DEPARTMENT OF
PARKS AND RECREATION
COUNTY OF MAUI

1580-C KAAHUMANU AVENUE
WAILUKU, HAWAII 96793

LINDA CROCKETT LINGLE
Mayor

CHARMAINE TAVARES
Director

LEE DODSON
Deputy Director

PLANNING & DEVELOPMENT DIVISION
(808) 243-7931

June 9, 1995

Mr. Gary Gill, Director
Office of Environmental Quality Control
220 South King Street, 4th Floor
Honolulu, Hawaii 96813

Dear Mr. Gill:

SUBJECT: Negative Declaration for
Eddie Tam Memorial Park Upgrade and Expansion
TMK: 2-4-6: 5 and 2-4-32: 98
Makawao, Maui, Hawaii

The County of Maui, Department of Parks and Recreation has reviewed the comments received during the 30-day public comment period which began on April 23, 1995 (OEQC Bulletin publication date). The agency has determined that this project will not have significant environmental effect and has issued a negative declaration. Please publish this notice in the June 23, 1995 OEQC Bulletin.

We have enclosed a completed OEQC Bulletin Publication Form and four copies of the final EA.

Please contact Mr. Patrick Matsui at (808) 243-7387 if you have any questions.

Sincerely,

Charmaine Tavares

Charmaine Tavares
Director

OEQC Bulletin Publ. Form
inside front cover of doc.

1995-06-23-MA-FEA-Eddie Tam Memorial Park Upgrade & Expansion

JUN 23 1995

FINAL ENVIRONMENTAL ASSESSMENT

(NEGATIVE DECLARATION)

EDDIE TAM MEMORIAL PARK UPGRADE & EXPANSION

Makawao, Maui, Hawaii

JUNE 1995

Prepared for

Department of Parks and Recreation
County of Maui

by
Hiyakumoto + Higuchi
Architects, Inc.

OEQC BULLETIN PUBLICATION FORM

1.23

TITLE OF PROJECT: Eddie Tam Memorial Park Upgrade & Expansion

LOCATION: ISLAND Maui DISTRICT Makawao

TAX MAP KEY : 2-4-6:5, 2-4-32:98

PLEASE CHECK THE FOLLOWING CATEGORIES:

Type of Action: AGENCY X APPLICANT ____

Applicable State or Federal Statute:

X Chapter 343, HRS ___ Chapter 205A, HRS ___ NEPA (Federal Actions Only)

Type of Document:

___	Draft Environmental Assessment (Negative Declaration anticipated)	___	Draft EIS	___	NEPA NOP
X	Final Environmental Assessment (Negative Declaration)	___	Final EIS	___	NEPA Draft EIS
___	Final Environmental Assessment (EIS Preparation Notice)	___	NEPA FONSI	___	NEPA Final EIS

Type of Revision (if applicable):

___ Revised ___ Supplemental ___ Addendum ___ Other (please explain)

Prior to general distribution, please submit to OEQC: 4 copies of the Draft EA, Final EA (Negative Declaration or EIS Preparation Notice), 4 copies of the Draft EIS or Final EIS (For Draft and Final EISs an additional copy is mailed to OEQC.)

PROPOSING AGENCY OR APPLICANT SHOULD SUBMIT COPIES OF THE DOCUMENTS TO THE APPROVING AGENCY OR ACCEPTING AUTHORITY PRIOR TO SUBMITTING COPIES TO OEQC.

APPROVING AGENCY OR ACCEPTING AUTHORITY: Department of Parks & Recreation, County of Maui

ADDRESS: 1580 Kaahumanu Avenue
Wailuku, HI 96793

CONTACT: Mr. Patrick Matsui PHONE: 243-7387

PROPOSING AGENCY OR APPLICANT: Department of Parks & Recreation, County of Maui

ADDRESS: 1580 Kaahumanu Avenue
Wailuku, HI 96793

CONTACT: Mr. Patrick Matsui PHONE: 243-7387

CONSULTANT: Hiyakumoto + Higuchi Architects, Inc.

ADDRESS: 1860 Main Street
Wailuku, HI 96793

CONTACT: Mr. Calvin Higuchi PHONE: 242-9705

COMMENT PERIOD END DATE: July 24, 1995

CONDITIONS WHICH TRIGGERED THE EIS LAW: PLEASE CHECK ALL THAT APPLY TO THE PROPOSED ACTION.

X	*Use of State or County lands or funds HRS 343-5(a)(1)*	____	*Use of lands in the Waikiki Special District HRS 343-5(a)(5)*
____	*Use of Conservation District Lands HRS 343-5(a)(2)*	____	*Amendment to a County General Plan HRS 343-5(a)(6)*
____	*Use of Shoreline Setback Area HRS 343-5(a)(3)*	____	*Reclassification of Conservation Lands HRS 343-5(a)(7)*
____	*Use of Historic Site or District HRS 343-5(a)(4)*	____	*Construction or modification of helicopter facilities HRS 343-5(a)(8)*

OTHER CONDITIONS:

____ *Use of Special Management Area (City & County of Honolulu)*

____ *Other** _____

* *If the project does not trigger HRS 343, please explain why document is being submitted to OEQC.*

***SUMMARY** of the proposed action or project to be published in the OEQC Bulletin. Please submit it as a summary ready for publication. The description should be brief (300 words or less), yet provide sufficient detail to convey the full impact of the proposed action.*

The County of Maui Department of Parks & Recreation proposes to expand the existing 13.68 acre Eddie Tam Memorial Park in Makawao, Maui, Hawaii, onto an adjacent 32.68 acre vacant parcel as well as upgrade facilities on the existing park site. The two parcels are bordered by Makawao Avenue, Kalama Intermediate School, Hale Kipa Road, and Hoomaha Road. The expansion site is proposed to include baseball, soccer, football fields; a horse track, an open playfield, parking, restrooms, picnic areas, and open shelters. The existing park upgrade is proposed to include: additional parking areas, improvement to the entrance roadway, expansion of the existing gymnasium, additional tennis courts and a roller blade court. The County has owned the existing park site since 1955 and acquired the expansion site in 1993. The plan proposes the full development of improvements to occur in seven phases (four in the expansion site, three in the existing site). Drainage improvements are planned with retention basins and off-site drainlines in the earlier phases of work to address drainage concerns in the area.

***NOTE:** Since the deadline for EIS submittal is so close to the publication date for the OEQC Bulletin, please assist us by bringing the Document for Publication Form and a computer disk with the project description (size 3 1/2" or 5 1/4" disk are acceptable; preferably WordPerfect 5.1 or ASCII text format) to the Office of Environmental Quality Control as early as possible. Thank you.*

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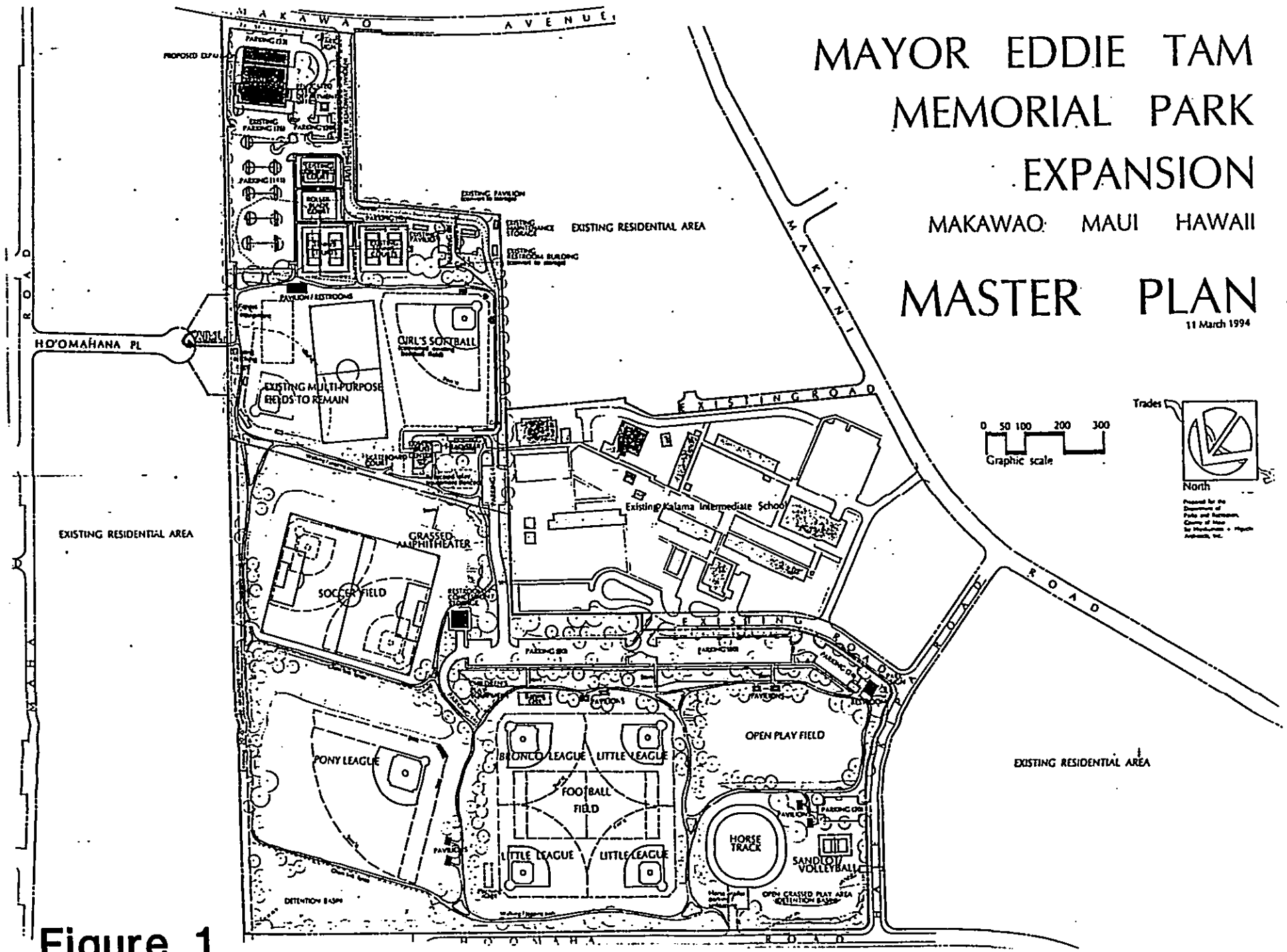

MAYOR EDDIE TAM
MEMORIAL PARK
EXPANSION
MAKAWAO MAUI HAWAII
MASTER PLAN
11 March 1994
MAKAWAO AVENUE
HO'OMAHANA PL
EXISTING RESIDENTIAL AREA
EXISTING MULTI-PURPOSE FIELDS TO REMAIN
GIRL'S SOFTBALL
MAKANI
EXISTING ROAD
Existing Kalama Intermediate School
GRASSED AMPHITHEATER
SOCCER FIELD
PONY LEAGUE
BRONCO LEAGUE
LITTLE LEAGUE
FOOTBALL FIELD
OPEN PLAY FIELD
HORSE TRACK
SAND LOT VOLLEYBALL
OPEN GRASSED PLAY AREA
DETENTION BASIN
HOOMAHANA ROAD
KULANIHAKOI ROAD
0 50 100 200 300
Graphic scale
Trades
North

Figure 1

MAYOR EDDIE TAM MEMORIAL PARK EXPANSION

MAKAWAO MAUI HAWAII

CONCEPTUAL PHASING MASTER PLAN

11 March 1994

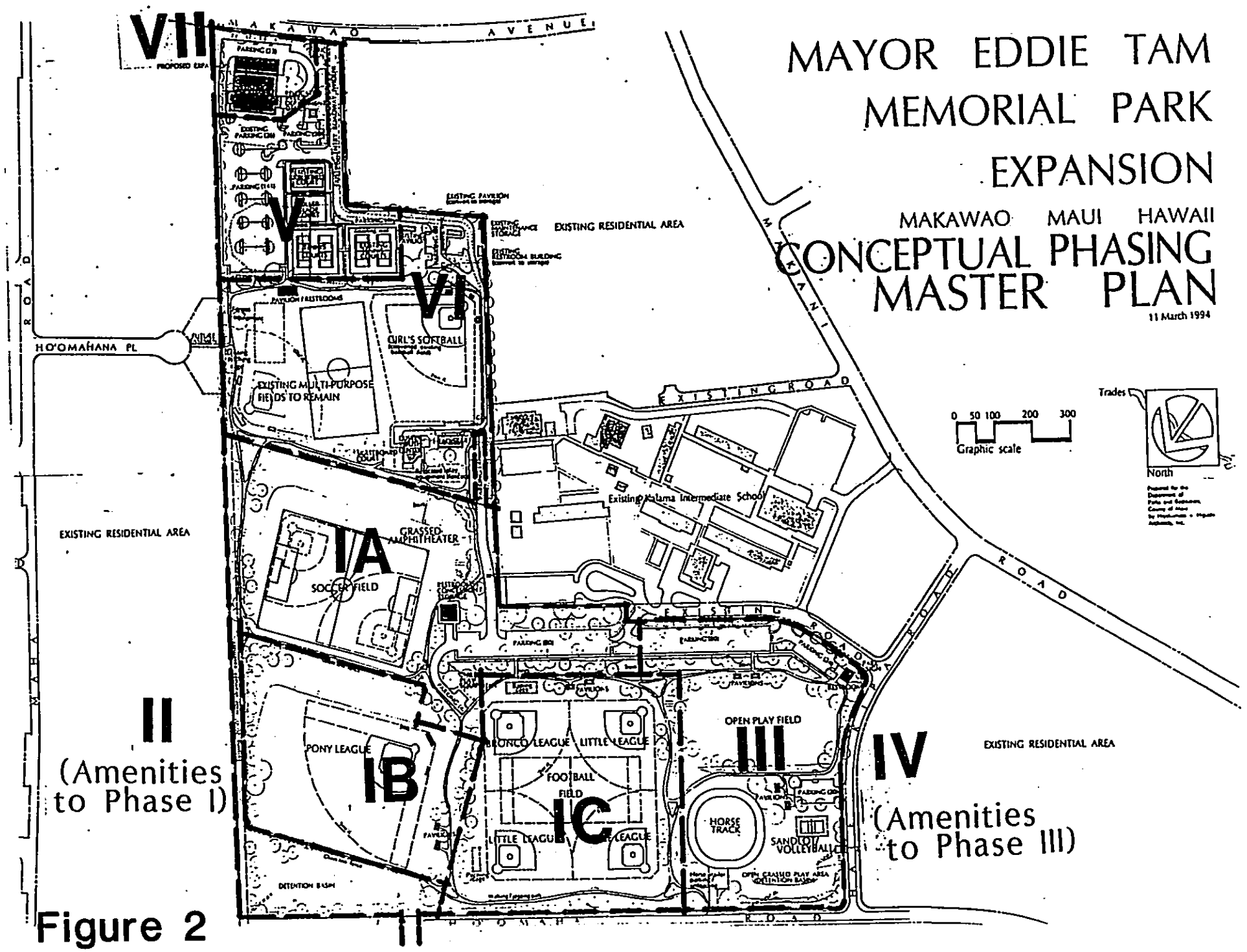


Figure 2

IV. PHASING AND BUDGETARY CONSIDERATIONS

Phase I (26 Acres) - Soccer & Baseball Fields @ **Expansion Site**

Phase IA (12 Acres) - Upper Soccer Field, Parking/Roadway, Detention Basin, Offsite Drainage Improvements

Offsite Drainage Improvements	$ 668,000
Detention Basin (sitework & landscaping)	255,000
Parking (94 stalls) & Roadway to Youth Center incl. landscaping	741,000
Pavilion/Restroom Building	180,000
Upper Soccer Field : Site Development & Improvements	598,000
Landscaping (incl. topsoil/prep, maint.)	413,000
Phase IA TOTAL	**$2,855,000**

Phase IB (6.4 Acres) - Pony Baseball Field

Site Development & Improvements	$ 686,000
Landscape Planting & Irrigation (incl. topsoil/prep., maint.)	370,000
Phase IB TOTAL	**$1,056,000**

Phase IC (7.3 Acres) - Four Baseball (with football) Fields

Site Development & Improvements	$ 311,000
Landscape Planting & Irrigation (incl. topsoil/prep., maint.)	423,000
Phase IC TOTAL	**$ 734,000**

Phase II (26 Acres) - Amenities to Phase I @ **Expansion Site**

Lighting for two Phase I Fields (50 f.c.)	$ 250,000
Paving of Walking & Jogging Paths	227,000
Paving of Youth Center Parking Lot (relocation of play equip.)	31,000
Batting & Pitching Cages	60,000
Picnic Pavilions (4 @ 400 ± s.f. each)	240,000
Phase II TOTAL	**$ 808,000**

Figure 3a

Phase III (8 Acres) - Open Play Field & Horse Track @ **Expansion Site**

Site Development and Improvements (incl. Open Play Field, Horse Track, & Volleyball Area)	$ 714,000
Restroom/Storage Building (650 ± s.f.)	150,000
Paving of Parking Lot with 100 stalls	136,000
Landscape Planting and Irrigation (incl. topsoil, prep, maint.)	330,000
Phase III TOTAL	**$1,330,000**

Phase IV (8 Acres) - Amenities to Phase III @ **Expansion Site**

Paving of 20 stall Parking Lot	27,000
Paving of Walking & Jogging Paths	105,000
Picnic Pavilions (4 @ 400 ± s.f. each)	240,000
Phase IV TOTAL	**$ 372,000**

Phase V (10 Acres) - Play courts & Parking @ **Existing Park**

Site Development and Improvements (incl. 2 Tennis Courts and 1 Rollerblade Court)	$ 179,000
Paving of Parking Lot Below Gym (130 stalls) & Entry Road Widen'g.	256,000
Relocation of Parks Dept. Office Building	50,000
Landscape Planting and Irrigation (incl. topsoil, prep, maint.)	115,000
Phase V TOTAL	**$ 600,000**

Phase VI (8 Acres) - Baseyard & Restroom @ **Existing Park**

Site Development and Improvements	$ 16,000
Paving of Parking & Baseyard Areas and Fencing	105,000
Existing Pavilion & Backstop Restroom Renovations	150,000
New Restroom/Pavilion (1200 ± s.f.)	200,000
Landscape Planting and Irrigation (incl. topsoil, prep, maint.)	195,000
Phase VI TOTAL	**$ 666,000**

Figure 3b

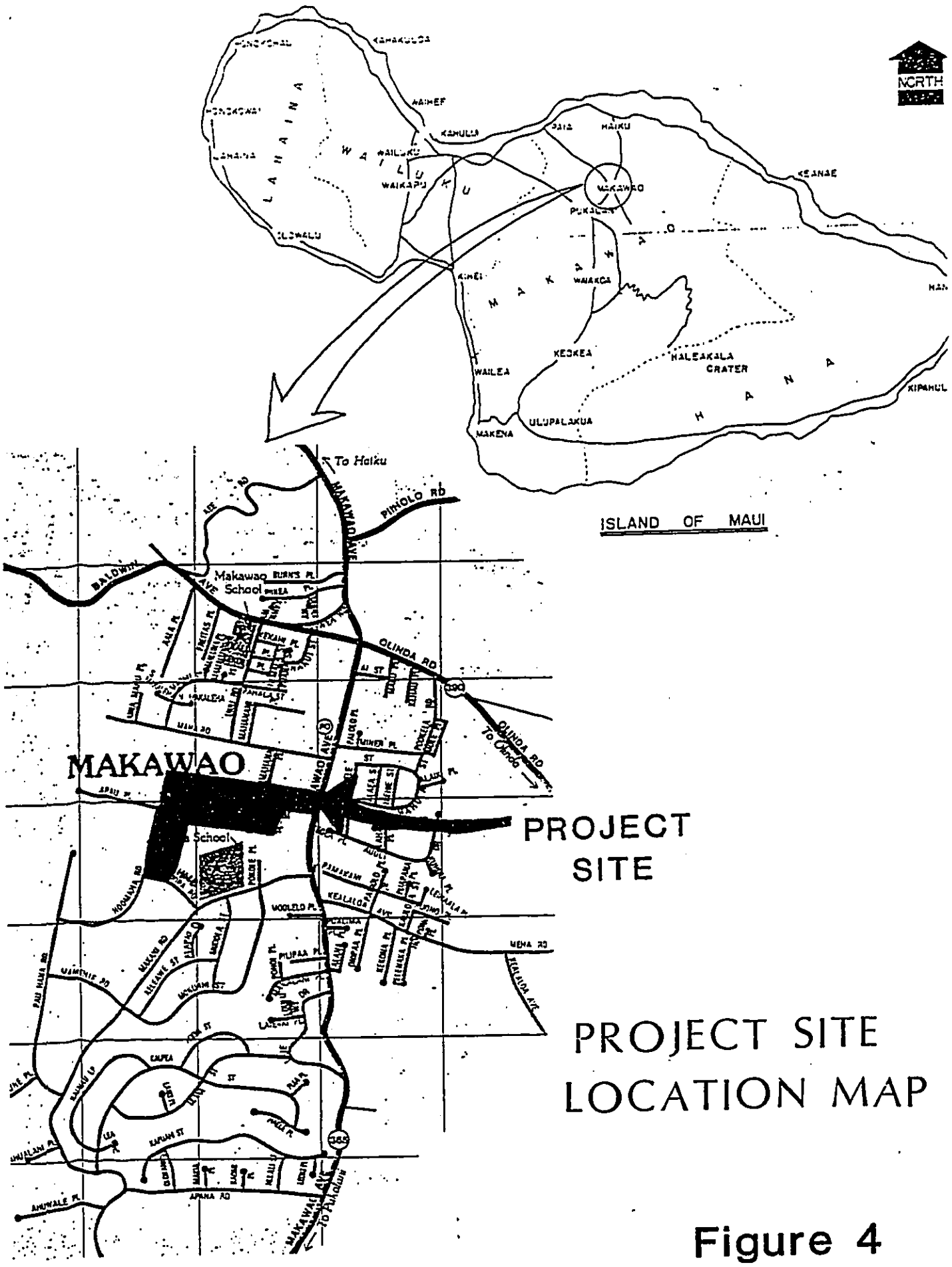
Phase VII (2 Acres) - Gym Expansion @ Existing Park

Site Development and Improvements	$ 59,000
Paving of Parking Lot Above Gym & Roadway	192,000
Gym Renovation & Addition (3,000 ± s.f.)	750,000
Landscape Planting & Irrigation (topsoil, prep, maint.)	30,000
Phase VII TOTAL	**$1,031,000**

TOTAL DEVELOPMENT BUDGET **$9,452,000***

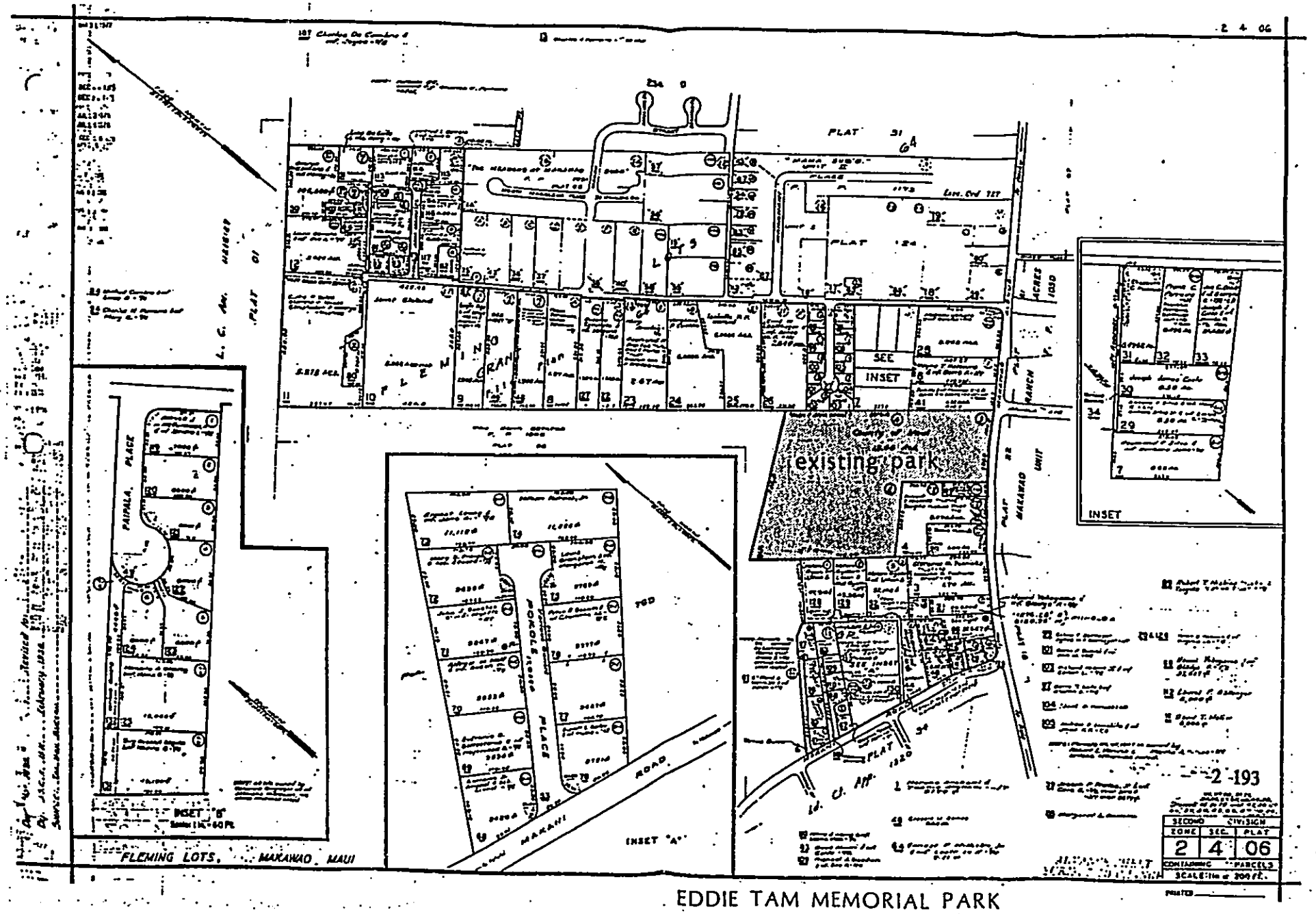
* Budget estimates are based on present probable cost and will be required to be adjusted prior to budget requests for the upcoming fiscal year

Figure 3c



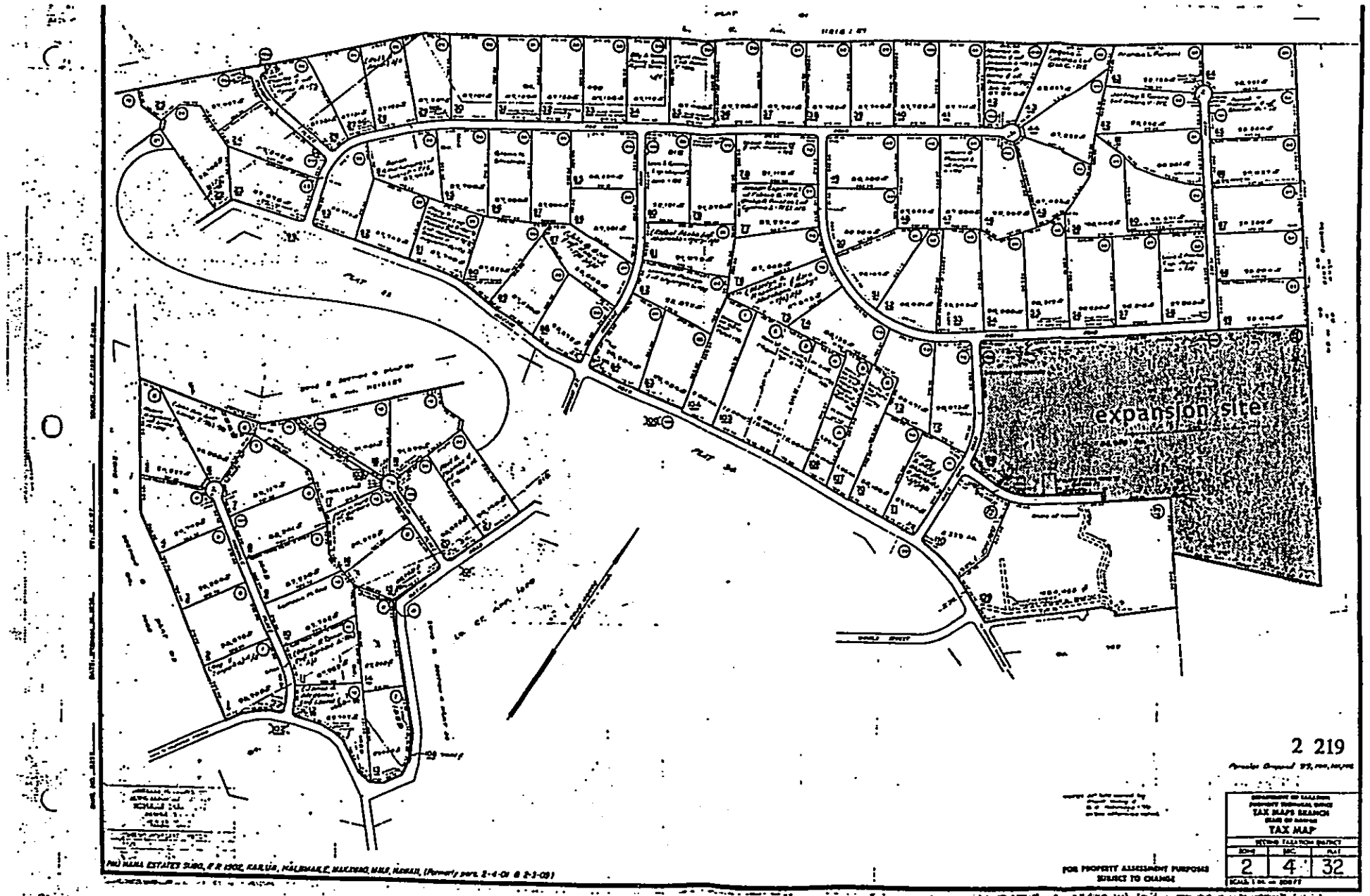
PROJECT SITE LOCATION MAP

Figure 4



EDDIE TAM MEMORIAL PARK

Figure 5



EDDIE TAM MEMORIAL PARK

Figure 6

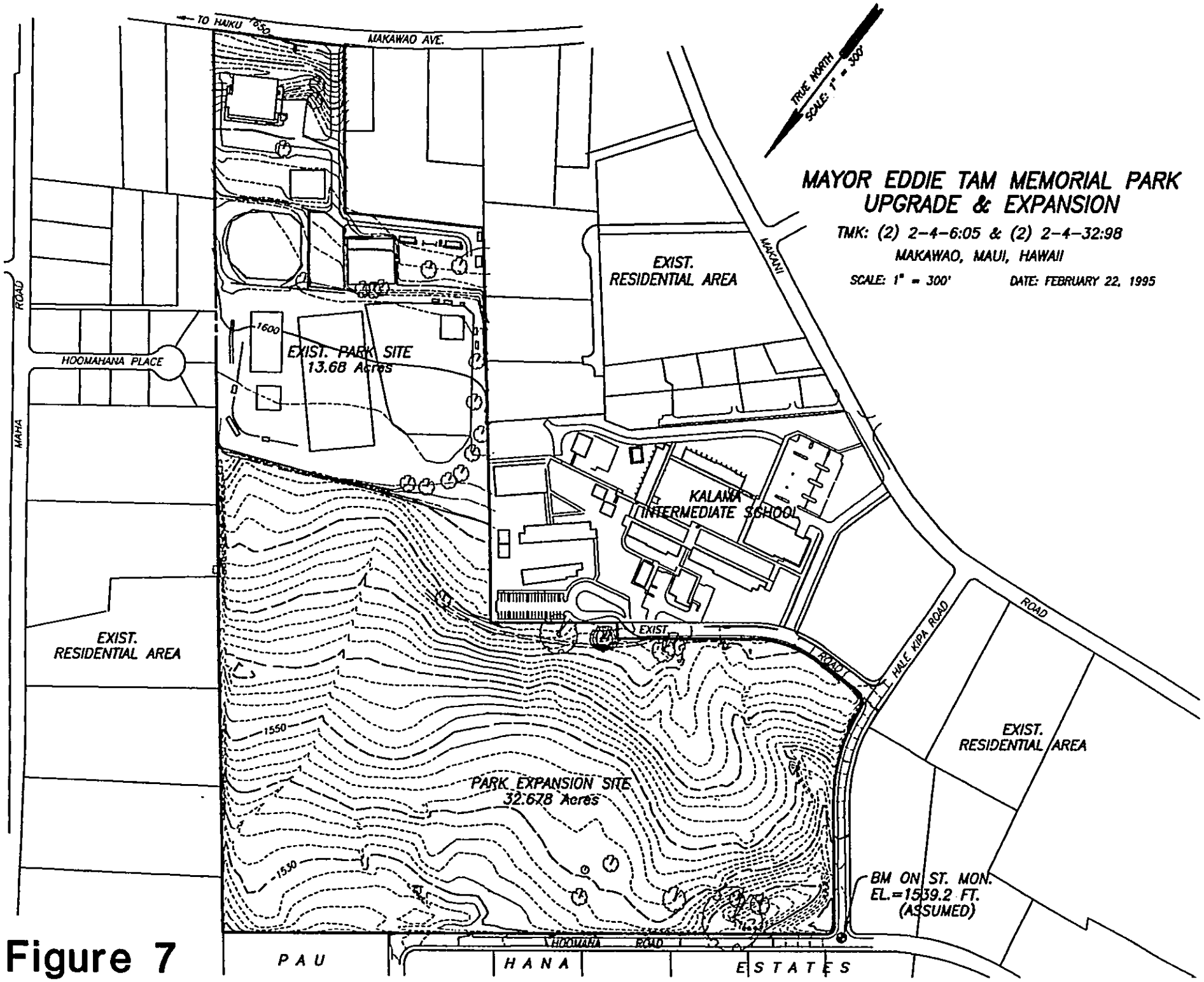

TO HAIKU
MAKAWAO AVE.
TRUE NORTH
SCALE: 1" = 300'
MAYOR EDDIE TAM MEMORIAL PARK
UPGRADE & EXPANSION
TMK: (2) 2-4-6:05 & (2) 2-4-32:98
MAKAWAO, MAUI, HAWAII
SCALE: 1" = 300'
DATE: FEBRUARY 22, 1995
EXIST. RESIDENTIAL AREA
HAKANI
MAHA ROAD
HOOMAHANA PLACE
1600
EXIST. PARK SITE
13.68 Acres
KALAMA INTERMEDIATE SCHOOL
EXIST.
ROAD
HALE KIPA ROAD
ROAD
EXIST. RESIDENTIAL AREA
EXIST. RESIDENTIAL AREA
1550
PARK EXPANSION SITE
32.678 Acres
1530
BM ON ST. MON.
EL.=1539.2 FT.
(ASSUMED)
HOOMANA ROAD
PAU
HANA
ESTATES

Figure 7

I. GENERAL INFORMATION

A. Proposed Action

The Maui County Department of Parks and Recreation (the Agency) proposes to upgrade the existing Eddie Tam Memorial Park and develop an adjacent parcel for additional park usage based on the "Final Summary Report for the Master Plan Update of Eddie Tam Memorial Park and Expansion" dated 11 March 1994 and its Master Plan (see Figure 1). The project is slated to be developed in seven (7) major phases as shown in Figure 2 and detailed by scope and cost estimates in Figures 3a, 3b, and 3c.

B. Project Site Location (see Figure 4)

1. Existing Park Site: T.M.K.: 2-4-6: parcel 5 (see Figure 5)
2. Park Expansion Site: T.M.K.: 2-4-32: parcel 98 (see Figure 6)
3. Adjacent landmarks:
    a. Northwest: Hoomaha Road and ag-zoned 2-acre lots
    b. Northeast: residential and ag lots
    c. Southeast: Makawao Avenue and residential lots
    d. Southwest: Kalama Intermediate School, Hale Kipa Road, and residential and ag lots.

C. Land Areas

1. Existing Park Site: 13.68 acres
2. Park Expansion Site: 32.678 acres

D. Land Use Zoning

1. State Land Use Designations
    a. Existing Park Site: Urban
    b. Park Expansion Site: Agricultural
    c. Adjacent Parcels: Urban and Agricultural

2. Community Plan Designations (Makawao-Pukalani-Kula)
    a. Existing Park Site: Park
    b. Park Expansion Site: Park and Single Family Residential
    c. Adjacent Parcels: Ag, Single Family Residential, and Public/Quasi-public

3. Use Zone (Maui County Comprehensive Zoning Ordinance)
    a. Existing Park Site: Interim
    b. Park Expansion Site: Agricultural
    c. Adjacent Parcels: Agricultural, Residential, Public/Quasi-public

II. EXISTING ENVIRONMENTS, POTENTIAL IMPACTS, & MITIGATIVE MEASURES

A. Physical Environment

1. Surrounding Land Uses

   The surrounding developments include single-family residential, Kalama Intermediate School, and two-acre agricultural lots. The surrounding uses are compatible with the existing park use and the park expansion on the adjacent lot. The park upgrade and expansion will benefit the school as it now uses the park for its PE program and the gym for numerous school activities.

2. Climate
   a. Average Makawao area temperatures range from the mid 50's to the mid and high 70's.
   b. Average rainfall in the Makawao area range from approximately 10 inches in December to less than 5 inches/month in the summer.
   c. Winds are generally northeasterly trades with southerly Kona storm winds occurring frequently from October to April.

3. Topography and Soil Characteristics (Figure 7)
   a. The existing ground within the site slopes from an elevation of about 1,620 feet above mean sea level at Makawao Avenue to an elevation of about 1,490 feet at Hoomaha Street. The average ground slope is about 6 percent.

   b. According to the Soil Survey of Islands of Kauai, Oahu, Maui, Molokai, and Lanai, State of Hawaii, the on-site soil consists of Haliimaile Silty Clay and Silty Clay Loam. The soil survey describes these soils as having moderately rapid permeability, slow to medium runoff, and a slight to moderate erosion hazard.

4. Flood Hazards
   a. The Federal Emergency Management Agency's (FEMA) Flood Insurance Rate Map of the area designates the site as Zone C. Zone C is an area subject to minimal flooding. FEMA's Flood Boundary and Floodway Map of the area does not identify any floodway or flood plain affecting the site.

5. Flora and Fauna
   a. The existing park portion of the project site is fully developed with play fields and courts, parking, picnic areas, a youth center and a gym. Most of the open field areas are grassed with kikuyu grass. Trees and shrubs of several varieties (such as cypress, oleander, bougainvillea, shower, banyan, monkey pod, jacaranda, California pepper, and

avocado) have been planted within the park throughout its development.

b. The park expansion site was cultivated in pineapple fields in the 1940's through the late 60's. Prior to the purchase of the property by the County of Maui from Sport Shinko in 1993, the property was subdivided as a separate lot in the Pau Hana Estates subdivision and has remained vacant with no development except for some drainage swales to direct some rainwater flows. The site is now overgrown with kikuyu grass, horse cane, and common weeds, and a few Christmas berry, jacaranda, and wattle trees.

c. Common to the rural Makawao area are such fauna as mongoose, chicken, rats, dogs, and cats. Common bird life in the area include golden plover, gray fancolin, meijiro, rice bird, house finch, mynah, house sparrow, barred and spotted dove, and American cardinals. The pueo (Hawaiian owl) periodically hunts in the upcountry areas.

d. There are no known rare, endangered or threatened species of flora within the project site. As such removal of existing vegetation is not considered an adverse impact on this component of the environment.

e. The proposed development is not expected to have any impact on rare, endangered or threatened fauna or avifauna as only common alien species seem to be utilizing the site. Development of the park with trees on fringe areas of fields and in the passive park use areas will in fact provide for the bird species presently in the area.

6. Archaeological Resources
   a. The existing park site has been fully developed with play fields, buildings and parking areas and there seems to be no visible historically significant landmarks.

   b. The expansion site was fully disturbed for several years as it was in pineapple cultivation for possibly over fifty years and has been vacant since Sport Shinko acquired the lot and sold it to the County of Maui. No visible archaeological or historical landmarks exist.

   c. The contractor will cease work in the area if any artifacts or remains of historic value are found and immediately contact the Department of Land and Natural Resources, Historic Preservation Division for appropriate action.

7. Air Quality and Noise
   a. The air quality of the Makawao area is considered good, with existing airborne pollutants attributed primarily to automobile exhaust from the

roadways in the area. No known major airborne emission point sources exist on or around the project site. The State of Hawaii Department of Health, Environmental Health Services Division noted that there are no monitoring sites in the upcountry area; the nearest being in Kihei and Kahului.

b. Noise levels in the Makawao region are relatively low and characteristic of the rural atmosphere of the area. Background noise is generated by traffic on the surrounding roadways. Occasional noise is generated by events at the park or the school such as sporting events, the Upcountry Fair, private parties at the gym, etc.

c. No long-term impacts on the air quality are anticipated from this development except for a insignificant increase in emissions from vehicles of park users.

d. Short-term impacts on air quality are anticipated from increased dust generated by construction during the various phases of development. These impacts will be mitigated by dust control measures specified in construction documents and the construction contracts. These measures will include site dust screens, regular watering and sprinkling, etc. as necessary to minimize the airborne dust.

e. No major long term noise level impacts are anticipated due to this development. There will be a slight increase of noise levels for the immediate Pau Hana Estates subdivision lots from the park-related vehicular traffic and the mostly-weekend sports events at the new fields in the expansion site.

f. Short-term impacts on the noise level in the area are expected due to construction activities especially during the grading and sitework phases of work. All construction activities are anticipated to occur during normal working daylight hours.

8. Visual Resources
   a. The upcountry area of Makawao, being on the slopes of Haleakala, has natural views of the central Maui and the West Maui mountains. Existing buildings on the existing park site are all one-story except for the gymnasium which is two story. The views from mauka properties are not significantly restricted as most sit on higher elevations across Makawao Avenue and the gym is set at an elevation considerably below the road.

   b. No significant visual impacts are anticipated. Proposed structures will be one-story restrooms and picnic structures. The gym expansion is

anticipated to expand vertically to accommodate more seating area but should still be below sight lines of mauka properties. Views of the property from and along Hale Kipa Road and Hoomaha Road will be improved by planned landscaping. The park fringe areas are anticipated to be landscaped with trees to act as windbreaks and to define the park boundary however to be open enough to allow visibility into the park for security and safety reasons. Some play field lighting is anticipated and mitigative measures will be taken (in the form of light fixture shields, correct positioning, and careful fixture selection) to prevent glare into the adjacent residential neighborhoods.

B. Socio-economic Environment

1. Population
   a. The population of Maui in 1990 was estimated at approximately 100,000 with projection by DBED estimated at approximately 125,000 by the year 2000. The Makawao-Pukalani-Kula area population estimate for 1990 was approximately 18,900 with a projected estimate of approximately 21,600 by the year 2000.

2. Economy
   a. The economy of this area is based on ranching, pineapple, and small retail businesses in Makawao town. The Makawao area also serves as a "bedroom" community for many people who work in the central, west, and south Maui area.

   b. The project impact on the economy will be short-term and limited mainly to supporting construction and construction-related employment. Long-term impacts of this development will be insignificant to the economy.

C. Public Services

1. Recreational Facilities
   a. The Eddie Tam Memorial Park (this project) is the major recreational facility with active and passive use in the upcountry area. Other county facilities in the upcountry area include Pukalani Park, the Upcountry Community Center, Kula Gym, Keokea Park, Harold Rice Park (passive use only), Kula Recreation Center, and the Haiku 4th Marine Park (presently passive use only).

   b. Because the Upcountry area is populated with many young families, the various youth sports programs are very strong and well supported. Due to this fact, the number of soccer, baseball, and football teams needing practice and play fields in this area has far exceeded the available facilities and scheduling of the facilities have been very tight.

As an example, the number of teams in the Makawao area alone for the month of February for soccer and baseball was 52 (according to a field usage survey of the Park Expansion Committee in December 1993).

c. This development will expand and improve the recreational resources in the upcountry area as there is a definite need for more athletic fields.

2. Police and Fire Protection
   a. The Maui Police Department which is headquartered in Wailuku operates a substation from the Eddie Tam Memorial Gym which is on the project site. They have recently implemented a program where a patrol officer is assigned to patrol in Makawao town and this area.

   b. The Makawao Fire Station is located approximately 2 miles from the project site.

   c. The project will not require significant increases in police or fire protection services.

3. Solid Waste
   a. Solid waste generated by the existing park is presently transported to the Central Maui Landfill in Puunene by a private disposal contractor.

   b. The construction contractor will be required to work with the Solid Waste Division of the Maui County Department of Public Works for coordination of a solid waste management plan for disposal of clearing and grubbing material from the site during construction.

   c. Solid waste generated by the park after development will be transported to the Central Maui Landfill in Puunene through private solid waste disposal companies.

4. Schools
   a. Public schools in the upcountry area include Makawao Elementary School, Pukalani Elementary School, Kula Elementary School, Kalama Intermediate School, and King Kekaulike High School (which is slated to open in September, 1995).

   b. Private schools in the area include St. Joseph School(elementary), Haleakala Waldorf School (elementary), Montessori School of Maui (elementary), and Seabury Hall (intermediate/high school).

   c. The development of this park will be an asset to Kalama Intermediate School which is immediately adjacent and already uses the park for its

P.E. program and other school activities. Other schools in the area may also benefit indirectly by having these recreational facilities in close proximity.

D. Infrastructure

1. Roadways and traffic
   a. The project abuts Makawao Avenue on the southeast (mauka) side. Makawao Avenue leads to Pukalani toward the southwest and Haiku and Paia toward the northwest. Hoomaha Road and Hale Kipa Road are on the southwest and southeast sides of the expansion site and are part of the Pau Hana Estates subdivision. Both roads connect to Makani Road which serves as an alternate route between Makawao and Pukalani and the Pukalani bypass highway which continues on to the central Maui area.

   b. A new entrance to the park expansion site is planned through the access easement road at the makai side of the intermediate school. The existing park driveway is also planned to be improved to three lanes (one entrance lane and two exit lanes).

   c. The existing weekday and weekend traffic in the area is relatively moderate being a rural area. The Level of Service at the three intersections studied by the traffic consultants seem acceptable at this time except the left turn lane of Makani Road onto Makawao Avenue which is operating at LOS E. (theTraffic Impact Report by Austin Tsutsumi and Associates is included as part of this report).

   d. According to the Traffic Impact Report by ATA, the impact on traffic in the area generated from full development of the proposed project would be within acceptable standards.

   e. The project civil engineering consultant is working with the Department of Public Works & Waste Management, Engineering Division relative to roadway improvements adjacent to the project site.

2. Waste water
   a. There is no waste water collection and treatment facilities which serve the site. Existing on-site facilities use cesspools and individual waste water systems for disposal of waste water. New facilities will also use individual waste water systems for disposal of waste water.

3. Water
   a. Existing Department of Water Supply waterlines provide water to the site and surrounding areas. A 6-inch line along Makawao Avenue provides water to the exiting park and gymnasium. A 12-inch line along

the makai boundary of the existing park provides water to the Head Start facilities at the northwest corner of the existing park.

b. In addition to these waterlines, there is a 12-inch line along the west boundary of the expansion site within Hale Kipa Road and an 8-inch line along the north boundary with Hoomaha Road.

4. Drainage
   a. Existing Conditions
      i. The site is part of a 360-acre drainage basin which extends for about 9,600 feet from its lower end along Hoomaha Road to its upper end at a point along Olinda Road. About 160 acres of this area are agricultural lands. The remaining 200 acres are urbanized areas including residential, business, public, and park areas. The site consists of the 13.68-acre existing park parcel and the 32.678-acre expansion parcel. Its total area of 46.358 acres is about 13 percent of the total drainage area.

      ii. Storm runoff from the upstream areas enters the site at various points, passes through the site, and exits the site at two points. There is a natural drainage divide through the site which splits the site into two drainage areas. This report will refer to the northeasterly drainage area as the east system and the southwesterly drainage area as the west system. Both systems discharge runoff into the Pau Hana Estates Subdivision downstream of the site.

      iii. The east system includes an area of about 330 acres and carries most of the runoff. Catch basins on Makawao Avenue collect runoff on the street and pass the runoff into the site through a 24-inch drain line. The drain line runs along the northeasterly property line for about 1,000 feet through the existing park site and ends at an existing earth drainage channel. Grated drain inlets along this line collect runoff along the property line. The earth drainage channel continues downstream for about 1,200 feet along the northeasterly property line of the expansion parcel. This channel lies within an existing 20-foot wide drainage easement along the northeasterly property line.

      iv. The earth drainage channel also intercepts other flows. An earth swale along the lower end of the existing park site intercepts surface runoff from the site and additional runoff transferred to the site from upstream areas. The swale directs runoff to a 48-inch culvert at the upstream end of the earth drainage channel. About 280 feet downstream of this point, the earth drainage channel receives runoff from the outlet of a 30-inch drain line. The 30-inch

drain line collects runoff at the intersection of Ukiu Road and Maha Road. There is a proposed County drainage project which involves increasing the capacity of the existing drain line and extending the drain line along Ukiu Road and Pahala Street to collect runoff from those areas. The proposed drainage project will add about 40 additional acres of drainage area to the east system. The earth drainage channel also receives flows from a swale within the expansion parcel and areas adjoining the channel.

v. The west system includes an area of about 30 acres and carries the remaining runoff. The drainage system within Kalama Intermediate School collects runoff produced within the school site and from the upstream areas, and discharges runoff into the site through a 42-inch drain line. From this point, runoff flows through a meandering gully on the site and enters a 30-inch culvert at Hoomaha Road. The 30-inch culvert passes runoff under the road and into an earth channel within Lot 55 of Pau Hana Estates Subdivision. Runoff also enters the site through the outlet of a 30-inch drain line on Hale Kipa Road. This drain line collects runoff along Hale Kipa Road and is about 160 feet mauka of the intersection of Hale Kipa Road and Hoomaha Road.

vi. Existing drainage improvements within the Pau Hana Estates Subdivision carry runoff from the park site to a major gulch within the subdivision. Runoff discharged through the park's east system continues downstream through an earth channel along the northeasterly side of Lots 69, 68, and 67 of the subdivision. At the end of Lot 67, the channel enters Lot 66 and makes a 90-degree turn toward the southwest. Runoff continues to flow in an earth channel along the southeasterly side of Lot 66. From that point, runoff enters a double 54-inch culvert at Apau Place. The culvert passes runoff under the road and into an earth channel within Lot 61. Runoff continues to flow through the channel in a westerly direction for about 600 feet and enters the major gulch within the subdivision. Runoff discharged through the park's west system continues downstream for about 500 feet through Lots 55 and 54, and enters the major gulch within the subdivision.

b. Developed Conditions

i. Development of the project will result in small increases in peak flow rates and runoff volumes. These increases are primarily due to the addition of impervious areas such as roofs, parking lots, roads, and other paved areas. They are also due to the reduction of flow time across the site. Preliminary computations based on the methods described in the Soil Conservation Service's publication, ***Urban***

Hydrology for Small Watersheds, show increases in peak flow rates and runoff volumes of two to four percent for both systems.

c. Drainage Design Concept
   i. Development of this project will incorporate the following drainage design concepts to address the existing drainage conditions at the site and the increase in runoff due to the project:
      - Maintain drainage patterns within the existing east system and west system.
      - Mitigate the effects of the increase in runoff with detention basins by keeping peak flows at pre-development levels.
      - Improve existing on-site channels to contain and safely carry off-site runoff through the site.
      - Install culverts where proposed roads and parking areas cross existing on-site channels.
      - Use grassed swales and sheet flow to carry runoff across the flat areas of the site.
      - Use inlets to collect runoff at the tops of slopes and drain lines to carry runoff to the bottom of slopes to prevent erosion and reduce inconvenience to the public.

d. The following recommended improvements incorporate the drainage design concepts noted above.
   i. Major drainage improvements for the east system include constructing a detention basin at the lower end of the site, constructing an off-site drain line from the site to the major gulch within the Pau Hana Estates Subdivision, improving the existing earth channel along the northeasterly property line, and improving the earth swale along the lower end of the existing park.

   ii. The detention basin will control the increase in peak flows due to the park expansion and mitigate the effects of any increase in runoff due to the project. The detention basin will reduce peak flows by temporarily storing runoff and by releasing the stored runoff at a controlled rate. It will also improve the quality of storm runoff by slowing down the flows and trapping some of the sediment.

   iii. The off-site drain line serves as the outlet for the detention basin. The off-site drain line will convey the runoff down Apau Place to the major gulch below the project.

   iv. The improved channel, and improved swale, and will contain runoff from smaller storms. Runoff produced during these storms will follow its current path through the site and through the downstream areas. The improved swale, however, will not contain runoff from larger storms. Runoff which exceeds the capacity of the swale will flow onto

and over the fields within the site. This overflow runoff and site-generated runoff will enter the detention basin.

v. Minor drainage improvements for the east system include inlets at the parking areas with drain lines to carry runoff to the bottom of slopes. These improvements will prevent erosion of the site and reduce inconvenience to the public.

vi. Major drainage improvements for the west system include constructing a detention basin at the existing 30-inch culvert at Hoomaha Road and extending the existing 42-inch drain line from Kalama Intermediate School. The detention basin will control the increase in peak flows due to the park expansion and off-site drainage areas, and mitigate the effects of any increase in runoff. The extended 42-inch drain line will prevent erosion and reduce inconvenience to the public by taking all off-site runoff directly to the detention basin.

vii. The west system also has similar minor drainage improvements as the east system. These drainage improvements include similar items such as inlets at the parking areas with drain lines to carry runoff to the bottom of slopes.

viii. The proposed Phase IA of the park expansion affects the east drainage system. The bulk of the drainage improvements for the east system will be constructed during this initial phase of the project. This procedure will protect the downstream and adjoining properties and provide for subsequent phases of the project.

ix. The Phase IA improvements include improving the existing earth swales within the east drainage system, constructing a detention basin at the lower end of the site, and constructing the off-site drain line outlet to the gulch within the adjoining Pau Hana Estates Subdivision. Part of the design work involves verifying the capacities of the affected existing drainage ways through the Pau Hana Estates Subdivision.

5. Electrical/Telephone
   a. Electrical and telephone services are provided by Maui Electric Company and GTE Hawaiian Tel, respectively.
   b. Overhead electrical and telephone services are available from facilities from Makawao Avenue where service is being provided to the existing complex.
   c. An alternative is to provide service from Hale Kipa Road.
   d. Alternative service entrances are under review by Maui Electric Company.

III. RELATIONSHIP TO GOVERNMENTAL ZONING AND LAND USE POLICIES

A. State Land Use Designations

1. The proposed park use is an acceptable use within the Urban and Agricultural State Land Use zones of this project parcel.

B. Maui County General Plan

1. The planned expansion and enhancement of the existing park conforms to the objectives and policies of the Social Infrastructure/Recreation and Open Space section of the Maui County General Plan (1990 Update) effective September 27, 1991 and amended April 23,1993.

C. Makawao-Pukalani-Kula Community Plan

1. The existing park site is designated for Park use in the Community Plan.
2. The northeast half of the expansion site is also designated for Park use in the Community Plan.
3. The southwest half of the expansion site mauka of the school site is designated for single-family residential in the Community Plan. Park use within this designation is compatible.

D. Maui County Comprehensive Zoning Ordinance

1. The existing park site is zoned Interim which allows expansion of existing park use and publicly owned buildings.
2. The expansion site is zoned Agricultural which allows "open land types" of park use. Restroom and open shelter buildings for picnic type use have been determined to be acceptable structures.

IV. SUMMARY OF SIGNIFICANCE CRITERIA

A. Based on the following significance criteria, the project does not seem to have a significant impact on the environment.

1. ***Loss or destruction of any natural or cultural resources.*** The project will not involve significant loss or destruction of natural or cultural resources. The existing and expansion park sites have been disturbed with development of the park and the cultivation of pineapple for several years and does not seem to contain any significant historical or archaeological landmarks, artifacts, or remains. Construction work will be halted if any are uncovered and the State Historic Preservation Office will be called in immediately for a determination. No endangered flora or fauna have been found on the site and the planting of landscape tree clusters may encourage avifauna to nest in the area.

2. ***Curtailment of the range of beneficial uses of the environment.*** The project will not curtail the beneficial uses of the environment. The basic use is proposed to be open land type of active and passive recreation with minimal buildings especially on the expansion site and is within the intended uses of the present zoning. The athletic fields and passive park use areas will be beneficial to the residential areas and the school in the adjacent areas.

3. ***Conflicts with the State's long-term goals and guidelines as expressed in Chapter 344, HRS.*** The project will not conflict with Chapter 344, HRS. In fact, the development will promote the goals and guidelines by: (1) providing for a better quality of life for the residents through more and improved recreational facilities, and (2) providing open space land use with minimal impact and possibly enhancement of the environment.

4. ***Substantial effects on the economic and social welfare of the community and state.*** The project will affect the economic and social welfare of the community in a very positive way as it will be providing for much needed additional recreational facilities in the area.

5. ***Substantial effects on public health.*** The project will have a positive affect on public health in terms of providing for recreational needs for the mental health of the people in the community. In terms of sanitation, waste water facilities will be planned for the restroom facilities by environmentally safe and regulated means.

6. ***Substantial secondary effects, such as population changes or infrastructure demands.*** The project will not cause any population changes and should, in fact, provide for the already growing population. There will not be significant demands on the infrastructure in the area. The drainage problems which may already exist during severe rain storms will be addressed in the development of drainage improvements on and off site in conjunction with the design of the project.

7. ***Involvement of a substantial degradation of environmental quality.*** This project will not involve substantial degradation of the environmental quality. It's design is intended to improve the quality of the environment in the area.

8. ***Individually limiting but cumulatively having a considerable effect upon environment or a commitment for larger action.*** This application is for a upgrade of the existing 14 acre park and its expansion to 46 acres. At this point in time, the project is limited to this area and there are some possibilities of acquisition of adjacent properties for further expansion. However this is not foreseen for many years and the present upgrade and expansion does not necessarily commit to a larger action in the future nor a cumulatively considerable impact on the environment.

9. ***Substantial effects on a rare, threatened, or endangered species or its habitat.*** There is no evidence of rare, threatened or endangered species on or around the project site.

10. ***Detrimental effects on air or water quality or ambient noise levels.*** The project is not expected to have any adverse long-term effects on the air or water quality or the ambient noise levels in the area. Short term impacts on air and water quality and noise levels will be apparent during construction. Measures to mitigate these impacts are already required by existing laws and will be emphasized in the construction documents for the project.

11. ***Effects on an environmentally sensitive area, such as a flood plain, tsunami, erosion-prone area, geologically hazardous land, estuary, freshwater area, or coastal water.*** The project is not in an environmentally sensitive area. However, the area is within a drainage area which has had some problems during severe rainstorm situations. These problems will be addressed in the design of drainage improvement on and off site.

V. COMMENTS RECEIVED DURING PREPARATION OF DRAFT EA INCLUDING RESPONSES, IF ANY

A. Department of Education, State of Hawaii, Maui District Office (dated 3/17/95)

B. Department of Land and Natural Resources, Division of Forestry and Wildlife (dated 3/21/95)

C. Maui Land and Pineapple Co., Ltd. (dated 3/22/95) with response letter dated 3/30/95

D. Maui Electric Company, Ltd. (dated 3/22/95)

E. Department of Transportation, State of Hawaii, Highways Division, Maui District Office (dated 3/24/95)

BENJAMIN J. CAYETANO
GOVERNOR

HERMAN M. AIZAWA, Ph.D.
SUPERINTENDENT

STATE OF HAWAII

OFFICE OF DISTRICT SUPERINTENDENT
DEPARTMENT OF EDUCATION
54 HIGH STREET, 4TH FLOOR, RM. 401
WAILUKU, MAUI, HAWAII 96793

March 17, 1995

Mr. Calvin S. Higuchi
Hiyakumoto & Higuchi Architects Inc.
P.O. Box 922
Wailuku, Hawaii 96793

Dear Mr. Higuchi:

SUBJECT: MAYOR EDDIE TAM MEMORIAL PARK UPGRADE AND EXPANSION

Maui District is very impressed with the magnitude of the forth coming upgrade and expansion of the Mayor Eddie Tam Memorial Park.

Such a facility will provide the children a much needed facility in which physical development will be enhanced, an area to meet new friends and most important, a long awaited facility for the Upcountry community.

As was mentioned to you, comments should be solicited from Kalama Intermediate School regarding this project. Some concerns we have would be parking for users of the facility and the possible flow of "walking" traffic to the facility from community bordering Kalama and proposed park.

If you have any questions, please feel free to contact David Keala at 243-5060.

Sincerely,

for Ralph M. Murakami
District Superintendent

RMM:DK:cka

BENJAMIN J. CAYETANO
~~GOVERNOR~~
~~STATE OF HAWAII~~

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
DIVISION OF FORESTRY AND WILDLIFE
54 SOUTH HIGH ST., ~~1ST FLOOR~~ ROOM [illegible]
WAILUKU, HAWAII 96793
March 21, 1995

Michael D. Wilson
~~WILLIAM W. PATY~~, CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES

DEPUTIES
Gilbert Coloma-Agaran
~~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 PROGRAM
LAND MANAGEMENT
STATE PARKS
WATER AND LAND DEVELOPMENT

Mr. Calvin S. Higuchi
Hiyakumoto and Higuchi
Architects, Inc.
1860 Main Street
P.O. Box 922
Wailuku, Hawaii 96793

Re: Mayor Eddie Tam Memorial Park Upgrade and Expansion

Dear Mr. Higuchi:

A field inspection was conducted at the proposed project site for the upgrade and expansion of Mayor Eddie Tam Memorial Park in Makawao. The project site appears to be land once under pineapple cultivation. Initially, golden plovers were observed in the adjacent playgrounds and school yard. Additional avian wildlife observed at the project site included barred and spotted doves, gray francolins, house sparrows, house finches, meijiros, rice birds, American cardinal and mynahs. The pueo or Hawaiian owl, although not observed during the field trip, may at times hunt the area.

Because of the highly disturbed condition of the subject project site, it is doubtful that endangered wildlife occur there.

Sincerely,

Meyer L. H. Ueoka
Wildlife Manager

cc: Wayne Ching, Resource Management Forester

Maui Pineapple Company, Ltd.
Haliimaile Division

March 22, 1995

Mr. Calvin S. Higuchi
Hiyakumoto + Higuchi Architects, Inc.
P. O. Box 922
Wailuku, HI 96793

Dear Sir:

Thank you for the copy of the Draft Environmental Assessment for the Eddie Tam Park upgrade and expansion. I have the following comments:

1. I am not sure that the capacity of the detention basin is adequate to handle the additional storm water, as well as what is presently a problem with water coming off the watershed that feeds into the Eddie Tam Gym area. It is my feeling that this should be reviewed by the Soil Conservation Service people, who are real professionals at sizing watershed problems for retention.

2. Who is to maintain the detention basin?

   Currently, the County of Maui has done an inadequate job of maintaining detention basins, particularly those in West Maui. The Kahana basin is at capacity and should have been cleaned years ago but the County has been unable to maintain it adequately, for one reason another.

3. At present the Haliimaile Road crossing is inadequate for the amount of water coming off the watershed that it serves.

870 Haliimaile Highway • Haliimaile, Maui, Hawaii 96768 • Telephone (808) 572-7211 • FAX (808) 572-8229

This Eddie Tam Memorial Park upgrade will just add to the problem. It is my feeling that a new culvert needs to be installed now across Haliimaile Road to prevent a major accident at this location.

Your consideration is appreciated.

Sincerely,

L. D. MacCluer
Plantation Manager
and
Chairman, Central Maui
Soil & Water Conservation District

/sj

Hiyakumoto + Higuchi
ARCHITECTS · INC.

30 March 1995

Mr. Douglas MacCluer
Plantation Manager, Maui Pineapple Co., Ltd.
Chairman, Central Maui SWC District
Maui Pineapple Company, Ltd.
870 Haliimaile Highway
Haliimaile, HI 96768

Mr. MacCluer:

Thank you for your review and comments we received on the Draft Environmental Assessment for the subject project in your letter dated 3/22/95. We offer the following response at this time to those comments:

1. As we noted earlier, we recognize the fact that the detention basin will not control the high intensity rainfall runoffs. The intent of the basin is to control low flows and decrease the intensity of the runoff offsite and makai of our site. Eric Yamashige (Ronald Fukumoto Engineering), our civil engineer is in contact with Mr. Neal Fujiwara of the Natural Resources Conservation Service, as you had recommended, and will be working with Neal on the design of the drainage detention design.
2. It is my understanding that the maintenance of the detention basin will be under the jurisdiction of the Parks Department as it will be part of the park. This concern will be forwarded to the Parks Department for verification.
3. The problem of the drainage way crossing at Haliimaile Road is an existing problem. The intent of the design of the drainage detention basins and improvements at and near the park site will be to lessen the intensity of the runoff and to not *add* to the problem at the Haliimaile Road crossing.

Although these responses may not have satisfied your concerns completely, we hope, by the end of the project, to provide for those drainage concerns which the Parks Department is responsible for.
Again, may I express our sincere appreciation for your review and comments and we are willing to work with you on your concerns.

Sincerely,

Calvin S. Higuchi AIA

cc: Charmaine Tavares, Patrick Matsui, Eric Yamashige (with copies of Mr. MacCluer's letter)

1860 Main Street • P.O. Box 922 • Wailuku, Maui, Hawaii 96793 • (808) 242-9705

Maui Electric Company, Ltd. • 210 West Kamehameha Avenue • PO Box 398 • Kahului, Maui, HI 96732-0398 • (808) 871-846

March 22, 1995

Mr. Calvin S. Higuchi, AIA
Hiyakumoto + Higuchi Architects, Inc.
1860 Main Street
P. O. Box 922
Wailuku, HI 96793

Dear Mr. Higuchi:

Subject: Mayor Eddie Tam Memorial Park Upgrade and Expansion
EA Application (TMK: 2-4-32:98)

Thank you for allowing us to comment on the above subject:

In reviewing the information transmitted and our records, Maui Electric Company (MECO) at this time has no objections to the proposed project.

MECO has received a service request (M129247) for phase 1 of the proposed project and will continue to work with the project's electrical consultant.

If you have any questions or concerns, please call Fred Oshiro at 872-3202.

Sincerely,

Wayne Nagamine for

Edward Reinhardt
Manager, Engineering

FO:rt

BENJAMIN J. CAYETANO
GOVERNOR

KAZU HAYASHIDA
DIRECTOR

DEPUTY DIRECTORS
SAM CALLEJO
GLENN M. OKIMOTO

IN REPLY REFER TO:

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

HWY-M 2.140-95
I.D. No. ME-95-10

March 24, 1995

Mr. Calvin S. Higuchi, AIA
Hiyakumoto + Higuchi Architects, Inc.
1860 Main St.
P.O. Box 922
Wailuku, Hawaii 96793

Dear Mr. Higuchi:

Subject: Draft EA for Eddie Tam Memorial Park Expansion

Thank you for the opportunity to comment on the Draft EA.

The proposed expansion does not appear to have adverse impact on our facilities. We request, however, that the Traffic Impact Report as mentioned in the EA be provided for our review.

Very truly yours,

Robert O. Siarot
District Engineer, Maui

/fmc

RECEIVED AS FOLLOWS

VI. COMMENTS RECEIVED DURING 30-DAY PUBLIC REVIEW PERIOD (4/23-5/23/95) INCLUDING RESPONSES, IF ANY

A. Planning Department, County of Maui (dated 4/10/95 and 5/4/95)

B. S. Department of Agriculture, Natural Resources Conservation Service (dated 4/17/95) with response as noted in H+HA letter dated 5/10/95

C. Department of Public Works and Waste Management, County of Maui (dated 4/21/95) with responses in RFE memos dated 5/25/95)

D. Board of Water Supply, County of Maui, dated 4/24/95

E. Department of Health, State of Hawaii dated 4/27/95

F. Department of Land and Natural Resources, Historic Preservation Division, State of Hawaii dated 4/28/95

~~Laura Veeck~~
~~947-8190~~

LINDA CROCKETT LINGLE
Mayor

BRIAN W. MISKAE
Director

GWEN Y. OHASHI
Deputy Director

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

April 10, 1995

Mr. Calvin S. Higuchi, AIA
Hiyakumoto & Higuchi Architects, Inc.
1860 Main Street
P. O. Box 922
Wailuku, Hawaii 96793

Dear Mr. Higuchi:

RE: Advance Copy of the Draft Environmental Assessment for the Eddie Tam Memorial Park Upgrade and Expansion, TMK:2-4-6:5 and TMK:2-4-32:98, Makawao, Hawaii

The Planning Department has reviewed the advance copy of the Draft Environmental Assessment for the Eddie Tam Memorial Park. The existing park site is within the State Urban District and is further zoned interim. The site is also designated for park use on the Makawao-Pukalani-Kula (MPK) Community Plan.

Pursuant to Chapter 19.02.030.A.7, Maui County Code, Interim Zoning Provisions, permitted property use includes:

> "The expansion of existing parks, playgrounds, or community centers consisting of such open spaces developed with no buildings or minimum buildings, owned, or operated by either private or governmental agencies;"

The expansion site (TMK: 2-4-32:98) is located within the State Agricultural District and designated for Park and Single Family use on the existing MPK Community Plan. The proposed update to the MPK Community Plan designates the entire expansion site for park use.

As provided in Chapter 205-4.5, HRS, the State agricultural zoning classification on the expansion site will allow:

> "Public and private open area types of recreational uses including day camps, picnic grounds, parks, and riding stables, but not including dragstrips, airports, drive-in theaters, golf courses, golf driving ranges, country clubs, and overnight camps."

The Planning Department's interpretation of the above law would allow for restrooms but not pavilions.

The Planning Department further recommends that both the existing park site, as well as the expansion site be zoned "Park 2".

In addition, we recommend that a State Land Use District Boundary Amendment be obtained from the Land Use Commission as the acreage exceeds 15 acres. Pavilions, if desired, could be pursued through the Special Use Permit process.

Thank you for the opportunity to comment. If further clarification is required, please contact Ms. Ann Cua of this office.

Yours truly,

BRIAN MISKAE
Planning Director

ATC:osy
cc: Colleen Suyama, Planning Department
Ann Cua
Project File
a:higuchi.tem.mem.ltr

LINDA CROCKETT LINGLE
Mayor

BRIAN W. MISKAE
Director

GWEN Y. OHASHI
Deputy Director

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

May 4, 1995

MEMO TO: Charmaine Tavares, Director of Parks and Recreation

F R O M: Brian Miskae, Director of Planning

SUBJECT: EDDIE TAM MEMORIAL PARK EXPANSION

This confirms our meeting of May 3, 1995, to discuss development of recently acquired lands to Eddie Tam Recreation Center.

Your further description of the "pavilions" as being simple shelters causes me to change my assessment of the project in the context of the requirement of a State Land Use Special Use Permit. Please be advised that as long as the structures are similar to those that would be used in picnic grounds for shelter, such structures would be permitted by Chapter 205-4.5, HRS.

I trust this is the information you require.

BWM:jso
cc: Colleen Suyama, Planning Program Manager
Ann Cua, Staff Planner
c:\memo\46

United States
Department of
Agriculture

Natural
Resources
Conservation
Service

210 Imi Kala Street
Suite 209
Wailuku, HI
96793-2100

April 17, 1995

Mr. Calvin S. Higuchi
Hiyakumoto & Higuchi Architects, Inc.
P.O. Box 922
Wailuku, Hawaii 96793

Dear Mr. Higuchi,

Subject: Mayor Eddie Tam Memorial Park Upgrade and Expansion

My sincere apology in responding so late to your draft EA of the subject parcel.

There are three concerns regarding drainage from the proposed project. They are runoff affects on the subdivsion properties within the gulch, adverse affects to the adjacent pineapple fields farmed by Maui Pineapple Company, and affects to Hawaiian Commercial and Sugar Company's reservoir, pumping station and power house located at the end of the gulch.

I would recommend that you meet with representatives of the three affected land owners for a smooth project proposal.

Sincerely,

Neal S. Fujiwara
District Conservationist

FAXED 5-11-95

Hiyakumoto + Higuchi
ARCHITECTS · INC.

May 10, 1995

Mr. Pat Matsui
Department of Parks & Recreation
County of Maui
1580 Kaahumanu Avenue
Wailuku, HI 96793

Re: Eddie Tam Park Expansion
Phase 1A & 1B

Dear Pat:

The following are notes of meetings held today relative to this project:

Meeting #1 (@RFE Office)

1. Present: Jeffrey Taketa (Wailuku Agribusiness), Neal Fujiwara (Nat. Resources Conservation Service), Eric Yamashige (RFE), Calvin Higuchi.

2. Eric presented preliminary drainage plan to Jeff and Neal including graph of "before and after" development rainwater flows for the park site. Information presented showed a reduction of flows after development from the site, due to storm routing through the detention basin.

3. Jeff and Neal seemed satisfied with the direction of our planning. They both are concerned about drainage in the area but now realize that our project will not increase the flow into the gulch.

4. Neal noted that Randall Moore of HC&S had concern about increase in flows into the drainage gulch which goes down to Paia and HC&S properties. They have had some problems in that area during heavy rains. As we are not increasing flows to that gulch with the development of this park, HC&S should feel comfortable with this project's drainage plan.

5. Jeff mentioned that another development installed a drain line along Apau Place. RFE will investigate.

1860 Main Street • P.O. Box 922 • Wailuku, Maui, Hawaii 96793 • (808) 242-9705

Meeting #2 (@County Planning Conference Room)

1. Present: Arborist Committee, Russel Gushi, Calvin Higuchi.

2. The preliminary landscape plan was presented by Russel to the Committee for preliminary review.

3. The following were comments and suggestions noted:

   a. Xmas berry, although it grows well in the area, may become a problem and some consider it a "rubbish" tree.
   b. Banyan trees have aggressive roots and should be used and located very carefully.
   c. Strong recommendations were noted for jacaranda trees (noted as the "Upcountry" tree).
   d. Tree "windbreak" should be considered at the existing park on the windward side.
   e. Consider using native koa.
   f. Coromandel as a ground cover may be too aggressive and may become a maintenance problem.
   g. Bob Martin may be a source for honeysuckle.
   h. Mexican creeper and honeysuckle tend to attract bees and that may be a problem with kids being stung.
   i. Kikuyu grass is not recommended for playing field as it tends to grow thick and is a tripping hazard.
   j. On banks consider ground cover in lieu of grass if mowers cannot handle slope. Or inform Parks that grassed banks may have to be trimmed by weed eaters (like Pukalani Park).

4. Final landscape plans will be submitted when completed.

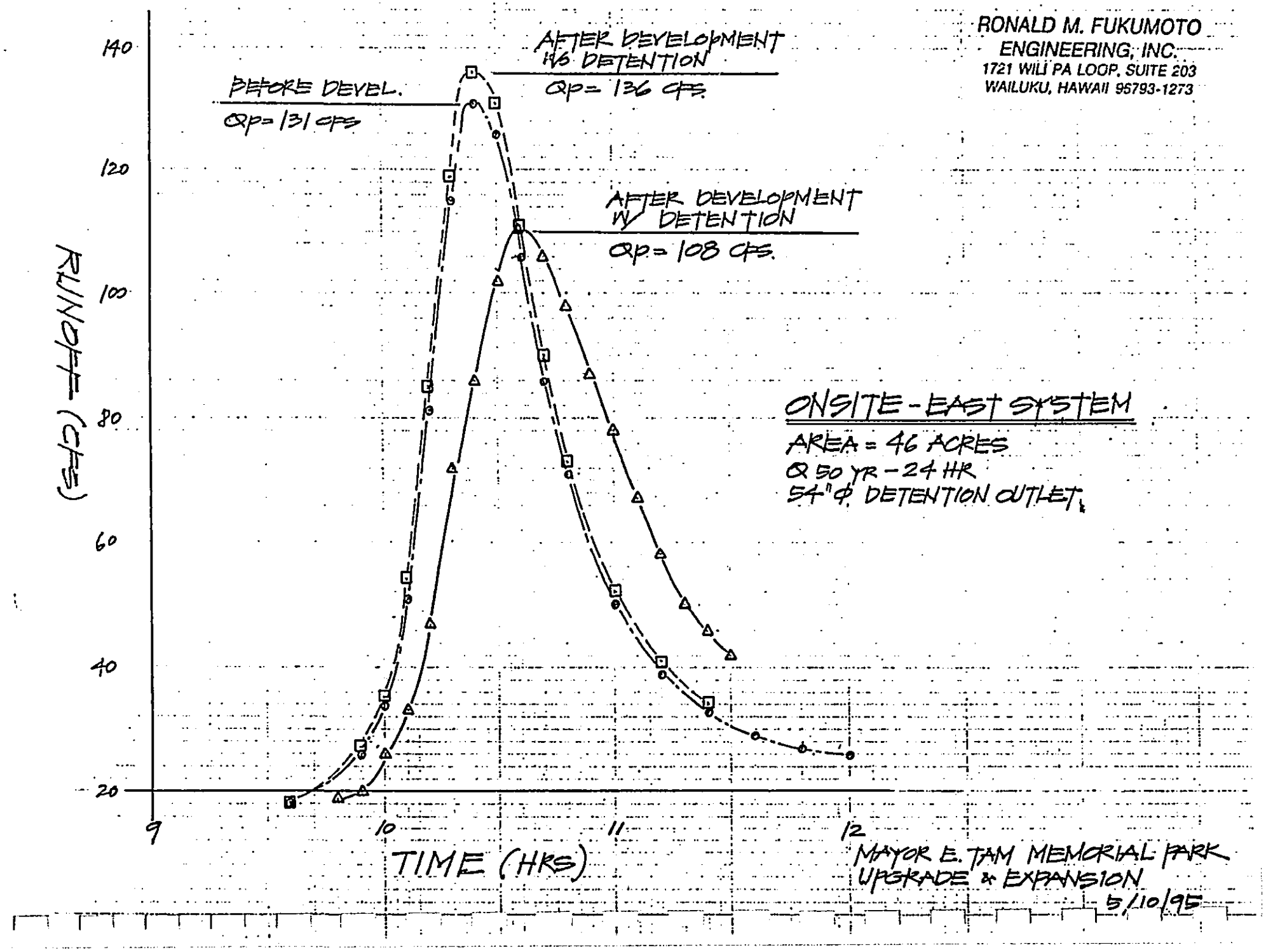
Any questions, please call.

Very truly yours,

Calvin S. Higuchi AIA

cc: Jeffrey Taketa
Neal Fujiwara
Russel Gushi
Eric Yamashige

RONALD M. FUKUMOTO
ENGINEERING, INC.
1721 WILI PA LOOP, SUITE 203
WAILUKU, HAWAII 95793-1273



ONSITE - EAST SYSTEM

AREA = 46 ACRES
Q 50 YR - 24 HR
54" ϕ DETENTION OUTLET

MAYOR E. TAM MEMORIAL PARK
UPGRADE & EXPANSION
5/10/95

COUNTY OF MAUI
DEPARTMENT OF PUBLIC WORKS
AND WASTE MANAGEMENT
LAND USE AND CODES ADMINISTRATION
250 SOUTH HIGH STREET
WAILUKU, MAUI, HAWAII 96793

April 21, 1995

Mr. Calvin Higuchi
HIYAKUMOTO + HIGUCHI ARCHITECTS, INC.
1860 Main Street
Wailuku, Hawaii 96793

SUBJECT: Draft Environmental Assessment
MAYOR EDDIE TAM MEMORIAL PARK UPGRADE & EXPANSION
TMK: (2)2-4-006 & 2-4-032

Dear Mr. Higuchi:

We reviewed the subject draft environmental assessment and have the following comments:

1. Comments from the Engineering Division:

   a. Road widening lots be provided for the adjoining halves of Hale Kipa Road and Hoomana Road in areas where access to proposed park improvements are contemplated. Necessary improvements shall include pavement widening, construction of curb, gutter and sidewalk, and relocation of utilities underground. Said lots shall be dedicated to the County upon completion of the improvements.

   b. All structures, such as walls, trees, etc., shall be removed or relocated from the road widening strips. The rear boundaries of the road widening strips shall be clearly marked to determined if said structures have been properly removed and relocated.

   c. A final detailed drainage and erosion control plan including, but not limited to, hydrologic and hydraulic calculations, scheme for controlling

erosion and disposal of runoff water, and an analysis of the soil loss using the HESL erosion formula, be submitted to the Department of Public Works, Engineering Division for our review and approval. The plan shall provide verification that the grading and runoff water generated by the project will not have an adverse effect on the adjacent and downstream properties.

d. The applicant shall submit a Traffic Impact Analysis Report for our review and approval.

e. The applicant shall construct road improvements.

f. The 100-year flood inundation limits, if applicable, be shown on the project site plans.

The applicant is requested to contact the Engineering Division at 243-7745 for additional information.

2. Comments from the Wastewater Reclamation Division:

a. Consultant should ensure that the wastewater disposal system meets all requirements of HAR Title 11, Chapter 62.

The applicant is requested to contact the Wastewater Reclamation Division at 243-7417 for additional information.

3. Comments from the Solid Waste Division:

a. Contact the Central Maui Sanitary Landfill Operations Supervisor at 877-7596 or 877-5319 for instructions on the disposal of clearing and grubbing.

The applicant is requested to contact the Solid Waste Division at 243-7875 for additional information.

4. Comments from the Land Use and Codes Administration:

This division has reviewed this submittal and has no comments at this time.

If you have any questions regarding this letter, please call me at 243-7845.

Very truly yours,

CHARLES JENCKS
Director of Public Works & Waste Management

ey
xc: Engineering Division
Solid Waste Division
Wastewater Reclamation Division

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RONALD M. FUKUMOTO ENGINEERING, INC.
CIVIL ENGINEERING & SURVEYING CONSULTANTS

MEMORANDUM

Date: May 25, 1995

To: Lloyd P.C.W. Lee, PE, Chief
Engineering Division
Department of Public Works and Waste Management
County of Maui

From: Eric Yamashige

Subject: DRAFT ENVIRONMENTAL ASSESSMENT
MAYOR EDDIE TAM MEMORIAL PARK UPGRADE & EXPANSION
TMK: (2) 2-4-06: 05 & 2-4-32: 98 MAKAWAO, MAUI

Thank you for meeting with me yesterday to discuss the Engineering Division's comments on the draft environmental assessment. Engineering's comments were forwarded in DPWWM's April 17, 1995 letter to Project Architect Hiyakumoto + Higuchi Architects.

The following is a brief summary of our discussions. The item numbers refer to the April 17, 1995 DPWWM letter.

1.a. Road widening lots be provided for the adjoining halves of Hale Kipa Road and Hoomaha Road in areas where access to proposed park improvements are contemplated. Necessary improvements shall include pavement widening, construction of curb, gutter and sidewalk, and relocation of utilities underground.

The properties across the adjoining Hale Kipa Road and Hoomaha Road are zoned agricultural. The park expansion site is also zoned agricultural. Due to this zoning, the existing 40-feet wide right-of-way is adequate. Also, curbs, gutters, and underground utilities are not required. A 4-feet wide sidewalk, however, is required since the adjoining roads are within one-half mile of Kalama Intermediate School [MCC 18.20.070 Sidewalks]. **The sidewalk is required during the park development adjoining the roads.**

The existing 40-feet wide "private" access between Kalama Intermediate School and the park, however, requires a 44-feet wide right-of-way. Although this access will remain private, improvement to urban standards is required. These improvements include pavement widening, construction of curb, gutter and sidewalk, and underground utilities. The right-of-way should be widened now, however, improvements are not required until the development of the park adjoining the access.

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1.d. The applicant shall submit a Traffic Impact Analysis Report for our review and approval.

The draft environmental assessment prepared for the park included a draft traffic impact report. The report, included as appendix D in the draft environmental assessment, compared the 1994 field observed traffic to the 1999 completed park projected traffic.

Again, thank you very much for meeting with me and reviewing the comments. This is our understanding of the discussion. Please call me immediately if I misunderstood our conversation.

Copy: Pat Matsui, Parks Department
Calvin Higuchi, AIA

1HH105A

RONALD M. FUKUMOTO ENGINEERING, INC.
CIVIL ENGINEERING & SURVEYING CONSULTANTS

MEMORANDUM

Date: May 25, 1995

To: Calvin S. Higuchi, AIA
HIYAKUMOTO + HIGUCHI ARCHITECTS, INC.

From: Eric Yamashige

Subject: DRAFT ENVIRONMENTAL ASSESSMENT
MAYOR EDDIE TAM MEMORIAL PARK UPGRADE & EXPANSION
TMK: (2) 2-4-06: 05 & 2-4-32: 98 MAKAWAO, MAUI
Department of Public Works and Waste Management Comments

We contacted the following divisions of DPWWM in response to their April 21, 1995 comments on the draft environmental assessment.

Engineering Division

We met with Mr. Lloyd P.C.W. Lee, PE, Chief of the engineering division yesterday. Our discussion of their comments is recorded in our May 25, 1995 memorandum to engineering.

Wastewater Reclamation Division

We spoke to Mr. Tracy Takamine, PE of the wastewater reclamation division. The request to contact their division is a standard comment. They have no additional information at this time.

Solid Waste Division

We called Joanne at the solid waste division. The request to contact their division is a standard comment. They have no additional information at this time.

Land Use and Codes Administration

The division offered no comments.

Please call if you have any questions or need further clarification.

Copy: Pat Matsui, Parks Department

HH05A

1721 WILI PA LOOP, SUITE 203 • WAILUKU, HAWAII 96793-1273 • PHONE (808) 242-8611 • FAX (808) 244-7510

BOARD OF WATER SUPPLY
COUNTY OF MAUI
P.O. BOX 1109
WAILUKU, MAUI, HAWAII 96793-7109

April 24, 1995

Mr. Calvin S. Higushi, AIA
Hiyakumoto + Higushi Architects, Inc.
P.O. Box 922
Wailuku, Hawaii 96793

Dear Mr. Munekiyo,

Re: Proposed 32-acre expansion and upgrade of existing 13-acre park at 2-4-6:5 and 2-4-32:98, Makawao; Consultation on an advanced copy of the Draft Environmental Assessment report dated March 15, 1995 requested by Hiyakumoto + Higushi, on behalf of Department of Parks and Recreation

The submitted materials provided inadequate information to finalize an evaluation of the project. The following comments should be taken only as consultation. For your convenience we submit general information and concerns as follows:

1. Attached for your information is a 1991 water distribution and fire protection map section of the area;

2. Three 2-inch meters presently exist at the park. Inadequate water source affects the region of the subject site. New hook-ups to the source by way of the community system are presently restricted. No guarantee of additional water for the project is granted or implied as a result of these comments or the approval of the subject application;

3. Fire, domestic, fixture count, mechanical and irrigation calculations will be required and reviewed at the time of water service or building permit application;

4. The project summary includes no consumption estimates by the developer. Therefore, for consultation purposes we approximate the maximum daily water consumption for the park expansion by acreage by the standards as approximately 81,600 gallons (32 acres X 1700 gallon/ acre/day X 1.5 max. day;)

5. Full, attractive plantings are encouraged. However, limit the commitment of the island's water resources to irrigation-thirsty landscapes. Plant drought-tolerant species, as the site and commercial-availability permit, which survive on the site's rainfall supplemented with irrigation only during the first year(s) and summers.

5. (concluded)

The subject site is located in what is naturally part of the dryland forest and shrub, and Maui County Plan Natural Plant Survival Zone 4, between 1,000 and 3,000 feet elevation. Some plants which survive naturally in this vegetation zone are included on the attached list, "Some Maui Native and Polynesian Plants."

Turf species with low water use requirements are, for example, Buffalograss (18"-28"/year), Common Bermuda, 'No Mow' Bermuda and Zoysia. Concentrate turf planting in areas which are comfortable and frequently used by humans for active play and picnicking. Remove turf from roadsides, parking lots, boundaries and other areas which are too uncomfortable, exposed or out-of-the-way for active human leisure activities. Instead, use drought-tolerant, low groundcover and shrubs in areas primarily used for passive, visual pleasure and relief.

Further guidance in water conservation in landscaping may be found in the second attached document, "XERISCAPE: Water Conservation Through Creative Landscaping."

6. Building and stand-alone mechanical equipment, including but not limited to air-conditioners and commercial ice-makers, should be specified as air-cooled or recirculating water-cooled. Single-pass water-cooled systems should be eliminated per Maui County Code Subsection 14.21.20.

Sincerely,

MAUI COUNTY BOARD OF WATER SUPPLY

David R. Craddick, Director

DDS
c:\dds\ed'tam.par
enclosures

Eddie Tam—Park Expansion
TMK 2-4-6:5, 2-4-32:1

Some Maui Native and Polynesian Plants

For further information and additional native plant listings, see the Maui County Planting Plan. The plan was prepared by the Maui Arborist Committee, and it is available at the Volunteer Action office, Kahului Community Center, 275 Ulu Street, ph. 243-7325, for a $15.00 donation.

Natural Vegetation Zones
1 - Wet areas on the windward side.
2 - Cool, dry areas in higher elevations (above 1,000 feet.)
3 - Low, drier areas that are warm to hot.
(4) - Lower elevations that are wetter due to proximity to the mountains.
5 - Salt-spray zone in coastal areas on the windward side.

Elevation
L - Sea-level to 1,000 feet
(M) - 1,000 to 3,000 feet
H - Higher than 3,000 feet

Common Name	Scientific Name	Ht	Zone of Self-Subsistance					Elevation		
Koa	Acacia koa	60'	1	2		4			M	H
Kamani	Calophylum inophylum	60'	1			4		L	M	
Kukui	Alerites moluccana	50'	1			4	5	L	M	
Hala	Pandanus tectorius	35'	1			4	5	L		
Kou	Cordia subcordata	35'	1			4	5	L		
'Ōhi'a Lehua	Metrosideros polymorpha	25'	1	2		4		L	M	H
Kou haole	Cordia sebestena	20'	1		3	4	5	L	M	
Koki'o ke'oke'o	Hibiscus waimeae	20'		2		4			M	
Hala pepe	Pleomele auwahiensis	20'		2	3	4			M	
Wiliwili	Erythrina sandwicensis	20'		2	3	4		L		
Hao	Rauvolfia sandwicensis	20'		2	3	4		L	M	
'Ohe Makai	Reynoldsia sandwicensis	20'			3				M	
Olopua	Nesteqis sandwicensis	15'		2	3	4			M	
Mai'a	Musa acuminata	6-30'	1			4		L	M	
Kōlea	Myrsine lessertiana	15'		2		4			M	
Keahi	Nesoluma polynesicum	15'			3			L	M	
Hō'awa	Pittosporum hosmeri	12'		2		4			M	
Alahe'e	Canthium odoratum	12'			3	4		L	M	
Lama	Diospyros sandwicensis	12'			3	4		L	M	
Naio	Myoporum sandwicense	10'		2	3	4	5	L	M	H
Koki'o 'Ula'ula	Hibiscus kokio	10'	1			4		L	M	
'Awa	Piper methysticum	10'	1					L		

Common Name	Scientific Name	Ht	Zone of Self-Subsistance					Elevation		
Pōhuehue	Ipomoea pes-caprae	1'					5	L		
Naupaka	Scaevola coriacea	1'			3	4	5	L	M	
'Uala	Ipomoea batatas	1'	1			4		L	M	
'Akulikuli	Susuvium portulacastrum	.5'	1				5	L		
'Ilima papa	Sida fallax	.5'			3	4	5	L		
Mau'u 'aki'aki	Fimbristylis cymosa	.5'			3		5	L		
Pā'ūohi'iaka	Jacquemontia ovalifolia subsp.sandwicensis	.5'			3	4	5	L		
Seashore Paspalum	Paspalum vaginatum	1"	1			4	5	L		

For further information and additional native plant listings, see the Maui County Planting Plan. The plan was prepared by the Maui Arborist Committee, and it is available at the Volunteer Action office, Kahului Community Center, 275 Ulu Street, ph. 243-7325, for a $15.00 donation.

Natural Vegetation Zones
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Elevation
L - Sea-level to 1,000 feet
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H - Higher than 3,000 feet

XERISCAPE

Water Conservation Through Creative Landscaping

Xeriscape Defined

Seven Water Conservation Fundamentals

Planning and Design

Soil Improvement

Efficient, Zoned Irrigation

Limited Turf Area

Use of Mulches

Use Of Low Water-Demand Plants

Appropriate Maintenance

Community Water Management

Many have misread the term as zeroscape, which would imply noscape or no landscape plantings. Others have equated Xeriscape landscaping with "rockscapes," many of which are not aesthetically pleasing and may not always conserve water or energy. Rockscapes are harsh, produce glare, and do little to prevent noise and air pollution, making them a poor substitute for Xeriscape landscaping.

Seven Water Conservation Fundamentals

The Xeriscape motto, "Water conservation through creative landscaping," provides the umbrella under which a wide variety of landscape water conservation activities may be taught and employed in a community. And although there are many landscape and horticultural techniques that conserve water, Xeriscape programming has focused on seven broad, fundamental areas.

1. Planning and Design
2. Soil Improvement
3. Efficient, Zoned Irrigation
4. Limited Turf Areas
5. Use of Mulches
6. Use of Low Water Demand Plants
7. Appropriate Maintenance

Planning and Design

Architects, planners, and homeowners are encouraged and taught to incorporate standard design elements of function, circulation, topography, exposure, seasonal color, texture, safety, etc. into existing landscapes and new designs with emphasis on conserving, limiting and/or reusing water. 40% to 60% of the water homeowners use goes for yard watering. Appropriate design and planning can provide these very necessary aspects of urban life and conserve water at the same time. Xeriscapes can ameliorate the impact of a severe drought and avoid the costly clean-up resulting from a "boom and bust" water policy. Tree removal, replanting of landscapes and turfgrass fields are eliminated and real savings to Maui County.

Thayer and Richman (1984) suggest that designing water-conserving landscapes should be considered in two parts. First, the physical ecology of plants and plant communities must be integrated within the microclimates of the landscape. Logically, plants best adapted to the climate, temperatures, sun, wind, and physical nuances of the site thrive best and require the least expenditures for water, energy and maintenance. Secondly, landscape designers must accept that there is a "human ecology" of water use in landscapes. That is, the intensity of human

Not only are irrigation zones established to meet the physical or ecological water needs of plants, but Xeriscape landscaping also recognizes that human activity will impact plant water needs. Thayer and Richman (1984) describe this irrigation zoning to match man's activity as hydrozone planning, and they define four irrigation regimes (Figure 10-3).

The Principal Hydrozone represents the area with the greatest human activity and consequently the greatest water and energy use: sites in yards, parks, and play fields where people frequently, play, sit, walk, gather, or relax: places where people regularly contact plants.

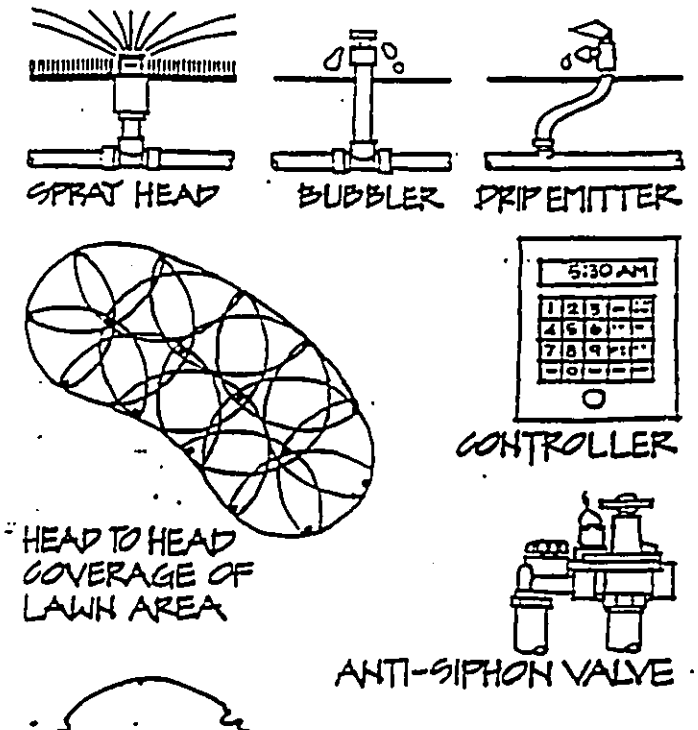
The Secondary Hydrozone is less physically impacted by humans, but is visually important: areas of passive activities space delineation or focal interest such as flower and shrub beds, entrances, prominent plantings, etc; areas of high visual impact, but seldom touched by humans.

Buffer zones, distant views, median strips, parkways, and embankments-these make up the third hydrozone, called the Minimal Hydrozone. In this case, plants are selected that need minimal supplemental water to survive the natural climatic conditions.

The Elemental hydrozone constitutes landscape plantings that require only natural precipitation to survive and seldom, if ever, incur human activity. Utility areas, mulched native plantings, and naturally sustainable, exotic vegetation belong to this hydrozone (Figure 10-4).

Flexible sprinkler heads and nozzles, adjustable delivery rates and coverage, modern valves, and automated controllers - these allow greater water conservation through zoned irrigation. On-off watering is easily programmed to match water infiltration rates into soils, thus avoiding surface runoff. Also, water is better applied to meet specific plant needs as impacted by seasonal human activity and changes in the weather.

Collection systems should be designed and constructed throughout the landscape to gather storm runoff from roofs, walks, drives, and slopes. By grouping high or moderate water requiring plants near swales and collection basins, much of their water needs can be met by natural moisture accumulations rather than irrigation. On the other hand, drought tolerant species may succumb to frequent accumulations of water and should be located on southern exposures or at the tops of slopes. Because they often only require supplemental irrigation during establishment or during a severe drought, a permanent irrigation system may not be needed.



1. Separate irrigation lines into high, moderate and low water-use zones or areas and set an automatic valve at the head of each line. The same plant material on the north side of a structure or in a sheltered area will require less water than in a more severe exposure.

2. To help achieve uniform water distribution for turfgrass, overlap sprinkler spray patterns (100%) so that water from one head reaches out to the next nearest head (head-to-head coverage). Ask your irrigation supplier for low gallonage sprinkler heads that have "matched precipitation rates."

3. Wire each valve into an automatic timer to control how many minutes each valve applies water. Select a timer that allows recycling, that is, several cycles of on/off "runtime" during each irrigation day. Heavy soils, clays, require several hours between short on periods to allow water to move deeper into soils. Sandy soils require less time between on times and may require mulching to enhance water retention qualities.

4. Prepare and follow an irrigation schedule by contacting a local landscape architect or irrigation specialist. Determine the precipitation requirements for your particular trees, shrubs, lawn and flower beds and program the timer to meet their individual water requirements. Settings will have to be changed seasonally to meet the plants demand for water.

5. Prevent surface run-off by adjusting heads to eliminate over spray on hard surfaces; reduce misting by spraying larger water droplets; utilizing on/off cycling; reducing slopes; using low precipitation heads and applying mulch whenever possible.

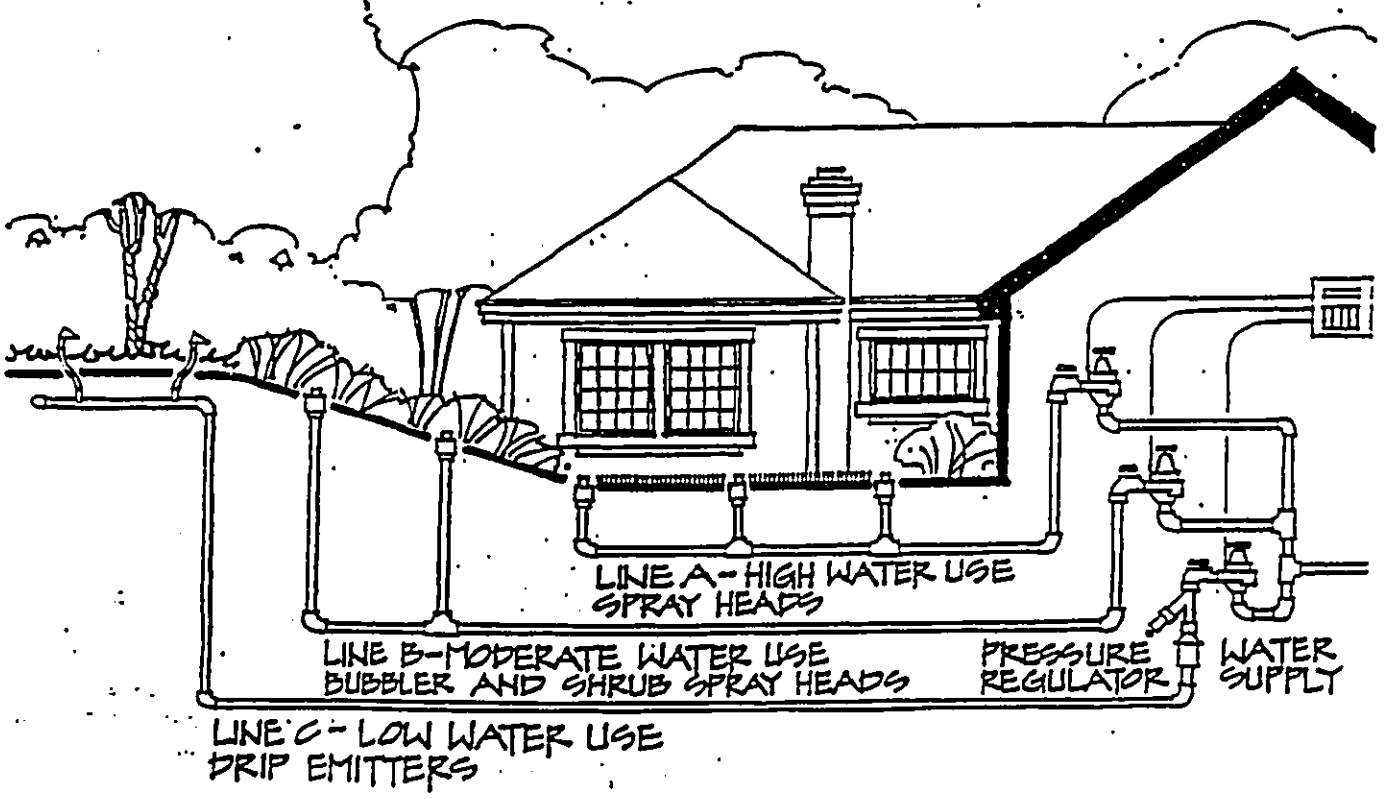


Figure 10-2. Five Steps to Efficient Irrigation

Likewise, the amount of turfgrass in a landscape may be reduced by increasing the hardscape. Patios, wooden decks, rocked and graveled walks limit the turf area while reducing the water requirement.

Use of Mulches

Mulches function to buffer soils against climatic extremes. In summer, they reduce soil heating and slow evaporation water loss from soil surfaces. They also reduce weeds and make those present easier to remove. Proper use of mulches reduces or prevents soil erosion. Organic mulches also contribute to the nutritional level and tilth of the soil as they breakdown.

These practical functions are important: however, many mulches are included in the landscape for their design flexibility and attractiveness, not simply because they save water, protect roots, and reduce maintenance.

Mulches are classified as organic, inorganic, and living. Organic mulches include plant refuse, such as chips and slash from tree trimming operations, saw dust, composted leaves and manures, peat moss, and graded bark products. Sized and washed rocks and gravels are popular inorganic mulches which come in many sizes, colors, and textures. Impervious sheet plastics covered with either organic or inorganic mulches were popular, but because sheet plastic prevents gas and water exchange between air and soil and creates a water-logged root environment, woven, porous plastics are now preferred. Mulches are applied 3 to 4 inches deep over bare soil and only 2 to 3 inches deep over woven fabrics. Living mulches include low growing groundcovers and low maintenance turfgrasses. They function well as mulches, but may be heavy competitors for water and nutrients under newly planted trees and shrubs. If used, select hardy, drought-tolerant species that resist common diseases. These species provide the best results and require less maintenance.

Use Of Low Water-Demand Plants

Many beautiful and functional plants, both exotics and natives, are available that thrive with natural precipitation or small amounts of supplemental water.

Chapter Two lists tree characteristics including their water requirements ranging from dry (less-thirsty) to wet (very-thirsty).

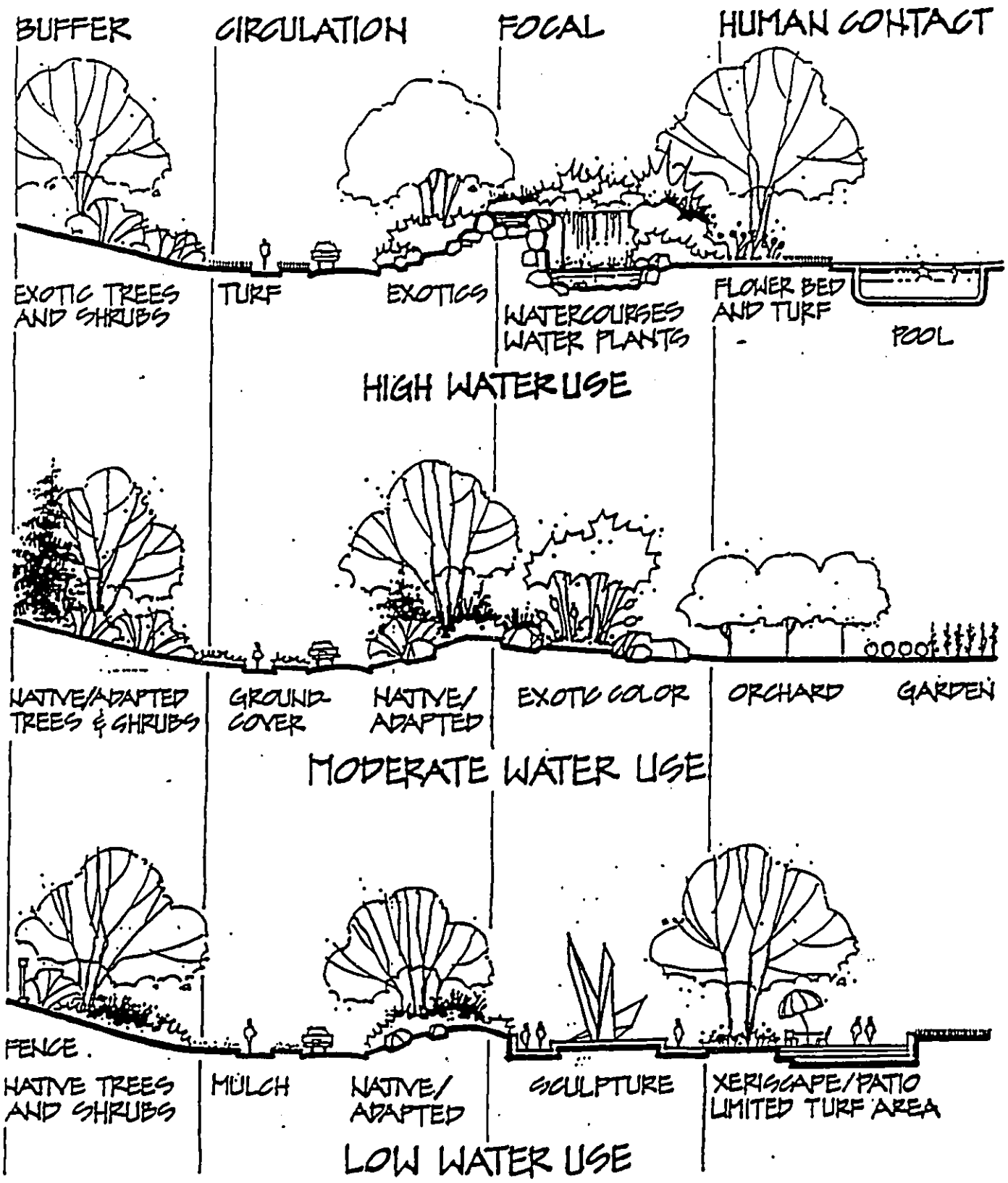


Figure 10-4. Water Use Relating to Human Use—Three Approaches

LOW WATER USE/DROUGHT TOLERANT PLANT LIST

All plants require water for establishment. After they are rooted and growing well their water requirements will vary.

The following is an incomplete list of drought tolerant plants. It is provided for your convenience.

Please review the following reference lists for many other suggestions.

1. Drought Resistant Plants For Hawaiian ardens by Norman C. Benzona, County Extension Agent, Cooperative Extension Service.

2. Drought Tolerant Native Hawaiian Plants for the Landscape - by Heidi Bornhorst Horticulturist, Honolulu Botanic Gardens.

3. Halawa Xeriscape Garden Registry of Nurseries that grow Less-Thirstry-Plants-Honolulu Board of Water Supply, November 1989.

Key to Symbols

A	Accent Plant
F	Flower Color
GC	Groundcover
G	Grass
OG	Ornamental Grass
S	Shrub
SC	Succulent
ST	Small Tree
MT	Medium Tree
LT	Large Tree
V	Vines

Key to Zones

Zone 1 - Normal watering level. Includes lush lawns and gardens.

Zone 2 - Moderate watering level. Includes lawns, ground covers and shrubs.

Zone 3 - Low watering level. Includes self-sustaining plant materials and natural vegetation with emphasis on plants that require little or no supplemental irrigation.

Type	Botanical Name	Zone	Common Name
MT	Caesalpinia ferrea	2	Brazilian Ironwood
A,S,F	Caesalpinia pulcherrima	3	Ohai ali'i(3 colors)
S	Calotropis gigantea	3	Crown Flower
ST	Canthium odoratum	3	Alahe'e
S	Carissa grandiflora	3	Natal Plum
S,GC	C. grandiflora prostrata	3	Creeping Natal Plum
S,ST,F	C. surratensis	3	Kolomona
SC,GC	Carpobrotus edulis	3	Hotentot Fig
MT,F	Cassia fistula	2	Yellow Shower
MT,F	Cassia fistula x C. javanica	3	Rainbow Shower (All Colors)
ST	Ceratonia siliqua	3	Carob Tree
V,GC,S	Clerodendron inerme	3	Glory Bower
MT	Clusia rosea	3	Autograph Tree
S	Clusia sp.	3	Small Leaf Clusia
MT,F	Cochlospermum vitiflium	2	Buttercup Tree
MT,F	Cordia subcordata	3	Kou
OG	Cortederia selloana	3	Pampas Grass
S,SC,A	Crassula argentea	3	Jade Plant
ST	Cresentia cujete	3	Calabash Tree
V	Cryptostegia grandiflora	2	India Rubber Vine
A,S	Cycas revoluta	3	Sago Palm
G	Cynodon dactylon		Bermuda Grass
A,S,SC	Dasyliron wheeleri	3	Spoon Flower
MT,A,F	Delonix regia	2	Royal Poinciana (3 colors)
S	Dodonaea viscosa	3	'A'ali'i
LT	Enterolobium cyclocarpum	3	Earpod
MT	Eriobotrya japonica	2	Loquat
MT	Erythrina sandwicensis	3	Wiliwili
MT	Erythrina "Tropic Coral"	2	Tropic Coral Wiliwili
MT	E. variegata var. orientalis	2	Tigers Claw
S,SC,A	Euphorbia cotinifolia	2	Hierba mala
A,GC,SC	E. millii	3	Crown of Thorns
ST,A	Feijoa sellowiana	2	Pineapple Guava
S	Ficus buxifolia	2	Boxwood Ficus
ST,A	Ficus carica	3	Fig
S,A	F. diversifolia	2	Mistletoe Fig
LT	F. microcarpa	3	Chinese Banyan
S,GC	F. microcarpa var. crassifolia	3	Taiwan Ficus
A,SC	Furcraea aff. giantea variegata		Variegated Furcraea

Type	Botanical Name	Zone	Common Name
S	Rosemarinus offcinalis	3	Rosemary
GC	R. officinalis var. prostrata	3	Creeping Rosemary
S,A,F	Russelia equisetifolia	2	Coral Plant
T	Samanea saman	3	Monkey Pod
A	Sansevieria spp.	3	Sansevieria
MT	Sapindus saponaria	2	Soapberry Tree
S	Scaevola taccada	3	Naupaka
ST	Schinus molle	3	California Pepper Tree
GC,SC	Sedum spp.	3	Sedum
V,F	Senecio confusus	2	Mexican Flame Vine
V,GC	Stapelia nobilis	3	Giant Carrion Flower
G	Stenotaphrum secundatum	2	St. Augustine Grass
OG	S. secundatum variegatum	2	Veriegated St. Augustine Grass
A,F	Strelitzia reginae	2	Bird of Paradise
MT	Tabebuia argentea	2	Silver Trumpet Tree
LT	T. chrysantha	2	Trumpet Tree
LT	T. donnel-smithii	2	Gold Tree
MT	Tamarix aphylla	3	Desert Athel
V,GC,F	Thevetia peruviana	3	Be-still Tree
GC	Tradescantia spathacea	3	Oyster Plant
S,GC	Wikstroemia uva-ursi	3	'Akia
A,SC	Yucca gloriosa	3	Spanish Bayonet
G	Zoysia tenuifolia 'Elegance'	2	
G	Z. tenuifolia 'Emerald'	2	

BENJAMIN J. CAYETANO
Governor of Hawaii

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

LAWRENCE MIIKE
Director of Health

Lawrence Hart, M.D., M.P.H.
District Health Services Administrator (M.D.)

April 27, 1995

Mr. Calvin S. Higuchi, AIA
Hiyakumoto & Higuchi
P. O. Box 922
Wailuku, Hawaii 96793

Dear Mr. Higuchi:

Subject: Draft Environmental Assessment for Mayor Eddie Tam Memorial Park Upgrade and Expansion, TMK: 2-4-32, Makawao, Maui, Hawaii

Thank you for the opportunity to review and comment on the subject Draft Environmental Assessment. Our comments are as follows:

1. Building modifications may require an upgrade of the existing wastewater disposal systems (IWS's). All new IWS's shall be treatment IWS's.
2. Any direct or indirect discharges into State waters as defined in chapter 54, Title 11, Administrative Rules, Department of Health, will require a National Pollution Discharge Elimination System (NPDES) permit.
3. Renovation of the Gym building will require an upgrade of the existing kitchen. A three (3) compartment sink and a hand basin will be required.

If you have any questions regarding the above, please call me at 243-5255.

Sincerely,

HERBERT S. MATSUBAYASHI
Acting Chief Sanitarian, Maui

1736

BENJAMIN J. CAYETANO
Governor of Hawaii

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES

P. O. Box 621
Honolulu, Hawaii 96809

REF:OCEA:TES

FILE NO. 95-440
APR 28 1995

Mr. Calvin S. Higuchi, AIA
Hiyakumoto + Higuchi Architects, Inc.
P.O. Box 922
Wailuku, Hawaii 96793

Dear Mr. Higuchi:

SUBJECT: Advance Draft Environmental Assessment (DEA): Eddie Tam Memorial Park Upgrade & Expansion, Makawao, Maui, TMK: 2-4-06: 5; 2-4-32: 98

We have reviewed the advance DEA for the subject project transmitted by your letter dated March 15, 1995, and have the following comments:

Historic Preservation Division

The Historic Preservation Division (HPD) comments that their review is based on historic maps, aerial photographs and reports maintained in the HPD library; no field inspections were made of the subject parcels.

There are no records of historic sites on these properties. Since the existing park site is a well-developed facility and since the proposed areas for expansion of the park were formerly under pineapple cultivation, HPD believes that it is unlikely that significant historic sites are still present. HPD therefore believes that the proposed undertakings, as described in the DEA, will have "no effect" on significant historic sites.

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

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

Aloha,

Gilbert S. Coloma-Agaran
MICHAEL D. WILSON

ST:tes

VII. DETERMINATION

A. After a review of the short and long term impacts of the proposed action and based on the "significance criteria" as noted in the previous section, it is determined that a Negative Declaration is appropriate and an Environmental Impact Statement is not required.

B. The only probable adverse impacts will occur during the construction phase and are therefore temporary. As stated earlier, these impacts will be mitigated by appropriate actions by the contractor during construction as specified in the construction documents and as required by law.

C. It does not appear that any long term impacts will detrimentally affect the region. In fact, long term impacts should be beneficial to the surrounding neighborhood and the community in general.

VIII. APPENDIX

A. List of Agencies, Associations, Groups, Companies Contacted during the preparation of Draft Environmental Assessment

COUNTY AGENCIES:

Ms. Charmaine Tavares, Director
Department of Parks and Recreation, County of Maui
1580 Kaahumanu Avenue
Wailuku, HI 96793

Mr. Brian Miskae, Director
Department of Planning, County of Maui
250 S. High Street
Wailuku, HI 96793

Mr. Charles Jencks, Director
Department of Public Works, County of Maui
200 South High Street
Wailuku, HI 96793

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

Mr. Ron Davis, Fire Chief
Maui County Department of Fire Control
21 Kinipopo Street
Wailuku, HI 96793

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

Economic Development Agency
County of Maui
200 South High Street
Wailuku, HI 96793

STATE AGENCIES:

Department of Land and Natural Resources
1151 Punchbowl Street
Honolulu, HI 96813

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

Ms. Theresa Donham
Department of Land and Natural Resources
Historic Preservation Division
1325 Lower Main Street, Room 108
Wailuku, HI 96793

Mr. Meyer L. Ueoka
Department of Land and Natural Resources
Wildlife Biologist
54 South High Street
Wailuku, HI 96793

Mr. David Keala, Facilities Coordinator
Department of Education
State Building
54 High Street
Wailuku, HI 96793

Mr. Dennis Hokama, Principal
Kalama Intermediate School
120 Makani Road
Makawao, HI 96768

Mr. Herbert Matsubayashi, Acting Chief Sanitarian
Environmental Health Services Division
Health Department, State of Hawaii
54 High Street
Wailuku, HI 96793

FEDERAL AGENCIES:

Mr. Neal Fujiwara, District Conservationist
Natural Resources Conservation Services
U.S. Dept. of Agriculture
210 Imi Kala Street, Suite 209
Wailuku, HI 96793

OTHER ENTITIES CONTACTED:

Mr. L. Douglas MacCluer, Plantation Manager
Maui Pineapple Company, Ltd.
Haliimaile Division
870 Haliimaile Highway
Makawao, HI 96768

Makawao Community Association
c/o Mr. Guus Mauri
82 Makani Road
Makawao, HI 96768

Mr. Ed Reinhardt, Engineering Manager
Maui Electric Company
210 West Kam Avenue
Kahului, HI 96732

RECEIVED AS FOLLOWS

VIII. APPENDIX (CONTINUED)

B. Preliminary Drainage & Erosion Control Report

PRELIMINARY
DRAINAGE & SOIL EROSION CONTROL REPORT
FOR
MAYOR EDDIE TAM MEMORIAL PARK
UPGRADE & EXPANSION

Makawao, Maui, Hawaii

TMK: (2) 2-4-06: 05
and TMK: (2) 2-4-32: 98

Prepared for

Hiyakumoto + Higuchi Architects, Inc.
1860 Main Street
Wailuku, Hawaii 96793

April 1995

Ronald M. Fukumoto Engineering, Inc.
1721 Wili Pa Loop, Suite 203
Wailuku, Hawaii 96793

PRELIMINARY
DRAINAGE & SOIL EROSION CONTROL REPORT
FOR
MAYOR EDDIE TAM MEMORIAL PARK
UPGRADE & EXPANSION
Makawao, Maui, Hawaii
TMK: (2) 2-4-06: 05
and TMK: (2) 2-4-32: 98

PURPOSE:

The purpose of this preliminary report is to review the existing, and evaluate the developed drainage conditions of the Mayor Eddie Tam Memorial Park Upgrade and Expansion. This report will also review the potential movement of soil in accordance with Chapter 20.08, Soil Erosion and Sedimentation Control of the Maui County Code.

PROJECT DESCRIPTION & LOCATION:

The Mayor Eddie Tam Memorial Park Upgrade and Expansion project will upgrade the existing park and facilities located on TMK: (2) 2-4-06: 05, and develop the adjacent expansion site located on TMK: (2) 2-4-32: 98. Upgrades to the existing park and facilities include additional parking, play courts, and restrooms; renovations to the existing restrooms, pavilions, and maintenance baseyard; and renovation and addition to the existing gymnasium. Expansion of the park include development of parking, restrooms, play fields, an equestrian area, and areas for open passive recreation.

The project site is located in Makawao, on the northwest slope of Haleakala on the island of Maui. The site is bordered by Makawao Avenue and residential lots on the southeast; Kalama Intermediate School, Hale Kipa Road, and residential and agricultural lots on the southwest; Hoomaha Road and agricultural lots on the northwest; and residential and agricultural lots on the northeast.

EXISTING DRAINAGE CONDITIONS:

The existing ground within the site slopes from an elevation of about 1,620 feet above mean sea level at Makawao Avenue to an elevation of about 1,490 feet at Hoomaha Road. The average ground slope is about 6 percent.

According to the ***Soil Survey of Islands of Kauai, Oahu, Maui, Molokai and Lanai, State of Hawaii*** the on-site soil consists of Haliimaile Silty Clay and Silty Clay Loam. The soil survey describes these soils as having moderately rapid permeability, slow to medium runoff, and a slight to moderate erosion hazard.

Soils International prepared a soils investigation report for the ***Proposed Eddie Tam Memorial Park Expansion, Phase I.*** The investigation performed at the expansion site support the Haliimaile association. The investigation, however, discovered silty gravel and soft to moderately hard weathered basaltic rock below the surface.

The Federal Emergency Management Agency's (FEMA) Flood Insurance Rate Map of the area designates the site as Zone C. Zone C is an area subject to minimal flooding. FEMA's Flood Boundary and Floodway Map of the area does not identify any floodway or floodplain affecting the site.

The site is part of a 360-acre drainage basin which extends for about 9,600 feet from its lower end along Hoomaha Road to its upper end at a point along Olinda Road. About 160 acres of this area are agricultural lands. The remaining 200 acres are urbanized areas including residential, business, public and park areas. The site consists of the 13.68-acre existing park parcel and the 32.678-acre expansion parcel. The total park area of 46.358 acres is about 13 percent of the total drainage area.

Storm runoff from the upstream areas enters the site at various points, passes through the site, and exits the site at two points. There is a natural drainage divide through the site which splits the site into two drainage areas. This report will refer to the northeasterly drainage area as the east system and the southwesterly drainage area as the west system. Both systems discharge runoff into the Pau Hana Estates Subdivision downstream of the site.

The east system includes an area of about 330 acres and carries most of the runoff. Catch basins on Makawao Avenue collect runoff on the street and pass the runoff into the site through a 24-inch drainline. The drainline runs along the northeasterly property line for about 1,000 feet through the existing park site and ends at an existing earth drainage channel. Grated drain inlets along this line collect runoff along the property line. The earth drainage channel continues downstream for about 1,200 feet along the northeasterly property line of the expansion parcel. This channel lies within an existing 20-foot wide drainage easement along the northeasterly property line.

The earth drainage channel also intercepts other flows. An earth swale along the lower end of the existing park site intercepts surface runoff from the site and additional runoff transferred to the site from upstream areas. The swale directs runoff to a 48-inch culvert at the upstream end of the earth drainage channel. About 280 feet downstream of this point, the earth drainage channel receives runoff from the outlet of a 30-inch drainline. The 30-inch drainline collects runoff at the intersection of Ukiu Road and Maha Road. There is a proposed County drainage project which involves increasing the capacity of the existing drainline and extending the drainline along Ukiu Road and Pahala Street to collect runoff from those areas. The proposed drainage project will add about 40 additional acres of drainage area to the east system. The earth drainage channel also receives flows from a swale within the expansion parcel and areas adjoining the channel.

The west system includes an area of about 30 acres and carries the remaining runoff. The drainage system within Kalama Intermediate School collects runoff produced within the school site and from the upstream areas, and discharges runoff into the site through a 42-inch drainline. From this point, runoff flows through a meandering gully on the site and enters a 30-inch culvert at Hoomaha Road. The 30-inch culvert passes runoff under the road and into an earth channel within Lot 55 of Pau Hana Estates Subdivision. Runoff also enters the site through the outlet of a 30-inch drainline on Hale Kipa Road. This drainline collects runoff along Hale Kipa Road and is about 160 feet mauka of the intersection of Hale Kipa Road and Hoomaha Road.

Existing drainage improvements within the Pau Hana Estates Subdivision carry runoff from the park site to a major gulch within the subdivision. Runoff discharged through the park's east system continues downstream through an earth channel along the northeasterly side of Lots 69, 68, and 67 of the subdivision. At the end of Lot 67, the channel enters Lot 66 and makes a 90-degree turn toward the southwest. Runoff continues to flow in an earth channel along the southeasterly side of Lot 66. From that point, runoff enters a double 54-inch culvert at Apau Place. The culvert passes runoff under the road and into an earth channel within Lot 61. Runoff continues to flow through the channel in a westerly direction for about 600 feet and enters the major gulch within the subdivision. Runoff discharged through the park's west system continues downstream for about 500 feet through Lots 55 and 54, and enters the major gulch within the subdivision.

DEVELOPED CONDITIONS:

Development of the project will result in small increases in peak flow rates and runoff volumes. These increases are primarily due to the addition of impervious areas such as roofs, parking lots, roads, and other paved areas. They are also due to the reduction of flow time across the site. Preliminary computations based on the methods described in the Soil Conservation Service's publication, ***Urban Hydrology for Small Watersheds***, show increases in peak flow rates and runoff volumes of about two to four percent for both systems.

Development of the project will incorporate the following drainage design concepts to address the existing drainage conditions at the site and the increase in runoff due to the project.

1. Maintain drainage patterns within the existing east system and west system.
2. Mitigate the effects of the increase in runoff with detention basins by keeping peak flows at pre-development levels.
3. Improve existing on-site channels to contain and safely carry off-site runoff through the site.
4. Install culverts where proposed roads and parking areas cross existing on-site channels.
5. Use grassed swales and sheet flow to carry runoff across the flat areas of the site.
6. Use inlets to collect runoff at the tops of slopes and drainlines to carry runoff to the bottom of slopes to prevent erosion and reduce inconvenience to the public.

Major drainage improvements for the east system include constructing a detention basin at the lower end of the site, constructing an off-site drainline from the site to the major gulch within the Pau Hana Estates Subdivision, improving the existing earth channel along the northeasterly property line, improving the earth swale along the lower end of the existing park, and constructing a culvert to pass runoff under the road and parking areas at the Youth Center and Head Start Buildings.

The detention basin will control the increase in peak flows due to the park expansion and mitigate the effects of any increase in runoff due to the project. The detention basin will reduce peak flows by temporarily storing runoff and by releasing the stored runoff at a controlled rate. It will also improve the quality of storm runoff by slowing down the flows and trapping some of the sediments.

The off-site drainline serves as the outlet for the detention basin. The off-site drainline will convey the runoff down Apau Place to the major gulch below the project.

The improved channel, improved swale, and new culvert will contain runoff from smaller storms. Runoff produced during these storms will follow its current path through the site and through the downstream areas. The improved swale, however, will not contain runoff from larger storms. Runoff which exceeds the capacity of the swale will flow onto and over the fields within the site. This overflow runoff and site-generated runoff will enter the detention basin.

Minor drainage improvements for the east system include inlets at the parking areas with drainlines to carry runoff to the bottom of slopes. These improvements will prevent erosion of the site and reduce inconvenience to the public.

Major drainage improvements for the west system include constructing a detention basin at the existing 30-inch culvert at Hoomaha Road and extending the existing 42-inch drainline from Kalama Intermediate School. The detention basin will control the increase in peak flows due to the park expansion and off-site drainage areas, and mitigate the effects of any increase in runoff. The extended 42-inch drainline will prevent erosion and reduce inconvenience to the public by taking all off-site runoff directly to the detention basin.

The west system also has similar minor drainage improvements as the east system. These drainage improvements include similar items such as inlets at the parking areas with drainlines to carry runoff to the bottom of slopes.

CONCLUSION:

Development of this project will not significantly increase storm runoff. Due to the small increase in surface runoff and the incorporation of the detention basin, there will be no adverse effects on the adjacent and downstream properties.

EROSION CONTROL:

The entire upgrade and expansion site consists of 46.358 acres. Project funding, however, will limit the phasing and construction areas. The maximum anticipated project phase will encompass phases IA and IB simultaneously. This report evaluates the potential of soil loss based on the maximum anticipated 18-acre grading area.

The following summarizes the results of the soil loss computations based on the Universal Soil Loss Equation. Refer to Appendix A for soil loss computations.

Area:	18 acres
Uncontrolled Erosion Rate:	88 tons/acre/year
Allowable Erosion Rate:	278 tons/acre/year
Severity Number:	31,700

Conclusion:

The uncontrolled erosion rate (88 tons/acre/year) is less than the allowable erosion rate (278 tons/acre/year), and the severity number (31,700) is less than the maximum allowable value of 50,000. Normal construction erosion control measures and best management practices are therefore sufficient for this project with no excessive soil loss occurring.

Erosion control measures during construction shall include limiting the area of clearing and grubbing, sprinkling for dust control, minimizing the construction period, and constructing or installing permanent erosion control measures as soon as possible.

REFERENCES:

Department of Public Works, City and County of Honolulu, ***Storm Drainage Standards***, March 1986.

Federal Emergency Management Agency, National Flood Insurance Program, ***FIRM, Flood Insurance Rate map, Maui County, Hawaii, Community-Panel Number 150003 01950 B***, June 1, 1981.

Federal Emergency Management Agency, National Flood Insurance Program, ***FLOODWAY, Flood Boundary and Floodway map, Maui County, Hawaii, Community-Panel Number 150003 0195***, June 1, 1981.

R.M. Towill Corporation, ***Drainage Master Plan for the County of Maui***, October 1971.

Soils International, ***Report, Soils Investigation, Proposed Eddie Tam Memorial Park Expansion, Phase I***, March 15, 1995.

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

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

U.S. Department of Agriculture, Soil Conservation Service, ***Urban Hydrology for Small Watersheds***, June 1986.

APPENDIX A

SOIL EROSION CONTROL PLAN
(PHASES IA & IB)

1. SITE CONDITIONS DURING CONSTRUCTION:

Subject to project financing, the maximum anticipated project phase will encompass phases IA and IB simultaneously. These two phases cover about 18 acres of the 46-acre project site. This area may be cleared, grubbed, and graded in one increment. Exposed areas shall be grassed or paved immediately after grading is complete.

2. UNCONTROLLED EROSION RATE:

Erosion Rate as set forth by the Maui County Code:

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

Where: E = Uncontrolled Erosion Rate (Soil Loss) in tons/acre/year

R = Rainfall factor = 220 tons/acre/year

K = Soil Erodibility Factor (Haliimaile) = 0.17

L = Slope Length = 1,100 feet

S = Slope Gradient = 6.4 %

LS = Topographic Factor = 2.35

C = Cover Factor (to be determined if necessary); use bare soil factor = 1.0

P = Control Factor (to be determined if necessary); use non-agricultural land = 1.0

$E = 220 \text{ tons/acre/year} \times 0.17 \times 2.35 \times 1.0 \times 1.0$

$= 88 \text{ tons/acre/year}$

3. ALLOWABLE EROSION RATE:

Coastal Water Hazard (D) = 4 (class AA)

Downstream Hazard (F) = 4 (major)

Duration of Site Work (T) = 1 year

Maximum Allowable construction Area x Erosion Rate = 5,000 tons/year

Project Construction Area (A) = 18 acres
[Maximum Anticipated Phases IA & IB]

Allowable Erosion Rate: $\frac{5{,}000 \text{ tons/year}}{18 \text{ acres}} = 278$ tons/acre/year

4. REDUCTION IN EROSION RATE:

Allowable Erosion Rate : 278 tons/acre/year = 3.2 > 1.0
Uncontrolled Erosion Rate: 88 tons/acre/year

Therefore, no reduction in erosion rate is required.

5. SEVERITY NUMBER (H):

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

Where: H = Severity Number

F = Downstream Hazard = 4

D = Coastal Water Hazard = 4

T = Duration of Site Work (years) = 1

A = Project Construction Area (acres) = 18

E = Uncontrolled Erosion Rate (tons/acre/year) = 88

$H = (2 \times 4 \times 1 + 3 \times 4) 18 \times 88 = 31{,}700 < 50{,}000$

6. CONCLUSION:

Assuming the maximum anticipated project development of Phases IA & IB in one increment, normal construction erosion control measures and best management practices are sufficient for this project with no excessive soil loss occurring.

RECEIVED AS FOLLOWS

VIII. APPENDIX (CONTINUED)

C. Traffic Impact Report

DRAFT TRAFFIC IMPACT REPORT

FOR THE

MAYOR EDDIE TAM MEMORIAL PARK EXPANSION

ISLAND OF MAUI

PREPARED FOR

MAUI COUNTY DEPARTMENT OF PARKS AND RECREATION

Prepared By

AUSTIN, TSUTSUMI & ASSOCIATES, INC.
Engineers • Surveyors
Honolulu • Wailuku • Hilo, Hawaii

DRAFT TRAFFIC IMPACT REPORT

FOR THE

MAYOR EDDIE TAM MEMORIAL PARK EXPANSION

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AUSTIN, TSUTSUMI & ASSOCIATES, INC.
Engineers • Surveyors
Honolulu • Wailuku • Hilo, Hawaii

December 1994

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(Cont'd.)

DRAFT TRAFFIC IMPACT REPORT

FOR THE

MAYOR EDDIE TAM MEMORIAL PARK EXPANSION

ISLAND OF MAUI

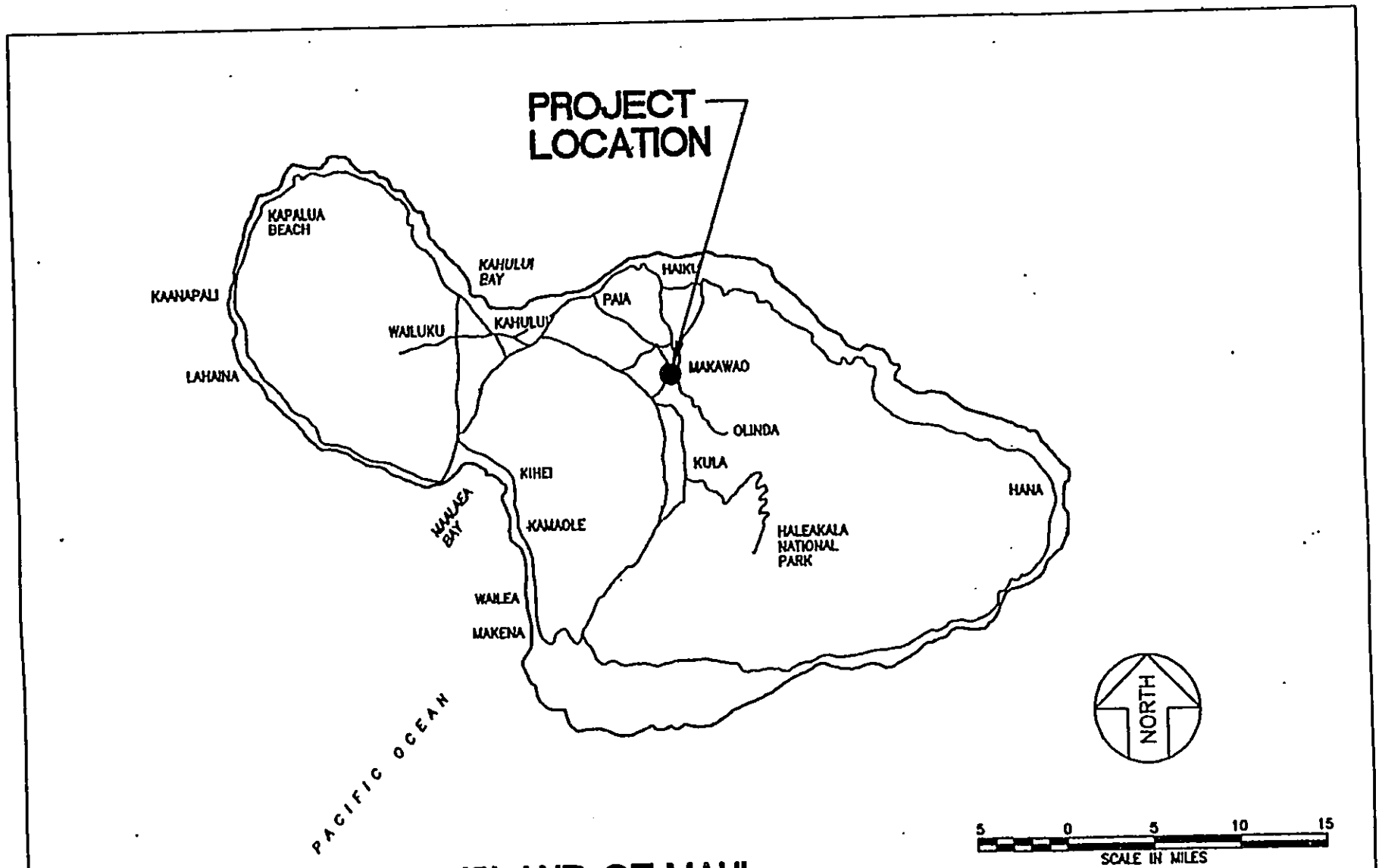
I. INTRODUCTION

This report documents the findings of the traffic study conducted by Austin, Tsutsumi & Associates, Inc. (ATA) to evaluate the potential traffic impacts and circulation needs of the Mayor Eddie Tam Memorial Park Expansion.

A. Project Description

The project is located in the town of Makawao, on the island of Maui. Figure 1 shows the project location. The existing 13.7 acre park (TMK: 2-4-06) is located northeast of Kalama Intermediate School. Access to the existing park is off Makawao Avenue, approximately 800 feet north of Makani Road.

The 32.7 acre expansion (TMK: 2-4-32) of the existing park will be constructed in seven phases. Construction of Phase 1 is anticipated to begin in the Year 1995. Completion of the park expansion is anticipated to be sometime in the Year 1999. As part of the park expansion, an additional access to the expansion site will be created from the existing Kalama Intermediate School entrance off Hale Kipa Road. A summary and description



ISLAND OF MAUI

AUSTIN, TSUTSUMI & ASSOCIATES, INC.
ENGINEERS • SURVEYORS

PROJECT LOCATION MAP

FIGURE 1

of the expansion phases from the "Master Plan Update" are included in Appendix A. Figure 2 illustrates the project site.

B. Purpose And Scope

The purpose of the study is to analyze potential traffic impacts on the roadway system within the study area. Proposed roadway improvements, which are required to allow the street system to accommodate the future traffic volumes after the completion of the project, are identified in this study. The following traffic scenarios are analyzed in the study:

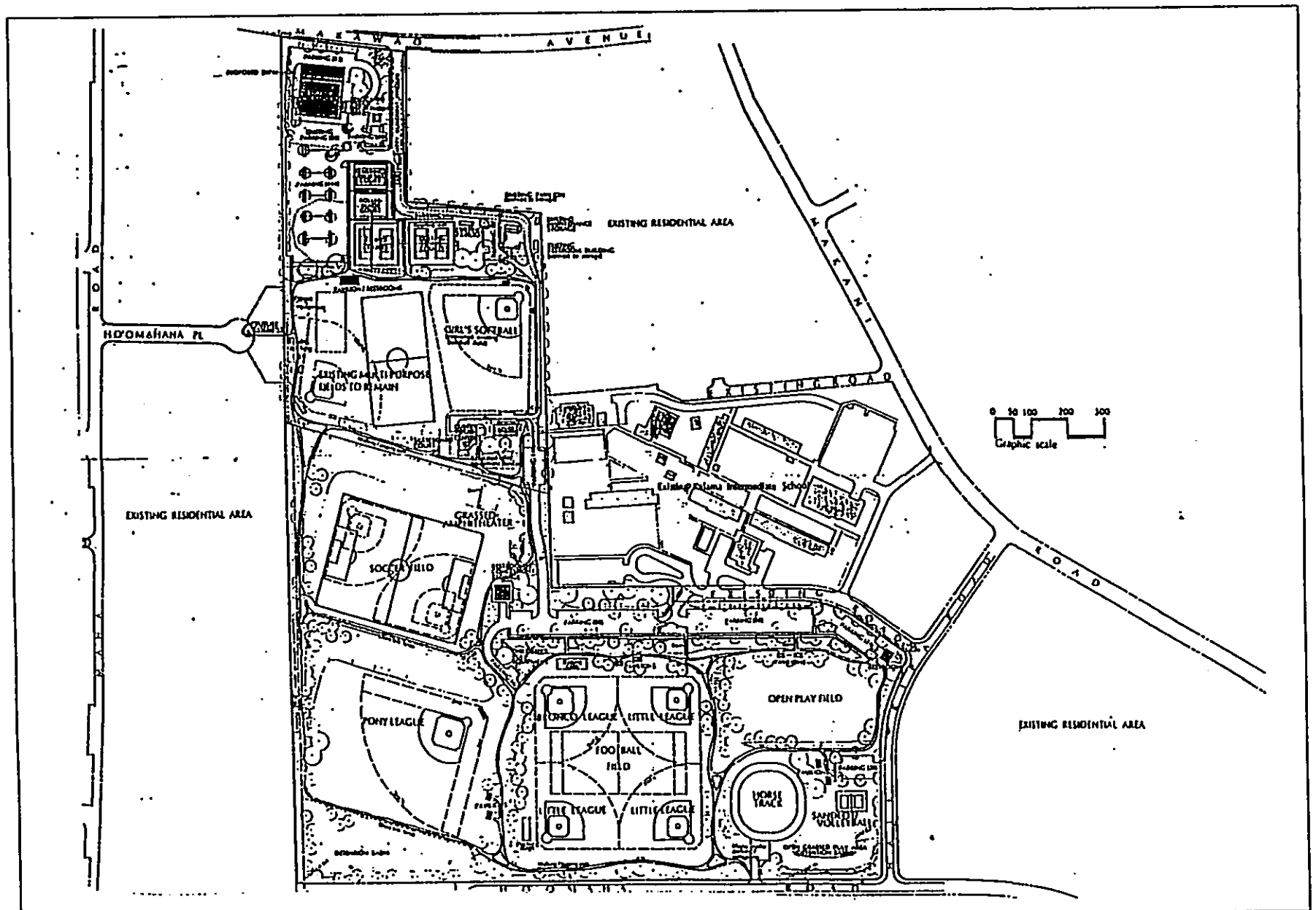
- Existing Conditions - The analysis of existing traffic conditions is intended to provide a basis for the remainder of the study. The existing conditions analysis includes an assessment of land use, streets and highways, traffic volumes, and current operating conditions.

- Year 1999 Base (Without Project) Conditions - This is an analysis of future base traffic conditions for the study area in the Year 1999. The objective of this phase of the study is to forecast future traffic conditions for the study area in the Year 1999 without the project, to serve as a basis against which project impacts can be measured.

- Year 1999 With Project Conditions - This is an analysis of future traffic conditions with traffic expected to be generated by the proposed project in the Year 1999 added to Year 1999 Base traffic forecasts, in order to identify impacts of the proposed project on future traffic operating conditions.

A total of three intersections have been identified within the study area which are to be analyzed during the weekday PM peak traffic hour and the weekend mid-day peak traffic hour for each of the traffic scenarios described above. The three intersections are as follows:

1. Makawao Avenue and existing park driveway (stop-controlled)



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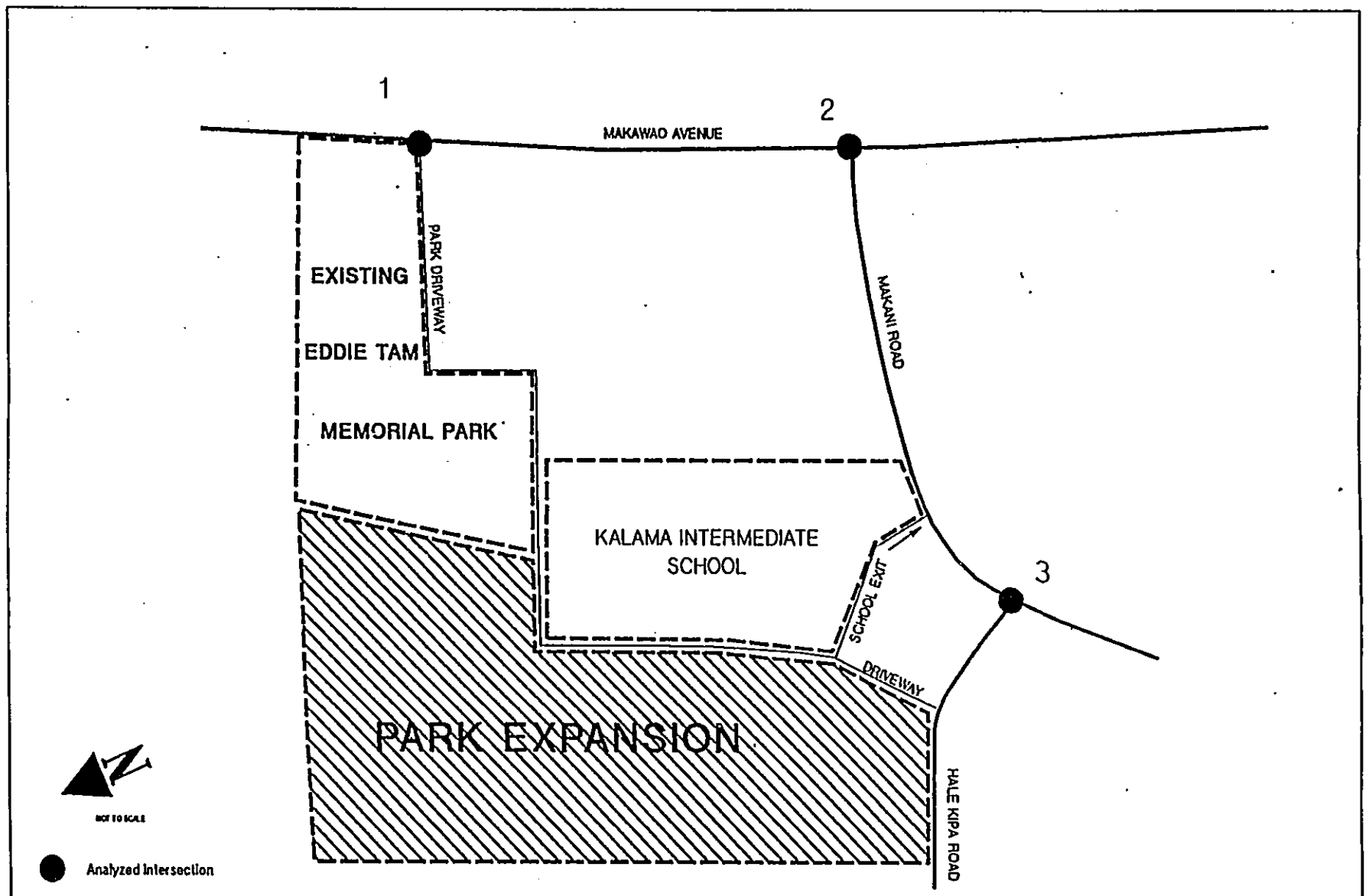
SITE MAP

FIGURE
2

2. Makawao Avenue and Makani Road (stop-controlled)

3. Makani Road and Hale Kipa Road (stop-controlled)

Figure 3 illustrates the study area and locations of the three study intersections.



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STUDY AREA

FIGURE
3

II. EXISTING CONDITIONS

An extensive field investigation was undertaken to develop an accurate and detailed description of existing conditions and infrastructure within the study area. Information relevant to the study includes land use, an inventory of streets, traffic volumes, and current operating conditions on the street system.

A. Existing Roadway System

This section describes the existing circulation system serving the study area, including number of travel lanes, street classifications, and traffic control devices.

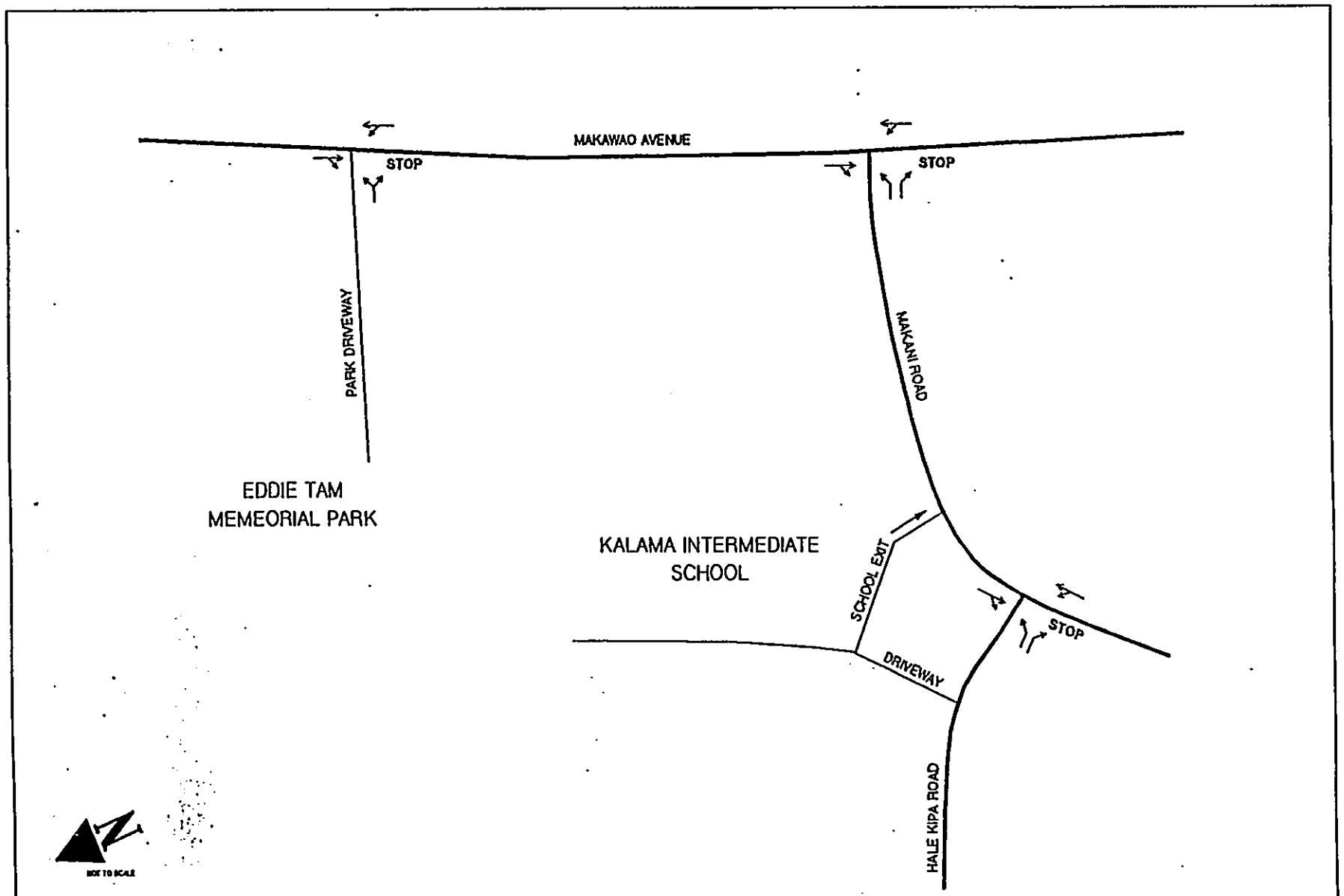
Brief descriptions of major facilities within the study area follow:

- Makawao Avenue - Within the study area, Makawao Avenue is a two-lane arterial road serving mainly residential uses. South of the study area, Makawao Avenue provides access to and from its neighboring town, Pukalani, and intersects with Haleakala Highway and the Pukalani Bypass. North of the study area, at the intersection with Baldwin Avenue, Makawao Avenue continues northeast as Kaupakulua Road, which eventually connects with Hana Highway in the vicinity of Ulumalu. Baldwin Avenue extends northwest and connects with Hana Highway near Lower Paia.

- Makani Road - Makani Road is a two-lane, collector road serving mainly residential uses within Makawao. Makani Road provides an alternate access for residents in Makawao to the Pukalani Bypass and Pukalani Town.

- Hale Kipa Road - Hale Kipa Road is a two-lane local road serving Kalama Intermediate School and residential uses.

Existing intersection configurations are illustrated in Figure 4.



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EXISTING INTERSECTION CONFIGURATIONS

FIGURE
4

B. Existing Traffic Operations

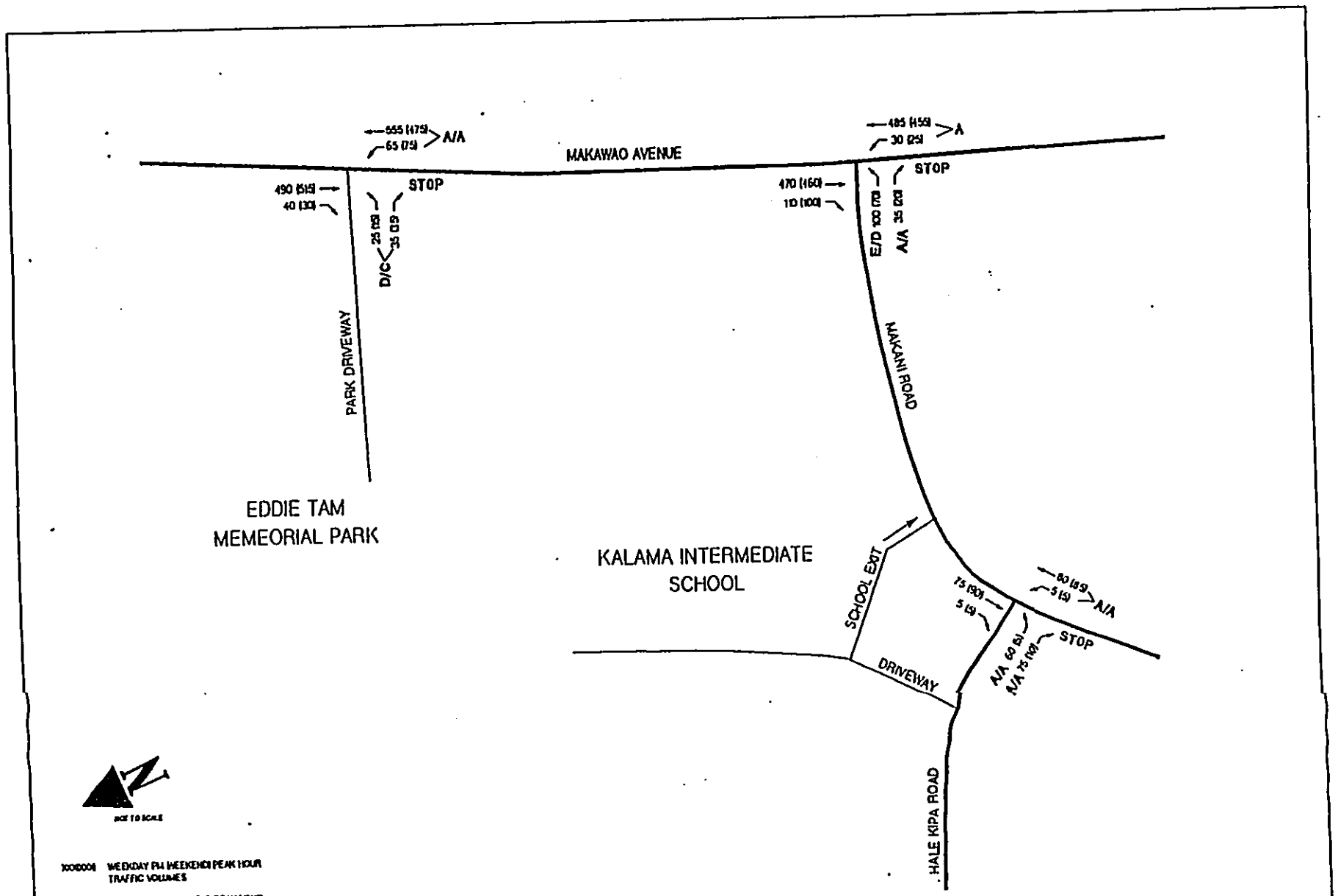
The following sections present the existing intersection peak hour traffic volumes, a description of the methodology utilized to analyze the intersection traffic conditions, and the resulting level of service conditions at each of the three analyzed intersections under existing conditions.

1. Existing Traffic Volumes

Weekday afternoon and weekend mid-day traffic counts were conducted by ATA as part of this study at each of the existing intersections. The results of the traffic counts are provided in Appendix B. Manual turning movement counts were conducted for the weekday afternoon peak period of traffic (2:00 to 5:00 PM) on May 24 and weekend mid-day peak period of traffic (10:00 AM to 1:00 PM) on June 4, 1994 at the existing analyzed intersections. The weekday PM peak period counts for the intersection of Makawao Avenue and Makani Road were conducted on October 11, 1994. Figure 5 illustrates the existing peak hour traffic volumes within the study area.

Existing weekday afternoon traffic within the study area is generally moderate. Traffic count data indicate that approximately 530 peak hour vehicles enter the study area from the north, via Makawao Avenue, with approximately 40 vehicles turning into the park driveway. Traffic count data also indicate that approximately 515 vehicles enter the study area from the south on Makawao Avenue, with 30 vehicles turning left onto Makani Road and 485 vehicles continuing north on Makawao Avenue. Approximately 85 vehicles enter the study area from Makani Road with approximately 5 vehicles turning left onto Hale Kipa Road and 80 vehicles continuing east to Makawao Avenue.

Existing weekend, mid-day traffic within the study area is also generally moderate. Traffic count data indicate that approximately 535



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EXISTING 1994 CONDITONS

FIGURE
5

peak hour vehicles enter the study area from the north, via Makawao Avenue, with approximately 30 vehicles turning into the park driveway. Traffic count data also indicate that approximately 480 vehicles enter the study area from the south on Makawao Avenue, with 25 turning left onto Makani Road and 455 continuing north on Makawao Avenue. Approximately 90 vehicles enter the study area from Makani Road with approximately 5 vehicles turning left onto Hale Kipa Road and 90 vehicles continuing east to Makawao Avenue.

2. Level Of Service Methodology

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. This section describes the current level of service of the three existing intersections. Level of service definitions are included in Appendix C.

For intersections controlled by stop signs on minor street approach(es), the "Two-Way Stop Control" method described in the Highway Capacity Manual (Transportation Research Board, 1985) was employed to determine the available reserve capacity and corresponding level of service for each of the constrained movements (approaches from minor streets and left-turn movements from major streets) at the intersection.

3. Existing Level Of Service

Under existing conditions, the left-turn movement on Makani Road at Makawao Avenue is operating at LOS E during the PM peak hour. Delay to the Makani Road left-turn movement is caused by relatively dense traffic on Makawao Avenue coupled with relatively high left-turn volumes on Makani Road. The other two intersections are operating at

acceptable levels of service (i.e. LOS D or better). Level of service calculations are included in Appendix D.

III. FUTURE TRAFFIC PROJECTIONS

In order to properly evaluate the potential impact of the project on local traffic conditions, it is necessary to develop forecasts of future traffic volumes in the study area under conditions both with and without the proposed project traffic. The methodologies and key assumptions used to develop these forecasts are described below.

A. Project Traffic Volumes

The development of traffic projections for the proposed project involves traffic generation, trip distribution, and traffic assignment. A description of each process follows:

1. Project Traffic Generation

Trip generation estimates for the development were developed by applying appropriate trip generation rates to the proposed density of the project. This method provides an indication of the volume of traffic expected to be generated by the project.

The traffic expected to be generated by the project was estimated by applying the trip generation rates for a county park, which are as follows:

- Weekday PM Peak Hour: 3.14 vehicles per acre with 35% entering and 65% exiting the park.
- Weekend Peak Hour: 2.24 vehicles per acre with 47% entering and 53% exiting the park.

These trip generation rates were based upon data from "Trip Generation" 5th Edition, Institute of Transportation Engineers (ITE), 1991. The application of these rates provides an estimate of the total increases in future traffic expected to be generated by the project. Table 1

TABLE 1
SUMMARY OF PROJECT TRIP GENERATION

LAND USE	SIZE	WEEKDAY PM PEAK HOUR IN	OUT	TOTAL	SATURDAY MID-DAY PEAK HOUR IN	OUT	TOTAL
TOTAL EXPANSION (COUNTY PARK)	32.7 AC	36	67	103	43	30	73
40% REDUCTION		14	27	41	17	12	29
NET GENERATION		22	40	62	26	18	44

Source: Institute Of Transportation Engineers, "Trip Generation 5th Edition", 1991.

summarizes the total amount of traffic the proposed development will generate in the Year 1999.

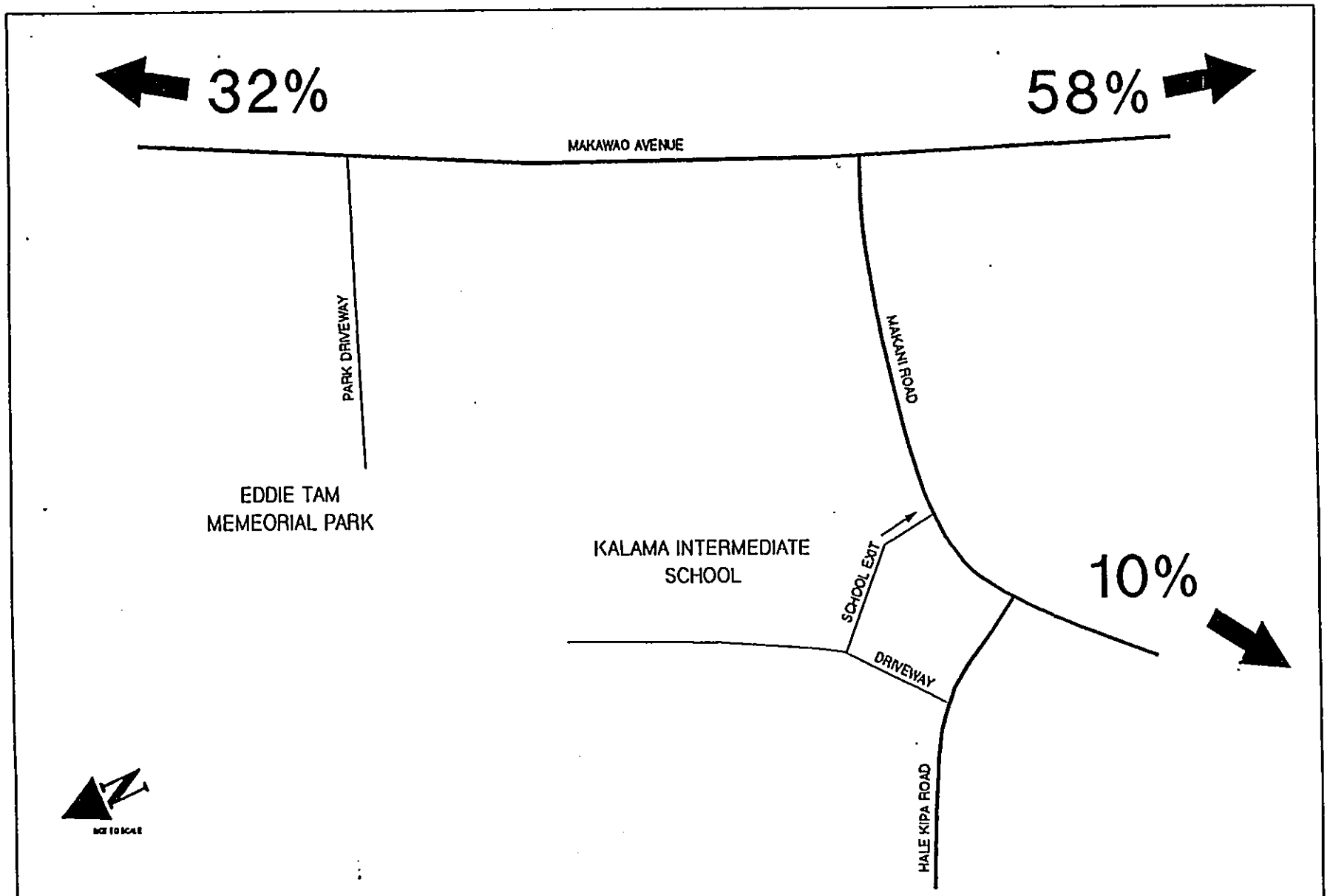
The project trip generation shown on Table 1 has been reduced to account for the overlap in existing and future park users. The park expansion will accommodate both future additional park users as well as existing park users. It is estimated that approximately 40% of the additional vehicular trips generated by the 32.7 acre park expansion will include vehicular trips that currently exist. Estimation of vehicular trip reduction is based on the existing deficiency in parking spaces and the future parking requirements as contained in the March 1994 "Master Plan Update of Eddie Tam Memorial Park & Expansion", by the Department of Parks & Recreation - County of Maui.

2. Project Traffic Distribution

The directional distribution pattern developed for the project site was based on the existing traffic distribution pattern. The general distribution pattern used to distribute future project traffic is illustrated in Figure 6.

3. Project Traffic Assignment

The trip distribution pattern identified in Figure 6 was used to assign the project-generated traffic to the local street network. The assignment to specific streets and intersections was based on the available access into and out of the site and the availability of local routes to access the regional highway system. The resulting estimated Year 1999 project generated peak hour traffic volumes, at each of the analyzed intersections, are illustrated in Figure 7.



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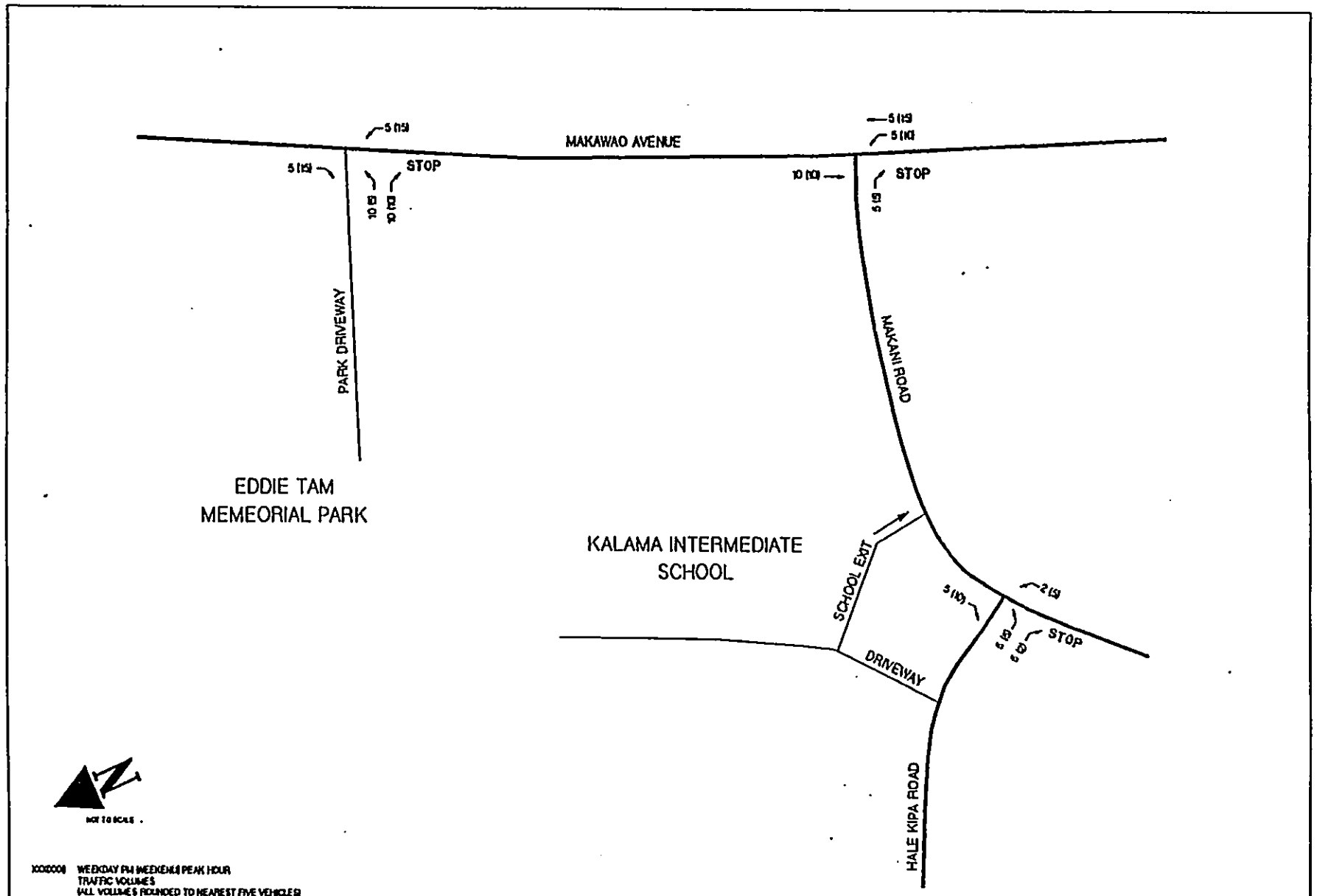
GENERAL TRAFFIC DISTRIBUTION PATTERN

FIGURE
6



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PROJECT ONLY TRAFFIC VOLUMES

FIGURE
7

B. Year 1999 Traffic Projections

The following sections describe Year 1999 Base (without project) and Year 1999 With Project traffic projections.

1. Year 1999 Base (Without Project) Traffic Volumes

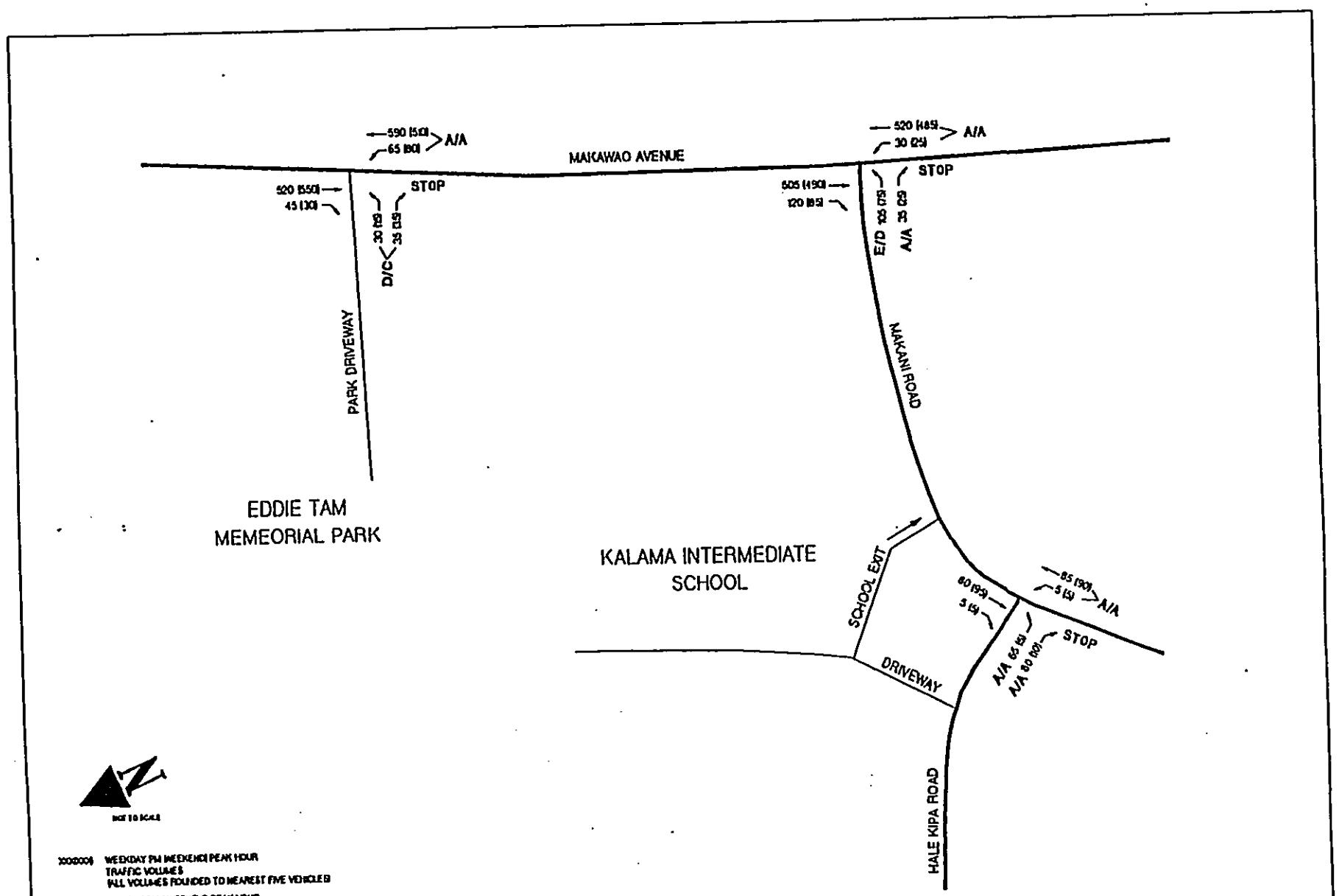
The forecasts of Year 1999 Base traffic without the proposed project are based on the yearly growth of existing traffic volumes and proposed related development projects expected to be completed by the Year 1999 which could contribute traffic to the street system within the study area.

The background growth rate, which was applied to existing traffic volumes to estimate Year 1999 Base conditions, is based on the May 1991 "Maui Long Range Highway Planning Study (Island-Wide Plan)" prepared by ATA and historical traffic counts obtained from the State Department of Transportation.

The average annual traffic growth rate of approximately 1.3 percent per year in the Makawao area was utilized to forecast the Year 1999 Base traffic conditions. Figure 8 illustrates Year 2006 Base traffic volumes.

2. Year 1999 With Project Traffic Volumes

The proposed development generated traffic volumes were then added to Year 1999 Base traffic volumes. The resulting Year 1999 With Project intersection traffic volumes are illustrated on Figure 9.



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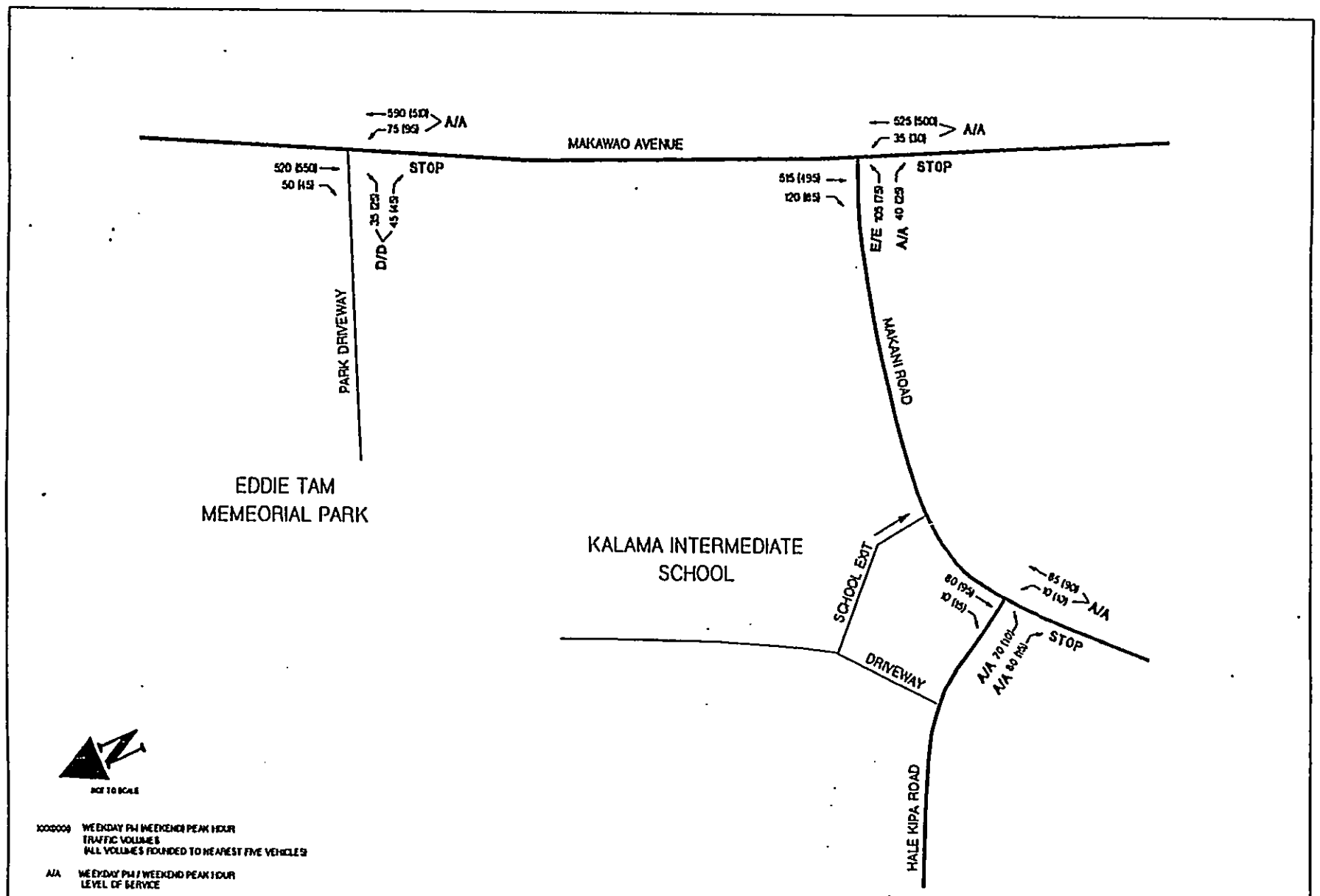
YEAR 1999 BASE (WITHOUT PROJECT) TRAFFIC CONDITIONS

FIGURE 8



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YEAR 1999 WITH PROJECT TRAFFIC CONDITIONS

FIGURE 9

IV. TRAFFIC IMPACT ANALYSIS

This section provides the results of the traffic impact analysis conducted to assess the potential project impacts on the Year 1999 traffic conditions, based on the traffic forecasts developed in the previous section. The traffic impact analysis includes an assessment of projected Year 1999 conditions both without and with the project for each of the analyzed intersections.

Potential roadway improvements and mitigation to alleviate traffic impacts within the study area will also be discussed.

A. Year 1999 Base (Without Project) Traffic Impact Analysis

Figure 8 summarizes the Year 1999 Base level of service at each of the analyzed intersections. Analysis indicates that, under base conditions, the left-turn movement on Makani Road at Makawao Avenue will be operating at LOS E during the weekday PM peak hour. The other two analyzed intersections will be operating at acceptable levels of service (i.e. LOS D or better).

Traffic within the study area is expected to increase slightly by the Year 1999. Although the left-turn movement on Makani Road at Makawao Avenue will still be operating at LOS E during the weekday PM peak hour, no significant traffic problems are anticipated.

B. Year 1999 With Project Traffic Impact Analysis

The Year 1999 With Project scenario was analyzed to determine the potential effect of the proposed development on the roadway system. The results indicate that the left-turn movement on Makani ~~Street~~ Road at Makawao Avenue will be operating at LOS E during both the weekday PM peak hour and also the weekend mid-day peak hour.

As discussed earlier, under the Year 1999 Base conditions, the overall growth in the study area will increase slightly. With the addition of the project traffic, only the intersection of Makawao Avenue and Makani Road will

experience an increase in level of service. Figure 9 summarizes the level of service at each of the three analyzed intersections.

V. CONCLUSIONS AND RECOMMENDATIONS

This study was undertaken to analyze the potential traffic impacts from the Mayor Eddie Tam Memorial Park Expansion. The following summarizes the conclusions and recommendations of the study.

A. Conclusions

- Existing traffic entering the study area is moderate and is presently accommodated without significant vehicular delays.
- Under existing conditions, all analyzed intersections are operating at acceptable levels of service (i.e LOS D or better) under both weekday and weekend peak hours, except for the left-turn movement on Makani Road at Makawao Avenue. Currently, the movement is operating at LOS E during the weekday PM peak hour of traffic.
- In the Year 1999, the project will generate a total of 62 vehicular trips during the weekday PM peak hour of traffic and a total of 44 vehicular trips during the weekend mid-day peak hour of traffic.
- Under Year 1999 Base (without project) conditions, only the left-turn movement on Makani Road at Makawao Avenue will be operating at LOS E during the weekday PM peak hour of traffic. The other two analyzed intersections will be operating at acceptable levels of service (i.e. LOS D or better).
- Under Year 1999 With Project conditions, only the left-turn movement on Makani Road at Makawao Avenue will be operating at LOS E during both the weekday PM peak hour of traffic and weekend mid-day peak hour of traffic. The other two analyzed intersections will be operating at acceptable levels of service (i.e. LOS D or better).

B. Recommendations

- Based on the Year 1999 traffic volumes without the proposed park expansion, a Traffic Signal Warrant Analysis was performed at the intersection of Makawao Avenue and Makani Road for the weekday PM peak hour. Results from the signal warrant analysis (provided in Appendix E) indicate that due to overall regional traffic growth, future Year 1999 traffic conditions without the proposed park expansion, will almost warrant the installation of a traffic signal. Because this traffic impact study is only an estimate of future traffic conditions, it is recommended that as the Year 1999 approaches, a complete traffic signal warrant analysis be performed to determine the necessity of a traffic signal. With the installation of a traffic signal, it is estimated that the intersection will operate at LOS A during both Weekday PM and Weekend mid-day peak hours.

- Although the existing park driveway off Makawao Avenue is expected to operate at an acceptable level of service (i.e. LOS D or better), it is suggested that the driveway be widened from two lanes to three lanes, thus providing one entrance lane and two exit lanes. The additional exit lane will allow right-turn vehicles to egress the park without being delayed by left-turning vehicles. Although this suggested improvement is not warranted by the results from the traffic impact study, it is recommended to improve overall vehicular cirulation.

REFERENCES

Institute of Transportation Engineers, Trip Generation, 5th Edition, 1991.

Transportation Research Board, Highway Capacity Manual, Special Report 209, 1985.

Austin, Tsutsumi & Associates, Inc., Maui County Long Range Highway Planning Study (Island-Wide Plan), March 1991.

Department of Parks & Recreation, Final Summary Report For The Master Plan Update of Eddie Tam Memorial Park & Expansion, March 11, 1994.

APPENDIX A

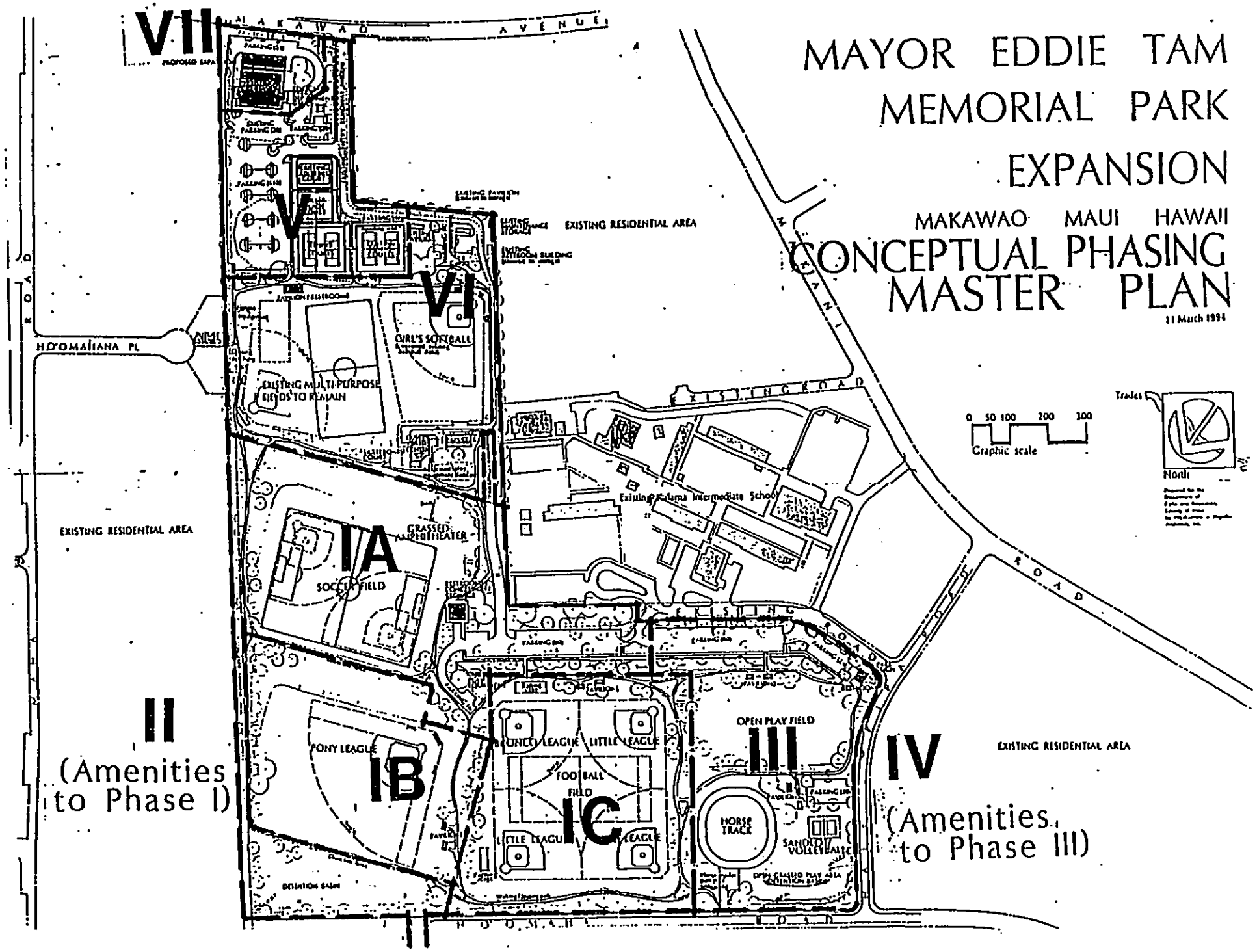
DESCRIPTION OF PHASING SCHEDULE

MAYOR EDDIE TAM MEMORIAL PARK EXPANSION

MAKAWAO MAUI HAWAII

CONCEPTUAL PHASING MASTER PLAN

11 March 1994



IV. PHASING AND BUDGETARY CONSIDERATIONS

Phase I (26 Acres) - Soccer & Baseball Fields @ Expansion Site

Phase IA (12 Acres) - Upper Soccer Field, Parking/Roadway, Detention Basin, Offsite Drainage Improvements

Offsite Drainage Improvements	$ 668,000
Detention Basin (sitework & landscaping)	255,000
Parking (94 stalls) & Roadway to Youth Center incl. landscaping	741,000
Pavilion/Restroom Building	180,000
Upper Soccer Field : Site Development & Improvements	598,000
Landscaping (incl. topsoil/prep, maint.)	413,000
Phase IA TOTAL	**$2,855,000**

Phase IB (6.4 Acres) - Pony Baseball Field

Site Development & Improvements	$ 686,000
Landscape Planting & Irrigation (incl. topsoil/prep., maint.)	370,000
Phase IB TOTAL	**$1,056,000**

Phase IC (7.3 Acres) - Four Baseball (with football) Fields

Site Development & Improvements	$ 311,000
Landscape Planting & Irrigation (incl. topsoil/prep., maint.)	423,000
Phase IC TOTAL	**$ 734,000**

Phase II (26 Acres) - Amenities to Phase I @ Expansion Site

Lighting for two Phase I Fields (50 f.c.)	$ 250,000
Paving of Walking & Jogging Paths	227,000
Paving of Youth Center Parking Lot (relocation of play equip.)	31,000
Batting & Pitching Cages	60,000
Picnic Pavilions (4 @ 400 ± s.f. each)	240,000
Phase II TOTAL	**$ 808,000**

Phase III (8 Acres) - Open Play Field & Horse Track @ Expansion Site

Site Development and Improvements (incl. Open Play Field, Horse Track, & Volleyball Area)	$ 714,000
Restroom/Storage Building (650 ± s.f.)	150,000
Paving of Parking Lot with 100 stalls	136,000
Landscape Planting and Irrigation (incl. topsoil, prep, maint.)	330,000
Phase III TOTAL	**$1,330,000**

Phase IV (8 Acres) - Amenities to Phase III @ Expansion Site

Paving of 20 stall Parking Lot	27,000
Paving of Walking & Jogging Paths	105,000
Picnic Pavilions (4 @ 400 ± s.f. each)	240,000
Phase IV TOTAL	**$ 372,000**

Phase V (10 Acres) - Play courts & Parking @ Existing Park

Site Development and Improvements (incl. 2 Tennis Courts and 1 Rollerblade Court)	$ 179,000
Paving of Parking Lot Below Gym (130 stalls) & Entry Road Widen'g.	256,000
Relocation of Parks Dept. Office Building	50,000
Landscape Planting and Irrigation (incl. topsoil, prep, maint.)	115,000
Phase V TOTAL	**$ 600,000**

Phase VI (8 Acres) - Baseyard & Restroom @ Existing Park

Site Development and Improvements	$ 16,000
Paving of Parking & Baseyard Areas and Fencing	105,000
Existing Pavilion & Backstop Restroom Renovations	150,000
New Restroom/Pavilion (1200 ± s.f.)	200,000
Landscape Planting and Irrigation (incl. topsoil, prep, maint.)	195,000
Phase VI TOTAL	**$ 666,000**

Phase VII (2 Acres) - Gym Expansion @ Existing Park

Site Development and Improvements	$ 59,000
Paving of Parking Lot Above Gym & Roadway	192,000
Gym Renovation & Addition (3,000 ± s.f.)	750,000
Landscape Planting & Irrigation (topsoil, prep, maint.)	30,000
Phase VII TOTAL	**$1,031,000**

TOTAL DEVELOPMENT BUDGET **$9,452,000***

* Budget estimates are based on present probable cost and will be required to be adjusted prior to budget requests for the upcoming fiscal year

APPENDIX B

TRAFFIC COUNTS

ATA INC. 26-May-94

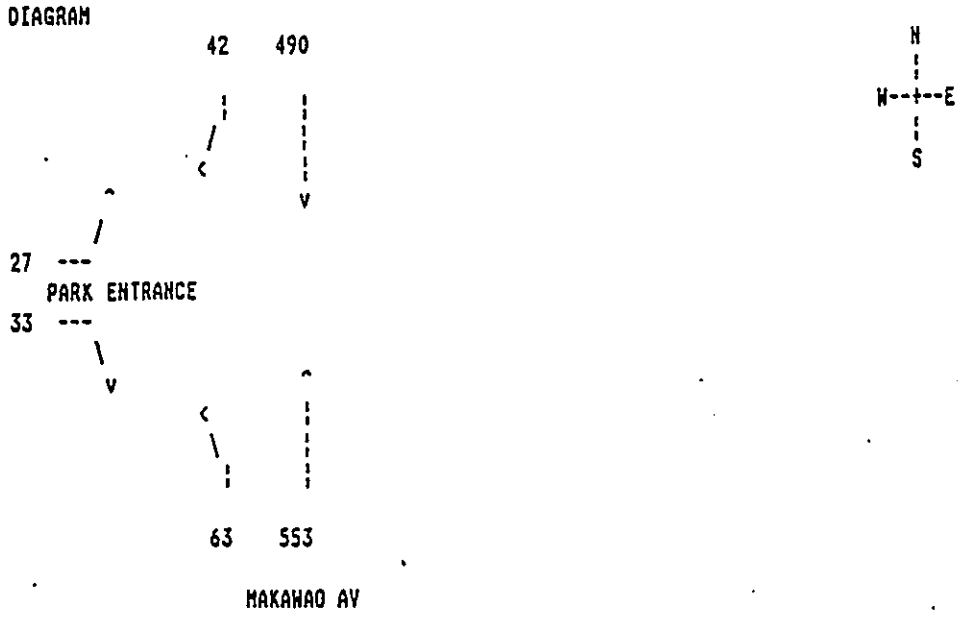
INTERSECTION COUNT SURVEY SUMMARY

North/South Street : MAKAWAO AV
East/West Street : PARK ENTRANCE
Weather : CLEAR

Period: PM
Date: 5/24/94
Day : TUESDAY

15 MINUTE PERIOD	MAKAWAO AV NORTHBOUND LEFT	THRU	RGHT	MAKAWAO AV SOUTHBOUND LEFT	THRU	RGHT	PARK ENTRANCE EASTBOUND LEFT	THRU	RGHT	PARK ENTRANCE WESTBOUND LEFT	THRU	RGHT	TOTAL VOLUME 15 MIN	HOURLY
200 - 215	5	130	0	0	116	2	2	0	4	0	0	0	259	
215 - 230	5	93	0	0	139	4	5	0	6	0	0	0	252	
230 - 245	4	127	0	0	97	3	3	0	1	0	0	0	233	
245 - 300	7	125	0	0	110	1	3	0	4	0	0	0	250	996
300 - 315	11	118	0	0	126	8	4	0	6	0	0	0	273	1,010
315 - 330	13	99	0	0	129	2	5	0	7	0	0	0	255	1,013
330 - 345	22	134	0	0	130	5	2	0	8	0	0	0	301	1,079
345 - 400	16	132	0	0	118	11	9	0	10	0	0	0	296	1,125
400 - 415	12	143	0	0	123	15	5	0	12	0	0	0	310	1,162
415 - 430	13	144	0	0	119	11	11	0	3	0	0	0	301	1,208
430 - 445	13	134	0	0	116	11	8	0	7	0	0	0	289	1,196
445 - 500	9	136	0	0	124	2	4	0	4	0	0	0	279	1,179
PEAK 15 MINUTE PERIOD: 400 - 415	12	143	0	0	123	15	5	0	12	0	0	0	310	--
PEAK HOUR PERIOD: 330 - 430	63	553	0	0	490	42	27	0	33	0	0	0	--	1208
PEAK HOUR FACTOR: 330 - 430	0.72	0.96	-	-	0.94	0.70	0.61	-	0.69	-	-	-		
		0.98			0.96			0.79			-			

PEAK HOUR TURNING MOVEMENT DIAGRAM



ATA INC. 06-Jun-

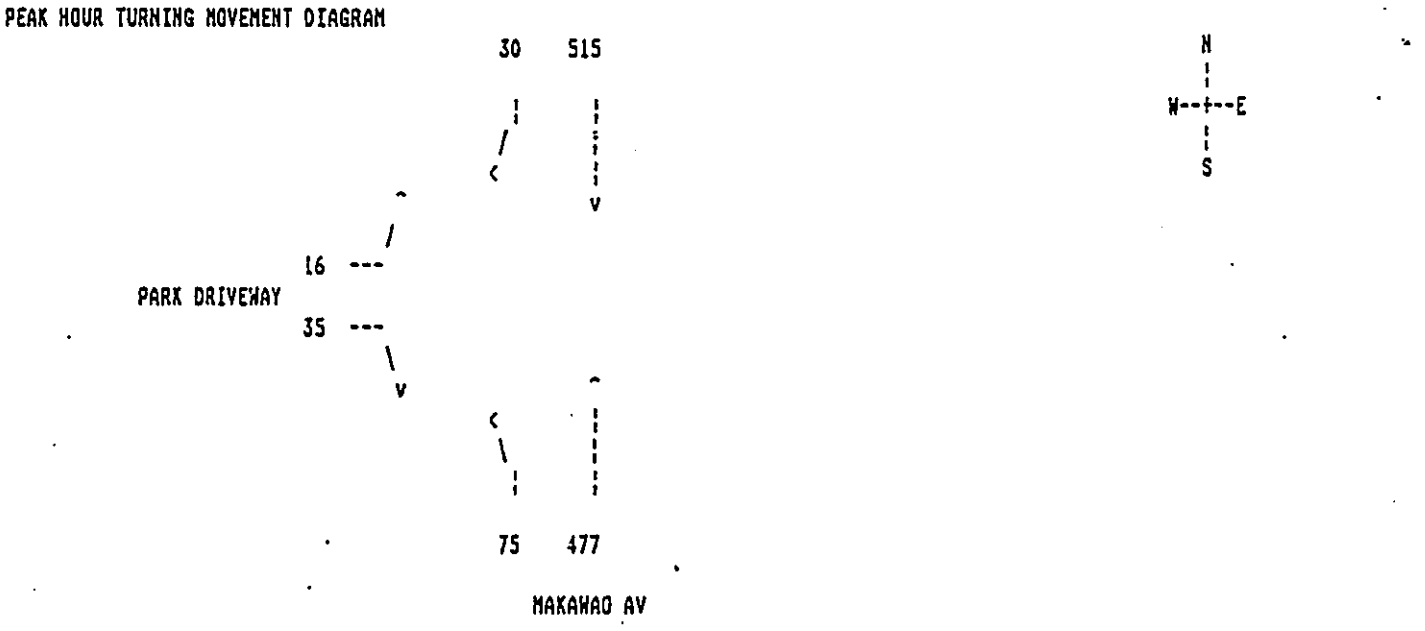
INTERSECTION COUNT SURVYEY SUMMARY

North/South Street : MAKAWAO AV
East/West Street : PARK DRIVEWAY
Weather : SIIGHT DRIZZLE

Period: MID-DAY
Date: 6/4/94
Day : SATURDAY

	MAKAWAO AV						PARK DRIVEWAY						TOTAL VOLUME	
15 MINUTE	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND				
PERIOD	LEFT	THRU	RGHT	LEFT	THRU	RGHT	LEFT	THRU	RGHT	LEFT	THRU	RGHT	15 MIN	HOURL
1000 - 1015	22	116	0	0	117	5	2	0	5	0	0	0	267	
1015 - 1030	28	112	0	0	124	6	7	0	14	0	0	0	291	
1030 - 1045	12	121	0	0	144	7	4	0	7	0	0	0	295	
1045 - 1100	13	128	0	0	130	12	3	0	9	0	0	0	295	1,14
1100 - 1115	6	105	0	0	139	9	2	0	5	0	0	0	266	1,14
1115 - 1130	11	111	0	0	124	6	3	0	8	0	0	0	263	1,11
1130 - 1145	18	114	0	0	102	2	9	0	17	0	0	0	262	1,08
1145 - 1200	10	134	0	0	133	4	6	0	12	0	0	0	299	1,09
1200 - 1215	12	136	0	0	117	3	2	0	5	0	0	0	275	1,09
1215 - 1230	5	104	0	0	112	2	3	0	14	0	0	0	240	1,07
1230 - 1245	8	134	0	0	123	3	3	0	3	0	0	0	274	1,08
1245 - 1300	8	125	0	0	118	5	2	0	6	0	0	0	264	1,05
PEAK 15 MINUTE PERIOD:														
1145 - 1200	10	134	0	0	133	4	6	0	12	0	0	0	299	--
PEAK HOUR PERIOD:														
1000 - 1100	75	477	0	0	515	30	16	0	35	0	0	0	--	114
PEAK HOUR FACTOR:														
1000 - 1100	0.67	0.93	-	-	0.89	0.63	0.57	-	0.63	-	-	-		
		0.98			0.90			0.61			-			

PEAK HOUR TURNING MOVEMENT DIAGRAM



ATA INC.

26-May-9

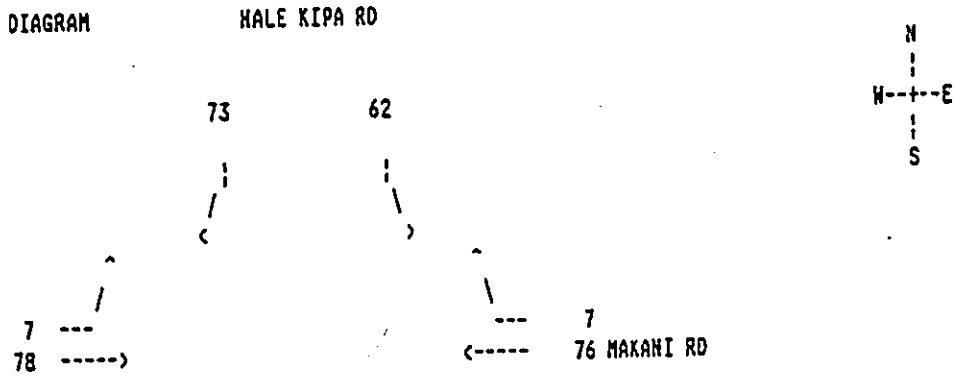
INTERSECTION COUNT SURYVEY SUMMARY

North/South Street : HALE KIPA RD
East/West Street : MAKANI RD
Weather : CLEAR

Period: PM
Date: 5/24/94
Day : TUESDAY

15 MINUTE PERIOD	HALE KIPA RD NORTHBOUND LEFT	THRU	RGHT	HALE KIPA RD SOUTHBOUND LEFT	THRU	RGHT	MAKANI RD EASTBOUND LEFT	THRU	RGHT	MAKANI RD WESTBOUND LEFT	THRU	RGHT	TOTAL VOLUME 15 MIN	HOURLY
200 - 215	0	0	0	32	0	39	2	21	0	0	22	2	118	
215 - 230	0	0	0	13	0	19	2	17	0	0	17	3	71	
230 - 245	0	0	0	12	0	12	2	19	0	0	18	1	64	
245 - 300	0	0	0	5	0	3	1	21	0	0	19	1	50	303
300 - 315	0	0	0	1	0	5	1	15	0	0	19	5	46	231
315 - 330	0	0	0	2	0	4	1	12	0	0	31	6	56	216
330 - 345	0	0	0	5	0	2	4	28	0	0	23	4	66	218
345 - 400	0	0	0	4	0	0	4	21	0	0	33	5	67	235
400 - 415	0	0	0	4	0	2	1	16	0	0	30	5	58	247
415 - 430	0	0	0	3	0	1	1	29	0	0	25	3	62	253
430 - 445	0	0	0	2	0	0	3	21	0	0	28	6	60	247
445 - 500	0	0	0	3	0	2	4	15	0	0	12	3	39	219
PEAK 15 MINUTE PERIOD: 200 - 215	0	0	0	32	0	39	2	21	0	0	22	2	118	--
PEAK HOUR PERIOD: 200 - 300	0	0	0	62	0	73	7	78	0	0	76	7	--	303
PEAK HOUR FACTOR: 200 - 300	-	-	-	0.48	-	0.47	0.88	0.93	-	-	0.86	0.58		
		-			0.48			0.92			0.86			

PEAK HOUR TURNING MOVEMENT DIAGRAM



ATA INC. 06-Jun-

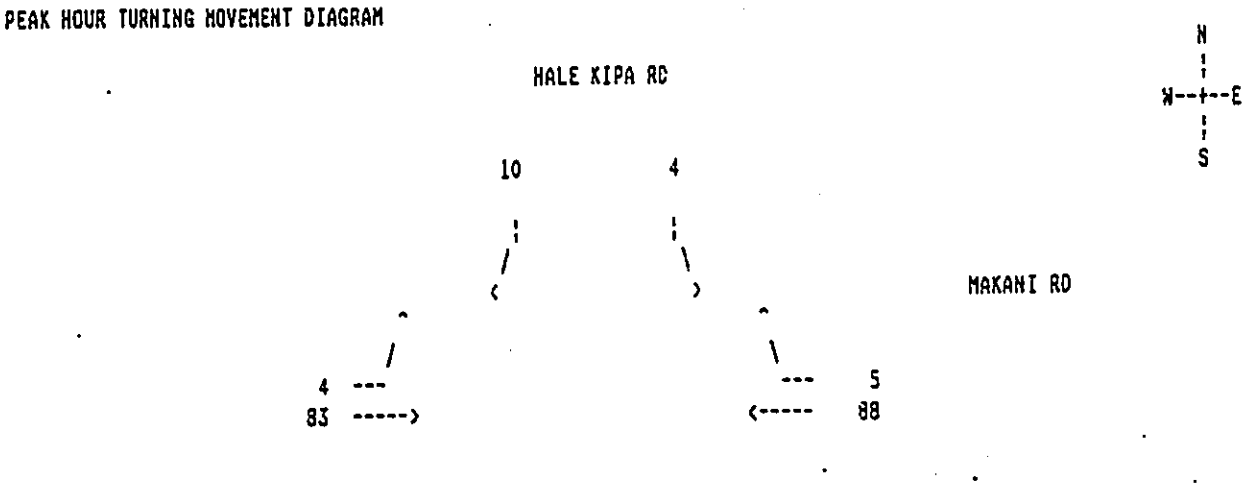
INTERSECTION COUNT SURYVEY SUMMARY

North/South Street : HALE KIPA RD
East/West Street : MAKANI RD
Weather : SLIGHT DRIZZLE

Period: MID-DAY
Date: 6/4/94
Day : SATURDAY

15 MINUTE PERIOD	HALE KIPA RD NORTHBOUND LEFT	THRU	RGHT	HALE KIPA RD SOUTHBOUND LEFT	THRU	RGHT	MAKANI RD EASTBOUND LEFT	THRU	RGHT	MAKANI RD WESTBOUND LEFT	THRU	RGHT	TOTAL VOLUME 15 MIN	HOURLY
330 - 345	0	0	0	0	0	2	1	22	0	0	19	2	46	
345 - 400	0	0	0	1	0	2	1	21	0	0	25	1	51	
400 - 415	0	0	0	0	0	5	1	20	0	0	25	0	51	
415 - 430	0	0	0	3	0	1	1	20	0	0	19	2	46	19
430 - 445	0	0	0	2	0	0	2	11	0	0	26	2	43	19
445 - 500	0	0	0	4	0	1	1	19	0	0	19	2	46	18
500 - 515	0	0	0	1	0	1	2	17	0	0	25	2	48	18
515 - 530	0	0	0	1	0	2	1	17	0	0	18	3	42	17
530 - 545	0	0	0	1	0	3	0	19	0	0	24	3	50	18
545 - 600	0	0	0	2	0	1	2	14	0	0	26	4	49	19
600 - 615	0	0	0	3	0	2	1	19	0	0	8	4	37	17
615 - 630	0	0	0	2	0	2	1	23	0	0	21	3	52	18
PEAK 15 MINUTE PERIOD: 615 - 630	0	0	0	2	0	2	1	23	0	0	21	3	52	--
PEAK HOUR PERIOD: 330 - 430	0	0	0	4	0	10	4	83	0	0	88	5	--	19
PEAK HOUR FACTOR: 330 - 430	-	-	-	0.33	-	0.50	1.00	0.94	-	-	0.88	0.63		
		-			0.70			0.95			0.89			

PEAK HOUR TURNING MOVEMENT DIAGRAM



ATA 12-Oct-9

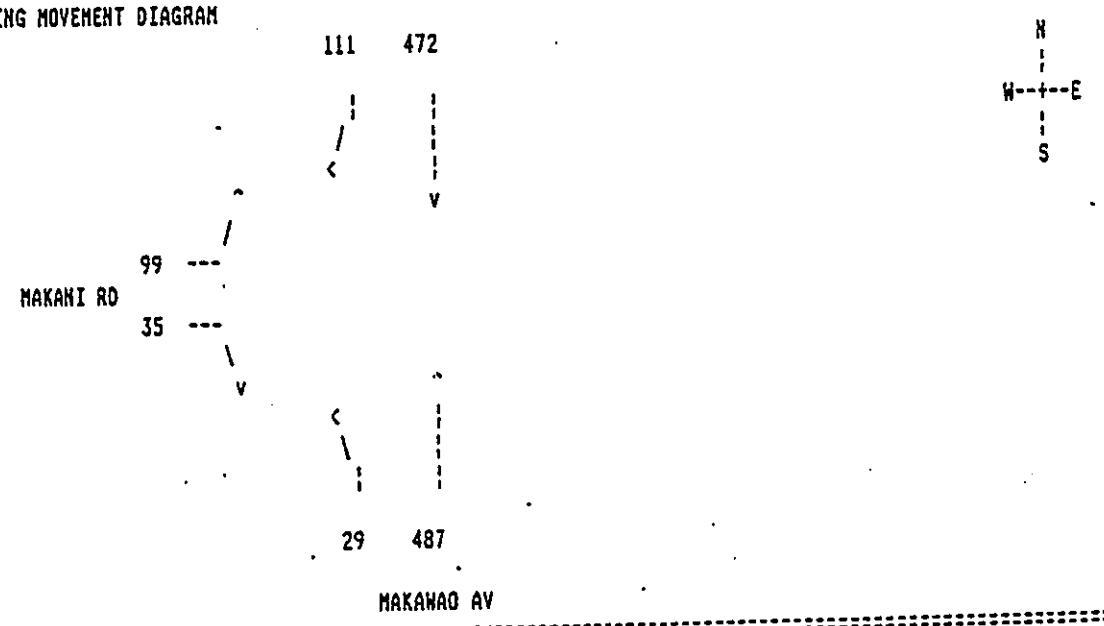
INTERSECTION TURNING MOVEMENT MANUAL COUNT REDUCTION WORKSHEET
TURNING MOVEMENT SUMMARY

North/South Street : MAKAWAO AV
East/West Street : MAKANI RD
Abnormal Conditions: OVERCAST

Time: PM
Date: 10/11/94
Day : TUESDAY

15 MINUTE PERIOD	MAKAWAO AV NORTHBOUND LEFT	THRU	RGHT	MAKAWAO AV SOUTHBOUND LEFT	THRU	RGHT	MAKANI RD EASTBOUND LEFT	THRU	RGHT	MAKANI RD WESTBOUND LEFT	THRU	RGHT	TOTAL VOLUME 15 MIN	HOURLY
330 - 345	5	118	0	0	106	30	38	0	8	0	0	0	305	
345 - 400	9	119	0	0	127	31	13	0	11	0	0	0	310	
400 - 415	6	125	0	0	112	25	26	0	11	0	0	0	305	
415 - 430	9	125	0	0	127	25	22	0	5	0	0	0	313	
PEAK 15 MINUTE PERIOD: 415 - 430	9	125	0	0	127	25	22	0	5	0	0	0	313	--
PEAK HOUR PERIOD: 330 - 430	29	487	0	0	472	111	99	0	35	0	0	0	--	1233

PEAK HOUR TURNING MOVEMENT DIAGRAM



APPENDIX C

LEVEL OF SERVICE DEFINITIONS

LEVEL OF SERVICE CRITERIA FOR UNSIGNALIZED INTERSECTIONS

Level of Service definitions for unsignalized intersections is determined by the reserve or unused capacity of a lane. The potential capacity is determined by the size and frequency in gaps in conflicting traffic that can accommodate the side street demand. The reserve capacity is equal to the potential capacity minus the traffic demand. A lower Level of Service translates into longer side street delay. The Levels of Service criteria are shown in the following table:

Level-of-Service Criteria
for Unsignalized Intersections

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

APPENDIX D

LEVEL OF SERVICE CALCULATIONS

1985 HCM: UNSIGNALIZED INTERSECTIONS

****

IDENTIFYING INFORMATION

AVERAGE RUNNING SPEED. MAJOR STREET.. 30

PEAK HOUR FACTOR..... .91

AREA POPULATION..... 150000

NAME OF THE EAST/WEST STREET..... PARK DRIVEWAY

NAME OF THE NORTH/SOUTH STREET..... MAKAWAO AV

NAME OF THE ANALYST..... BC

DATE OF THE ANALYSIS (mm/dd/yy)..... 09-20-1994

TIME PERIOD ANALYZED..... WD - PM

OTHER INFORMATION.... EXISTING 1994

INTERSECTION TYPE AND CONTROL

INTERSECTION TYPE: T-INTERSECTION

MAJOR STREET DIRECTION: NORTH/SOUTH

CONTROL TYPE EASTBOUND: STOP SIGN

TRAFFIC VOLUMES

	EB	WB	NB	SB
LEFT	27	--	63	0
THRU	0	--	553	490
RIGHT	33	--	0	42

NUMBER OF LANES

	EB	WB	NB	SB
LANES	1	--	1	1

ADJUSTMENT FACTORS

	PERCENT GRADE	RIGHT TURN ANGLE	CURB RADIUS (ft) FOR RIGHT TURNS	ACCELERATION LANE FOR RIGHT TURNS
EASTBOUND	0.00	90	20	N
WESTBOUND	-----	---	---	-
NORTHBOUND	0.00	90	20	N
SOUTHBOUND	0.00	90	20	N

VEHICLE COMPOSITION

	% SU TRUCKS AND RV'S	% COMBINATION VEHICLES	% MOTORCYCLES
EASTBOUND	0	0	0
WESTBOUND	---	---	---
NORTHBOUND	0	0	0
SOUTHBOUND	0	0	0

CRITICAL GAPS

		TABULAR VALUES (Table 10-2)	ADJUSTED VALUE	SIGHT DIST. ADJUSTMENT	FINAL CRITICAL GAP
MINOR RIGHTS	EB	5.50	5.50	0.00	5.50
MAJOR LEFTS	NB	5.00	5.00	0.00	5.00
MINOR LEFTS	EB	6.50	6.50	0.00	6.50

IDENTIFYING INFORMATION

NAME OF THE EAST/WEST STREET..... PARK DRIVEWAY
NAME OF THE NORTH/SOUTH STREET.... MAKAWAO AV
DATE AND TIME OF THE ANALYSIS..... 09-20-1994 ; WD - PM
OTHER INFORMATION.... EXISTING 1994

CAPACITY AND LEVEL-OF-SERVICE

MOVEMENT	FLOW-RATE v(pcph)	POTEN-TIAL CAPACITY c (pcph) p	ACTUAL MOVEMENT CAPACITY c (pcph) M	SHARED CAPACITY c (pcph) SH	RESERVE CAPACITY c = c - v R SH	LOS
MINOR STREET						
EB LEFT	33	161	149	149	117	D
RIGHT	40	583	583	253 / 583	180 / 543	>D A
MAJOR STREET						
NB LEFT	76	643	643	643	567	A

IDENTIFYING INFORMATION

NAME OF THE EAST/WEST STREET..... PARK DRIVEWAY
NAME OF THE NORTH/SOUTH STREET.... MAKAWAO AV
DATE AND TIME OF THE ANALYSIS..... 09-20-1994 ; WD - PM
OTHER INFORMATION.... EXISTING 1994

****

IDENTIFYING INFORMATION

AVERAGE RUNNING SPEED, MAJOR STREET.. 30

PEAK HOUR FACTOR..... .83

AREA POPULATION..... 150000

NAME OF THE EAST/WEST STREET..... PARK DRIVEWAY

NAME OF THE NORTH/SOUTH STREET..... MAKAWAO AV

NAME OF THE ANALYST..... BC

DATE OF THE ANALYSIS (mm/dd/yy)..... 09-20-1994

TIME PERIOD ANALYZED..... WE - MID-DAY

OTHER INFORMATION.... EXISTING 1994

INTERSECTION TYPE AND CONTROL

INTERSECTION TYPE: T-INTERSECTION

MAJOR STREET DIRECTION: NORTH/SOUTH

CONTROL TYPE EASTBOUND: STOP SIGN

TRAFFIC VOLUMES

	EB	WB	NB	SB
LEFT	16	--	75	0
THRU	0	--	477	515
RIGHT	35	--	0	30

NUMBER OF LANES

	EB	WB	NB	SB
LANES	1	--	1	1

ADJUSTMENT FACTORS

	PERCENT GRADE	RIGHT TURN ANGLE	CURB RADIUS (ft) FOR RIGHT TURNS	ACCELERATION LANE FOR RIGHT TURNS
EASTBOUND	0.00	90	20	N
WESTBOUND	-----	---	---	-
NORTHBOUND	0.00	90	20	N
SOUTHBOUND	0.00	90	20	N

VEHICLE COMPOSITION

	% SU TRUCKS AND RV'S	% COMBINATION VEHICLES	% MOTORCYCLES
EASTBOUND	0	0	0
WESTBOUND	---	---	---
NORTHBOUND	0	0	0
SOUTHBOUND	0	0	0

CRITICAL GAPS

		TABULAR VALUES (Table 10-2)	ADJUSTED VALUE	SIGHT DIST. ADJUSTMENT	FINAL CRITICAL GAP
MINOR RIGHTS	EB	5.50	5.50	0.00	5.50
MAJOR LEFTS	NB	5.00	5.00	0.00	5.00
MINOR LEFTS	EB	6.50	6.50	0.00	6.50

IDENTIFYING INFORMATION

NAME OF THE EAST/WEST STREET..... PARK DRIVEWAY
NAME OF THE NORTH/SOUTH STREET.... MAKAWAO AV
DATE AND TIME OF THE ANALYSIS..... 09-20-1994 ; WE - MID-DAY
OTHER INFORMATION.... EXISTING 1994

CAPACITY AND LEVEL-OF-SERVICE

MOVEMENT	FLOW-RATE v(pcph)	POTEN-TIAL CAPACITY c (pcph) p	ACTUAL MOVEMENT CAPACITY c (pcph) M	SHARED CAPACITY c (pcph) SH	RESERVE CAPACITY c = c - v R SH	LOS
MINOR STREET						
EB LEFT	21	147	130	> 130	> 109	> D
				> 270	> 202	>C
RIGHT	46	530	530	> 530	> 484	> A
MAJOR STREET						
NB LEFT	99	593	593	593	494	A

IDENTIFYING INFORMATION

NAME OF THE EAST/WEST STREET..... PARK DRIVEWAY
NAME OF THE NORTH/SOUTH STREET.... MAKAWAO AV
DATE AND TIME OF THE ANALYSIS..... 09-20-1994 ; WE - MID-DAY
OTHER INFORMATION.... EXISTING 1994

****

IDENTIFYING INFORMATION

AVERAGE RUNNING SPEED, MAJOR STREET.. 30

PEAK HOUR FACTOR..... .75

AREA POPULATION..... 150000

NAME OF THE EAST/WEST STREET..... MAKANI RD

NAME OF THE NORTH/SOUTH STREET..... HALE KIPA RD

NAME OF THE ANALYST..... BC

DATE OF THE ANALYSIS (mm/dd/yy)..... 09-20-1994

TIME PERIOD ANALYZED..... WD - PM

OTHER INFORMATION.... EXISTING 1994

INTERSECTION TYPE AND CONTROL

INTERSECTION TYPE: T-INTERSECTION

MAJOR STREET DIRECTION: EAST/WEST

CONTROL TYPE SOUTHBOUND: STOP SIGN

TRAFFIC VOLUMES

	EB	WB	NB	SB
LEFT	7	0	--	62
THRU	78	76	--	0
RIGHT	0	7	--	73

NUMBER OF LANES

	EB	WB	NB	SB
LANES	1	1	--	2

ADJUSTMENT FACTORS

	PERCENT GRADE	RIGHT TURN ANGLE	CURB RADIUS (ft) FOR RIGHT TURNS	ACCELERATION LANE FOR RIGHT TURNS
EASTBOUND	0.00	90	20	N
WESTBOUND	0.00	90	20	N
NORTHBOUND	-----	---	---	-
SOUTHBOUND	0.00	90	20	N

VEHICLE COMPOSITION

	% SU TRUCKS AND RV'S	% COMBINATION VEHICLES	% MOTORCYCLES
EASTBOUND	0	0	0
WESTBOUND	0	0	0
NORTHBOUND	---	---	---
SOUTHBOUND	0	0	0

CRITICAL GAPS

		TABULAR VALUES (Table 10-2)	ADJUSTED VALUE	SIGHT DIST. ADJUSTMENT	FINAL CRITICAL GAP
MINOR RIGHTS	SB	5.50	5.50	0.00	5.50
MAJOR LEFTS	EB	5.00	5.00	0.00	5.00
MINOR LEFTS	SB	6.50	6.50	0.00	6.50

IDENTIFYING INFORMATION

NAME OF THE EAST/WEST STREET..... MAKANI RD
NAME OF THE NORTH/SOUTH STREET.... HALE KIPA RD
DATE AND TIME OF THE ANALYSIS..... 09-20-1994 ; WD - PM
OTHER INFORMATION.... EXISTING 1994

CAPACITY AND LEVEL-OF-SERVICE

MOVEMENT	FLOW-RATE v(pcph)	POTEN-TIAL CAPACITY c (pcph) p	ACTUAL MOVEMENT CAPACITY c (pcph) M	SHARED CAPACITY c (pcph) SH	RESERVE CAPACITY c = c - v R SH	LOS
MINOR STREET						
SB LEFT	91	704	699	699	608	A
RIGHT	107	989	989	989	882	A
MAJOR STREET						
EB LEFT	10	998	998	998	988	A

IDENTIFYING INFORMATION

NAME OF THE EAST/WEST STREET..... MAKANI RD
NAME OF THE NORTH/SOUTH STREET.... HALE KIPA RD
DATE AND TIME OF THE ANALYSIS..... 09-20-1994 ; WD - PM
OTHER INFORMATION.... EXISTING 1994

IDENTIFYING INFORMATION

AVERAGE RUNNING SPEED, MAJOR STREET.. 30

PEAK HOUR FACTOR..... .85

AREA POPULATION..... 150000

NAME OF THE EAST/WEST STREET..... MAKANI RD

NAME OF THE NORTH/SOUTH STREET..... HALE KIPA RD

NAME OF THE ANALYST..... BC

DATE OF THE ANALYSIS (mm/dd/yy)..... 09-20-1994

TIME PERIOD ANALYZED..... WE - MID-DAY

OTHER INFORMATION.... EXISTING 1994

INTERSECTION TYPE AND CONTROL

INTERSECTION TYPE: T-INTERSECTION

MAJOR STREET DIRECTION: EAST/WEST

CONTROL TYPE SOUTHBOUND: STOP SIGN

TRAFFIC VOLUMES

	EB	WB	NB	SB
LEFT	4	0	--	4
THRU	83	88	--	0
RIGHT	0	5	--	10

NUMBER OF LANES

	EB	WB	NB	SB
LANES	1	1	--	2

ADJUSTMENT FACTORS

	PERCENT GRADE	RIGHT TURN ANGLE	CURB RADIUS (ft) FOR RIGHT TURNS	ACCELERATION LANE FOR RIGHT TURNS
EASTBOUND	0.00	90	20	N
WESTBOUND	0.00	90	20	N
NORTHBOUND	-----	---	---	-
SOUTHBOUND	0.00	90	20	N

VEHICLE COMPOSITION

	% SU TRUCKS AND RV'S	% COMBINATION VEHICLES	% MOTORCYCLES
EASTBOUND	0	0	0
WESTBOUND	0	0	0
NORTHBOUND	---	---	---
SOUTHBOUND	0	0	0

CRITICAL GAPS

		TABULAR VALUES (Table 10-2)	ADJUSTED VALUE	SIGHT DIST. ADJUSTMENT	FINAL CRITICAL GAP
MINOR RIGHTS	SB	5.50	5.50	0.00	5.50
MAJOR LEFTS	EB	5.00	5.00	0.00	5.00
MINOR LEFTS	SB	6.50	6.50	0.00	6.50

IDENTIFYING INFORMATION

NAME OF THE EAST/WEST STREET..... MAKANI RD
NAME OF THE NORTH/SOUTH STREET.... HALE KIPA RD
DATE AND TIME OF THE ANALYSIS..... 09-20-1994 ; WE - MID-DAY
OTHER INFORMATION.... EXISTING 1994

CAPACITY AND LEVEL-OF-SERVICE

MOVEMENT	FLOW-RATE v(pcph)	POTENTIAL CAPACITY c (pcph) p	ACTUAL MOVEMENT CAPACITY c (pcph) M	SHARED CAPACITY c (pcph) SH	RESERVE CAPACITY c = c - v R SH	LOS
MINOR STREET						
SB LEFT	5	713	710	710	705	A
RIGHT	13	988	988	988	975	A
MAJOR STREET						
EB LEFT	5	999	999	999	993	A

IDENTIFYING INFORMATION

NAME OF THE EAST/WEST STREET..... MAKANI RD
NAME OF THE NORTH/SOUTH STREET.... HALE KIPA RD
DATE AND TIME OF THE ANALYSIS..... 09-20-1994 ; WE - MID-DAY
OTHER INFORMATION.... EXISTING 1994

****

IDENTIFYING INFORMATION

AVERAGE RUNNING SPEED, MAJOR STREET.. 30

PEAK HOUR FACTOR..... .95

AREA POPULATION..... 150000

NAME OF THE EAST/WEST STREET..... MAKANI RD

NAME OF THE NORTH/SOUTH STREET..... MAKAWAO AV

NAME OF THE ANALYST..... BC

DATE OF THE ANALYSIS (mm/dd/yy)..... 10-12-1994

TIME PERIOD ANALYZED..... PM

OTHER INFORMATION.... EXISTING 1994

INTERSECTION TYPE AND CONTROL

INTERSECTION TYPE: T-INTERSECTION

MAJOR STREET DIRECTION: NORTH/SOUTH

CONTROL TYPE EASTBOUND: STOP SIGN

TRAFFIC VOLUMES

	EB	WB	NB	SB
LEFT	99	--	29	0
THRU	0	--	487	472
RIGHT	35	--	0	111

NUMBER OF LANES

	EB	WB	NB	SB
LANES	2	--	1	1

ADJUSTMENT FACTORS

	PERCENT GRADE	RIGHT TURN ANGLE	CURB RADIUS (ft) FOR RIGHT TURNS	ACCELERATION LANE FOR RIGHT TURNS
EASTBOUND	0.00	90	20	N
WESTBOUND	-----	---	---	-
NORTHBOUND	0.00	90	20	N
SOUTHBOUND	0.00	90	20	N

VEHICLE COMPOSITION

	% SU TRUCKS AND RV'S	% COMBINATION VEHICLES	% MOTORCYCLES
EASTBOUND	0	0	0
WESTBOUND	---	---	---
NORTHBOUND	0	0	0
SOUTHBOUND	0	0	0

CRITICAL GAPS

		TABULAR VALUES (Table 10-2)	ADJUSTED VALUE	SIGHT DIST. ADJUSTMENT	FINAL CRITICAL GAP
MINOR RIGHTS	EB	5.50	5.50	0.00	5.50
MAJOR LEFTS	NB	5.00	5.00	0.00	5.00
MINOR LEFTS	EB	6.50	6.50	0.00	6.50

IDENTIFYING INFORMATION

NAME OF THE EAST/WEST STREET..... MAKANI RD
NAME OF THE NORTH/SOUTH STREET.... MAKAWAO AV
DATE AND TIME OF THE ANALYSIS..... 10-12-1994 ; PM
OTHER INFORMATION.... EXISTING 1994

CAPACITY AND LEVEL-OF-SERVICE

MOVEMENT	FLOW-RATE v(pcph)	POTEN-TIAL CAPACITY c (pcph) p	ACTUAL MOVEMENT CAPACITY c (pcph) M	SHARED CAPACITY c (pcph) SH	RESERVE CAPACITY c = c - v R SH	LOS
MINOR STREET						
EB LEFT	115	200	194	194	79	E
RIGHT	41	587	587	587	547	A
MAJOR STREET						
NB LEFT	34	621	621	621	588	A

IDENTIFYING INFORMATION

NAME OF THE EAST/WEST STREET..... MAKANI RD
NAME OF THE NORTH/SOUTH STREET.... MAKAWAO AV
DATE AND TIME OF THE ANALYSIS..... 10-12-1994 ; PM
OTHER INFORMATION.... EXISTING 1994

****

IDENTIFYING INFORMATION

AVERAGE RUNNING SPEED, MAJOR STREET.. 30

PEAK HOUR FACTOR..... .95

AREA POPULATION..... 150000

NAME OF THE EAST/WEST STREET..... MAKANI RD

NAME OF THE NORTH/SOUTH STREET..... MAKAWAO AV

NAME OF THE ANALYST..... BC

DATE OF THE ANALYSIS (mm/dd/yy)..... 09-23-1994

TIME PERIOD ANALYZED..... WEEKEND MID-DAY

OTHER INFORMATION.... EXISTING 1994

INTERSECTION TYPE AND CONTROL

INTERSECTION TYPE: T-INTERSECTION

MAJOR STREET DIRECTION: NORTH/SOUTH

CONTROL TYPE EASTBOUND: STOP SIGN

TRAFFIC VOLUMES

	EB	WB	NB	SB
LEFT	72	--	23	0
THRU	0	--	454	459
RIGHT	22	--	0	79

NUMBER OF LANES

	EB	WB	NB	SB
LANES	2	--	1	1

ADJUSTMENT FACTORS

	PERCENT GRADE	RIGHT TURN ANGLE	CURB RADIUS (ft) FOR RIGHT TURNS	ACCELERATION LANE FOR RIGHT TURNS
EASTBOUND	0.00	90	20	N
WESTBOUND	-----	---	---	-
NORTHBOUND	0.00	90	20	N
SOUTHBOUND	0.00	90	20	N

VEHICLE COMPOSITION

	% SU TRUCKS AND RV'S	% COMBINATION VEHICLES	% MOTORCYCLES
EASTBOUND	0	0	0
WESTBOUND	---	---	---
NORTHBOUND	0	0	0
SOUTHBOUND	0	0	0

CRITICAL GAPS

		TABULAR VALUES (Table 10-2)	ADJUSTED VALUE	SIGHT DIST. ADJUSTMENT	FINAL CRITICAL GAP
MINOR RIGHTS	EB	5.50	5.50	0.00	5.50
MAJOR LEFTS	NB	5.00	5.00	0.00	5.00
MINOR LEFTS	EB	6.50	6.50	0.00	6.50

IDENTIFYING INFORMATION

NAME OF THE EAST/WEST STREET..... MAKANI RD
NAME OF THE NORTH/SOUTH STREET.... MAKAWAO AV
DATE AND TIME OF THE ANALYSIS..... 09-23-1994 ; WEEKEND MID-DAY
OTHER INFORMATION.... EXISTING 1994

CAPACITY AND LEVEL-OF-SERVICE

MOVEMENT	FLOW-RATE v(pcph)	POTENTIAL CAPACITY c (pcph) p	ACTUAL MOVEMENT CAPACITY c (pcph) M	SHARED CAPACITY c (pcph) SH	RESERVE CAPACITY c = c - v R SH	LOS
MINOR STREET						
EB LEFT	83	222	217	217	133	D
RIGHT	25	610	610	610	584	A
MAJOR STREET						
NB LEFT	27	658	658	658	631	A

IDENTIFYING INFORMATION

NAME OF THE EAST/WEST STREET..... MAKANI RD
NAME OF THE NORTH/SOUTH STREET.... MAKAWAO AV
DATE AND TIME OF THE ANALYSIS..... 09-23-1994 ; WEEKEND MID-DAY
OTHER INFORMATION.... EXISTING 1994

YEAR 1999 BASE (WITHOUT PROJECT)

****

IDENTIFYING INFORMATION

AVERAGE RUNNING SPEED, MAJOR STREET.. 30

PEAK HOUR FACTOR..... .95

AREA POPULATION..... 150000

NAME OF THE EAST/WEST STREET..... PARK DRIVEWAY

NAME OF THE NORTH/SOUTH STREET..... MAKAWAO AV

NAME OF THE ANALYST..... BC

DATE OF THE ANALYSIS (mm/dd/yy)..... 09-23-1994

TIME PERIOD ANALYZED..... WD PM

OTHER INFORMATION.... YEAR 1999 BASE

INTERSECTION TYPE AND CONTROL

INTERSECTION TYPE: T-INTERSECTION

MAJOR STREET DIRECTION: NORTH/SOUTH

CONTROL TYPE EASTBOUND: STOP SIGN

TRAFFIC VOLUMES

	EB	WB	NB	SB
LEFT	29	--	67	0
THRU	0	--	589	522
RIGHT	35	--	0	45

NUMBER OF LANES

	EB	WB	NB	SB
LANES	1	--	1	1

ADJUSTMENT FACTORS

	PERCENT GRADE	RIGHT TURN ANGLE	CURB RADIUS (ft) FOR RIGHT TURNS	ACCELERATION LANE FOR RIGHT TURNS
EASTBOUND	0.00	90	20	N
WESTBOUND	-----	---	---	-
NORTHBOUND	0.00	90	20	N
SOUTHBOUND	0.00	90	20	N

VEHICLE COMPOSITION

	% SU TRUCKS AND RV'S	% COMBINATION VEHICLES	% MOTORCYCLES
EASTBOUND	0	0	0
WESTBOUND	---	---	---
NORTHBOUND	0	0	0
SOUTHBOUND	0	0	0

CRITICAL GAPS

		TABULAR VALUES (Table 10-2)	ADJUSTED VALUE	SIGHT DIST. ADJUSTMENT	FINAL CRITICAL GAP
MINOR RIGHTS	EB	5.50	5.50	0.00	5.50
MAJOR LEFTS	NB	5.00	5.00	0.00	5.00
MINOR LEFTS	EB	6.50	6.50	0.00	6.50

IDENTIFYING INFORMATION

NAME OF THE EAST/WEST STREET..... PARK DRIVEWAY
NAME OF THE NORTH/SOUTH STREET.... MAKAWAO AV
DATE AND TIME OF THE ANALYSIS..... 09-23-1994 ; WD PM
OTHER INFORMATION.... YEAR 1999 BASE

CAPACITY AND LEVEL-OF-SERVICE

MOVEMENT	FLOW-RATE v(pcph)	POTEN-TIAL CAPACITY c (pcph) p	ACTUAL MOVEMENT CAPACITY c (pcph) M	SHARED CAPACITY c (pcph) SH	RESERVE CAPACITY c = c - v R SH	LOS
MINOR STREET						
EB LEFT	34	156	144	144	110	D
RIGHT	41	574	574	574	534	A
MAJOR STREET						
NB LEFT	78	633	633	633	555	A

IDENTIFYING INFORMATION

NAME OF THE EAST/WEST STREET..... PARK DRIVEWAY
NAME OF THE NORTH/SOUTH STREET.... MAKAWAO AV
DATE AND TIME OF THE ANALYSIS..... 09-23-1994 ; WD PM
OTHER INFORMATION.... YEAR 1999 BASE

IDENTIFYING INFORMATION

AVERAGE RUNNING SPEED, MAJOR STREET.. 30

PEAK HOUR FACTOR..... .95

AREA POPULATION..... 150000

NAME OF THE EAST/WEST STREET..... PARK DRIVEWAY

NAME OF THE NORTH/SOUTH STREET..... MAKAWAO AV

NAME OF THE ANALYST..... BC

DATE OF THE ANALYSIS (mm/dd/yy)..... 09-23-1994

TIME PERIOD ANALYZED..... WE MID-DAY

OTHER INFORMATION.... YEAR 1999 BASE

INTERSECTION TYPE AND CONTROL

INTERSECTION TYPE: T-INTERSECTION

MAJOR STREET DIRECTION: NORTH/SOUTH

CONTROL TYPE EASTBOUND: STOP SIGN

TRAFFIC VOLUMES

	EB	WB	NB	SB
LEFT	17	--	80	0
THRU	0	--	508	548
RIGHT	37	--	0	32

NUMBER OF LANES

	EB	WB	NB	SB
LANES	1	--	1	1

ADJUSTMENT FACTORS

	PERCENT GRADE	RIGHT TURN ANGLE	CURB RADIUS (ft) FOR RIGHT TURNS	ACCELERATION LANE FOR RIGHT TURNS
EASTBOUND	0.00	90	20	N
WESTBOUND	-----	---	---	-
NORTHBOUND	0.00	90	20	N
SOUTHBOUND	0.00	90	20	N

VEHICLE COMPOSITION

	% SU TRUCKS AND RV'S	% COMBINATION VEHICLES	% MOTORCYCLES
EASTBOUND	0	0	0
WESTBOUND	---	---	---
NORTHBOUND	0	0	0
SOUTHBOUND	0	0	0

CRITICAL GAPS

		TABULAR VALUES (Table 10-2)	ADJUSTED VALUE	SIGHT DIST. ADJUSTMENT	FINAL CRITICAL GAP
MINOR RIGHTS	EB	5.50	5.50	0.00	5.50
MAJOR LEFTS	NB	5.00	5.00	0.00	5.00
MINOR LEFTS	EB	6.50	6.50	0.00	6.50

IDENTIFYING INFORMATION

NAME OF THE EAST/WEST STREET..... PARK DRIVEWAY
NAME OF THE NORTH/SOUTH STREET.... MAKAWAO AV
DATE AND TIME OF THE ANALYSIS..... 09-23-1994 ; WE MID-DAY
OTHER INFORMATION.... YEAR 1999 BASE

CAPACITY AND LEVEL-OF-SERVICE

MOVEMENT	FLOW-RATE v(pcph)	POTEN-TIAL CAPACITY c (pcph) p	ACTUAL MOVEMENT CAPACITY c (pcph) M		SHARED CAPACITY c (pcph) SH		RESERVE CAPACITY c = c - v R SH		LOS
MINOR STREET									
EB LEFT	20	167	151	>	151	>	131	>	D
				> 302		> 239		>C	
RIGHT	43	560	560	>	560	>	517	>	A
MAJOR STREET									
NB LEFT	93	623	623		623		531		A

IDENTIFYING INFORMATION

NAME OF THE EAST/WEST STREET..... PARK DRIVEWAY
NAME OF THE NORTH/SOUTH STREET.... MAKAWAO AV
DATE AND TIME OF THE ANALYSIS..... 09-23-1994 ; WE MID-DAY
OTHER INFORMATION.... YEAR 1999 BASE

IDENTIFYING INFORMATION

AVERAGE RUNNING SPEED, MAJOR STREET.. 30

PEAK HOUR FACTOR..... .95

AREA POPULATION..... 150000

NAME OF THE EAST/WEST STREET..... MAKANI RD

NAME OF THE NORTH/SOUTH STREET..... HALE KIPA RD

NAME OF THE ANALYST..... BC

DATE OF THE ANALYSIS (mm/dd/yy)..... 09-23-1994

TIME PERIOD ANALYZED..... PM

OTHER INFORMATION.... YEAR 1999 BASE

INTERSECTION TYPE AND CONTROL

INTERSECTION TYPE: T-INTERSECTION

MAJOR STREET DIRECTION: EAST/WEST

CONTROL TYPE SOUTHBOUND: STOP SIGN

TRAFFIC VOLUMES

	EB	WB	NB	SB
LEFT	7	0	--	66
THRU	83	81	--	0
RIGHT	0	7	--	78

NUMBER OF LANES

	EB	WB	NB	SB
LANES	1	1	--	2

ADJUSTMENT FACTORS

	PERCENT GRADE	RIGHT TURN ANGLE	CURB RADIUS (ft) FOR RIGHT TURNS	ACCELERATION LANE FOR RIGHT TURNS
EASTBOUND	0.00	90	20	N
WESTBOUND	0.00	90	20	N
NORTHBOUND	-----	---	---	-
SOUTHBOUND	0.00	90	20	N

VEHICLE COMPOSITION

	% SU TRUCKS AND RV'S	% COMBINATION VEHICLES	% MOTORCYCLES
EASTBOUND	0	0	0
WESTBOUND	0	0	0
NORTHBOUND	---	---	---
SOUTHBOUND	0	0	0

CRITICAL GAPS

		TABULAR VALUES (Table 10-2)	ADJUSTED VALUE	SIGHT DIST. ADJUSTMENT	FINAL CRITICAL GAP
MINOR RIGHTS	SB	5.50	5.50	0.00	5.50
MAJOR LEFTS	EB	5.00	5.00	0.00	5.00
MINOR LEFTS	SB	6.50	6.50	0.00	6.50

IDENTIFYING INFORMATION

NAME OF THE EAST/WEST STREET..... MAKANI RD
NAME OF THE NORTH/SOUTH STREET.... HALE KIPA RD
DATE AND TIME OF THE ANALYSIS..... 09-23-1994 ; PM
OTHER INFORMATION.... YEAR 1999 BASE

CAPACITY AND LEVEL-OF-SERVICE

MOVEMENT	FLOW-RATE v(pcph)	POTEN-TIAL CAPACITY c_p (pcph)	ACTUAL MOVEMENT CAPACITY c_M (pcph)	SHARED CAPACITY c_{SH} (pcph)	RESERVE CAPACITY $c_R = c_{SH} - v$	LOS
MINOR STREET						
SB LEFT	76	736	733	733	656	A
RIGHT	90	996	996	996	905	A
MAJOR STREET						
EB LEFT	8	1000	1000	1000	992	A

IDENTIFYING INFORMATION

NAME OF THE EAST/WEST STREET..... MAKANI RD
NAME OF THE NORTH/SOUTH STREET.... HALE KIPA RD
DATE AND TIME OF THE ANALYSIS..... 09-23-1994 ; PM
OTHER INFORMATION.... YEAR 1999 BASE

****

IDENTIFYING INFORMATION

AVERAGE RUNNING SPEED, MAJOR STREET.. 30

PEAK HOUR FACTOR..... .95

AREA POPULATION..... 150000

NAME OF THE EAST/WEST STREET..... MAKANI RD

NAME OF THE NORTH/SOUTH STREET..... HALE KIPA RD

NAME OF THE ANALYST..... BC

DATE OF THE ANALYSIS (mm/dd/yy)..... 09-23-1994

TIME PERIOD ANALYZED..... WEEKEND MID-DAY

OTHER INFORMATION.... YEAR 1999 BASE

INTERSECTION TYPE AND CONTROL

INTERSECTION TYPE: T-INTERSECTION

MAJOR STREET DIRECTION: EAST/WEST

CONTROL TYPE SOUTHBOUND: STOP SIGN

TRAFFIC VOLUMES

	EB	WB	NB	SB
LEFT	4	0	--	4
THRU	88	94	--	0
RIGHT	0	5	--	11

NUMBER OF LANES

	EB	WB	NB	SB
LANES	1	1	--	2

ADJUSTMENT FACTORS

	PERCENT GRADE	RIGHT TURN ANGLE	CURB RADIUS (ft) FOR RIGHT TURNS	ACCELERATION LANE FOR RIGHT TURNS
EASTBOUND	0.00	90	20	N
WESTBOUND	0.00	90	20	N
NORTHBOUND	-----	---	---	-
SOUTHBOUND	0.00	90	20	N

VEHICLE COMPOSITION

	% SU TRUCKS AND RV'S	% COMBINATION VEHICLES	% MOTORCYCLES
EASTBOUND	0	0	0
WESTBOUND	0	0	0
NORTHBOUND	---	---	---
SOUTHBOUND	0	0	0

CRITICAL GAPS

		TABULAR VALUES (Table 10-2)	ADJUSTED VALUE	SIGHT DIST. ADJUSTMENT	FINAL CRITICAL GAP
MINOR RIGHTS	SB	5.50	5.50	0.00	5.50
MAJOR LEFTS	EB	5.00	5.00	0.00	5.00
MINOR LEFTS	SB	6.50	6.50	0.00	6.50

IDENTIFYING INFORMATION

NAME OF THE EAST/WEST STREET..... MAKANI RD
NAME OF THE NORTH/SOUTH STREET.... HALE KIPA RD
DATE AND TIME OF THE ANALYSIS..... 09-23-1994 ; WEEKEND MID-DAY
OTHER INFORMATION.... YEAR 1999 BASE

CAPACITY AND LEVEL-OF-SERVICE

MOVEMENT	FLOW-RATE v(pcph)	POTENTIAL CAPACITY c_p (pcph)	ACTUAL MOVEMENT CAPACITY c_M (pcph)	SHARED CAPACITY c_{SH} (pcph)	RESERVE CAPACITY $c_R = c_{SH} - v$	LOS
MINOR STREET						
SB LEFT	5	722	720	720	715	A
RIGHT	13	993	993	993	981	A
MAJOR STREET						
EB LEFT	5	999	999	999	995	A

IDENTIFYING INFORMATION

NAME OF THE EAST/WEST STREET..... MAKANI RD
NAME OF THE NORTH/SOUTH STREET.... HALE KIPA RD
DATE AND TIME OF THE ANALYSIS..... 09-23-1994 ; WEEKEND MID-DAY
OTHER INFORMATION.... YEAR 1999 BASE

1985 HCM: UNSIGNALIZED INTERSECTIONS
****

IDENTIFYING INFORMATION

AVERAGE RUNNING SPEED, MAJOR STREET.. 30

PEAK HOUR FACTOR..... .95

AREA POPULATION..... 150000

NAME OF THE EAST/WEST STREET..... MAKANI RD

NAME OF THE NORTH/SOUTH STREET..... MAKAWAO AV

NAME OF THE ANALYST..... BC

DATE OF THE ANALYSIS (mm/dd/yy)..... 10-12-1994

TIME PERIOD ANALYZED..... PM

OTHER INFORMATION.... ~~EXISTING 1994~~ 1999 BASE

INTERSECTION TYPE AND CONTROL

INTERSECTION TYPE: T-INTERSECTION

MAJOR STREET DIRECTION: NORTH/SOUTH

CONTROL TYPE EASTBOUND: STOP SIGN

TRAFFIC VOLUMES

	EB	WB	NB	SB
LEFT	105	--	31	0
THRU	0	--	519	503
RIGHT	37	--	0	118

NUMBER OF LANES

	EB	WB	NB	SB
LANES	2	--	1	1

ADJUSTMENT FACTORS

	PERCENT GRADE	RIGHT TURN ANGLE	CURB RADIUS (ft) FOR RIGHT TURNS	ACCELERATION LANE FOR RIGHT TURNS
EASTBOUND	0.00	90	20	N
WESTBOUND	-----	---	---	-
NORTHBOUND	0.00	90	20	N
SOUTHBOUND	0.00	90	20	N

VEHICLE COMPOSITION

	% SU TRUCKS AND RV'S	% COMBINATION VEHICLES	% MOTORCYCLES
EASTBOUND	0	0	0
WESTBOUND	---	---	---
NORTHBOUND	0	0	0
SOUTHBOUND	0	0	0

CRITICAL GAPS

	TABULAR VALUES (Table 10-2)	ADJUSTED VALUE	SIGHT DIST. ADJUSTMENT	FINAL CRITICAL GAP
MINOR RIGHTS EB	5.50	5.50	0.00	5.50
MAJOR LEFTS NB	5.00	5.00	0.00	5.00
MINOR LEFTS EB	6.50	6.50	0.00	6.50

IDENTIFYING INFORMATION

NAME OF THE EAST/WEST STREET..... MAKANI RD
NAME OF THE NORTH/SOUTH STREET.... MAKAWAO AV
DATE AND TIME OF THE ANALYSIS..... 10-12-1994 ; PM
OTHER INFORMATION.... ~~EXISTING 1994~~ 1999 BASE

CAPACITY AND LEVEL-OF-SERVICE

MOVEMENT	FLOW-RATE v(pcph)	POTENTIAL CAPACITY c (pcph) c_p	ACTUAL MOVEMENT CAPACITY c (pcph) c_M	SHARED CAPACITY c (pcph) c_{SH}	RESERVE CAPACITY $c = c_R - v_{SH}$	LOS
MINOR STREET						
EB LEFT	122	179	172	172	51	E
RIGHT	43	561	561	561	518	A
MAJOR STREET						
NB LEFT	36	595	595	595	559	A

IDENTIFYING INFORMATION

NAME OF THE EAST/WEST STREET..... MAKANI RD
NAME OF THE NORTH/SOUTH STREET.... MAKAWAO AV
DATE AND TIME OF THE ANALYSIS..... 10-12-1994 ; PM
OTHER INFORMATION.... ~~EXISTING 1994~~
1999 BASE

****

IDENTIFYING INFORMATION

AVERAGE RUNNING SPEED, MAJOR STREET.. 30

PEAK HOUR FACTOR..... .95

AREA POPULATION..... 150000

NAME OF THE EAST/WEST STREET..... MAKANI RD

NAME OF THE NORTH/SOUTH STREET..... MAKAWAO AV

NAME OF THE ANALYST..... BC

DATE OF THE ANALYSIS (mm/dd/yy)..... 09-23-1994

TIME PERIOD ANALYZED..... WE MD

OTHER INFORMATION.... YEAR 1999 BASE

INTERSECTION TYPE AND CONTROL

INTERSECTION TYPE: T-INTERSECTION

MAJOR STREET DIRECTION: NORTH/SOUTH

CONTROL TYPE EASTBOUND: STOP SIGN

TRAFFIC VOLUMES

	EB	WB	NB	SB
LEFT	77	--	24	0
THRU	0	--	484	489
RIGHT	23	--	0	84

NUMBER OF LANES

	EB	WB	NB	SB
LANES	2	--	1	1

ADJUSTMENT FACTORS

	PERCENT GRADE	RIGHT TURN ANGLE	CURB RADIUS (ft) FOR RIGHT TURNS	ACCELERATION LANE FOR RIGHT TURNS
EASTBOUND	0.00	90	20	N
WESTBOUND	-----	---	---	-
NORTHBOUND	0.00	90	20	N
SOUTHBOUND	0.00	90	20	N

VEHICLE COMPOSITION

	% SU TRUCKS AND RV'S	% COMBINATION VEHICLES	% MOTORCYCLES
EASTBOUND	0	0	0
WESTBOUND	---	---	---
NORTHBOUND	0	0	0
SOUTHBOUND	0	0	0

CRITICAL GAPS

		TABULAR VALUES (Table 10-2)	ADJUSTED VALUE	SIGHT DIST. ADJUSTMENT	FINAL CRITICAL GAP
MINOR RIGHTS	EB	5.50	5.50	0.00	5.50
MAJOR LEFTS	NB	5.00	5.00	0.00	5.00
MINOR LEFTS	EB	6.50	6.50	0.00	6.50

IDENTIFYING INFORMATION

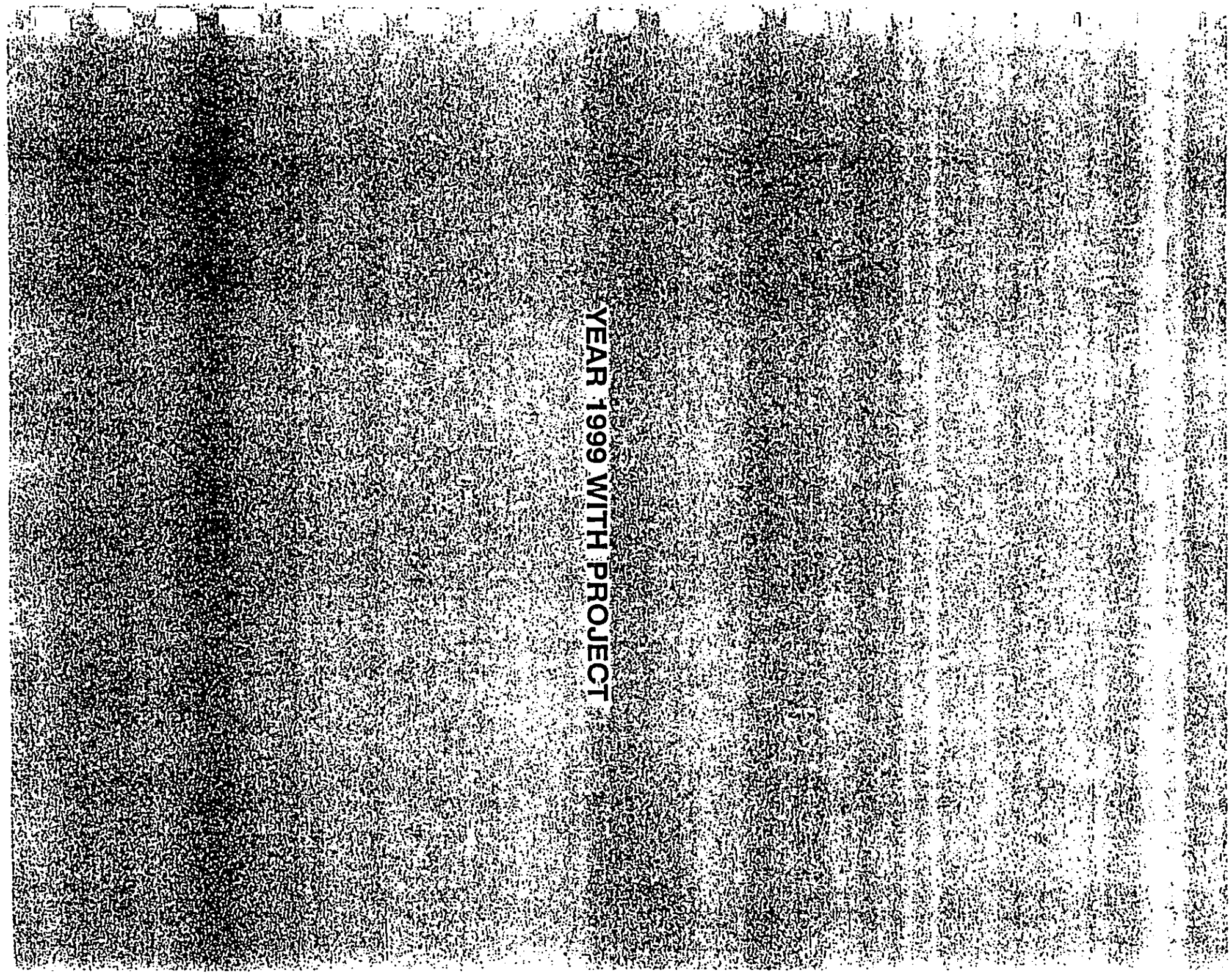
NAME OF THE EAST/WEST STREET..... MAKANI RD
NAME OF THE NORTH/SOUTH STREET.... MAKAWAO AV
DATE AND TIME OF THE ANALYSIS..... 09-23-1994 ; WE MD
OTHER INFORMATION.... YEAR 1999 BASE

CAPACITY AND LEVEL-OF-SERVICE

MOVEMENT	FLOW-RATE v(pcph)	POTEN-TIAL CAPACITY c_p (pcph)	ACTUAL MOVEMENT CAPACITY c_M (pcph)	SHARED CAPACITY c_{SH} (pcph)	RESERVE CAPACITY $c_R = c_{SH} - v$	LOS
MINOR STREET						
EB LEFT	89	202	197	197	107	D
RIGHT	27	585	585	585	558	A
MAJOR STREET						
NB LEFT	28	628	628	628	600	A

IDENTIFYING INFORMATION

NAME OF THE EAST/WEST STREET..... MAKANI RD
NAME OF THE NORTH/SOUTH STREET.... MAKAWAO AV
DATE AND TIME OF THE ANALYSIS..... 09-23-1994 ; WE MD
OTHER INFORMATION.... YEAR 1999 BASE



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IDENTIFYING INFORMATION

AVERAGE RUNNING SPEED, MAJOR STREET.. 30

PEAK HOUR FACTOR..... .95

AREA POPULATION..... 150000

NAME OF THE EAST/WEST STREET..... PARK DRIVEWAY

NAME OF THE NORTH/SOUTH STREET..... MAKAWAO AV

NAME OF THE ANALYST..... BC

DATE OF THE ANALYSIS (mm/dd/yy)..... 09-23-1994

TIME PERIOD ANALYZED..... WD PM

OTHER INFORMATION.... YEAR 1999 + PROJECT

INTERSECTION TYPE AND CONTROL

INTERSECTION TYPE: T-INTERSECTION

MAJOR STREET DIRECTION: NORTH/SOUTH

CONTROL TYPE EASTBOUND: STOP SIGN

TRAFFIC VOLUMES

	EB	WB	NB	SB
LEFT	37	--	74	0
THRU	0	--	589	522
RIGHT	45	--	0	51

NUMBER OF LANES

	EB	WB	NB	SB
LANES	1	--	1	1

ADJUSTMENT FACTORS

	PERCENT GRADE	RIGHT TURN ANGLE	CURB RADIUS (ft) FOR RIGHT TURNS	ACCELERATION LANE FOR RIGHT TURNS
EASTBOUND	0.00	90	20	N
WESTBOUND	-----	---	---	-
NORTHBOUND	0.00	90	20	N
SOUTHBOUND	0.00	90	20	N

VEHICLE COMPOSITION

	% SU TRUCKS AND RV'S	% COMBINATION VEHICLES	% MOTORCYCLES
EASTBOUND	0	0	0
WESTBOUND	---	---	---
NORTHBOUND	0	0	0
SOUTHBOUND	0	0	0

CRITICAL GAPS

		TABULAR VALUES (Table 10-2)	ADJUSTED VALUE	SIGHT DIST. ADJUSTMENT	FINAL CRITICAL GAP
MINOR RIGHTS	EB	5.50	5.50	0.00	5.50
MAJOR LEFTS	NB	5.00	5.00	0.00	5.00
MINOR LEFTS	EB	6.50	6.50	0.00	6.50

IDENTIFYING INFORMATION

NAME OF THE EAST/WEST STREET..... PARK DRIVEWAY
NAME OF THE NORTH/SOUTH STREET.... MAKAWAO AV
DATE AND TIME OF THE ANALYSIS..... 09-23-1994 ; WD PM
OTHER INFORMATION.... YEAR 1999 + PROJECT

CAPACITY AND LEVEL-OF-SERVICE

MOVEMENT	FLOW-RATE v(pcph)	POTENTIAL CAPACITY c_p (pcph)	ACTUAL MOVEMENT CAPACITY c_M (pcph)	SHARED CAPACITY c_{SH} (pcph)	RESERVE CAPACITY $c_R = c_{SH} - v$	LOS
MINOR STREET						
EB LEFT	43	153	140	239	97	E
RIGHT	52	572	572		520	A
MAJOR STREET						
NB LEFT	86	628	628		542	A

IDENTIFYING INFORMATION

NAME OF THE EAST/WEST STREET..... PARK DRIVEWAY
NAME OF THE NORTH/SOUTH STREET.... MAKAWAO AV
DATE AND TIME OF THE ANALYSIS..... 09-23-1994 ; WD PM
OTHER INFORMATION.... YEAR 1999 + PROJECT

1985 HCM: UNSIGNALIZED INTERSECTIONS
****

IDENTIFYING INFORMATION

AVERAGE RUNNING SPEED, MAJOR STREET.. 30

PEAK HOUR FACTOR..... .95

AREA POPULATION..... 150000

NAME OF THE EAST/WEST STREET..... PARK DRIVEWAY

NAME OF THE NORTH/SOUTH STREET..... MAKAWAO AV

NAME OF THE ANALYST..... BC

DATE OF THE ANALYSIS (mm/dd/yy)..... 09-23-1994

TIME PERIOD ANALYZED..... WE MID-DAY

OTHER INFORMATION.... YEAR 1999 + PROJECT

INTERSECTION TYPE AND CONTROL

INTERSECTION TYPE: T-INTERSECTION

MAJOR STREET DIRECTION: NORTH/SOUTH

CONTROL TYPE EASTBOUND: STOP SIGN

TRAFFIC VOLUMES

	EB	WB	NB	SB
LEFT	24	--	95	0
THRU	0	--	508	548
RIGHT	45	--	0	45

NUMBER OF LANES

	EB	WB	NB	SB
LANES	1	--	1	1

ADJUSTMENT FACTORS

	PERCENT GRADE	RIGHT TURN ANGLE	CURB RADIUS (ft) FOR RIGHT TURNS	ACCELERATION LANE FOR RIGHT TURNS
EASTBOUND	0.00	90	20	N
WESTBOUND	-----	---	---	-
NORTHBOUND	0.00	90	20	N
SOUTHBOUND	0.00	90	20	N

VEHICLE COMPOSITION

	% SU TRUCKS AND RV'S	% COMBINATION VEHICLES	% MOTORCYCLES
EASTBOUND	0	0	0
WESTBOUND	---	---	---
NORTHBOUND	0	0	0
SOUTHBOUND	0	0	0

CRITICAL GAPS

		TABULAR VALUES (Table 10-2)	ADJUSTED VALUE	SIGHT DIST. ADJUSTMENT	FINAL CRITICAL GAP
MINOR RIGHTS	EB	5.50	5.50	0.00	5.50
MAJOR LEFTS	NB	5.00	5.00	0.00	5.00
MINOR LEFTS	EB	6.50	6.50	0.00	6.50

IDENTIFYING INFORMATION

NAME OF THE EAST/WEST STREET..... PARK DRIVEWAY
NAME OF THE NORTH/SOUTH STREET.... MAKAWAO AV
DATE AND TIME OF THE ANALYSIS..... 09-23-1994 ; WE MID-DAY
OTHER INFORMATION.... YEAR 1999 + PROJECT

CAPACITY AND LEVEL-OF-SERVICE

MOVEMENT	FLOW-RATE v(pcph)	POTENTIAL CAPACITY c (pcph) p	ACTUAL MOVEMENT CAPACITY c (pcph) M		SHARED CAPACITY c (pcph) SH		RESERVE CAPACITY c = c - v R SH		LOS
MINOR STREET									
EB LEFT	28	162	142	>		142	>	114	> D
				>	276		> 196		>D
RIGHT	52	555	555	>		555	>	503	> A
MAJOR STREET									
NB LEFT	110	614	614			614		504	A

IDENTIFYING INFORMATION

NAME OF THE EAST/WEST STREET..... PARK DRIVEWAY
NAME OF THE NORTH/SOUTH STREET.... MAKAWAO AV
DATE AND TIME OF THE ANALYSIS..... 09-23-1994 ; WE MID-DAY
OTHER INFORMATION.... YEAR 1999 + PROJECT

****

IDENTIFYING INFORMATION

AVERAGE RUNNING SPEED, MAJOR STREET.. 30

PEAK HOUR FACTOR..... .95

AREA POPULATION..... 150000

NAME OF THE EAST/WEST STREET..... MAKANI RD

NAME OF THE NORTH/SOUTH STREET..... HALE KIPA RD

NAME OF THE ANALYST..... BC

DATE OF THE ANALYSIS (mm/dd/yy)..... 09-23-1994

TIME PERIOD ANALYZED..... PM

OTHER INFORMATION.... YEAR 1999 + PROJECT

INTERSECTION TYPE AND CONTROL

INTERSECTION TYPE: T-INTERSECTION

MAJOR STREET DIRECTION: EAST/WEST

CONTROL TYPE SOUTHBOUND: STOP SIGN

TRAFFIC VOLUMES

	EB	WB	NB	SB
LEFT	9	0	--	71
THRU	83	81	--	0
RIGHT	0	11	--	81

NUMBER OF LANES

	EB	WB	NB	SB
LANES	1	1	--	2

ADJUSTMENT FACTORS

	PERCENT GRADE	RIGHT TURN ANGLE	CURB RADIUS (ft) FOR RIGHT TURNS	ACCELERATION LANE FOR RIGHT TURNS
EASTBOUND	0.00	90	20	N
WESTBOUND	0.00	90	20	N
NORTHBOUND	-----	---	---	-
SOUTHBOUND	0.00	90	20	N

VEHICLE COMPOSITION

	% SU TRUCKS AND RV'S	% COMBINATION VEHICLES	% MOTORCYCLES
EASTBOUND	0	0	0
WESTBOUND	0	0	0
NORTHBOUND	---	---	---
SOUTHBOUND	0	0	0

CRITICAL GAPS

		TABULAR VALUES (Table 10-2)	ADJUSTED VALUE	SIGHT DIST. ADJUSTMENT	FINAL CRITICAL GAP
MINOR RIGHTS	SB	5.50	5.50	0.00	5.50
MAJOR LEFTS	EB	5.00	5.00	0.00	5.00
MINOR LEFTS	SB	6.50	6.50	0.00	6.50

IDENTIFYING INFORMATION

NAME OF THE EAST/WEST STREET..... MAKANI RD
NAME OF THE NORTH/SOUTH STREET.... HALE KIPA RD
DATE AND TIME OF THE ANALYSIS..... 09-23-1994 ; PM
OTHER INFORMATION.... YEAR 1999 + PROJECT

CAPACITY AND LEVEL-OF-SERVICE

MOVEMENT	FLOW-RATE v(pcph)	POTENTIAL CAPACITY c (pcph) p	ACTUAL MOVEMENT CAPACITY c (pcph) M	SHARED CAPACITY c (pcph) SH	RESERVE CAPACITY c = c - v R SH	LOS
MINOR STREET						
SB LEFT	82	732	728	728	645	A
RIGHT	94	995	995	995	902	A
MAJOR STREET						
EB LEFT	10	1000	1000	1000	990	A

IDENTIFYING INFORMATION

NAME OF THE EAST/WEST STREET..... MAKANI RD
NAME OF THE NORTH/SOUTH STREET.... HALE KIPA RD
DATE AND TIME OF THE ANALYSIS..... 09-23-1994 ; PM
OTHER INFORMATION.... YEAR 1999 + PROJECT

IDENTIFYING INFORMATION

AVERAGE RUNNING SPEED, MAJOR STREET.. 30

PEAK HOUR FACTOR..... .95

AREA POPULATION..... 150000

NAME OF THE EAST/WEST STREET..... MAKANI RD

NAME OF THE NORTH/SOUTH STREET..... HALE KIPA RD

NAME OF THE ANALYST..... BC

DATE OF THE ANALYSIS (mm/dd/yy)..... 09-23-1994

TIME PERIOD ANALYZED..... WEEKEND MID-DAY

OTHER INFORMATION.... YEAR 1999 + PROJECT

INTERSECTION TYPE AND CONTROL

INTERSECTION TYPE: T-INTERSECTION

MAJOR STREET DIRECTION: EAST/WEST

CONTROL TYPE SOUTHBOUND: STOP SIGN

TRAFFIC VOLUMES

	EB	WB	NB	SB
LEFT	8	0	--	8
THRU	88	94	--	0
RIGHT	0	13	--	13

NUMBER OF LANES

	EB	WB	NB	SB
LANES	1	1	--	2

ADJUSTMENT FACTORS

	PERCENT GRADE	RIGHT TURN ANGLE	CURB RADIUS (ft) FOR RIGHT TURNS	ACCELERATION LANE FOR RIGHT TURNS
EASTBOUND	0.00	90	20	N
WESTBOUND	0.00	90	20	N
NORTHBOUND	-----	---	---	-
SOUTHBOUND	0.00	90	20	N

VEHICLE COMPOSITION

	% SU TRUCKS AND RV'S	% COMBINATION VEHICLES	% MOTORCYCLES
EASTBOUND	0	0	0
WESTBOUND	0	0	0
NORTHBOUND	---	---	---
SOUTHBOUND	0	0	0

CRITICAL GAPS

		TABULAR VALUES (Table 10-2)	ADJUSTED VALUE	SIGHT DIST. ADJUSTMENT	FINAL CRITICAL GAP
MINOR RIGHTS	SB	5.50	5.50	0.00	5.50
MAJOR LEFTS	EB	5.00	5.00	0.00	5.00
MINOR LEFTS	SB	6.50	6.50	0.00	6.50

IDENTIFYING INFORMATION

NAME OF THE EAST/WEST STREET..... MAKANI RD
NAME OF THE NORTH/SOUTH STREET.... HALE KIPA RD
DATE AND TIME OF THE ANALYSIS..... 09-23-1994 ; WEEKEND MID-DAY
OTHER INFORMATION.... YEAR 1999 + PROJECT

CAPACITY AND LEVEL-OF-SERVICE

MOVEMENT	FLOW-RATE v(pcph)	POTEN-TIAL CAPACITY c (pcph) p	ACTUAL MOVEMENT CAPACITY c (pcph) M	SHARED CAPACITY c (pcph) SH	RESERVE CAPACITY c = c - v R SH	LOS
MINOR STREET						
SB LEFT	9	714	710	710	701	A
RIGHT	15	989	989	989	974	A
MAJOR STREET						
EB LEFT	9	998	998	998	989	A

IDENTIFYING INFORMATION

NAME OF THE EAST/WEST STREET..... MAKANI RD
NAME OF THE NORTH/SOUTH STREET.... HALE KIPA RD
DATE AND TIME OF THE ANALYSIS..... 09-23-1994 ; WEEKEND MID-DAY
OTHER INFORMATION.... YEAR 1999 + PROJECT

IDENTIFYING INFORMATION

AVERAGE RUNNING SPEED, MAJOR STREET.. 30

PEAK HOUR FACTOR..... .95

AREA POPULATION..... 150000

NAME OF THE EAST/WEST STREET..... MAKANI RD

NAME OF THE NORTH/SOUTH STREET..... MAKAWAO AV

NAME OF THE ANALYST..... BC

DATE OF THE ANALYSIS (mm/dd/yy)..... 10-12-1994

TIME PERIOD ANALYZED..... PM

OTHER INFORMATION.... YEAR 1999 W/PROJECT

INTERSECTION TYPE AND CONTROL

INTERSECTION TYPE: T-INTERSECTION

MAJOR STREET DIRECTION: NORTH/SOUTH

CONTROL TYPE EASTBOUND: STOP SIGN

TRAFFIC VOLUMES

	EB	WB	NB	SB
LEFT	105	--	35	0
THRU	0	--	526	513
RIGHT	42	--	0	118

NUMBER OF LANES

	EB	WB	NB	SB
LANES	2	--	1	1

ADJUSTMENT FACTORS

	PERCENT GRADE	RIGHT TURN ANGLE	CURB RADIUS (ft) FOR RIGHT TURNS	ACCELERATION LANE FOR RIGHT TURNS
EASTBOUND	0.00	90	20	N
WESTBOUND	-----	---	---	-
NORTHBOUND	0.00	90	20	N
SOUTHBOUND	0.00	90	20	N

VEHICLE COMPOSITION

	% SU TRUCKS AND RV'S	% COMBINATION VEHICLES	% MOTORCYCLES
EASTBOUND	0	0	0
WESTBOUND	---	---	---
NORTHBOUND	0	0	0
SOUTHBOUND	0	0	0

CRITICAL GAPS

		TABULAR VALUES (Table 10-2)	ADJUSTED VALUE	SIGHT DIST. ADJUSTMENT	FINAL CRITICAL GAP
MINOR RIGHTS	EB	5.50	5.50	0.00	5.50
MAJOR LEFTS	NB	5.00	5.00	0.00	5.00
MINOR LEFTS	EB	6.50	6.50	0.00	6.50

IDENTIFYING INFORMATION

NAME OF THE EAST/WEST STREET..... MAKANI RD
NAME OF THE NORTH/SOUTH STREET.... MAKAWAO AV
DATE AND TIME OF THE ANALYSIS..... 10-12-1994 ; PM
OTHER INFORMATION.... YEAR 1999 W/PROJECT

CAPACITY AND LEVEL-OF-SERVICE

MOVEMENT	FLOW-RATE v(pcph)	POTENTIAL CAPACITY c (pcph) p	ACTUAL MOVEMENT CAPACITY c (pcph) M	SHARED CAPACITY c (pcph) SH	RESERVE CAPACITY c = c - v R SH	LOS
MINOR STREET						
EB LEFT	122	172	165	165	44	E
RIGHT	49	554	554	554	505	A
MAJOR STREET						
NB LEFT	41	588	588	588	548	A

IDENTIFYING INFORMATION

NAME OF THE EAST/WEST STREET..... MAKANI RD
NAME OF THE NORTH/SOUTH STREET.... MAKAWAO AV
DATE AND TIME OF THE ANALYSIS..... 10-12-1994 ; PM
OTHER INFORMATION.... YEAR 1999 W/PROJECT

****

IDENTIFYING INFORMATION

AVERAGE RUNNING SPEED, MAJOR STREET.. 30

PEAK HOUR FACTOR..... .95

AREA POPULATION..... 150000

NAME OF THE EAST/WEST STREET..... MAKANI RD

NAME OF THE NORTH/SOUTH STREET..... MAKAWAO AV

NAME OF THE ANALYST..... BC

DATE OF THE ANALYSIS (mm/dd/yy)..... 09-23-1994

TIME PERIOD ANALYZED..... WE MD

OTHER INFORMATION.... YEAR 1999 + PROJECT

INTERSECTION TYPE AND CONTROL

INTERSECTION TYPE: T-INTERSECTION

MAJOR STREET DIRECTION: NORTH/SOUTH

CONTROL TYPE EASTBOUND: STOP SIGN

TRAFFIC VOLUMES

	EB	WB	NB	SB
LEFT	77	--	32	0
THRU	0	--	499	497
RIGHT	27	--	0	84

NUMBER OF LANES

	EB	WB	NB	SB
LANES	2	--	1	1

ADJUSTMENT FACTORS

	PERCENT GRADE	RIGHT TURN ANGLE	CURB RADIUS (ft) FOR RIGHT TURNS	ACCELERATION LANE FOR RIGHT TURNS
EASTBOUND	0.00	90	20	N
WESTBOUND	-----	---	---	-
NORTHBOUND	0.00	90	20	N
SOUTHBOUND	0.00	90	20	N

VEHICLE COMPOSITION

	% SU TRUCKS AND RV'S	% COMBINATION VEHICLES	% MOTORCYCLES
EASTBOUND	0	0	0
WESTBOUND	---	---	---
NORTHBOUND	0	0	0
SOUTHBOUND	0	0	0

CRITICAL GAPS

		TABULAR VALUES (Table 10-2)	ADJUSTED VALUE	SIGHT DIST. ADJUSTMENT	FINAL CRITICAL GAP
MINOR RIGHTS	EB	5.50	5.50	0.00	5.50
MAJOR LEFTS	NB	5.00	5.00	0.00	5.00
MINOR LEFTS	EB	6.50	6.50	0.00	6.50

IDENTIFYING INFORMATION

NAME OF THE EAST/WEST STREET..... MAKANI RD
NAME OF THE NORTH/SOUTH STREET.... MAKAWAO AV
DATE AND TIME OF THE ANALYSIS..... 09-23-1994 ; WE MD
OTHER INFORMATION.... YEAR 1999 + PROJECT

CAPACITY AND LEVEL-OF-SERVICE

MOVEMENT	FLOW-RATE v(pcph)	POTEN-TIAL CAPACITY c (pcph) p	ACTUAL MOVEMENT CAPACITY c (pcph) M	SHARED CAPACITY c (pcph) SH	RESERVE CAPACITY c = c - v R SH	LOS
MINOR STREET						
EB LEFT	89	192	185	185	96	E
RIGHT	31	579	579	579	547	A
MAJOR STREET						
NB LEFT	37	622	622	622	585	A

IDENTIFYING INFORMATION

NAME OF THE EAST/WEST STREET..... MAKANI RD
NAME OF THE NORTH/SOUTH STREET.... MAKAWAO AV
DATE AND TIME OF THE ANALYSIS..... 09-23-1994 ; WE MD
OTHER INFORMATION.... YEAR 1999 + PROJECT

APPENDIX E

TRAFFIC SIGNAL WARRANT

Major Street: MAKAWAO AV
Minor Street: MAKANI RD

Scenario: YEAR 1999 BASE
Urban or Rural: U
(U=Urban, R=Rural)

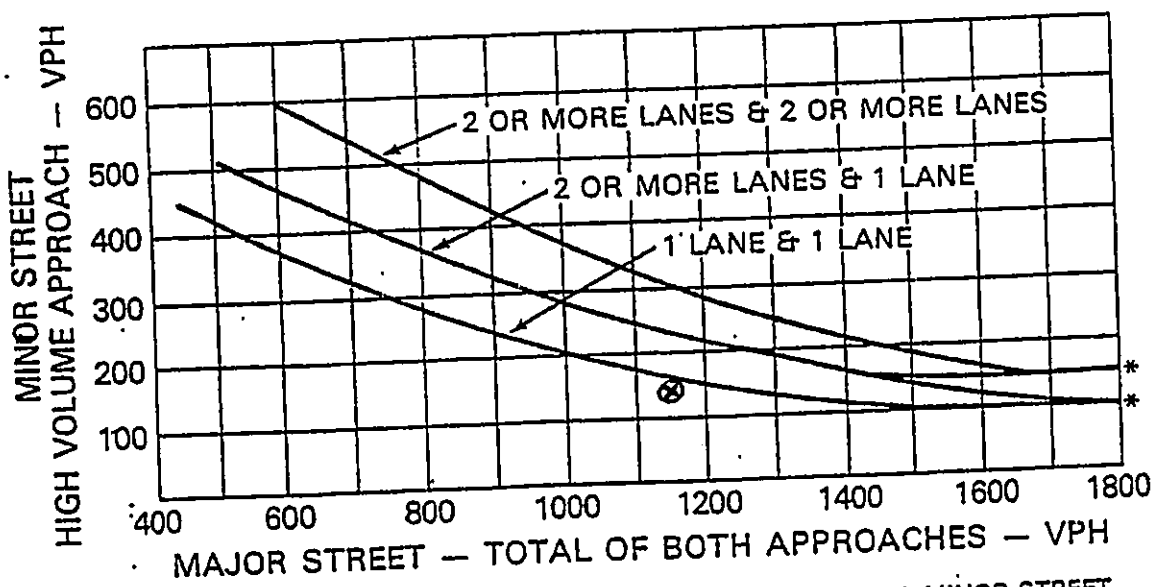
Number or lanes on each approach?
Major Street: 1
Minor Street: 2
Peak Hour? 330 - 430

Peak hour vehicles?
Major Street - 550
Major Street - 625
Minor Street: 140

Traffic Signal Warrant 11 - Peak Hour Volume:

Major Street VPH (Total):	1175	Peak hour:
Minor Street VPH (Highest):	140	330 - 430

FIGURE 4-5. PEAK HOUR VOLUME WARRANT



*NOTE: 150 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.

WARRANT 11 (Peak Hour Volume) SATISFIED? NO (BORDER YES)

Based on "Manual on Uniform Traffic Control Devices", FHWA, March 1988.

RECEIVED AS FOLLOWS

VIII. APPENDIX (CONTINUED)

D. Soils Investigation Report

REPORT
SOILS INVESTIGATION

PROPOSED EDDIE TAM MEMORIAL PARK EXPANSION
PHASE I
MAKAWAO, MAUI, HAWAII
TMK: 2-4-32: portion of 98

for

HIYAKUMOTO + HIGUCHI ARCHITECTS, INC.

Project No. M-2449-F
March 15, 1995

SOILS INTERNATIONAL
A CORPORATION
Geotechnical Consultants

99-1255 Waiua Place
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99-1255 WAIUA PLACE, AIEA, HAWAII 96701 (808) 488-0433 FAX (808) 488-9535

See Amendment on following page

March 15, 1995
Project No. M-2449-F

Hiyakumoto + Higuchi Architects, AIA
1860 Main Street
Wailuku, Maui, Hawaii 96793

Gentlemen:

The attached report presents the results of a soils investigation at the site of the proposed Eddie Tam Memorial Park Expansion, Phase I to be located in Makawao, Maui, Hawaii; TMK: 2-4-32: portion of 98.

A summary of the findings is as follows:

1) The subsurface conditions were explored by drilling eight (8) test borings to depths of 9 to 20.5 feet below existing grade and excavating 3 test pits to depths of 15 to 17.5 feet below existing grade. In general, the test borings and test pits disclosed the site to be overlain by stiff to very stiff, brown, red-brown and gray brown clayey SILT to depths of 6 to 13.5 feet below existing grade. The clayey SILT was underlain by gray to gray brown, completely weathered BASALTIC ROCK to the final depths of the borings/test pits at 9 to 20.5 feet below existing grade; the consistency of the rock was mostly very soft. No rock was encountered at Borings 1, 3 and 5. At Test Pit 2, the BASALTIC ROCK was preceded by a layer of dry, dense, tan silty GRAVEL with sand at a depth of 5 to 9 feet below existing grade.

2) No groundwater was encountered in any of the explorations at the time of the investigation.

3) Based on the findings and observations, no soil or geologic conditions were encountered which would preclude the planned development provided the recommendations contained herein are included in the design and construction of the project.

4) Field percolation tests were performed at the site. The tests produced percolation rates of between 8 and 231 minutes per inch.

5) Cut slopes may be made at 1.5 horizontal to 1 vertical. Fill slopes should not exceed 2 horizontal to 1 vertical.

6) Spread/strip footings bearing on firm on-site soils, properly compacted fill or the underlying ROCK may be used to support retaining wall footings or restroom facility footings.

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

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

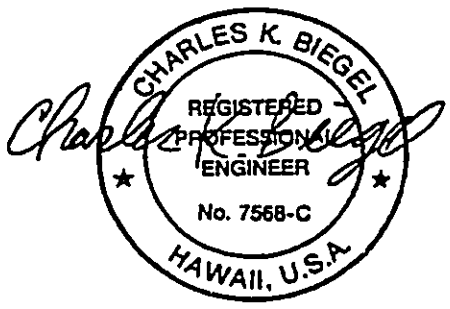
Respectfully submitted,

SOILS INTERNATIONAL

Charles K. Biegel

Charles K. Biegel, P.E.
Project Engineer

LSS:CKB:cb



This work was prepared by me
or under my supervision.

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March 22, 1995
Project No. M-2449-F

Hiyakumoto & Higuchi Architects, Inc.
1860 Main Street
Wailuku, Maui, Hawaii 96793

Attention: Mr. Calvin S. Higuchi, AIA

Subject: Ammendment To Soils Investigation Report
Cut Slope
Eddie Tam Memorial Park Expansion: Phase I
Makawao, Maui, Hawaii

Gentlemen:

From the information provided by Eric Yamashige of Ronald M. Fukumoto Engineering, there will be a 24 foot cut slope adjacent to the proposed parking lot. The slope will be cut at 2 horizontal to 1 vertical. Drainage from the parking lot will not free flow onto the slope but will be diverted to a drainline and fed down to the bottom of the slope.

Based on the information provided, the 8 foot bench requirement in our soils report is not necessary for this cut slope.

Should you have any questions or require any further information, please do not hesitate to contact us.

Very truly yours,

SOILS INTERNATIONAL

Charles K Biegel

Charles K. Biegel, P.E.
Staff Engineer

CKB:cb

cc: Eric Yamashige
Larry Shinsato

TABLE OF CONTENTS

INTRODUCTION

This investigation was made for the purpose of obtaining information on the subsurface conditions from which to base recommendations for site development and foundation design for the proposed Eddie Tam Memorial Park Expansion, Phase I to be located in Makawao, Maui, Hawaii. The location of the site, relative to the existing streets and landmarks, is shown on the Vicinity Map, Plate 1.

SCOPE OF WORK

The services included drilling 8 test borings to depths of 9 to 20.5 feet, excavating 3 test pits to depths of 15 to 17.5 feet, performing 3 field percolation tests at depths of 3 to 9 feet, obtaining samples of the underlying soils, performing laboratory tests on representative soil samples to determine their engineering characteristics, and performing an engineering analysis from the data gathered. In general, the following information is provided for use by the Architect and/or Engineer:

1. General subsurface conditions, as disclosed by the borings and test pits.
2. Physical characteristics of the soils encountered.
3. Recommendations for foundation design, including bearing values, embedment depth and estimated settlement.
4. Recommendations for placement of fill and backfill.

5. Percolation rates for the underlying soils.

6. Special design considerations.

PLANNED DEVELOPMENT

From the information provided, the project will consist of constructing a soccer field, a pony leage baseball field, a 90 stall parking lot, a grassed amphitheater and a detention basin. Preliminary grading information indicates the deepest cut will be on the order of 19 feet and the largest fill will be on the order of 14 feet.

SITE CONDITIONS

Surface

The property, designated by Tax Map Key Number 2-4-32: portion of 98, is located immediately adjacent to and makai of the existing Eddie Tam Memorial Park and the Kalama Intermediate School in Makawao, Maui, Hawaii.

From the topographic map by Edgardo V. Valera dated December 8, 1993, the existing elevations at the site ranged from +1596' at the southeast end of the site to +1520' at the northwest end of the site. This topographic map by Valera is based on an assumed project bench mark elevation of +1539.2' at the intersection of Hoomaha Road and Hale Kipa Road. The elevations shown on the USGS topographic map (Plate 1) vary from the elevations shown on the

Valera topographic map. Elevations shown on the test boring and test pit logs of this report were estimated by taping from existing features on the site and then interpolating from the elevations shown on the topographic map by Valera.

The site is bound on the northeast and northwest by residential area, on the south and southeast by the Kalama Intermediate School and the existing Eddie Tam Park and on the west/southwest by vacant land (future Eddie Tam Park Expansion site).

At the time of the field work, the site was overgrown with weeds and there were a few trees spread throughout the site. Abandoned cars were also observed throughout the site.

Subsurface

The subsurface conditions at the site were explored by drilling 8 test borings and excavating 3 test pits to depths of 9 to 20.5 feet below the existing grade. The locations of the explorations are shown on the Plot Plan, Plate 2. Detailed logs of the test borings and test pits are presented in the Appendix to this report.

In general, the test borings and test pits disclosed the site to be overlain by stiff to very stiff, brown, red-brown and gray brown clayey SILT to depths of 6 to 13.5 feet below existing grade. The clayey SILT was underlain by gray to gray brown, completely

weathered BASALTIC ROCK to the final depths of the borings/test pits at 9 to 20.5 feet below existing grade; the consistency of the rock was mostly very soft. The ROCK was moderately hard at Test Pit 1 at 15', Test Pit 3 at 15.5' and Boring 6 at 17.5'. No rock was encountered at Borings 1, 3 and 5. At Test Pit 2, the BASALTIC ROCK was preceded by a layer of dry, dense, tan silty GRAVEL with sand at a depth of 5 to 9 feet below existing grade.

No groundwater was encountered in any of the explorations at the time of the investigation.

From the USDA Soil Conservation Service "Soil Survey of the Islands of Kauai, Oahu, Maui, Molokai and Lanai, State of Hawaii", the site is located in an area designated as Haliimaile silty clay, 7 to 15 percent slopes (HhC).

The Haliimaile series consist of well-drained soils on uplands that developed in material weathered from basic igneous rock. The substratum is soft, weathered basic igneous rock. These soils have a moderate erosion hazard and the runoff is medium (USDA, 1972, pg. 36 and Plate 114).

Geology

The island of Maui is a volcanic doublet formed when lavas from Haleakala ponded against the older West Maui Mountains. The

development of the island above sea level is believed to have occurred between late Pliocene and Pleistocene time (approximately 1 to 12 million years ago).

The site is located on the northern slope of the Haleakala Volcano which was built over three rift zones that trend north, southwest and east. These rift zones are studded with large cinder cones. The lava flows making up the main mass of the mountain is known as the Honomanu volcanic series which consists of thin-bedded pahoehoe and aa lava flows. Above the Hononamu volcanics is the Kula volcanic series which consists of thicker andesitic aa flows. Most of the lava flows dip about 12 degrees. Along the southwest and east rift zones only, the volcano is capped with the Hana volcanic series (Stearns, 1966).

Fresh to slightly weathered pahoehoe flows generally have a relatively smooth, billowy or ropy surface. The vesicles in pahoehoe flows usually have a fairly regular spheroidal shape. Lava tubes and pressure domes are common in this type of flow.

Fresh to slightly weathered aa flows are characterized by very rough, spiny or rubbly surfaces. The clinkery surface covers a massive, relatively dense rock interior (commonly known as blue rock). Vesicles within the rock mass are generally irregular in shape.

The surface soils on the site have generally developed from the weathering of the lavas. Below the soil mantle, the bedrock formation grades harder with depth.

CONCLUSIONS AND RECOMMENDATIONS

General

Based on the findings and observations of this investigation, it is concluded that the cut slopes into the on-site soils can be made at 1.5 horizontal to 1 vertical. The recommended maximum inclination for fill slopes is 2 horizontal to 1 vertical.

Proposed structures may be supported on spread/strip footings bearing on stiff on-site soils or properly compacted fill.

Special Considerations

1) The on-site soils were found to be very moist at various depths of Borings 2, 4, 5, 6, 7 and 8. If used as fill, these soils will require aeration (drying) in order to achieve optimum moisture content for compaction purposes.

2) Excavations deeper than 15 feet below existing grade may encounter moderately hard ROCK. A Case 580K backhoe could not penetrate the ROCK at Test Pit 1 at 15′ and Test Pit 3 at 15.5′ below existing grade. The SIMCO 2400 drilling rig used

to advance the borings encountered moderately hard ROCK at Boring 6 at 17.5' below existing grade.

Foundations

For footings bearing on stiff to very stiff on-site soils or on properly compacted fill, an allowable bearing value of 3,000 pounds per square foot may be used. Footings shall be embedded a minimum of 12 inches below the lowest adjacent grade.

For footings bearing on the underlying BASALTIC ROCK, an allowable bearing value of 5,000 pounds per square foot may be used. The minimum footing embedment depth shall be 12 inches below lowest adjacent grade for very soft ROCK, and 6 inches below lowest adjacent grade for footings bearing on soft to moderately hard rock.

For footings located adjacent to new or existing utility trenches, the bottom of the footing shall be deepened below a 1 horizontal to 1 vertical plane projected upwards from the edge of the utility trench.

For footings located on or adjacent to slopes, the footing shall be deepened such that there is a minimum horizontal distance of 5 feet from the edge of the footing to the slope face.

The bearing values are for dead plus live loads and may be increased by one-third for momentary loads due to wind or seismic forces. If any footing is eccentrically loaded, the maximum edge pressure shall not exceed the bearing pressure for permanent or for momentary loads.

All loose and disturbed soil at the bottom of footing excavations shall be removed to firm soil or the disturbed soil shall be compacted prior to laying of steel or placing of concrete.

Settlement

Under the fully applied recommended bearing pressure, it is estimated that settlement of footings up to 2 feet continuous or 4 feet square bearing on firm on-site soils or properly compacted fill will be less than 3/4 inch. For footings bearing on ROCK, it is estimated that the settlement of footings will be less than 1/2 inch.

Differential settlement between footings will vary according to the size and bearing pressure of the footing.

Lateral Resistance

For resistance of lateral loads, such as wind or seismic forces, an allowable passive resistance equivalent to that exerted by a fluid weighing 300 pounds per cubic foot may be used for footings; or

other structural elements, provided the vertical surface is in direct contact with undisturbed soil or properly compacted fill.

Frictional resistance between footings and the underlying soils may be assumed as 0.4 times the dead load.

Lateral resistance and friction may be combined.

Retaining Walls

Foundations for retaining walls shall be designed as per the foundation section of this report.

Free-standing retaining walls with properly draining backfill may be designed to resist the following active earth pressures:

On-site clayey SILT as backfill material:

Backfill Slope	Horizontal Component (psf/ft.)	Vertical Component (psf/ft.)
Level	45	0
3H:1V	50	16
2H:1V	60	30

Imported granular material as backfill:

Backfill Slope	*Horizontal Component (psf/ft.)	*Vertical Component (psf/ft.)
Level	30	0
3H:1V	35	10
2H:1V	40	20

*These values apply when the granular material is located within a 1H:2V plane projected upwards from the heel of the

wall. If this condition cannot be satisfied, the active earth pressure shall be assumed as that of on-site clayey SILT material.

For restrained walls (i.e. walls that are not allowed to rotate at the top), the above active pressures shall be increased by 50 percent to account for "at-rest" soil conditions.

In order to provide proper drainage for the retaining wall backfill material, it is recommended that 4-inch diameter weepholes spaced at 8-feet on-center (horizontally as well as vertically) or a 4-inch diameter perforated PVC footing drain pipe be used. A 2 foot thick and 2 foot wide layer of crushed gravel (ASTM Designation No. 67), which is wrapped with geotextile filter fabric, shall be placed above the pipes; the crushed gravel shall be continuous from weephole to weephole, or in the case of a footing drainpipe, laid throughout the full length of the pipe. Geotextile fabric shall be AMOCO 4545 or similar.

In order to minimize the in-flow of surface water into the backfill material, it is recommended that:

a. Site grading shall be designed to minimize surface water flow from ponding in the area of the backfill material, and

b. The upper 12 inches of backfill be "capped" with material that has more than 10 percent fines (passing the No. 200 sieve). The on-site clayey SILT may be used for this purpose in non-structural areas. If imported granular fill is used below the 12 inch depth and satisfies the 1H:2V criteria, the active earth pressure for imported granular fill may still be used.

The retaining wall backfill material shall be properly compacted in accordance with the Site Preparation and Grading section to this report.

The above active earth pressures do not include surcharge loads such as sloping backfill, footings located within a 45 degree plane projected upwards from the heel of the footing, and/or from hydrostatic pressures. If such conditions occur, the active pressure shall be increased accordingly.

Slab-on Grade

Ring-swell and Atterberg Limits tests were performed on representative samples of the on-site clayey SILT soils to determine the expansion potential.

The ring-swell tests were conducted on relatively undisturbed samples (in-situ dry density of 88 pcf). A 1 psi surcharge load

was used in the test. The results of the tests are as follows:

Air-dried to saturation	13.3% swell
In-situ moisture to saturation	0.3% swell

Atterberg Limits test (ASTM D4318-93) were performed on the on-site clayey soils at Borings 1, 4 and 7. Plasticity Index values were 29, 22 and 23, respectively.

California Bearing Ratio tests (ASTM D1883) which were performed on compacted soil samples. Under a 10-pound surcharge on the 6-inch diameter sample, the swell was 0.2% for samples obtained from Test Pit 3 at 3.0 and 10.0 feet below existing grade.

Based on the results of the tests, the on-site soils have a high to very high expansion potential when allowed to air-dry. The expansion potential is deemed to be low to moderate from in-situ moisture content.

In order to minimize the possible adverse effects from expansive soils, it is recommended that concrete slabs-on-grade be designed with a minimum of 6 inches of granular material (untreated base course gravel, select borrow or similar) beneath the slab. The subgrade soils should be kept moist (within 2 percent of optimum moisture content (ASTM D 1557-91)) prior to placement of the 6 inches of granular material.

It is recommended that floor slabs with moisture sensitive floor covering be protected with a moisture barrier.

Site grading should be designed to minimize ponding of water adjacent to slab and footing areas.

Slopes

Cut slopes may be made at 1-1/2 horizontal to 1 vertical. Fill slopes shall not exceed 2 horizontal to 1 vertical.

Where slopes exceed 15 feet in vertical height, it is recommended that 8-foot wide benches be provided at 15-foot vertical height intervals, except that where only one bench is necessary it shall be at mid-slope.

Concentrated flows of water should not be allowed to flow over the slope in order to minimize erosion.

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

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

Pavement Design

From the information provided, the proposed parking lot will require 1 to 12 feet of excavation in order to obtain finished grade elevation. In order to obtain data for pavement design, California Bearing Ratio (CBR) tests (ASTM D1883-92 procedure) were performed on these samples taken from the proposed parking area. The results are as follows:

Location	Depth	CBR value at 0.1"	Expansion
TP-3	3.0'	47	0.2%
TP-3	10.0'	44	0.2%

For design of the proposed 90 stall parking lot and the entrance road to the parking lot, the flexible pavement section may consist of 2 inches of asphaltic concrete, 6 inches of compacted base course gravel and 6 inches of compacted subgrade. This assumes car and light truck traffic (up to 10,000 pound GVW).

Pavement sections for other types of traffic loading will vary depending on the number and types of vehicles. Should the proposed design traffic conditions and/or the proposed grading change, this office should be consulted in order to review the conditions and provide modifications to the above pavement section if necessary.

All material quality and compaction requirements for the pavement section shall be in accordance with the County of Maui, Department

of Public Works, "Standards Specifications for Public Works Construction", dated September 1986.

Site Preparation and Grading

The maximum dry density and optimum moisture content referred to herein shall be determined by the ASTM D1557-91 test procedure.

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

1. All vegetation, weeds, brush, roots, stumps, rubbish, debris, soft soil, abandoned cars and other deleterious material shall be removed and disposed of off-site.

2. In areas to receive fill and at finished subgrade in cut areas, the exposed surface shall then be scarified to a depth of 6 inches, moisture conditioned to near optimum moisture and then compacted to the degree of compaction specified below. If soft or loose spots are encountered, the loose/soft areas shall be removed to firm material and the resulting depression shall be filled with properly compacted fill.

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

4. Fill and Backfill in Structural Areas Structural areas shall be defined as areas beneath and 3 feet beyond the edges of buildings and pavement areas.

Structural fill and backfill material shall consist of material which is free of organics and debris and is non-expansive. In the upper 3 feet from finished grade, the structural fill and backfill material shall be less than 3 inches in greatest dimension. Below 3 feet from finished grade, the structural fill material shall be less than 6 inches in greatest dimension, provided there is sufficient fines to fill the interstices. The on-site soils are acceptable for use as structural fill to within 6 inches from the bottom of slab for the restroom facility (or similar structures) provided the gradation requirements setforth above are satisfied.

In the upper three (3) feet from finished grade, each layer of structural fill and backfill material shall be placed in lifts not exceeding 6 inches in compacted thickness. Below three (3) feet from finished grade, each layer of structural fill and backfill material may be placed in lifts not exceeding 12 inches in compacted thickness, provided the compaction equipment is capable of compacting the entire 12 inch lift to the minimum degree required. Each layer of structural fill

and backfill shall be thoroughly compacted prior to placing of any subsequent lifts. The top 3 feet of structural fill and backfill shall be compacted to at least 95 percent of the maximum dry density. Below 3 feet from finished grade each layer shall be compacted to at least 90 percent of the maximum dry density.

5. Fill and Backfill in Non-Structural Areas Non-structural areas shall be defined as areas beyond 3 feet from the edge of any building and non-pavement areas. The proposed ballparks are considered non-structural areas.

Non-structural fill and backfill material shall consist of material which is free of organics and debris. In the upper 3 feet from finished grade, the fill and backfill material shall be less than 3 inches in greatest dimension. Below 3 feet from finished grade, the fill material shall be less than 12 inches in greatest dimension, provided there is sufficient fines to fill the interstices. The on-site soils are acceptable for use as non-structural fill at any depth provided the gradation requirements setforth above are satisfied.

Each layer of non-structural fill and backfill material shall be placed in lifts not exceeding 12 inches in compacted

thickness. Each layer of non-structural fill and backfill shall be thoroughly compacted prior to placing of any subsequent lifts. All non-structural fill and backfill shall be compacted to at least 90 percent of the maximum dry density.

6. Backfill Behind Retaining Walls Retaining wall backfill shall be defined as backfill that extends from the face of the retaining wall to 6 inches beyond the face of the footing for the wall or the footing excavation line, whichever is greater.

All retaining wall backfill material shall consist of material that satisfies the criteria setforth in the project plans and specifications, including the type of backfill material intended by the retaining wall designer.

Each layer of backfill shall be placed in layers not exceeding 6 inches in compacted thickness. Each layer of backfill shall be thoroughly compacted prior to placing of any subsequent lifts. All retaining wall backfill shall be compacted to at least 90 percent of the maximum dry density except for backfill areas that support structures or roadways. Backfill in these areas shall be placed and compacted in accordance with the requirements for Fill and Backfill in Structural Areas.

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

It is particularly important to see that all fill and backfill soils are properly compacted in order to maintain the recommended design parameters provided in this report.

Field Percolation Tests

At the time of this report, the exact location of the restroom facility was not known. Tests were performed at various depths to provide general information of the underlying soils.

Three (3) percolation test were performed at depths of 3 to 9 feet below the existing grade at the locations shown on the Plot Plan, Plate 2. Two of the percolation test holes are labeled as P-1 and P-2 and the third percolation test was performed in the test boring hole, B-3. The tests were performed in 4.5 inch diameter borings drilled with continuous flight augers.

The percolation tests were performed in accordance with the Robert A. Taft Sanitary Engineering Center percolation test procedure. In general, this consisted of drilling the test hole, filling the bottom with 2 inches of gravel and then saturating the hole with water (overnight for clayey soils). The test was conducted by placing water in the bottom of the hole and then measuring the drop in water level with time. The results of the measurements are used to determine the percolation rate. A summary of the percolation test results are as follows:

Test No.	Depth of Hole	Percolation Rate
P-1	3.0'	8 minutes/1"
P-2	6.0'	137 minutes/1"
B-3	9.0'	231 minutes/1"

The above percolation test results indicate poor percolation rates at P-2 and B-3 and satifactory results at P-1. Although the results of the test at P-1 indicate satisfactory percolation in the upper shallow (3 feet or less) soils, it is recommended that when the final location of the restroom facility has been determined additional percolation test should be performed at the proposed leach field location and depth.

Should the leach field area be located in a fill area, the bottom of the leach field should be situated in natural ground that has satisfactory percolation rate, or the fill shall consist of soil

that has a percolation rate (at compacted density) equal to or better than the approved natural soil.

INSPECTION

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

1. Site preparation.
2. Placement of fill and backfill.
3. Footing excavations.

REMARKS

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

This report has been prepared for the exclusive use of Hiyakumoto + Higuchi Architects, Inc. and their respective design consultants. It shall not be used by or transferred to any other party or to another project without the consent and/or thorough review by this facility. Should the project be delayed beyond the period of one

year from the date of this report, the report shall be reviewed relative to possible changed conditions.

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

The following are included and complete this report:

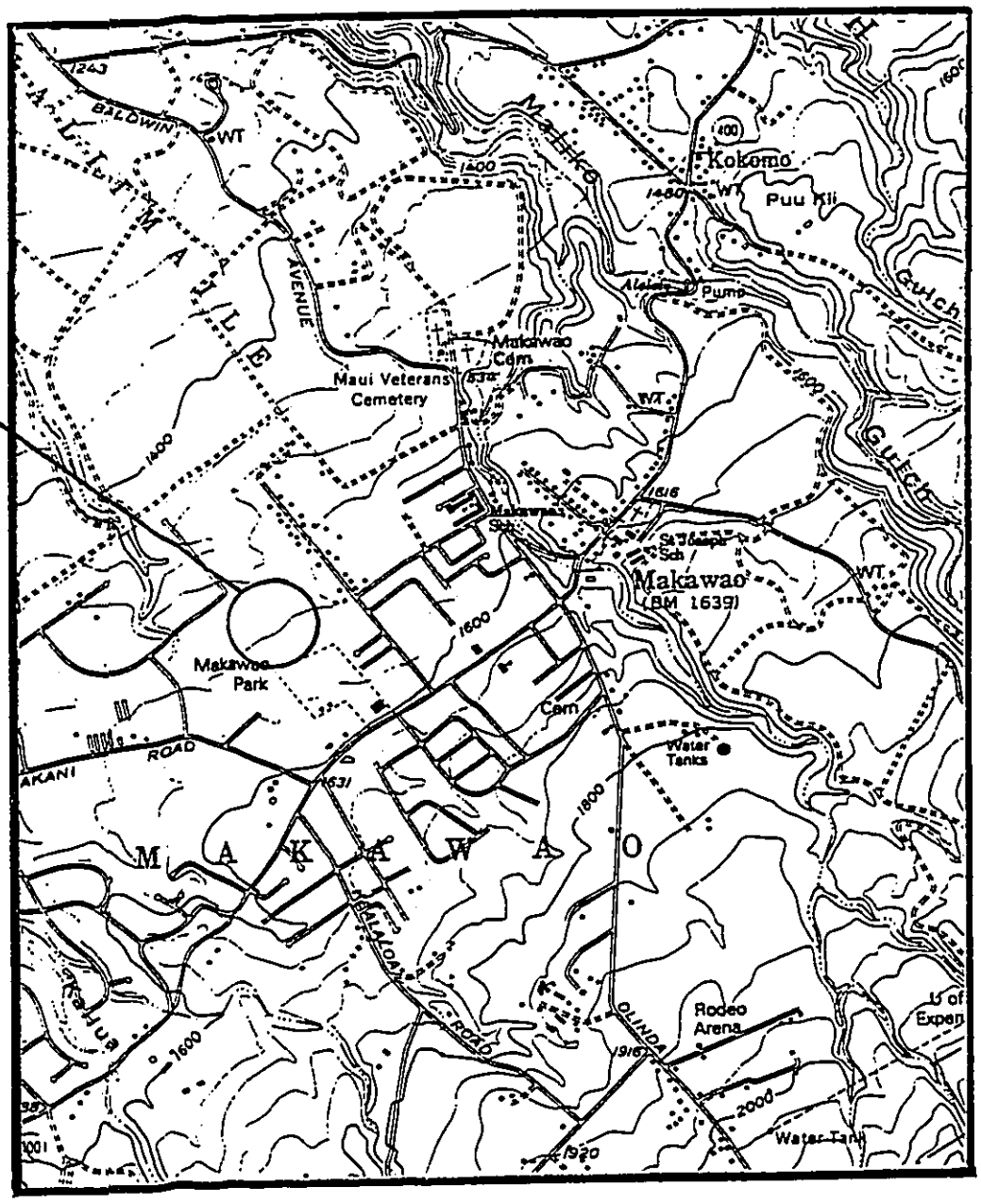
Vicinity Map ---------- Plate 1

Plot Plan ---------- Plate 2

Appendix

- Field Investigation
- Laboratory Testing
- Logs of Test Borings and Test Pits
- Results of Laboratory Tests

VICINITY MAP

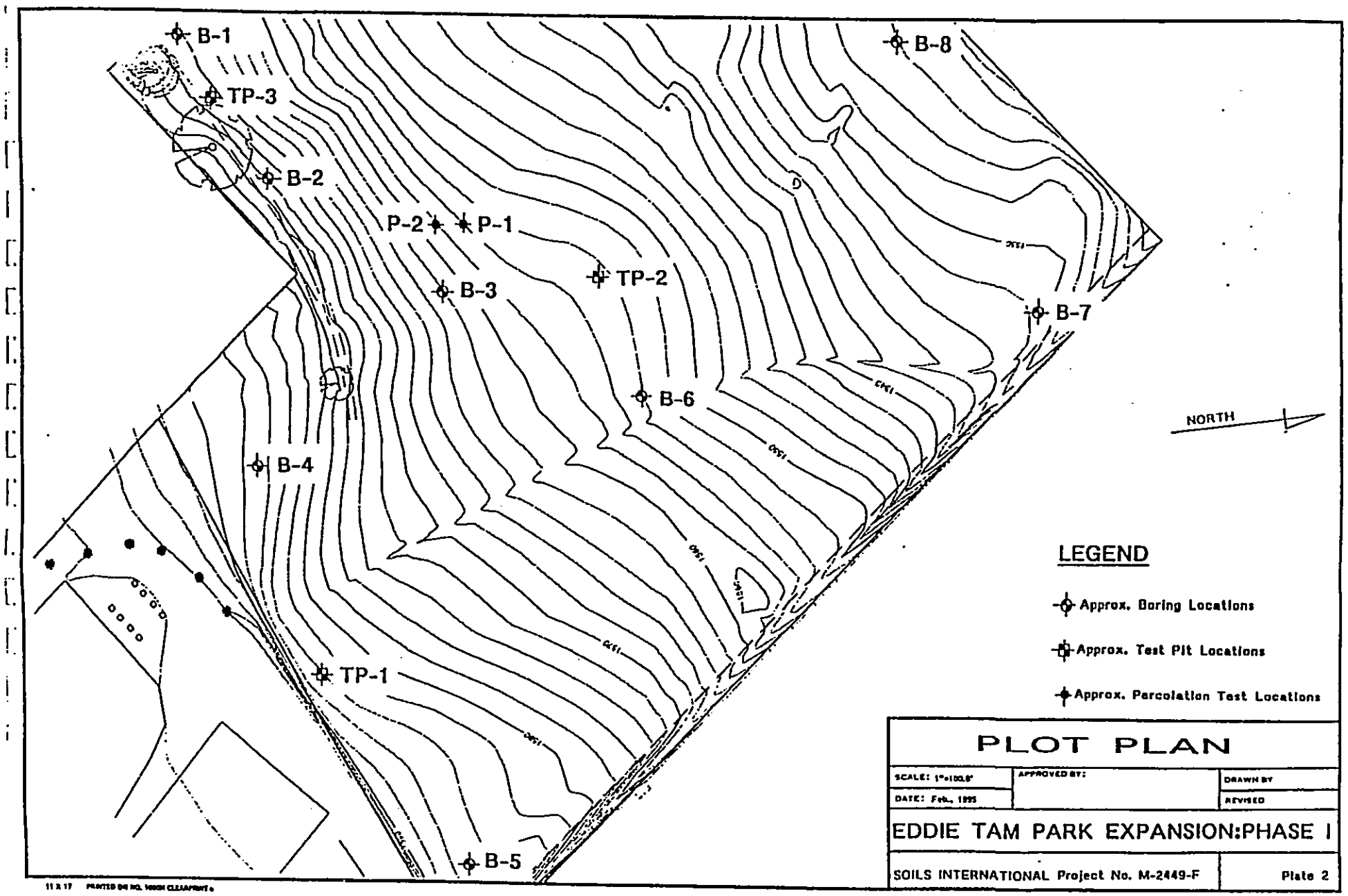


REFERENCE:
USGS TOPOGRAPHIC MAP
HAIKU QUADRANGLE
Dated: 1983

EDDIE TAM MEMORIAL PARK EXPANSION:
PHASE I

SOHA INTERNATIONAL
A CORPORATION
Consulting Foundation Engineers and Geologists

PROJECT NO.	M-2449-F
DATE	Feb, 1995
SCALE	1" = 2000'
PLATE	1



PLOT PLAN

SCALE: 1"=100.0'	APPROVED BY:	DRAWN BY
DATE: Feb., 1995		REVISED

EDDIE TAM PARK EXPANSION:PHASE I

SOILS INTERNATIONAL Project No. M-2449-F	Plate 2

APPENDIX

FIELD INVESTIGATION AND LABORATORY TESTING

FIELD INVESTIGATION

General

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

Test Borings Using Truck-Mounted Drilling Equipment

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

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

In soils where caving of the bore hole occurs, the hole is advanced by wash boring or hollow-stem augering. Wash boring consists of advancing steel casing by rotary action and water pressure to flush the soil from the casing. The lead section of the casing is equipped with a carbide or diamond casing bit. After the casing has been advanced to the required depth, soil samples are obtained through the inside of the casing. Hollow-stem drilling consists of advancing the hole with 7-5/8 inch outside diameter and 4-1/4 inch inside

diameter augers. The leading drill bit is connected to drilling rods through the central portion of the auger. At the required sampling depth, the interior drill rods and lead bit are removed, and the soil sample is taken by driving a sampler through the "hollow" section of the augers.

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

Test Borings Using Portable Drilling Equipment

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

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

Test Pits Using Excavators/Hopto

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

Explorations Using Hand Tools

In inaccessible areas requiring only shallow explorations, borings and test pits are made using hand equipment. Borings are drilled using hand augers. Test pits are excavated using hand tools. Cuttings from the boring and/or pit are inspected and visually classified.

Soil Sampling

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

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

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

LABORATORY TESTING

General

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

Unit Weight and Moisture Content

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

Direct Shear

Direct shear tests are performed to determine the strength characteristics of the representative soil samples. The test consists of placing the sample into a shear box, applying a normal load and then shearing the sample at a constant

rate of strain. The shearing resistance is recorded at various rates of strain. By varying the normal load, the angle of internal friction and cohesion can be determined.

Consolidation Test

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

Expansion Test - Ring Swell

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

Classification Tests

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

California Bearing Ratio Test

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

Maximum Dry Density/Optimum Moisture Content

The maximum dry density and optimum moisture content of the material is determined in accordance with the ASTM D1557-78 test procedure. The sample is compacted into a mold in 5 equal layers using a 10 pound hammer falling from a height of 18 inches. The diameter of the mold is either 4-inches or 6-inches depending on the proportion of gravel in the sample. The sample is compacted

at various moisture contents to develop a compaction curve for the soil. The curve is usually bell-shaped with a peak indicating the maximum dry density and optimum moisture content.

Penetrometer Test

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

Torvane

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

LOG OF BORING NO. 1

ELEVATION: +1571' (estimate)

EQUIPMENT USED: SIMCO 2400 DRILL RIG

DEPTH OF BORING: 10.5

DATE DRILLED: FEBRUARY 1, 1995

DEPTH TO GROUNDWATER: N/A

DEPTH (FT.)	GRAPHIC SYMBOL	UNIFIED SOIL CLASSIFICATION	DESCRIPTION	SAMPLE	BLOWS/FOOT	COLOR	MOISTURE	CONSISTENCY	DRY DENSITY (PCF)	MOISTURE CONTENT (% OF DRY WT.)	PENETROMETER (TSF)
0		MH	clayey SILT some roots, few highly to completely weathered gravel and sand			red-brown	moist	stiff			
2			--sample 1 at 1.5': Atterberg Limits...LL=65, PI=29		43			very stiff		30.2	
4					38					30.6	
6			--with highly to completely weathered sand		17	gray brown		stiff to very stiff		25.6	
8											
10					18			very stiff		26.8	
12			END OF BORING								
14											
16											
18											
20											

PROJECT NAME: EDDIE TAM MEMORIAL PARK EXPANSION: PHASE I

PROJECT NO.: M-2449-F

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Geotechnical Consultants

PLATE 3

LOG OF BORING NO. 2

ELEVATION: +1574' (estimate)

EQUIPMENT USED: SIMCO 2400 DRILL RIG

DEPTH OF BORING: 20.5

DATE DRILLED: JANUARY 30, 1995

DEPTH TO GROUNDWATER: N/A

DEPTH (FT.)	GRAPHIC SYMBOL	UNIFIED SOIL CLASSIFICATION	DESCRIPTION	SAMPLE	BLOWS/FOOT	COLOR	MOISTURE	CONSISTENCY	DRY DENSITY (PCF)	MOISTURE CONTENT (% OF DRY WT.)	PENETROMETER (TSF)
0		MH	clayey SILT some roots, few highly to completely weathered gravel and sand			brown	moist	stiff			
2					36			very stiff	86	26.0	4.50
4			—30 blows for 3";refusal > > cobble??		40	gray brown			90	25.0	4.50
6		(RX)	BASALT; completely weathered with clay seams		38			very soft rock	84	29.8	
8			from 9' to 9.6'; 4 blows for the first 6" then 20 blows for 1" (refusal). Augers grinding at 9'-7". Atterberg Limits at 9': LL=44, PI=7		xx		moist to very moist		65	37.4	4.50
10											
12											
14					41				78	43.9	
16											
18											
20					12				72	46.1	4.00
			END OF BORING								

PROJECT NAME: EDDIE TAM MEMORIAL PARK EXPANSION: PHASE I

PROJECT NO.: M-2449-F

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PLATE 4

LOG OF BORING NO. 3

EQUIPMENT USED: SIMCO 2400 DRILL RIG

DATE DRILLED: FEBRUARY 1, 1995

ELEVATION: +1562' (estimate)

DEPTH OF BORING: 9

DEPTH TO GROUNDWATER: N/A

DEPTH (FT.)	GRAPHIC SYMBOL	UNIFIED SOIL CLASSIFICATION	DESCRIPTION	SAMPLE	BLOWS/FOOT	COLOR	MOISTURE	CONSISTENCY	DRY DENSITY (PCF)	MOISTURE CONTENT (% OF DRY WT.)	PENETROMETER (TSF)
0		MH	clayey SILT some roots, few highly to completely weathered gravel and sand			brown	moist	stiff			
2					30			*very* stiff		33.9	
4					46					29.2	
6						gray brown		stiff			
8					15					28.3	
			END OF BORING								
10											
12											
14											
16											
18											
20											

PROJECT NAME: EDDIE TAM MEMORIAL PARK EXPANSION: PHASE I

PROJECT NO.: M-2449-F

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PLATE 5

LOG OF BORING NO. 4

EQUIPMENT USED: SIMCO 2400 DRILL RIG

DATE DRILLED: JANUARY 31, 1995

ELEVATION: +1587' (estimate)

DEPTH OF BORING: 10.5

DEPTH TO GROUNDWATER: N/A

DEPTH (FT.)	GRAPHIC SYMBOL	UNIFIED SOIL CLASSIFICATION	DESCRIPTION	SAMPLE	BLOWS/FOOT	COLOR	MOISTURE	CONSISTENCY	DRY DENSITY (PCF)	MOISTURE CONTENT (% OF DRY WT.)	PENETROMETER (TSF)
0		MH	clayey SILT some roots, few highly to completely weathered gravel and sand			brown to orange brown	moist to very moist	stiff			
2			—Atterberg Limits at 2': LL=73, PI=22		24	gray brown to brown		very stiff		51.6	4.50
4					22					44.7	4.50
6					19	gray		stiff to very stiff		32.0	
8											
10		(RX)	BASALT; completely weathered		21			very soft rock		40.5	
12			END OF BORING								
14											
16											
18											
20											

PROJECT NAME: EDDIE TAM MEMORIAL PARK EXPANSION: PHASE I

PROJECT NO.: M-2449-F

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PLATE 6

LOG OF BORING NO. 5

EQUIPMENT USED: SIMCO 2400 DRILL RIG

DATE DRILLED: JANUARY 31, 1995

ELEVATION: +1585' (estimate)

DEPTH OF BORING: 10.5

DEPTH TO GROUNDWATER: N/A

DEPTH (FT.)	GRAPHIC SYMBOL	UNIFIED SOIL CLASSIFICATION	DESCRIPTION	SAMPLE	BLOWS/FOOT	COLOR	MOISTURE	CONSISTENCY	DRY DENSITY (PCF)	MOISTURE CONTENT (% OF DRY WT.)	PENETROMETER (TSF)
0		MH	clayey SILT some roots, few highly to completely weathered gravel and sand —no more WH to WC gravels			brown to orange brown	moist to very moist	stiff			
2					21			very stiff		36.3	
4					21					41.6	
6					16					33.0	
8								stiff to very stiff			
10					14					36.6	
12			END OF BORING								
14											
16											
18											
20											

PROJECT NAME: EDDIE TAM MEMORIAL PARK EXPANSION: PHASE I

PROJECT NO.: M-2449-F

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PLATE 7

LOG OF BORING NO. 6

EQUIPMENT USED: SIMCO 2400 DRILL RIG

DATE DRILLED: JANUARY 31, 1995

ELEVATION: +1554' (estimate)

DEPTH OF BORING: 18.5

DEPTH TO GROUNDWATER: N/A

DEPTH (FT.)	GRAPHIC SYMBOL	UNIFIED SOIL CLASSIFICATION	DESCRIPTION	SAMPLE	BLOWS/FOOT	COLOR	MOISTURE	CONSISTENCY	DRY DENSITY (PCF)	MOISTURE CONTENT (% OF DRY WT.)	PENETROMETER (TSF)
0		MH	clayey SILT some roots, few highly to completely weathered gravel and sand			dark brown	moist to very moist	stiff			
2			—no more WH to WC gravels		43			very stiff	86.5	35.8	4.50
4			—between 4' and 4'-2": blowcounts = 31blows/2"		56				90	32.1	4.50
6			—some highly to completely weathered gravel and sand		15	gray brown		stiff	63	37.2	
8											
10		(RX)	BASALT; completely weathered with clay seams; multi-colored mottling		16			very soft rock	74	36.1	3.50
12											
14			—no more clay seams		16				74	42.8	
16											
18			—augers grinding at 17.5'					soft to mod. hard rock			
			—at 18.5', 10 blows /0" (refusal)								
20			END OF BORING								

PROJECT NAME: EDDIE TAM MEMORIAL PARK EXPANSION: PHASE I

PROJECT NO.: M-2449-F

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PLATE 8

LOG OF BORING NO. 7

ELEVATION: +1531' (estimate)

EQUIPMENT USED: SIMCO 2400 DRILL RIG

DEPTH OF BORING: 20

DATE DRILLED: JANUARY 31, 1995

DEPTH TO GROUNDWATER: N/A

DEPTH (FT.)	GRAPHIC SYMBOL	UNIFIED SOIL CLASSIFICATION	DESCRIPTION	SAMPLE	BLOWS/FOOT	COLOR	MOISTURE	CONSISTENCY	DRY DENSITY (PCF)	MOISTURE CONTENT (% OF DRY WT.)	PENETROMETER (TSF)
0		MH	clayey SILT some roots,			dark brown	moist to very moist	stiff			
2					45			very stiff	81	38.9	4.50
4			—Atterberg Limits at 2.5': LL=63, PI=23		52				73	35.9	4.50
6						gray brown					
8			—material has "ashy" feel		19				57	51.5	
10		(RX)	BASALT; completely weathered with clay seams		24			very soft rock	69	41.0	
12											
14					22				73	42.3	
16											
18			—no clayey seams			gray					
20			END OF BORING		45				78	33.3	

PROJECT NAME: EDDIE TAM MEMORIAL PARK EXPANSION: PHASE I

PROJECT NO.: M-2449-F

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PLATE 9

LOG OF BORING NO. 8

EQUIPMENT USED: SIMCO 2400 DRILL RIG

DATE DRILLED: FEBRUARY 1, 1995

ELEVATION: +1524' (estimate)

DEPTH OF BORING: 15

DEPTH TO GROUNDWATER: N/A

DEPTH (FT.)	GRAPHIC SYMBOL	UNIFIED SOIL CLASSIFICATION	DESCRIPTION	SAMPLE	BLOWS/FOOT	COLOR	MOISTURE	CONSISTENCY	DRY DENSITY (PCF)	MOISTURE CONTENT (% OF DRY WT.)	PENETROMETER (TSF)
0		MH	clayey SILT some roots, few highly to completely weathered gravel and sand			dark red brown	moist to very moist	mod. stiff			
2					23			very stiff		34.3	
4					22					32.2	
6					22					34.6	
8											
10					12			stiff		36.1	
12											
14		(RX)	BASALT; completely weathered		42	gray		very soft rock		28.5	
			END OF BORING								
16											
18											
20											

PROJECT NAME: EDDIE TAM MEMORIAL PARK EXPANSION: PHASE I

PROJECT NO.: M-2449-F

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PLATE 10

LOG OF TEST PIT NO. 1

EQUIPMENT USED: CASE 580K HOPTO

DATE EXCAVATED: JANUARY 26, 1995

ELEVATION: +1584' (estimate)

DEPTH OF TEST PIT: 15

DEPTH TO GROUNDWATER: N/A

DEPTH (FT.)	GRAPHIC SYMBOL	UNIFIED SOIL CLASSIFICATION	DESCRIPTION	SAMPLE	COLOR	MOISTURE	CONSISTENCY	DRY DENSITY (PCF)	MOISTURE CONTENT (% OF DRY WT.)	PENETROMETER (TSF)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX
0		MH	clayey SILT		brown	moist to very moist	stiff to very stiff						
3			–with gravel		light brown gray	mod. moist							
6					yellow								
9			–gravelly										
12					gray		very soft rock						
15		(RX)	BASALT; completely weathered to highly weathered. Coming out of trench as silty GRAVEL with sand. —— REFUSAL AT 15' END OF TEST PIT				mod. hard to hard rock						
18													
21													

PROJECT NAME: EDDIE TAM MEMORIAL PARK EXPANSION: PHASE I

PROJECT NO.: M-2449-F

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PLATE 11

LOG OF TEST PIT NO. 2

EQUIPMENT USED: CASE 580K HOPTO

DATE EXCAVATED: JANUARY 26, 1995

ELEVATION: +1555' (estimate)

DEPTH OF TEST PIT: 17.5

DEPTH TO GROUNDWATER: N/A

DEPTH (FT.)	GRAPHIC SYMBOL	UNIFIED SOIL CLASSIFICATION	DESCRIPTION	SAMPLE	COLOR	MOISTURE	CONSISTENCY	DRY DENSITY (PCF)	MOISTURE CONTENT (% OF DRY WT.)	PENETROMETER (TSF)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX
0		MH	clayey SILT		brown	mod. moist to moist	stiff to very stiff						
3			—with gravel		light brown								
		GM	silty GRAVEL with sand		tan	dry	dense						
6													
9		(RX)	BASALT; completely weathered. Material coming out of trench as SILT with gravel		dark gray brown	mod. moist to moist	very soft rock						
12													
15													
18			END OF TEST PIT										
21													

PROJECT NAME: EDDIE TAM MEMORIAL PARK EXPANSION: PHASE I

PROJECT NO.: M-2449-F

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PLATE 12

LOG OF TEST PIT NO. 3

EQUIPMENT USED: CASE 580K HOPTO

DATE EXCAVATED: JANUARY 26, 1995

ELEVATION: +1571' (estimate)

DEPTH OF TEST PIT: 15.5

DEPTH TO GROUNDWATER: N/A

DEPTH (FT.)	GRAPHIC SYMBOL	UNIFIED SOIL CLASSIFICATION	DESCRIPTION	SAMPLE	COLOR	MOISTURE	CONSISTENCY	DRY DENSITY (PCF)	MOISTURE CONTENT (% OF DRY WT.)	PENETROMETER (TSF)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX
0		MH	clayey SILT		brown	moist	stiff to very stiff						
3			---with gravel						35.6				
6					gray								
9		(RX)	BASALT; completely weathered. coming out of trench as gravelly SILT				very soft rock		36.4				
12													
15			REFUSAL at 15.5'				soft to mod. hard rock						
			END OF TEST PIT										
18													
21													

PROJECT NAME: EDDIE TAM MEMORIAL PARK EXPANSION: PHASE I

PROJECT NO.: M-2449-F

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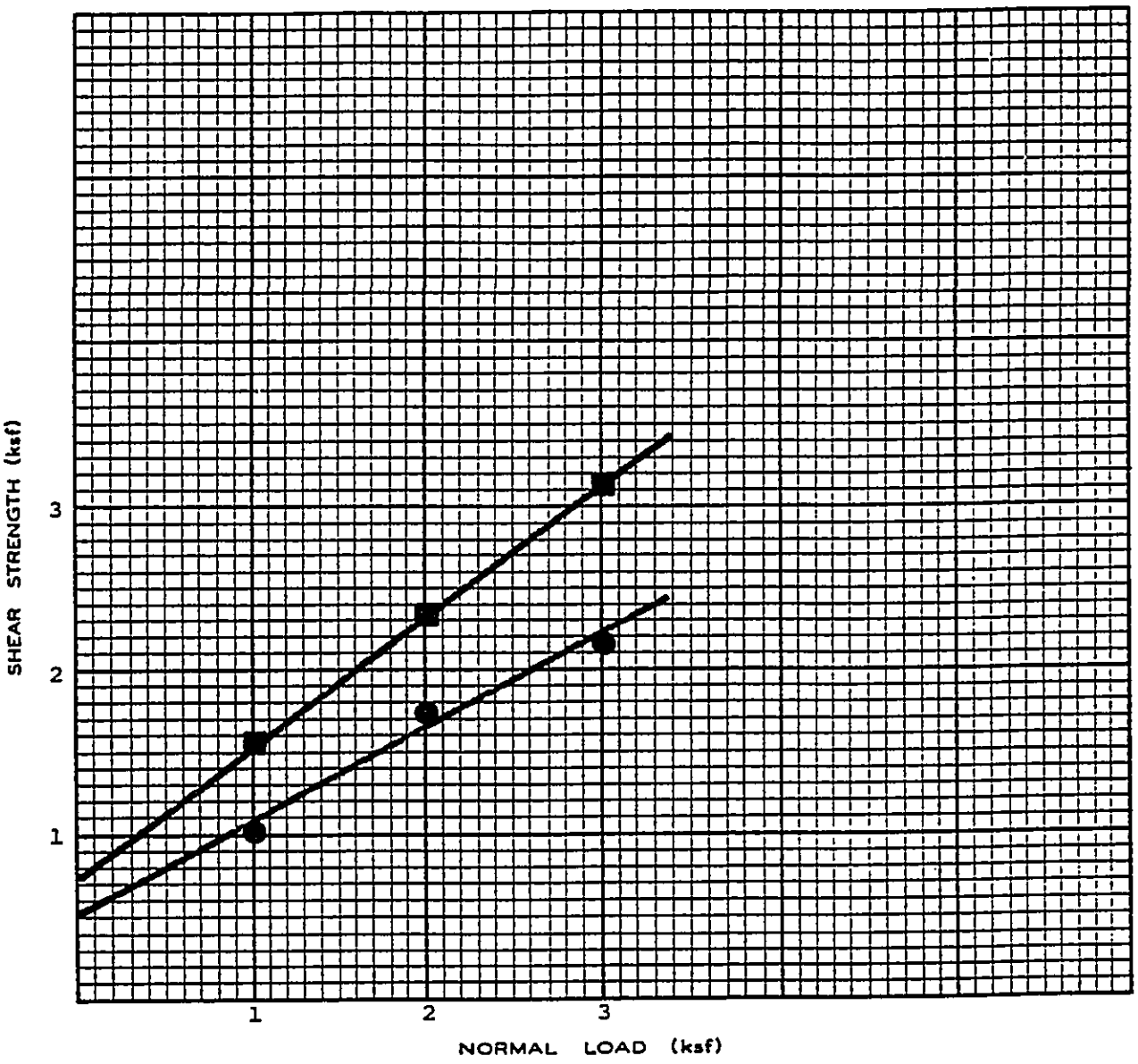
PLATE 13

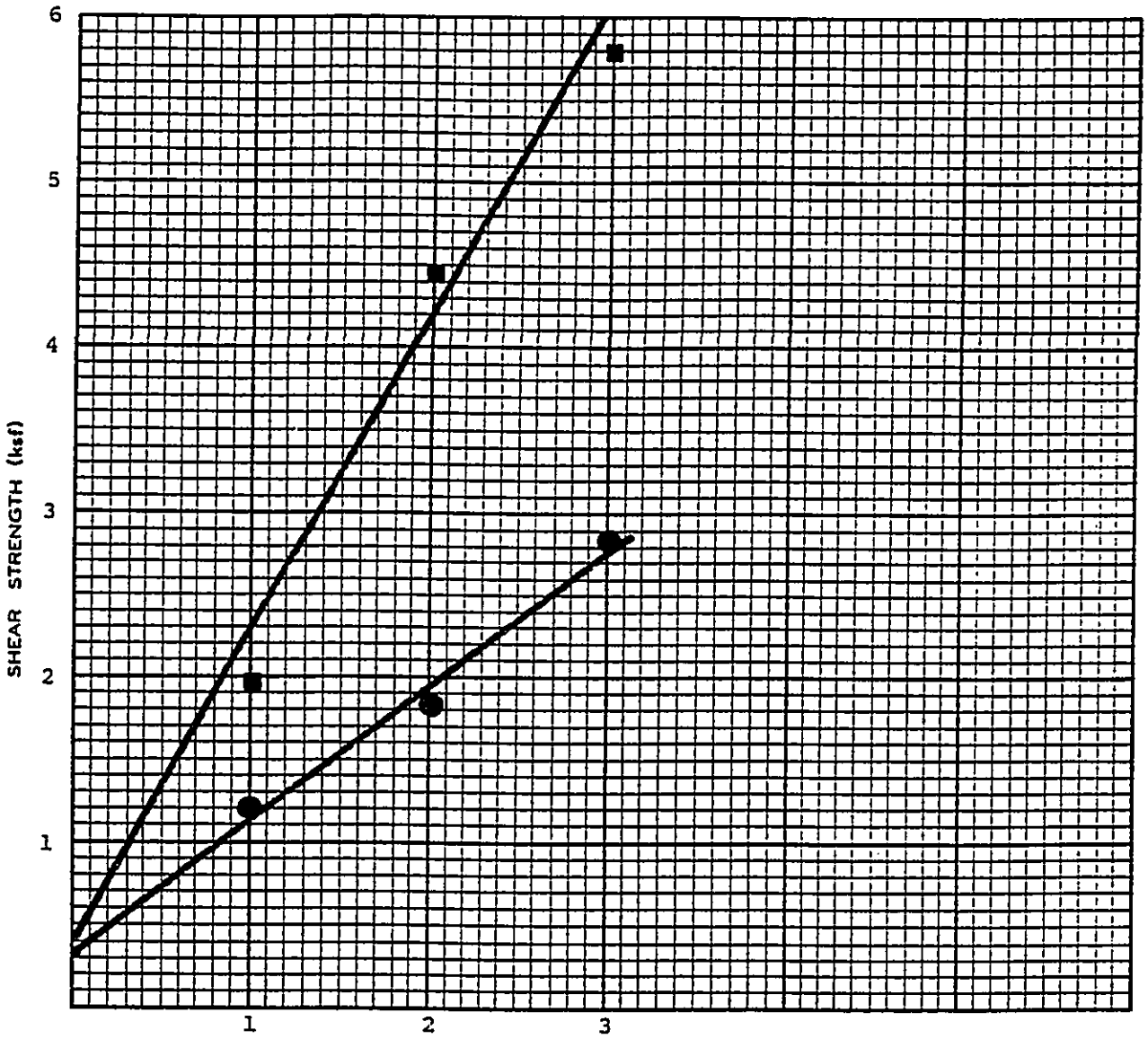
DIRECT SHEAR TEST



	LOCATION	DEPTH (ft.)	COHESION (psf)	ANGLE OF INTERNAL FRICTION	TEST CONDITIONS
●	Boring 2	20.5'	505	29°	Field Density-Peak Strength
■	Boring 7	2.5'	750	38°	Field Density-Peak Strength

PROJECT:	PROJECT NO.		PLATE
EDDIE TAM MEMORIAL PARK EXPANSION PHASE 1	M-2449-F	SOILS INTERNATIONAL 99-1255 WAIUA PLACE AIEA, HAWAII 96701	14

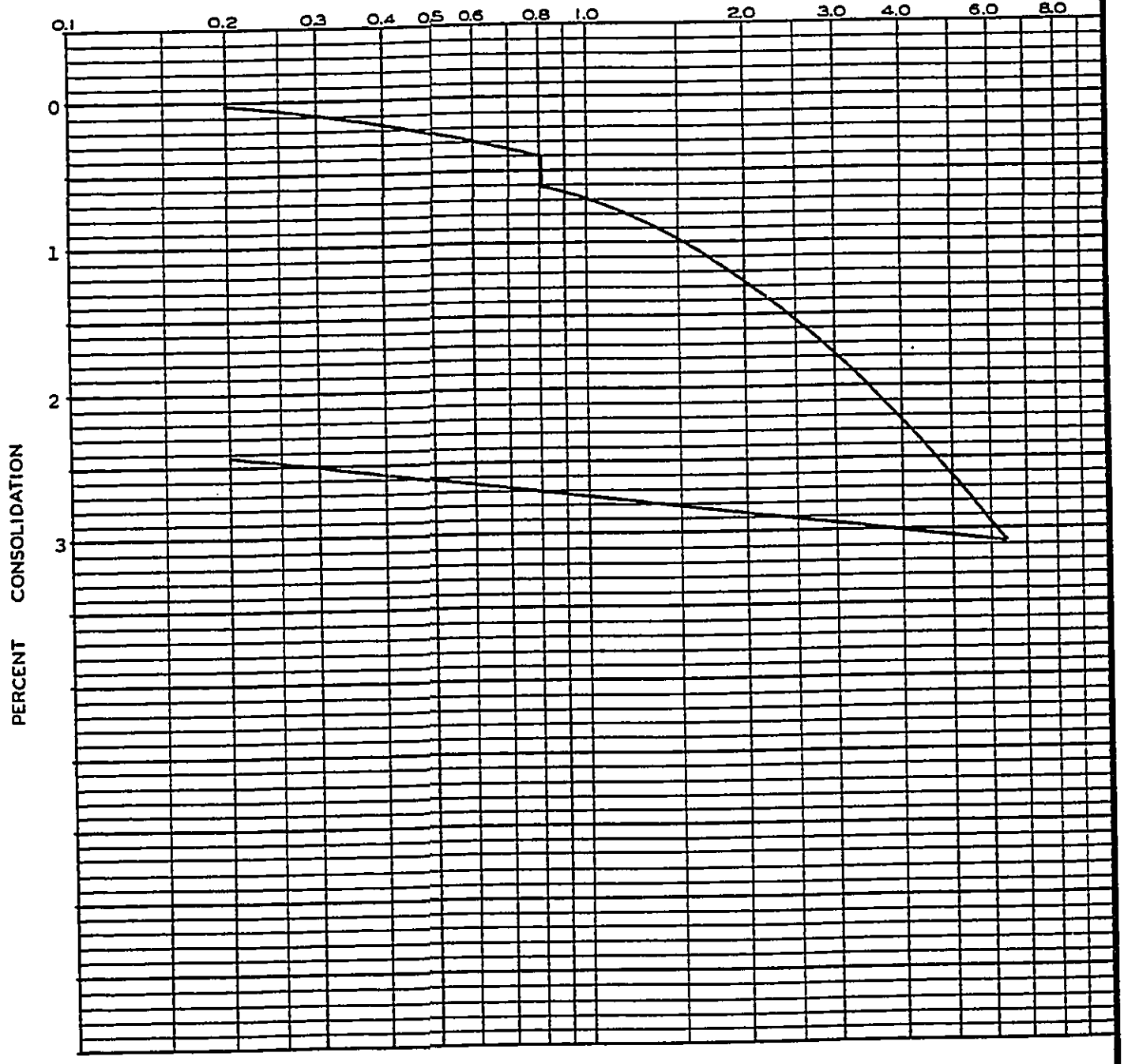
DIRECT SHEAR TEST



	LOCATION	DEPTH (ft.)	COHESION (psf)	ANGLE OF INTERNAL FRICTION	TEST CONDITIONS
■	Boring 2	4.0	425	62°	Field Density-Peak Strength
●	Boring 2	9.5	320	39°	Field Density-Peak Strength

PROJECT:	PROJECT NO.		PLATE
EDDIE TAM MEMORIAL PARK EXPANSION PHASE I	M-2449-F	SOILS INTERNATIONAL 99-1255 WAIUA PLACE AIEA, HAWAII 96701	15

CONSOLIDATION TEST DATA



BORING / TEST PIT NO.: B-2
DEPTH: 9.5'
WATER ADDED AT: 0.8 ksf

PROJECT:	PROJECT NO.		PLATE
EDDIE TAM MEMORIAL PARK EXPANSION: PHASE I	M-2449-F	SOILS INTERNATIONAL 99-1255 WAIUA PL. AIEA, HAWAII 96701	16

IX. LIST OF CONSULTANTS

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Landscape Architect:	Russel Gushi, ASLA 44 South Market Street Wailuku, HI 96793 Phone: (808) 242-6503, Fax: (808) 244-0131
Soils Engineer:	Larry Shinsato, PE Soils International 99-1255 Waiua Place Aiea, HI 96701 Phone: (808) 488-0433, Fax: (808) 488-9535
Traffic Engineer:	Ted Kawahigashi, PE Austin Tsutsumi & Associates, Inc. 501 Sumner Street, Suite 521 Honolulu, HI 96817-5031 Phone: (808) 533-3646, Fax: (808) 526-5031