sec)(14\ min)(60\ sec/min) = 6,468\ ft^3$

Required Storage Volume = $6,468\ ft^3 - 5,292\ ft^3 = 1,176\ ft^3$

Project KSBE - Pre-School

Calculated by S.A.O. Date 10-23-00

OTOMO ENGINEERING, INC.
CONSULTING CIVIL ENGINEERS

Determine the size of the perforated drainage system required to handle the increase in runoff volume.

Given: Required Storage Volume = 1,176 ft^3
43% of the rock volume is void space
Only 50% of the rock void space to be used as storage

Use 90 feet of 36" perforated pipe.
Area = $\pi(1.50)^2 = 7.07$ ft^2
Area of crushed rock = $[(7.0)(6.0) - 7.07] = 34.93$ ft^2
Volume of rock voids = $(34.93)(0.43)(0.50)(90) = 676$ ft^3
Volume of 36" pipe = $(90)(7.07) = 636$ ft^3

Total Storage Volume Available = 676 + 636 = 1,312 ft^3 > 1,176 ft^3 (ok)

Factor of Safety = $\frac{1,312 - 1,176}{1,176} = 12\%$

APPENDIX B

UNIVERSAL SOIL LOSS CALCULATIONS

Universal Soil Loss Calculations

A. HESL Soil Loss Calculations:

1. Erosion rate, as set forth by the County of Maui Ordinance:

$$E = R \times K \times LS \times C \times P$$

Where:

E = Soil Loss in tons/acre/year

R = Rainfall Factor = 190 tons/acre/year

K = Soil Erodibility Factor = 0.10 (Puuone sand)

L = Slope Length = 400 ft.

S = Slope Gradient = 0.05

LS = Slope Length Factor = 1.05

C = Cover Factor, Use Bare Soil = 1.0

P = Control Factor, Construction Site = 1.0

$E = 190 \times 0.10 \times 1.05 \times 1.0 \times 1.0$

= 20 tons/acre/year

2. Maximum Allowable Soil Loss:

$E_{max} = H_{max} / (2 F T + 3 D) A$

Coastal Water Hazard (D) = Class A = 2

Downstream Hazard (F) = 2

Duration of Site Work = 6 months

Maximum Allowable Construction Area x Erosion Rate
= 6,250 tons/acre/year

B. Severity Rating Number:

1. The degree of hazard from potential damage by erosion and sediment, known as "Severity Rating Number" will be determined for each grading site as follows:

$$H = (2\,F\,T + 3\,D)\,A\,E$$

Where:

H = Severity Rating Number

F = Unit Downslope/Downstream factor = 2

D = Unit Coastal Water Hazard = 2

T = Time of Distribution (years) = 0.5

A = Area of Disturbance (acres) = 2.50

E = Erosion Rate in tons/acre/year

$$H = ((2 \times 2 \times 0.5) + (3 \times 2)) \times 2.50 \times 20 = 400$$

The maximum allowable severity rating number established is 50,000, and is greater than 400 which is computed for the project.