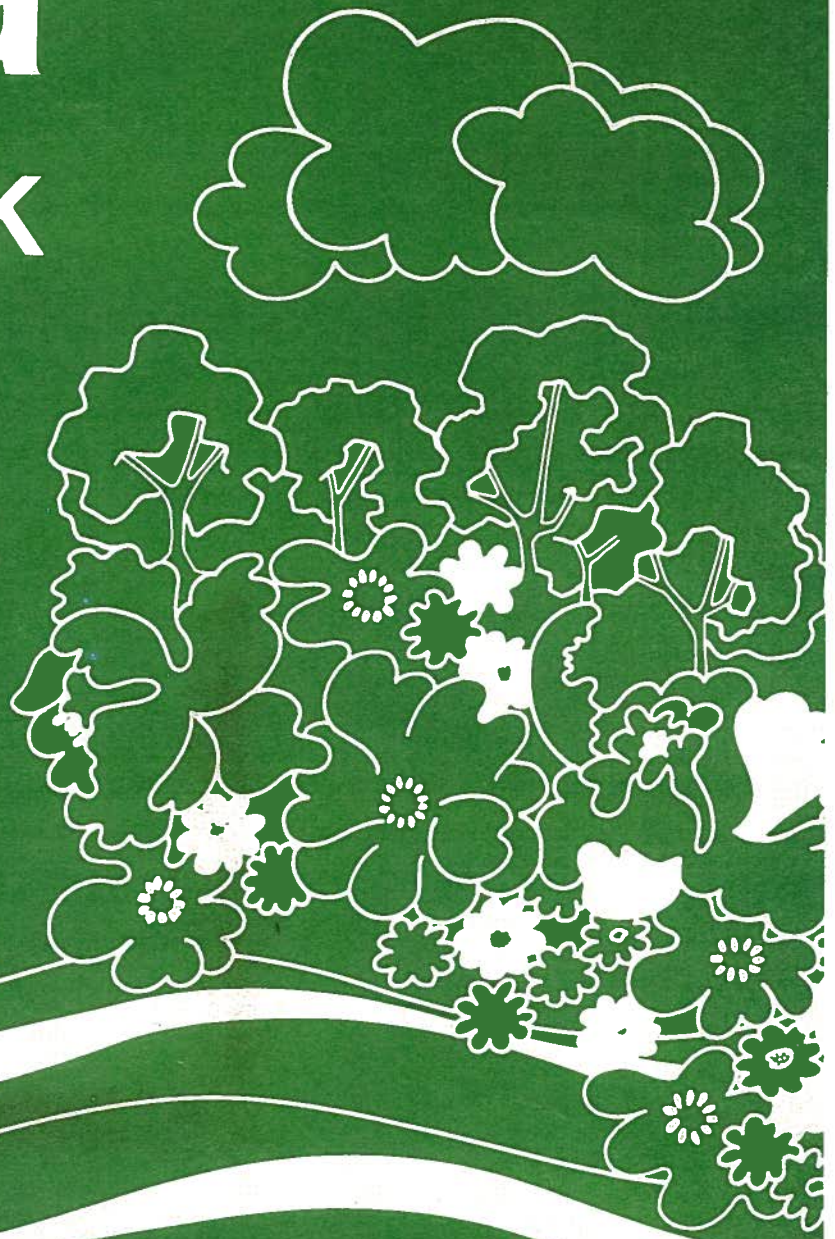
wahiawa

FRESH WATER PARK MASTER PLAN



HAWAII DEPARTMENT OF LAND
AND NATURAL RESOURCES
DIVISION OF STATE PARKS

KOEBIG & KOEBIG · HAWAII

PREFACE

This Master Plan for the Wahiawa Freshwater Park was prepared by Koebig & Koebig, Inc., pursuant to a contract with the Hawaii Department of Land and Natural Resources, Division of State Parks, Contract Number 972. The work was authorized by the Division of Parks in April, 1971.

Part I, the Investigative Report, was approved and Koebig & Koebig was authorized to proceed with Part II in September, 1971. The final report was submitted in late 1971 and reviewed by the Division of Parks during 1972. In March of 1973 a revised final draft was submitted by Koebig & Koebig. This printed document contains comments and minor modifications recommended by the Division of Parks as a result of the Division's review of the March, 1973 draft.

Virtually all of the substantive work on this project was accomplished during 1971. The design criteria upon which the park is planned and the estimated cost of construction is based on 1971 conditions. We strongly recommend that prior to implementation of any portion of the park development, that considerations be given to the changed environmental regulations which may effect the part development and that the cost estimates be revised to reflect the substantial increases in construction cost which have been realized since 1971.

Koebig & Koebig, Inc.
Honolulu

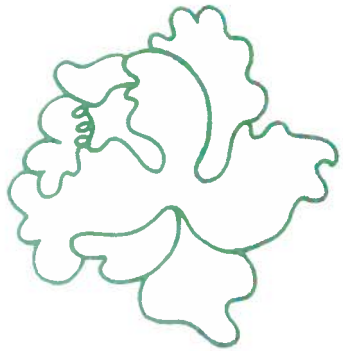
March, 1975

TABLE OF CONTENTS

TABLE OF CONTENTS
(Continued)

LIST OF TABLES

LIST OF PLATES



INTRODUCTION

PURPOSE OF THE REPORT

This report conveys the findings, conclusions, and recommendations of the study undertaken for the purpose of preparing a master plan for the Wahiawa Freshwater Park. It contains the park master plan, the estimates of the cost to construct the park, and the related phasing program. The plan and the report are expected to function as both a long-term and short-term guide in development of the park site useful to the State Parks Division and to other agencies with responsibility in the area of Wahiawa and the reservoir.

OBJECTIVE OF THE STUDY

Specifically, some of the primary objectives were the following:

To determine the potential uses of the study site.

To determine the value of the study site for recreational purposes.

To review the environmental and economic effects which the development of the site would have on the surrounding area.

To evaluate the restrictions within the study site that would hinder maximum utilization of the land and water areas of the site.

To indicate the hazards, such as the steep slopes and existing utility lines and structures, which would affect the development of the study site for a State park.

To determine the recreational needs of the Wahiawa-Mililani area.

To recommend and prepare a development plan for the study site.

LOCATION

The proposed 66.0-acre park site is located on the north shore of Wahiawa Reservoir (Wilson Reservoir). The study site, as shown on Plate 1, is bounded by the urban boundary line of Wahiawa Town on the north, the Wahiawa Intermediate School on the east, and the South Fork of Kaukonahua Stream on the south and west.

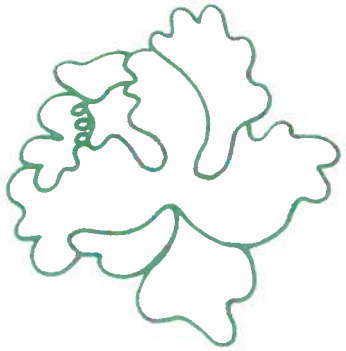
REPORT ORGANIZATION

The report is divided into two parts. Part I contains the background data compiled regarding the use of the site for park purposes, and is divided into two sections. The first presents the background data; the second presents the analysis of the site for park purposes.

STUDY SITE

PLATE 1

Part II presents the recommended development of the site. It is divided into several sections which present the recommended plan and the alternative plans, construction costs, development standards, and operation and maintenance recommendations.



CONCLUSIONS AND RECOMMENDATIONS

On the basis of data contained in this report, the following are concluded and recommended.

PART I

1. The study site is suited for development as a State park because of its unique natural setting along a large freshwater body.[1]

2. The study site contains 66 acres, of which only 36 acres are suitable for park development. The remaining 30 acres consist of land within the Wahiawa Reservoir impoundment area and steep slopes.

3. The extensive utility lines and easements would restrict the siting of facilities and certain types of recreational activities within the study site area.

4. Considering the existing boat launching ramp and the study site's present designation as part of the Wahiawa Public Fishing Area, fishing activities should be integrated and highlighted in any park development.

5. The substantial fluctuation of the water level in the Wahiawa Reservoir, with drops averaging about 30 feet a year, would make the installation of fixed or floating piers along the study site's shoreline difficult.

6. Before any additional water-oriented activities are permitted, such as swimming and pleasure boating, careful consideration should be given to existing hazards associated with the reservoir, such as the deep waters, steep slopes, and submerged debris.

7. The two existing concrete pads could be used for parking or for basketball, tennis, or volleyball courts; however, their removal would enhance the natural setting of the study site and is recommended.

8. All utility connections are available at the current entrance to the study site and along Neal Avenue, directly above the site.

9. Hazards, such as the steep slopes along the reservoir's edge should be fenced, then screened, preferably with shrubs which blend well with the natural landscape.

10. The existing railroad trestle should be either removed, or barricaded as it is unsafe for pedestrian use.

    If it is to be used as a trail bridge, extensive repair and modification will be required.

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1 See note on page 66 regarding State Division of Parks position on matter of use of site as State Park versus City/County Park.

11. The existing paved roadway along the upper section of the study site would be inadequate to accommodate the traffic of both park users and the new Wahiawa Community Center. The roadway would need to be widened, or a second access provided.

12. The Wahiawa-Mililani area lacks adequate picnic and camping facilities, as well as nearby hiking trails which can be used by all age groups.

13. Proceed with the preparation of site development proposals and costs to be contained in "Part II" to this report.

14. Recommend to the State Highway Division that they maximize their acquisition of right-of-way for the proposed H-2 Freeway, particularly in the area across the study site where any excess land can be used for possible expansion of the study site.

15. Coordinate development efforts with the State Highway Division and the U.S. Army in order that additional land may be used for park users for activities relating to hiking and nature study. In this regard, permission should also be obtained from the U.S. Army for reconstruction of the existing trestle or construction of a footbridge which could link the additional land area to the park site.

16. Coordinate with Castle and Cooke, Inc., for the use of their land within the gulch above the northeast part of the site for a connecting trail from the study site to the Wahiawa Recreational Center and to the Wahiawa Botanic Gardens.

17. Do not grant additional easements within the study site.

PART II

1. The study site is suitable for development of a multi-use State park, unique to Oahu because of the freshwater reservoir.

2. The available land area and topography control the extent and orientation of development.

3. Walker Avenue is the only street access to the site and must be used as access to the park in the initial development phase. In the future, a second access from Rose Street may be possible and desirable.

4. The natural character of the site can and should be preserved through imaginative park planning.

5. The existing launching facility and its access road can be successfully incorporated in the park.

6. Day use and overnight use areas can be adequately segregated to effect proper management.

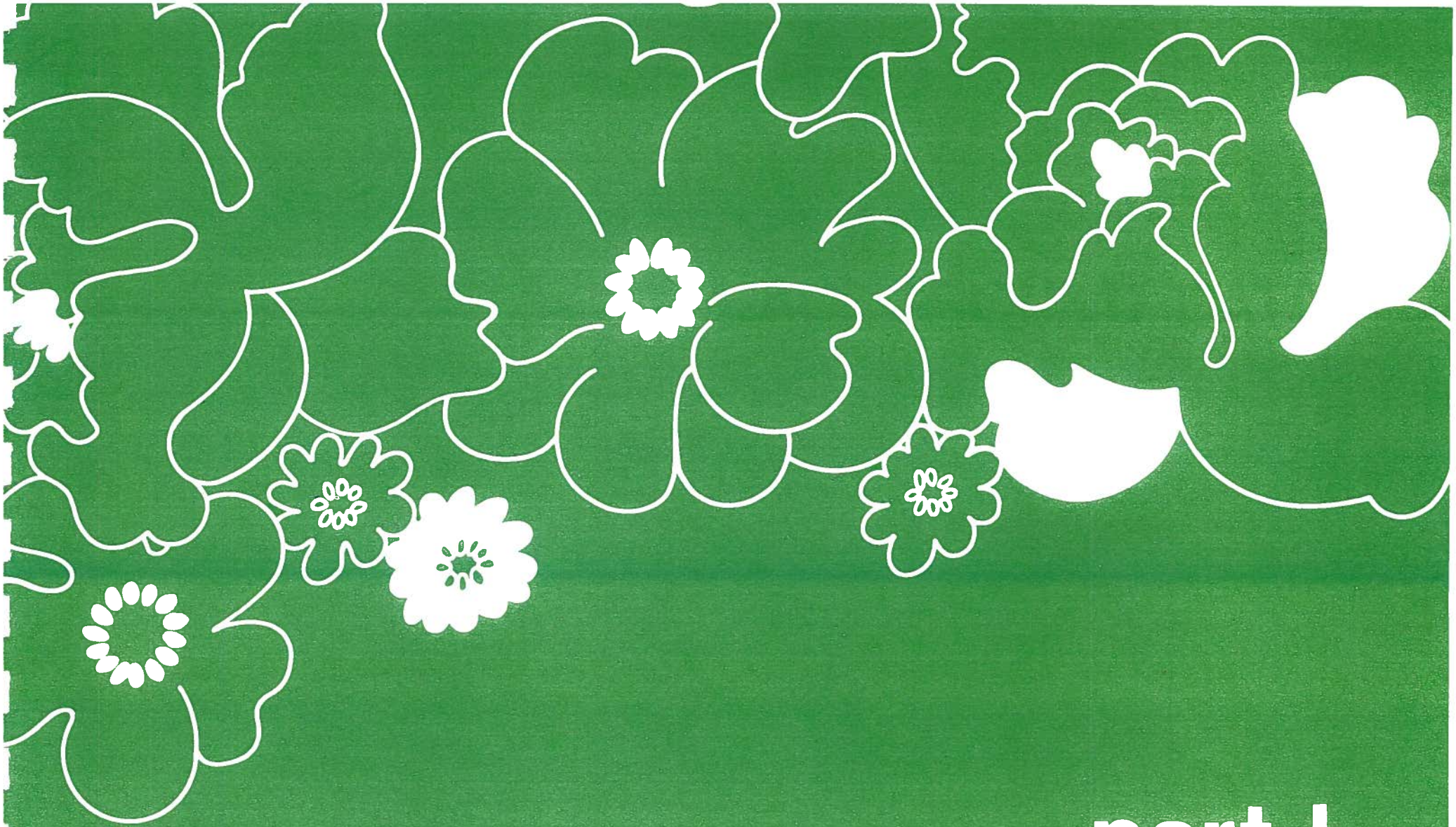
7. Existing funds are not adequate for completing the park but are sufficient to develop about one-quarter of the proposed facilities.

8. Adopt the Development Standards proposed and implement General Development Plan Alternative No. 1. (The three alternative plans are numbered in order of preference, i.e., Scheme 1 Plan is recommended as the most suitable and Scheme 3 is considered the least suitable.)

9. Adopt a scope of work consistent with the goals established in this report, and proceed with the preparation of detailed plans for the Phase I park development.

10. Establish a schedule and program funds for subsequent phases of development.

11. Review and update the Development Plan periodically to reflect changing park and recreation demands and State Parks Division policy.



part I

BACKGROUND DATA

WAHIAWA TOWN

Wahiawa Town is situated in the saddle-like area between the Waianae and Koolau Ranges. The elevation of the town varies from 850 feet near the project site to about 1,250 feet at the upper area near the forest reserve boundary along the slopes of the Koolau Range.

The town is situated within the large employment centers of Schofield Barracks, Wheeler Air Force Base and the sugar and pineapple plantations. The town, which is at the crossroads of the southern and northern areas of the island, is served by major highways which allows for travel time of 30 minutes to downtown Honolulu and 10 minutes to Haleiwa or Waialua, both of which are located to the north of Wahiawa.

The residential population of Wahiawa urban area was 33,129 in 1970. Population projections for 1990 indicate a possible increase to 51,300 residents. The following tables indicate the population of Wahiawa and surrounding areas from 1960 to 1970 and the population forecasts for Wahiawa in relation to the whole island of Oahu.

TABLE I-1

POPULATION OF WAHIAWA AND SURROUNDING AREAS FROM 1960-1970

	1960	1970	Percent Change
Schofield Barracks City	N/A	13,516	----
Wahiawa Town	15,512	17,598	13.4
Whitmore Village	1,820	2,015	10.7
Waipio Acres	1,158	2,416	85.3
Mililani Town	N/A	2,035	----

TABLE I-2

POPULATION FORECASTS FOR OAHU AND WAHIAWA

	1970	1975	1980	1985	1990	Percent Change 1970-1990
Oahu	630,528	680,000	735,000	795,000	859,000	36.2
Wahiawa-Urban Area	37,310	41,300	44,000	47,000	51,300	37.5
Wahiawa-Rural Area	4,181	4,362	4,613	5,212	6,104	46.0

CLIMATE

Wahiawa enjoys a cool climate because of its fairly high elevation in the saddle-like area between the Koolau and Waianae Ranges. The mean temperature of the area is 71.5 degrees. Mean maximum temperature varies from 75.8 degrees F. in January to 82.7 degrees F. in September, while mean minimums vary from 60.1 degrees F. in January to 67.1 degrees F. in August. The area is fairly humid as observations indicate that the frequency of 100 percent relative humidity occurs about 40 percent of the time or approximately 146 days a year in the Wahiawa area. Data concerning temperature, humidity and rainfall, which was obtained from the U.S. Weather Bureau, is reflected in the following table:

TABLE I-3

TEMPERATURE

Month	Mean Maximum (Degrees in F.)	Mean Minimum (Degrees in F.)	Mean Relative Humidity (%)	Percent of Rainy Days	Average Rainfall (inches)
January	75.8	60.1	80.0	39.6	6.3
February	76.3	60.1	79.0	46.0	4.3
March	76.2	60.8	78.4	52.9	5.7
April	77.0	62.3	76.2	53.0	3.4
May	79.1	63.6	75.8	51.0	2.5
June	81.0	65.8	74.5	50.6	1.7
July	81.9	66.7	74.4	47.6	1.9
August	82.5	67.1	75.3	53.2	2.4
September	82.7	66.5	75.9	42.7	2.1
October	81.9	65.4	78.0	48.1	3.3
November	78.9	63.6	81.6	49.4	4.0
December	76.5	62.2	82.0	57.4	6.5

The mean annual rainfall is 44.7 inches while the average rainfall for a typical year is 44.1 inches.

The wettest months are from November through February when the average monthly rainfall is about 5 inches while the dryer months are in the summer when the average monthly rainfall is about 2 inches. However, as indicated on the preceeding table, the number of rainy days per month remains about the same throughout the year. At the same time, other rainfall data (shown below) shows that the mean (44.7 inches) has been exceeded twelve times in the last 21 years. If only the past ten years are considered, the mean annual rainfall would be approximately 49 inches.

Year	Annual Rainfall (inches)	Year	Annual Rainfall (inches)
1950	35.2	1961	37.0
51	73.7	62	46.2
52	34.9	63	66.3
53	22.6	64	47.0
54	51.7	65	59.4
55	65.8	66	42.9
56	46.0	67	55.2
57	54.2	68	60.4
58	48.2	69	44.1
59	33.1	70	31.0
60	34.8		

Prevailing winds in the Wahiawa area, as shown in Table I-4, are from the northern and easterly directions with wind velocities ranging from 5 to 10 knots (5.7 to 11.5 mph).

Wind speed is generally less than 10 knots (11.5 mph) about 85 percent of the time and 11 to 16 knots (12.7 to 19.6 mph) about 13 percent of the time. High winds (exceeding 20 mph) occur two percent of the time, and are generally from the south or southwest. During the month of January in both 1970 and 1971, localized winds were reported gusting at 69 and 78 mph, respectively. Such velocities are the highest velocities ever recorded by Wheeler Air Force Base.

WAHIAWA RESERVOIR

Wahiawa Reservoir, officially named Lake Wilson, is formed by an earth dam located just downstream of the convergence of the South and North Forks of Kaukonahua Stream. The reservoir, constructed by the Waialua Sugar Company, Inc. in 1905 and 1906, is one the largest fresh water impoundments in Hawaii, enclosing the town of Wahiawa within its horeshoe shape. The reservoir's original capacity of 2.50 billion gallons was subsequently increased in December 1960 to its present capacity of 2.97 billion gallons with the installation of an inflatable tube along the crest of the dam's spillway. This increased the impounding capacity of the reservoir an additional 5 feet to an elevation of 847 feet above mean sea level. The surface area of the reservoir, when full, is about 300 acres.

The impoundment is owned by Castle and Cooke, Inc., and is leased and operated by the Waialua Sugar Company, Inc. As much as 50 million gallons per day of reservoir water are used for irrigation and other purposes by the Waialua Sugar Company. Through a cooperative agreement, signed in 1957, the Waialua Sugar Company and Castle and Cooke, Inc., the State Department of Land and Natural Resources gained the right to manage the public fishing in the reservoir. The reservoir area, including the study site, was subsequently designated as the Wahiawa Public Fishing Area. In 1968, a 14-foot wide concrete boat launching ramp and parking area for 21 vehicles and trailers were constructed by the State Fish and Game Division on the western part of the study site for public use.

TABLE I-4

PERCENTAGE FREQUENCY OF WIND
DIRECTION AND SPEED

Speed (Knots)	1-3	4-6	7-10	11-16	17-21	22-27	Percent of Wind	Mean Wind Speed
N	2.8	2.0	1.5	.3	.0	.0	6.6	5.0
NNE	1.1	1.4	1.4	.4	.1	.0	4.4	6.5
NE	2.9	3.9	6.3	3.2	.4	.0	16.8	7.9
ENE	1.1	2.3	5.3	3.3	.4	.0	12.6	9.0
E	1.8	2.4	4.7	2.9	.4	.0	12.1	8.4
ESE	.7	.9	1.3	.7	.1	.0	3.6	7.8
SE	1.2	1.4	1.5	.5	.1	.0	4.7	6.5
SSE	1.5	.8	.9	.5	.1	.0	3.0	7.9
S	.9	.8	.9	.4	.1	.2	3.1	7.0
SSW	.3	.2	.2	.1	.0	.0	.9	6.7
SW	.6	.3	.3	.1	.0	.0	1.3	6.0
WSW	.3	.2	.1	.9	.0	.0	.7	4.7
W	1.6	.7	.2	.0	.0	.0	2.6	3.8
WNN	1.5	.9	.3	.0	.0	.0	2.6	4.0
NW	4.5	3.0	2.3	.2	.0	.0	9.1	4.4
NNW	1.6	1.3	1.7	.1	.0	.0	3.7	4.6
CALM	.0	.0	.0	.0	.0	.0	12.1	.0
	23.6	22.5	27.0	12.7	1.8	.2	100.0	6.1

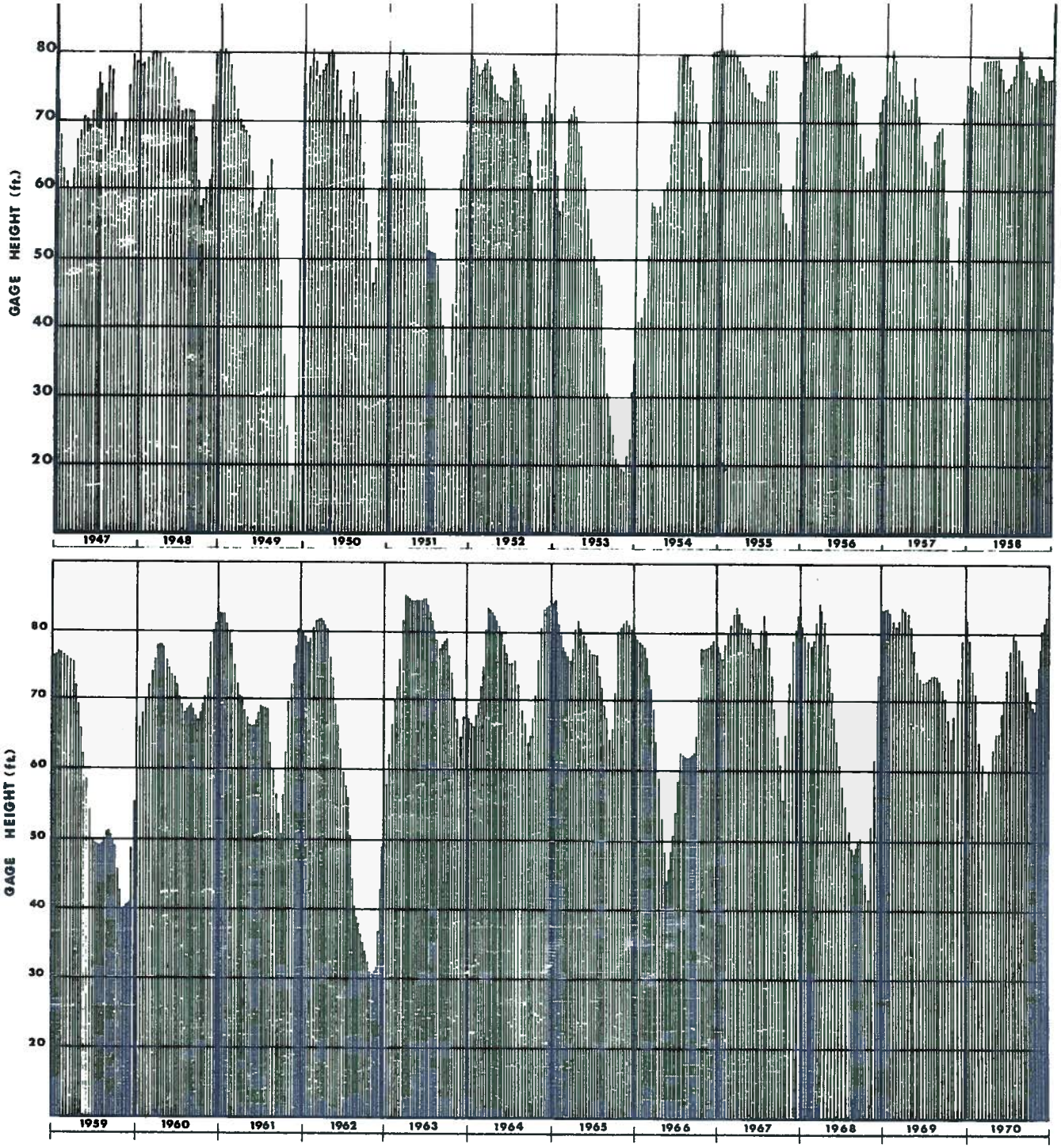
The reservoir is the largest body of freshwater and the most heavily fished freshwater body in the State. The reservoir is stocked with both large and small mouth bass, Bluegill, Channel Catfish, and Treadfin from North America; two species of Tilapia from Africa; Tucunare and Oscar from South America; Chinese catfish and air-breathing pongee from Asia; and other less abundant species. During 1969, an estimated 18,340 fish, totaling about eight tons in weight, were taken from the reservoir by about 12,852 anglers. This figure includes many fishermen who visited the reservoir several times.

Present regulations for fishing in the reservoir limit the size of boats to a maximum of 18 feet and the boat speed to 5 miles per hour. Boaters are restricted to fishing activity only. A fishing license along with a waiver of liability from the State Department of Land and Natural Resources is required, of all fishermen 15 years and older. In addition, all persons below the age of 15, unless accompanied by an adult, are prohibited entry into the fishing area either from shore or by boat. Further, limitations are imposed on the bag limit per person and size of fish that can be kept. Swimming in the reservoir is prohibited even though the State Department of Health's water classification for the reservoir permits such use.

The State Department of Health classifies the reservoir waters as Class II. This designation is a freshwater classification which permits the use of the water for bathing, swimming, recreation, growth and propagation of fish and other aquatic life, and for agricultural and industrial water supply.

Records maintained by the Waialua Sugar Company, Inc., since 1926 indicate substantial fluctuations of the water level are typical in the reservoir. During the fall, drought periods or other extended dry periods the water level may drop on the average of about 30 feet, although it has been known to drop as much as 75 feet. Graph I indicates the average yearly water level fluctuation for the period from 1947 to 1971.

The installation of an inflatable tube along the damps spillway in 1960, which increased the impounding capacity of the reservoir an additional 470 million gallons, has minimized the fluctuation of the water level. Large drops of water level exceeding 30 feet now do not occur as frequently. Occasional fish kills occur when the water level is very low, particularly in the reservoir area near the dam. The Division of Fish and Game has no jurisdiction in regard to the regulation of the water level in the reservoir. However, in line with their recommendations, procedures have been initiated by the sugar company to limit, if not avoid, such kills.



NOTE:
GAGE HEIGHT OF 80.00 FEET CORRESPONDS TO ELEVATION 842.00 FEET ABOVE MEAN SEA LEVEL, THE ELEVATION AT THE DAM'S SPILLWAY CREST.

DATA PROVIDED BY WAIALUA SUGAR COMPANY INC.

AVERAGE WATER LEVELS IN WAHIAWA RESERVOIR

GRAPH I

STUDY SITE

Prior to the U. S. Army's return of the study site to the State of Hawaii in 1965, the land was part of the East Range training area at Schofield Barracks. One of the first known uses of the land involved the construction of a railroad track through the northwestern section of the study site by the old Oahu Railroad Company. When the railroad ceased operation, the land was turned over to the U. S. Army. During the depression years, prior to World War II, the study site was used for a Civilian Conservation Corps camp, at which time, trees and shrubs were planted within the study site area. During World War II, the Army constructed two warehouses and a cold storage plant on the study site to accommodate the increased military population at Schofield Barracks.

Because of the subsequent decrease in military population at Schofield Barracks and the study site's detachment from the other East Range training areas, the Army declared the land to be in excess of their needs and returned the property to the State in 1965. Subsequently, 2.4 acres out of the original 68.4 acres returned to the State were set aside for the construction of the Wahiawa Community Center. The Center will be used as a vocational rehabilitation and child care center for the handicapped.

The study site (See Plate 2) lies within the Waianae Uka area, Parcel 6 of Tax Key Map 7-6-01. Of the total area of 66.0 acres, 20.7 acres of the study site are within the reservoir impoundment area and 9.3 acres of the remaining area are unusable, undevelopable land.

TOPOGRAPHY AND SHORELINE

The study site consists of a low, hilly terrain along its western boundary, gentle sloping land within its interior section, steep slopes along the South Fork of Kaukonahua Stream, as well as along the gulch along the eastern section of the site. As indicated, about 20.7 acres are within the reservoir impoundment area which includes the flood plain of the South Fork of Kaukonahua Stream. The shoreline of the study site is about 2 miles long.

CURRENT USE

Except for the boat launching ramp with its associated parking area and the use of the shoreline for fishing, the study site is currently not in use.

SOIL CHARACTER

The study site is within a 14L soil zone, as classified by the Land Study Bureau

of the University of Hawaii. This indicates that the soil, which is of dark red silty clay, is non-expanding, non-rocky and the surface well-drained. In addition, it has good bearing capacity and usually stable vertical cuts. The soil holds relatively large quantities of water available to plants; it is easy to work and conserve and very responsive to fertilization. Underlying material of consolidated lava is usually at depths of 15 feet or greater, which allows ease of installing underground utilities, lot grading, road building, and other similar construction within the study site area.

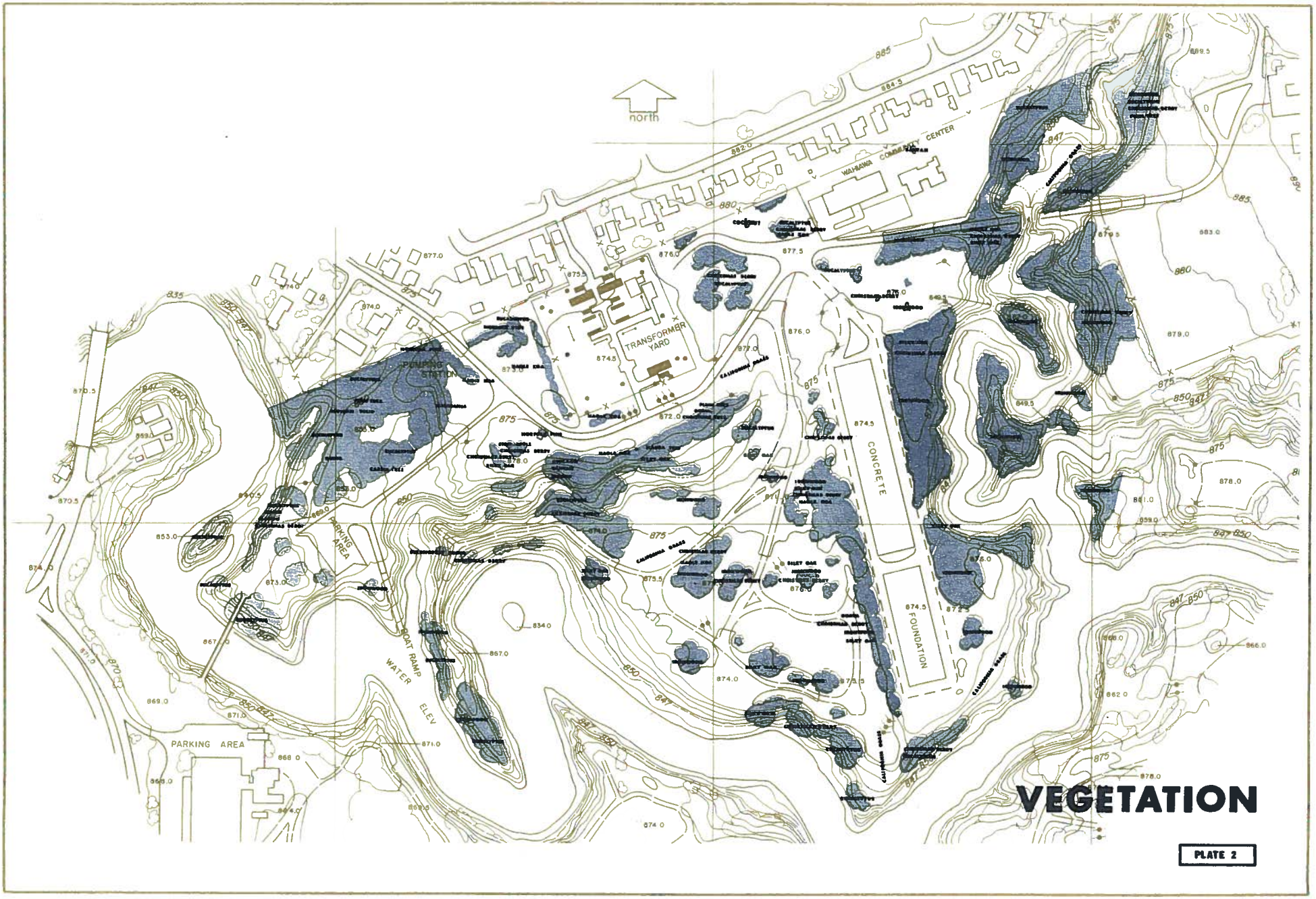
According to the Soil Conservation Service's report entitled "Soils Survey, Territory of Hawaii," issued in September 1955, the study site area consists of Rough Broken Land (Rs) within the reservoir impoundment area, Kunia Silty Clay (Kk7) along the steep slope along the gulch and the reservoir's edge, and Wahiawa silty clay (Wb) within the central parts of the site. The Rough Broken Land is indicated as rock deeply weathered with very little soil material. Soil development is offset by either geographic or man-induced erosion. The Wahiawa Silty Clay is a fine textured soil but not highly sticky and plastic like clays of the temperature regions. The soil is the best soil of the Wahiawa series for cultivation. The Kunia silty clay, like the Wahiawa soil, is fine textured. The soil is moderately to strongly acidic throughout its profile. On this soil, as on the Wahiawa soil, guava and lantana are persistent shrubs.

DRAINAGE

The primary drainage problem with the study site consists of storm runoff originating from a 33-acre area, located directly above the site, within the urban boundary of Wahiawa Town. The storm runoff enters the project site at points between the new Wahiawa Community Center and the power substation and, subsequently flows into the swale extending from the reservoir near the boat launching ramp. The site is, for the most part, well drained with only localized low spots, which pond after heavy rainfall.

VEGETATION

About 20 common trees and plants are found within the study site. The more abundant trees include Eucalyptus, Ironwood, Norfolk Island Pine, Silky Oak, Guava, and Christmas Berry. Plate 2 indicates the type and location of the forms of vegetation found within the study site. In addition Haole Koa, brush and shrub cover much of the site.


north
WAIMANA COMMUNITY CENTER
TRANSFORMER YARD
PUMPING STATION
CONCRETE
FOUNDATION
PARKING AREA
BOAT RAMP
WATER ELEV
PARKING AREA
VEGETATION
PLATE 2

BIRDS

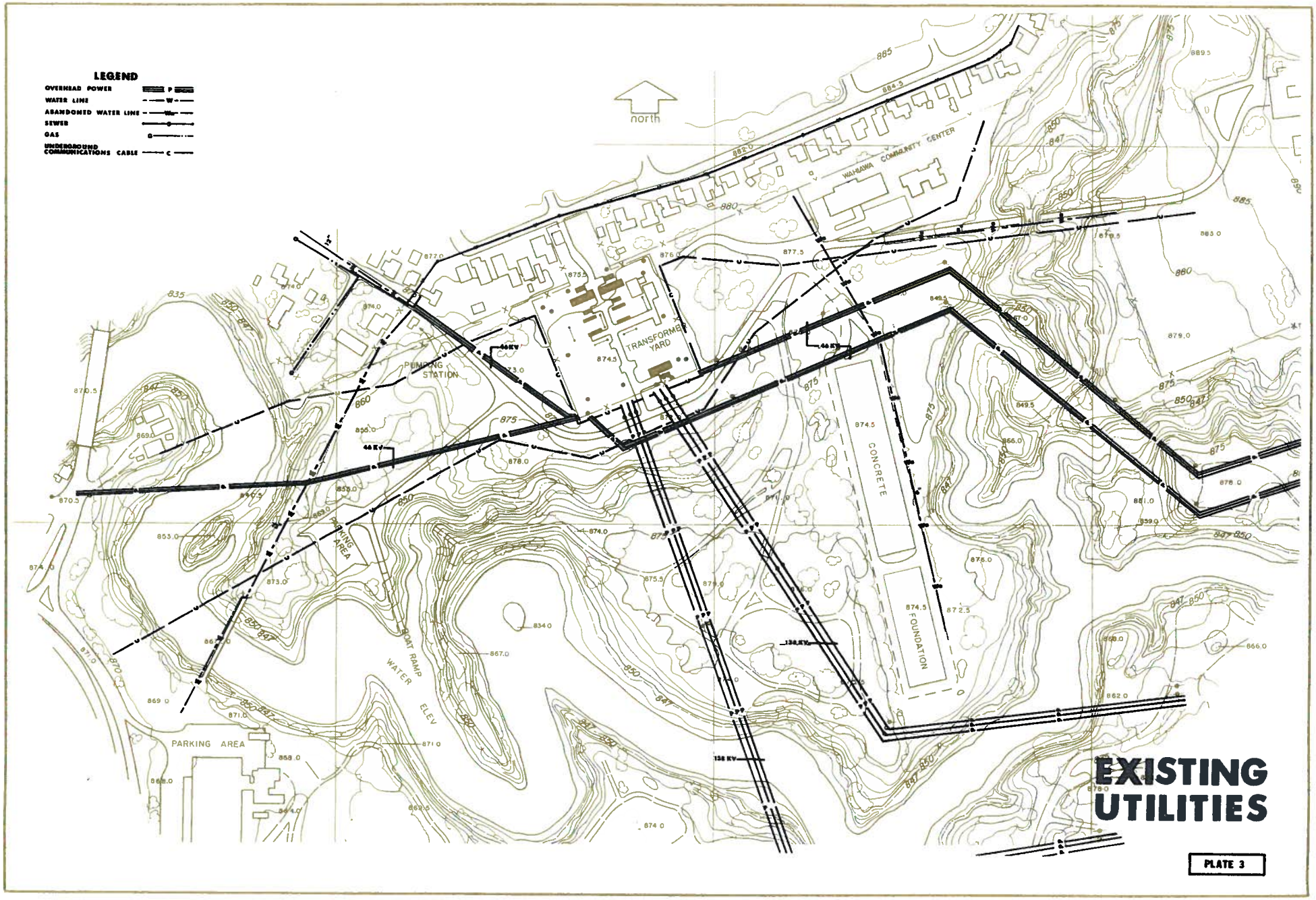
Approximately 14 species of birds can be seen in the vicinity of the study site. They are as follows:

1. Cattle Egret
2. Black-crowned Night Heron
3. Golden Plover
4. Ruddy Turnstone
5. Wandering Tattler
6. Spotted Dove
7. Barned Dove
8. Mynah
9. White Eye
10. Ricebird
11. House Sparrow
12. Cardinal (Kentucky)
13. Brazilian Cardinal
14. House Finch

EXISTING FACILITIES AND EASEMENTS

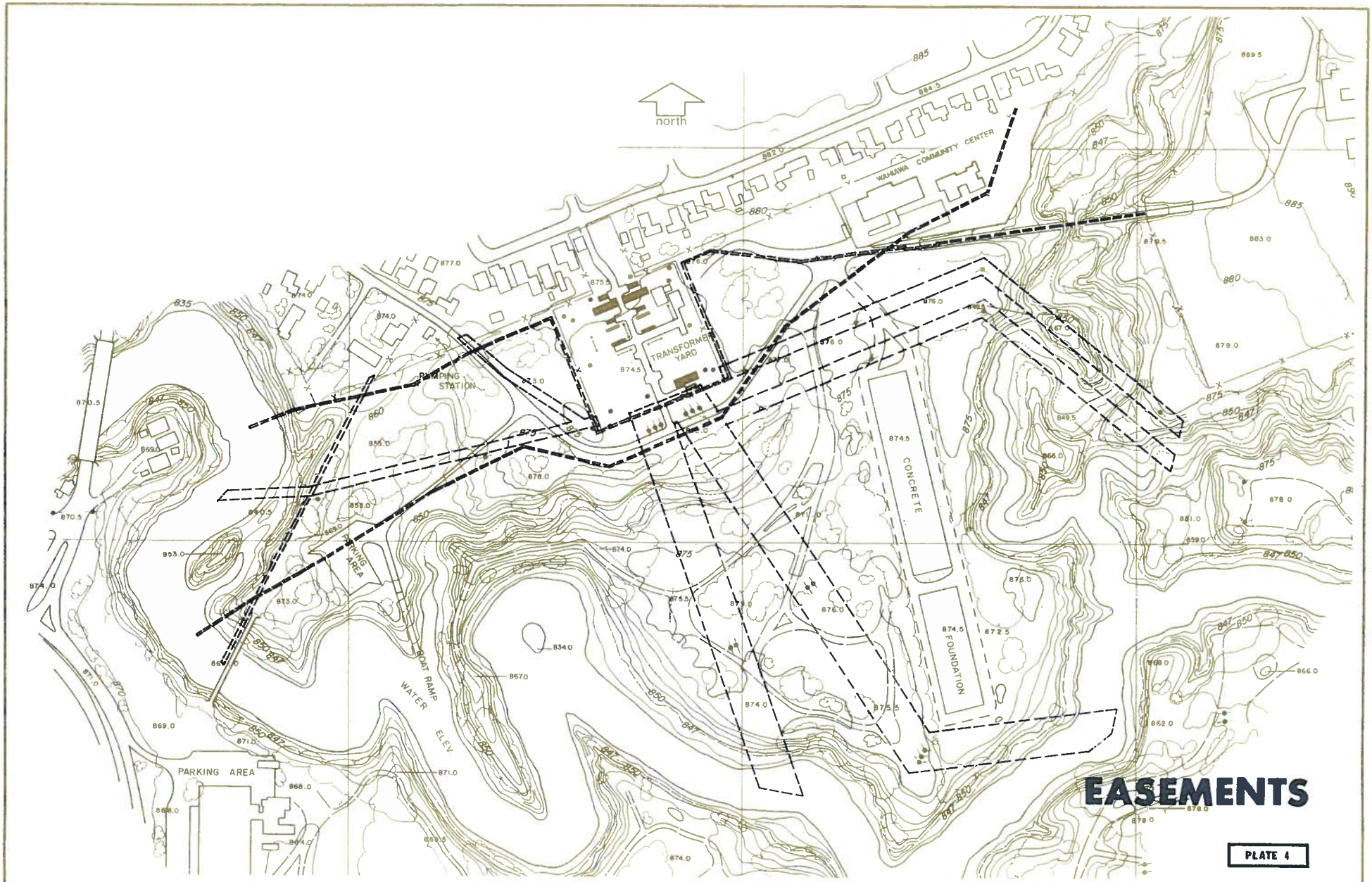
Existing facilities within the study site consist of the boat launching ramp with a parking area, and two large concrete pads, one 300 feet by 100 feet in size and the other 500 feet by 100 feet in size. In addition, a paved road about 15 feet in width runs through the upper section of the study site and an abandoned railroad trestle, currently supporting a 12-inch water line, crosses the stream just downstream from the boat launching ramp. Utility facilities, as indicated by Plate 3, include Hawaiian Electric's overhead power lines, the Army's 12-inch water line and underground communication cables, and Hawaiian Telephone's underground communication cables.

Utility easements within the study site, as shown on Plate 4, consist of Hawaiian Electric's two 100-foot wide, two 40-foot wide, and two 25-foot wide easements of their transmission lines; Hawaiian Telephone's 5-foot wide easement for their underground communication cable line and the Army's 10-foot wide easement for their water line and 5-foot easement for their underground communication cableline. These easements occupy 10 acres of the study site, of which Hawaiian Electric retains about 9.3 acres. Hawaiian telephone retains about 0.3 acre and the Army retains about 0.5 acre. In addition, Waialua Sugar Company, Inc. has been granted the right-of-way through the lands occupied by the reservoir waters. The easements were granted to the utility companies by the Army for a period of 50 years. Hawaiian Electric's two 25-foot and two 40-foot wide easements, which were granted to them on March 17, 1957, expire on March 16, 2007. The company's two 100-foot wide easements, which were granted to them on April 27, 1960, expire on April 26, 2010. Hawaiian Telephone's 5-foot wide easements granted to them



EXISTING UTILITIES

PLATE 3


north
WAIMANA COMMUNITY CENTER
TRANSFORMER YARD
PUMPING STATION
CONCRETE
FOUNDATION
PARKING AREA
BOAT RAMP
WATER ELEV
PARKING AREA
EASEMENTS
PLATE 4

on July 19, 1965 expire on July 18, 2015. The U. S. Army has retained their easements for an indefinite period of time.

The State is allowed to construct, use and maintain across, over, and/or under the easements in such a manner that unreasonable interferences are not created. Therefore, any extensive development such as a housing project would have to be designed "around" the easement areas. However, a single comfort station and/or pavilion, which would not interfere with any existing utility lines, may be located within the Hawaiian Electric easements. Consequently, these easement areas can be used for almost all recreational purposes, except for activities such as kite flying which could interfere with the overhead power lines that are located only about 60 feet above the ground. However, any proposals to develop within the Hawaiian Electric easements would have to be reviewed by their office. Planting within the easement areas should be limited to low growing vegetation while the planting of taller trees along the easements would help to minimize the visual impact of the overhead power lines.

Hawaiian Electric indicates that because of the high voltage (138 KV) involved, the power lines cannot be economically placed underground. At the same time, Hawaiian Electric has submitted a proposal to the State Utilities Commission for the consolidation of 6 separate transmission lines to be supported by larger and higher poles. Aesthetically, this alternative would be much more objectionable than the current system because of the increased height and density of wires and poles.

The Hawaiian Electric Company has also noted that they would entertain any proposal to relocate their substation if an alternative site could be provided. A possible site may be to the adjacent unused Army property. Such a proposal would be the ideal solution for maximum development of the study site, but at the same time, could be very costly.

An alternative to Hawaiian Electric's current proposal to the State to consolidate the power lines is a single new corridor extending south eastward along the upper section of the study site. The advantage of this alternative would be the removal of all power lines from the more desirable central portion of the site to a less objectionable area. Thus, it is recommended that the State Department of Land and Natural Resources urge Hawaiian Electric Company

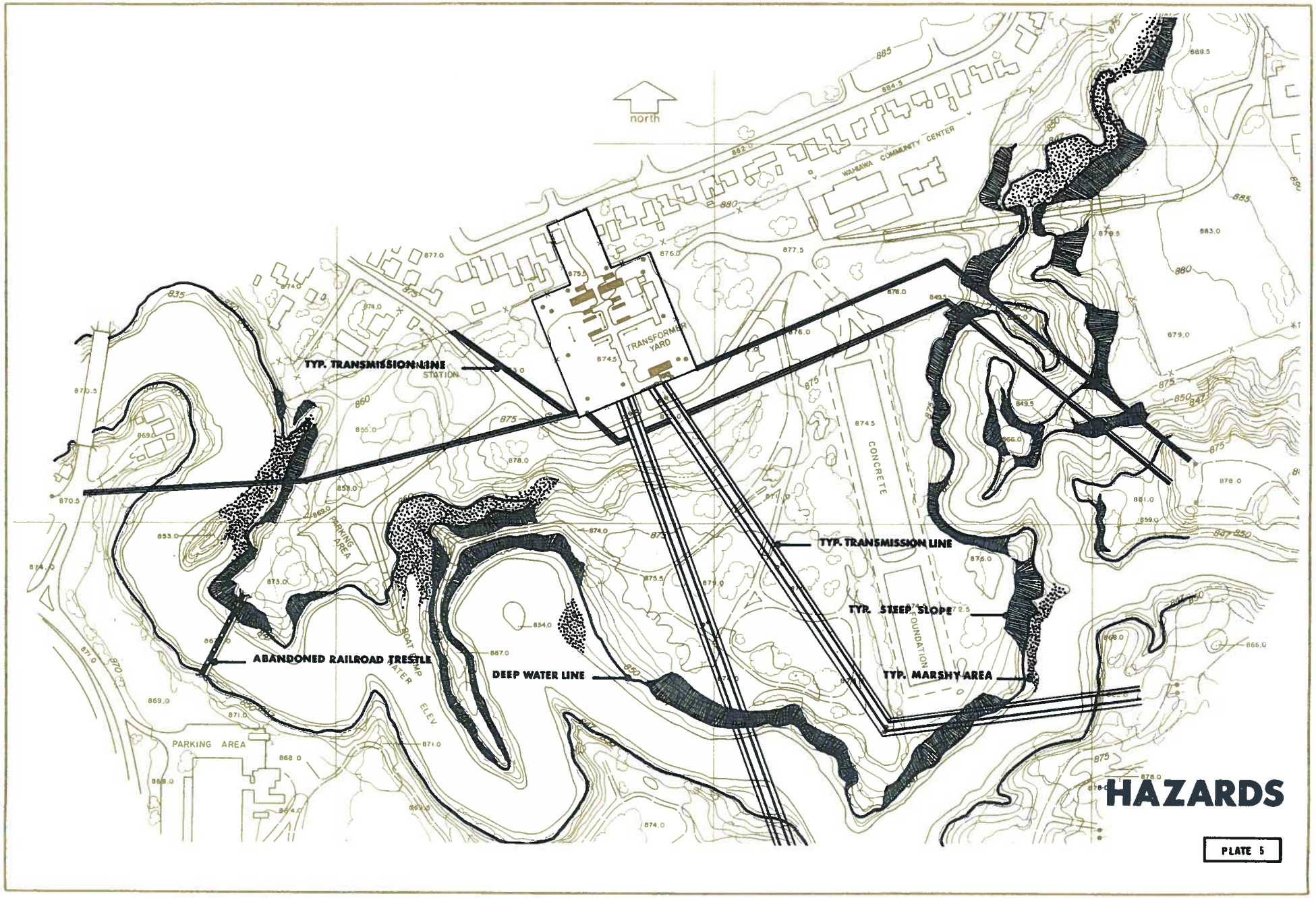
to amend their current proposal to the Public Utilities Commission in order that the power lines could possibly be consolidated into a single corridor along the upper section of the study site.

With regard to the existing trestle, the Army has indicated that they do not have any plans to reconstruct or to replace the structure supporting their 12-inch water line. The water lines were recently leased to the City and County of Honolulu Board of Water Supply to provide water to the Wheeler Air Force Base area. The line is used by the Army only during emergencies when a water shortage exists in the Schofield Barracks area. The trestle is in an extremely diapidated condition and dangerous to possible users or trespassers. A formal request for the reconstruction of the trestle should be directed to the Commanding General, U. S. Army, Hawaii, Schofield Barracks. The Board of Water Supply should also be approached to determine whether that agency would be willing to help finance the relocation of the water line. In addition, warning signs forbidding trespassing, should be posted on the trestle.

ADJACENT DEVELOPMENT

Developments adjacent to the study site consist of Honolulu Gas Company's holder station at the northwest corner of the site, the Board of Water Supply's pumping station at the current entrance to the study site at Walker Avenue, Hawaiian Electric's substation, the Wahiawa Intermediate School and the residential development within the urban boundary of Wahiawa Town. The U. S. Army military reservation across the stream from the study site is relatively underdeveloped except for a golf course, scattered warehouses, a laundry, and a MARS Radio station transmitter tower.

In addition, the new Wahiawa Community Center adjoins the northeast part of the study site. The Center,consists of a child training center and a sheltered workshop. The Center is used jointly by the Vocational Rehabilitation Division of the State Department of Social Services and the Child and Health Service Division of the State Department of Health. The facility is also used by the Wahiawa Branch of the Hawaiian Association to Help Retarded Children. The Center has a child development program, child training program, daily activities program, pre-vocational training program, and a vocational rehabilitation program. The Vocational Rehabilitation Division anticipates to have upwards of 65 students



HAZARDS

PLATE 5

in 1973 and about 100 students by 1978. The Child and Health Services Division serves about 24 handicapped children. The Center has a staff of about 11 employees. The child training center, including its play area, is enclosed with a chain link fence. A paved parking area for 29 vehicles is provided for both the staff and visitors to the Center. Access to the Center is via the existing paved roadway within the study site area.

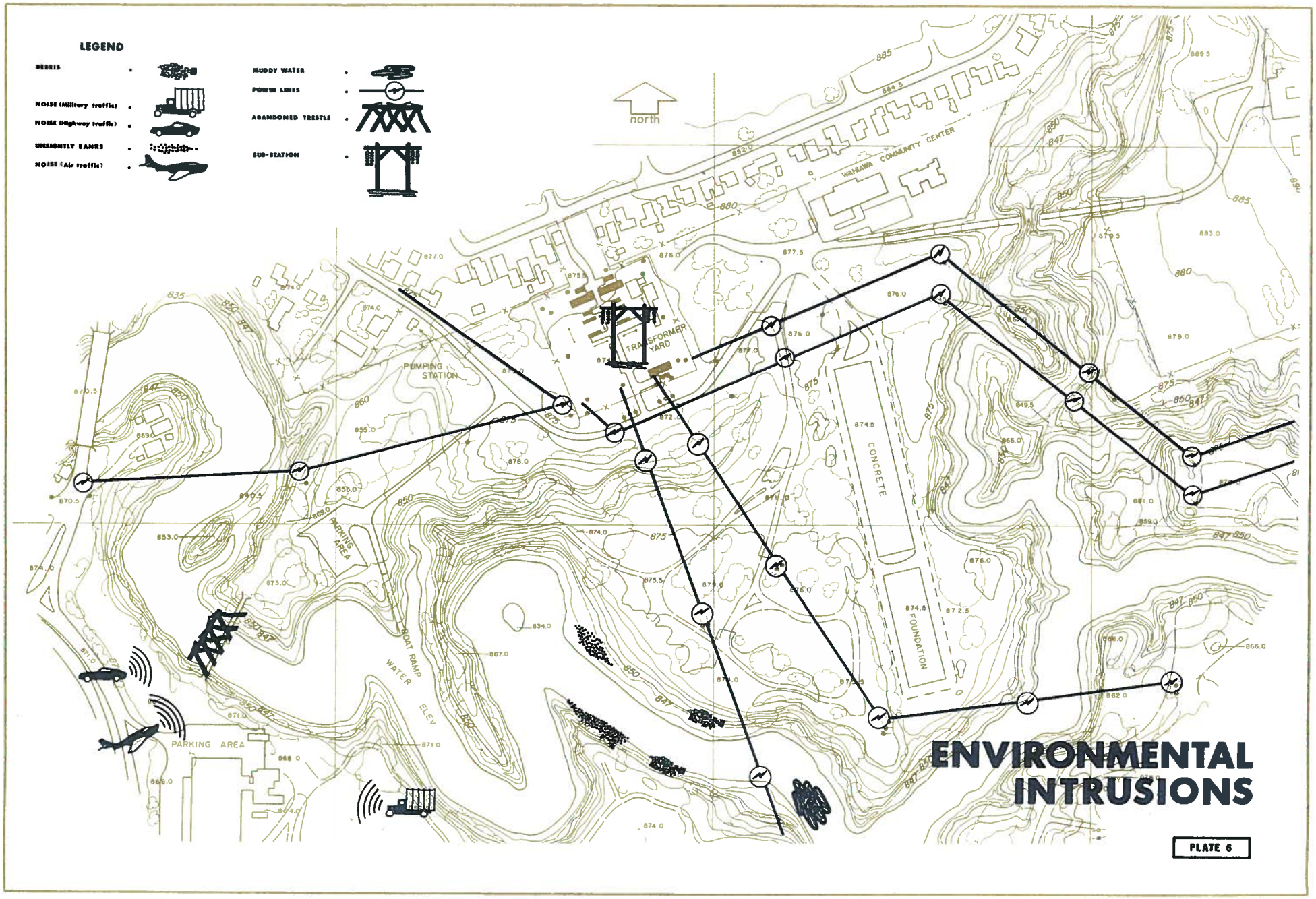
The Wahiawa Community Center has adequate facilities to accommodate the handicapped from the central leeward area, (estimated to be approximately 1.5 percent of the regional population). By 1978, the State Vocational Rehabilitation Center anticipates serving about 100 students, while, initially, the Child and Health Service Division anticipates serving about 24 handicapped children. The Center has the capability of serving a maximum of about 95 handicapped children. The facilities of the new Wahiawa Community Center should provide adequate accomodations for the mentally retarded in the Wahiawa urban area up to the year 1985.

HAZARDS

Hazards associated with the study site (See Plate 5) consist of the overhead power transmission lines and power sub-stations; the steep slopes along the South Fork of Kaukonahua Stream and along the gulch through the eastern section of the study site; the abandoned railroad trestle; the deep waters of the reservoir and the marshy bottoms along low water levels in the reservoir. In addition, after flood periods, logs and branches within the reservoir could be a hazard to boaters.

ENVIRONMENTAL INTRUSIONS

Environmental intrusions affecting the study site, as shown on Plate 6, consist of the 6 overhead power, transmission lines; power sub-station; noise from military aircrafts from Wheeler Air Force Base, from military equipment and vehicles in the Army East Range training area; and from traffic on Kamehameha Highway. In addition, environmental intrusions originating from the reservoir and affecting the site consist of the muddy waters and the accumulation of debris along the shoreline after flood periods. A future potential environmental intrusion into the study site would be the H-2 Freeway. In addition to the traffic noise, the proposal to construct the freeway on a high embankment, visible from the study site, could cause the study site to lose part of its natural setting.


LEGEND
DEBRIS
NOISE (Military traffic)
NOISE (Highway traffic)
UNSIGHTLY BANKS
NOISE (Air traffic)
MUDDY WATER
POWER LINES
ABANDONED TRESTLE
SUB-STATION
north
WAIMANA COMMUNITY CENTER
TRANSFORMER YARD
PUMPING STATION
CONCRETE
FOUNDATION
PARKING AREA
PARKING AREA
BOAT RAMP
WATER ELEV
ENVIRONMENTAL INTRUSIONS
PLATE 6

UTILITY CONNECTIONS AVAILABLE FOR THE SITE

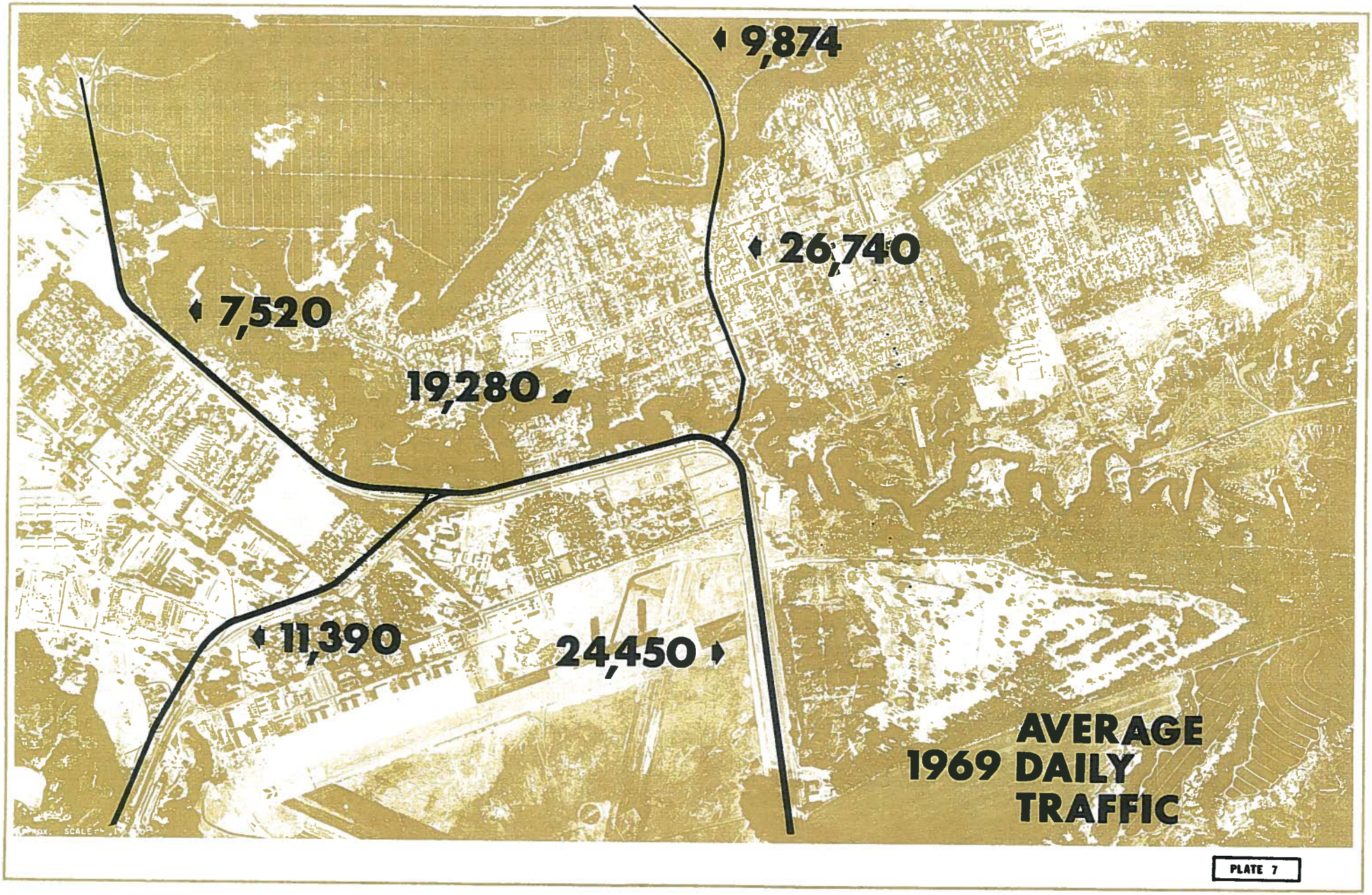
All utility connections will have to be made at the current entrance to the study site at Walker or Neal Avenues. Available utility lines at Walker and Neal Avenues include a sewer line, a 12-inch water line, a gas line and overhead power and telephone lines. Utility connections for the new Wahiawa Community Center will be made at Neal Avenue. The Center has obtained a 10-foot easement within a residential lot adjacent to the site for its utility connections.

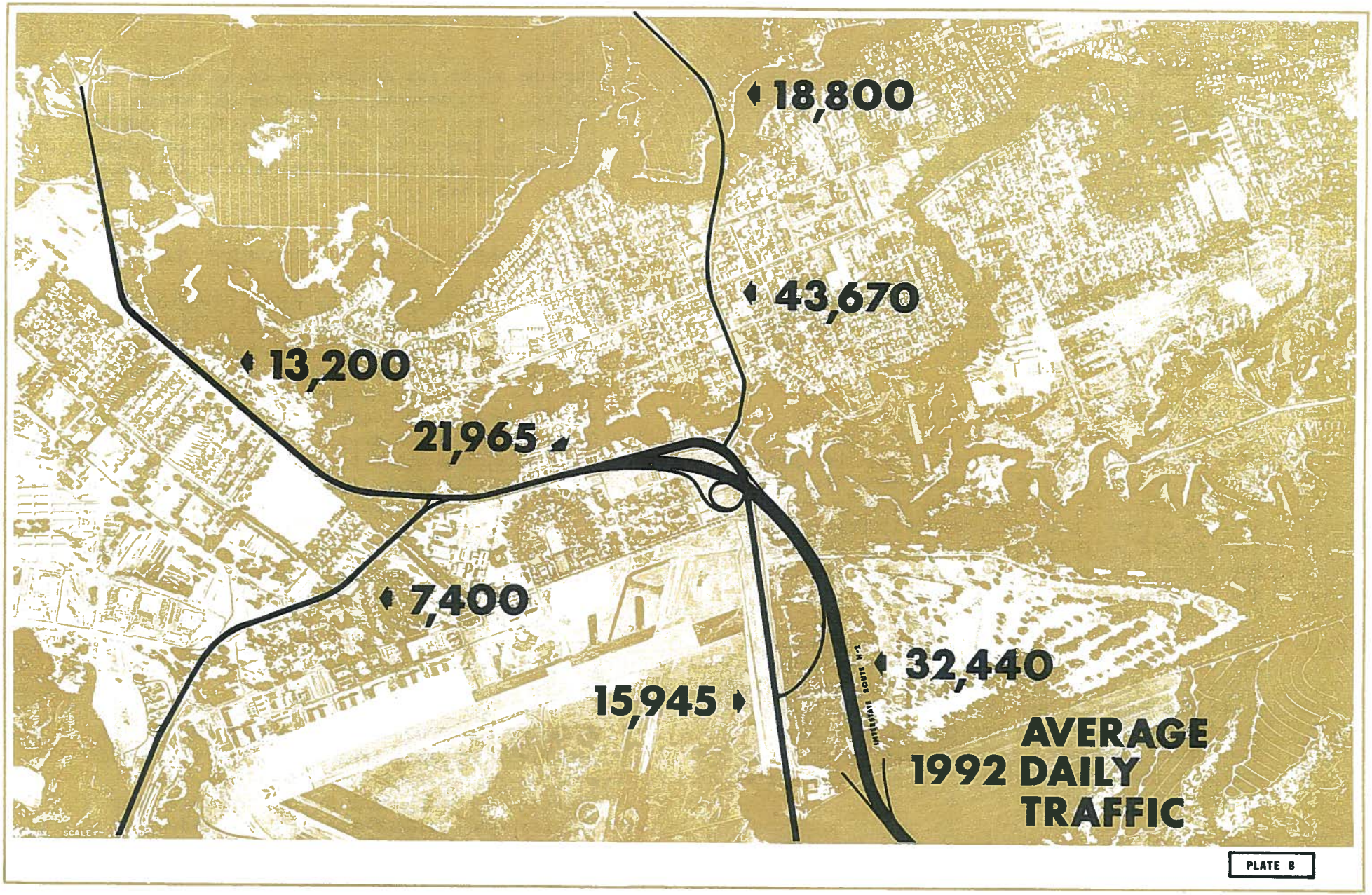
TRAFFIC

Wahiawa Town is served by Kamehameha Highway, a major highway connecting the southern and northern parts of the Island of Oahu. People driving from the western parts of the island, such as those from Waianae and Ewa, can reach the town utilizing Kunia Road, a two-line undivided highway, to Wilkina Road, a four-lane divided highway, and continuing southeastward to the southern entrance of Wahiawa Town. South of Wahiawa, Kamehameha Highway is a four-lane divided highway, a four-lane undivided highway within the town and only a two-lane undivided highway north of the town. All highways currently serving Wahiawa are in good condition.

The General Plan of the City and County of Honolulu indicates the eventual improvement of Walker Avenue and Avocado Street from their present two-lane width to four lanes. However, both of these roadways are not included in the City and County's six-year construction program.

The 1969 traffic counts (See Plate 7) indicated that an average daily traffic of 26,790 vehicles used on the section of Kamehameha Highway between the Wilson Bridge and Kilani Avenue. However, the counts revealed that most of this traffic either terminated or began within the town. Projections for 1992 traffic (See Plate 8) on Kamehameha Highway, within the same section, indicate about a 63 percent increase in daily traffic assuming that a second access route into Wahiawa Town is not developed. However, current State Highway plans show that roadway from Wilson Bridge to Kilani Avenue as being widened to 6 lanes and the existing Wilson Bridge replaced to accommodate the increase in traffic and present congestion during peak hours. A decrease of traffic volume is anticipated on the southern approach route of Kamehameha Highway due to construction of the H-2 Freeway, which will originate from the H-1 Freeway near Waipahu and terminate at Wahiawa.


9,874
26,740
7,520
19,280
11,390
24,450
AVERAGE
1969 DAILY
TRAFFIC
PLATE 7


18,800
43,670
13,200
21,965
7,400
15,945
32,440
INTERSTATE ROUTE 43
AVERAGE
1992 DAILY
TRAFFIC
PLATE 8

LAND USE

State land use designations in Hawaii are divided into three general land use classifications -- urban, agricultural, and conservation. Boundaries of these districts are established by the State Land Use Commission, and are updated every 5 years to reflect changes in population and land use requirements. As shown on Plate 9, the study site is in an agricultural district. The responsibility for zoning administration within agricultural and urban classifications rests with the City and County Planning Commissions.

As shown on Plate 10, the City and County General Plan designates the study site for park use except for a section along the upper part of the site which is designated for residential use. In the event the site is to be used as a park, this residentially designated area should be redesignated for park purposes. The lands immediately above the site and to the northwest, which are within the urban district of Wahiawa, are designated as a medium density apartment district and lands to the northeast are designated as a residential district. A small section above the study site, where the Honoluly Gas Company's gas holder station is located, is designated as a light industrial district. The military reservation bounding the site is within the AG-1 restricted agricultural district.

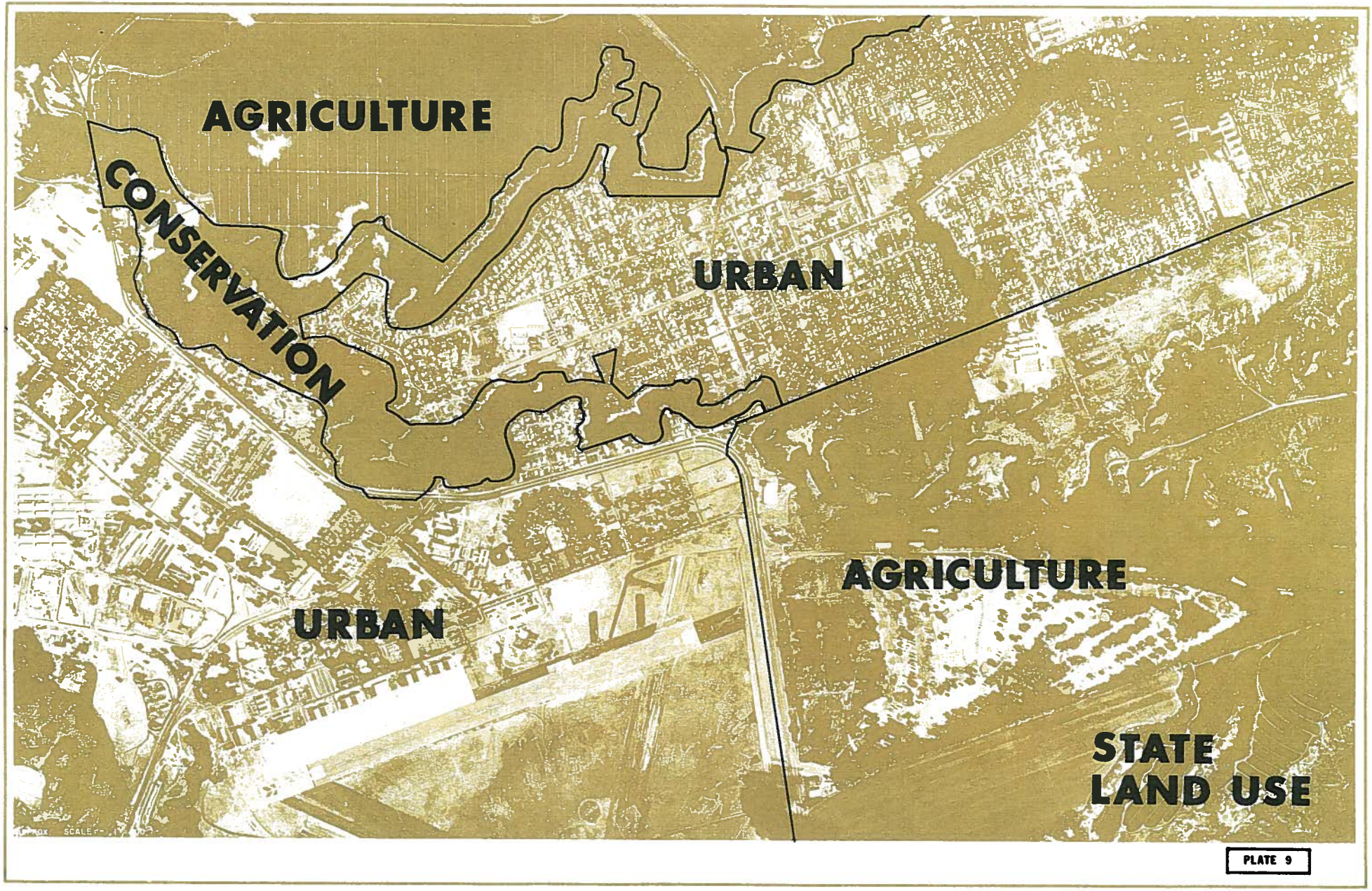
Designated uses for the study site do not permit the use of it for dragstrips or as a golf course. Consequently, any proposal which include these type of activities would require a special use permit or a change of the study site's land use classification from agricultural to urban.

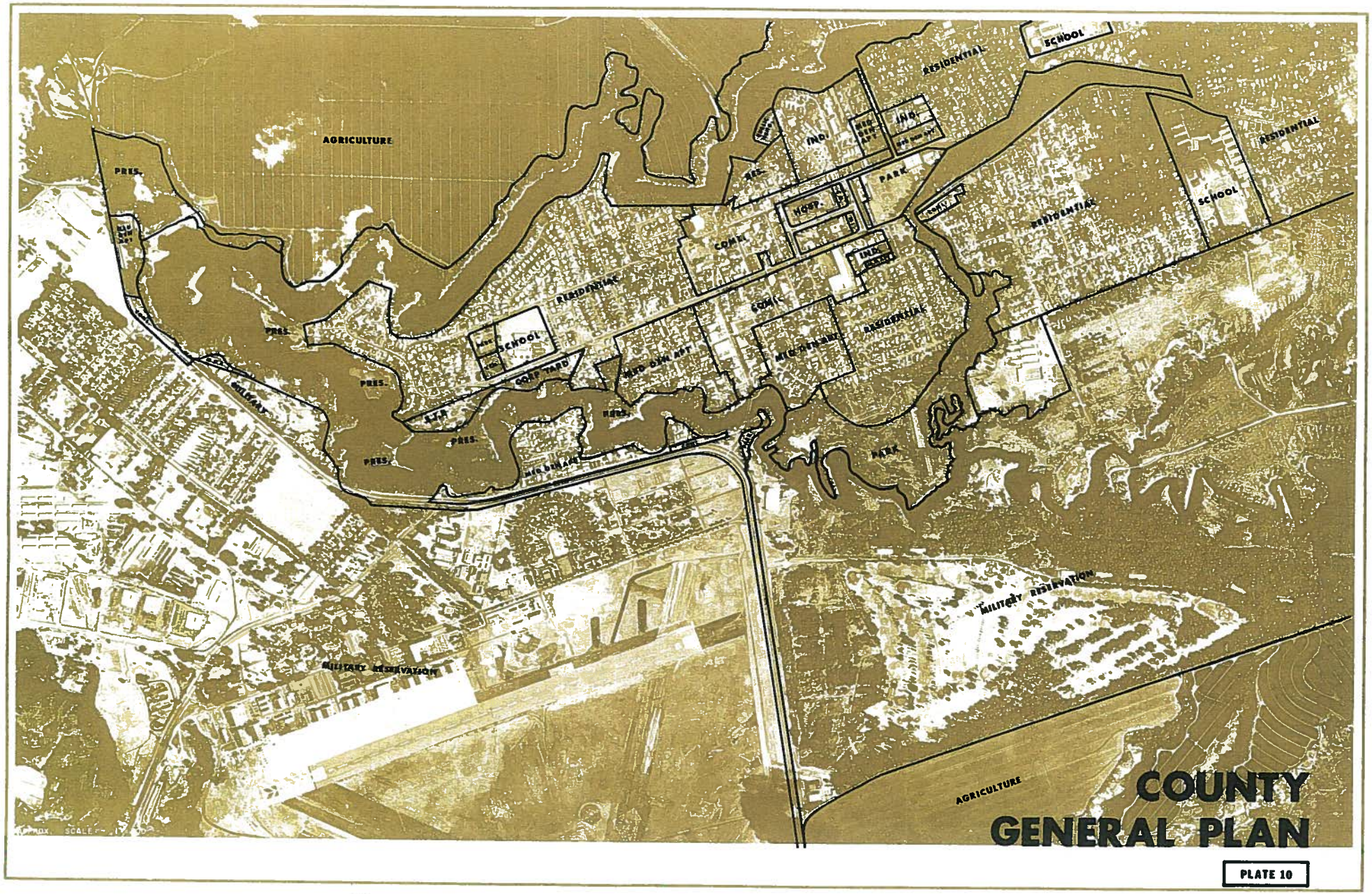
LAND OWNERSHIP AND DEVELOPMENT TRENDS

Land ownership within the urban district of Wahiawa Town consists primarily of individual property owners. Major land owners in the area are the U.S. Army at Schofield Barracks, the U.S. Air Force at Wheeler Air Force Base and Helamano Land Company, Limited (Castle and Cooke, Inc.) which owns land within the Wahiawa Reservoir, the gulch between the study site and the Botanic Gardens, and the cultivated lands bordering Wahiawa and the military reservations.

Recent urbanization in the area has occurred primarily in the Mililani Town development area, located about 2.5 miles south of Wahiawa along Kamehameha Highway. The developers of the town anticipate to eventually utilize about 3,000 acres and expect upwards of 60,000 residents within 15 or 20 years.

Military construction master planned for the Schofield Barracks area includes a warehouse complex in the East Range training area, between the South Fork of Kaukonahua Stream and Leilehua Golf Course. In addition, a family housing complex, which will consist of 966 units on 121 acres, is planned for the


AGRICULTURE
CONSERVATION
URBAN
URBAN
AGRICULTURE
STATE
LAND USE
PLATE 9


AGRICULTURE
PRES.
RESIDENTIAL
SCHOOL
IND.
PARK
COMM.
HOSP.
MED. OFF. BLDG.
MED. DEN. APT.
MED. COM. APT.
CORP. YARD
MILITARY RESERVATION
AGRICULTURE
COUNTY
GENERAL PLAN
PLATE 10

area directly makai of the Wahiawa Intermediate School and adjacent to the Waipio end of Rose Street. Construction of this development is scheduled to begin in fiscal year 1974; however, completion of the project is not expected until fiscal year 1975. The main access to the area will be via Rose Street.

Another future development to be located adjacent to the study site is the proposed H-2 Freeway. The recently completed preliminary plans of the State Department of Transportation indicate that the freeway would be located on a high embankment within the area between Kamehameha Highway and the reservoir, leaving a narrow strip of land (about 3 feet minimum) between the reservoir's edge and the freeway. The U. S. Army Hawaii's Real Estate Division has said that this narrow strip of land would be useless to the Army's needs and, therefore, could probably be acquired for park use. The Army suggests that the State could possibly lease the land for a maximum of 5 years by permission of the local Army Command while processing a formal request to Congress to have the land deeded back to the State for park use.

SURROUNDING RECREATIONAL FACILITIES AND ACTIVITIES

Wahiawa is a community where residents of all ages participate in organized forms of recreation. To satisfy such recreational needs, the area is provided with many recreational facilities and activities on an annual basis. Table I-5 summarizes these and other types of facilities and activities that are available in Wahiawa and its immediate surrounding areas.

PLAYGROUNDS AND PARKS

City and County playgrounds and parks which comprise the "Wahiawa Complex" include Kipapa Park, Mililani Waena Park, Iliahi Playground, Kaala Playground, Wahiawa Recreation Center, and Whitmore Playground. Table I-6 shows the type and number of recreational facilities that are available at each of the playgrounds. The Wahiawa Botanic Garden is also administered by the City and County; however, it is not part of the "Wahiawa Complex." The Botanic Garden offers nature study as well as limited picnicking within the park area. It is estimated that about 15,000 persons visited the Botanic Garden in 1970.

During 1970, about 4,000 residents of all ages were involved within the "Wahiawa Complex." Organized activities consisted of arts and crafts workshops, educational and interest classes, games, sports, and meetings of teenagers and

TABLE I-5

SURROUNDING RECREATIONAL FACILITIES

NAME OF FACILITY	LOCATION	AREA IN SQ. FT.	FACILITIES																ACTIVITIES																	
			Trail	Overnight Camping	Shelter Pavilion	Picnic Tables	Cooking Facilities	Rest Rooms	Recreation Bldg.	Gymnasium	Parking	Food Concessions	Playfield	Golf Course	Pool	Boat Ramp	Children Play Eqp.	Reservoir	Golf Driving Rng.	Picnicking	Nature Study	Hiking	Swimming	Hunting	Golfing	Tennis	Volleyball	Basketball	Baseball	Football	Children Play	Summer Fun Prgm.	Softball	Senior Citizen Act.	Adult Classes	Youth Crfts. & Sprt.	Tiny Tots Classes	Fishing
Mililani Waena Park	Mililani	7.0			*			*					*													*		*					*		*		
Kipapa Park	Waipio	5.0			*			*					*														*	*				*	*				
Iliahi Playground	Wahiawa	3.1			*			*					*				*										*	*			*	*		*		
Kaala Playground	Wahiawa	2.2			*			*					*														*	*			*	*		*		
Wahiawa Rec. Ctr.	Wahiawa	10.0			*			*	*	*	*		*		*		*			*						*	*	*	*	*	*	*	*	*	*	*	
Wahiawa Bot. Grdn.	Wahiawa	26.9			*	*					*									*	*																
Whitmore Playground	Whitmore	2.3						*					*													*		*				*					
Hale Kula School	Wahiawa	und						*			*		*															*		*		*					
Wheeler Elem. School	Wheeler AFB	und						*	*		*		*														*	*		*		*					
Wheeler Inter. School	Wheeler AFB	und						*			*		*																	*		*					
Wahiawa Inter. School	Wahiawa	und						*			*		*													*	*	*		*		*					
Wahiawa Elem. School	Wahiawa	und											*																	*		*					
Kaala Elem. School	Wahiawa	und						*			*		*																	*		*					
Iliahi Elem. School	Wahiawa	und						*			*		*																	*		*					
Kipapa Elem. School	Waipio	und						*			*		*														*	*		*		*					
Kunia Elem. School	Kunia	und						*			*		*															*		*		*					
Helemano Elem.School	Helemano	und						*			*		*																			*					
Wahiawa Reservoir	Wahiawa	und														*	*										*	*		*		*					
Mililani Golf Course	Mililani	und						*			*	*	*					*						*													*
Hawaii Country Club	Kunia	und						*			*	*		*				*					*														
Leilehua Golf Course	Schofld.Brk.	und						*			*	*		*				*					*														
Kalakaua Golf Course	Schofld.Brk.	und						*			*	*		*				*					*														
Wahiawa Trail	Schofld.Brk.	4.0mi.	*																		*																
Poamoho Valley Trail	Whitmore	3.0mi.	*																		*																
Poamoho Valley Trail	Helemano	3.4mi.	*																		*																

TABLE I-6

PLAYGROUND FACILITIES
IN THE WAHIAWA COMPLEX

LAYGROUND	LOCATION	SIZE	TYPES OF FACILITIES													
		AC	Recreation Bldg.	Gymnasium	Basketball Court	Volleyball Court	Baseball Field	Softball Field	Tennis Courts	Bathhouse	Swimming Pool	Children Play Apparatus Area	Parking Stalls	Comfort Station	Pavilion
Kipapa Park	Waipio	5.0			2	2		1						1	1
Mililani Waena Park	Mililani Town	7.0						1	2					1	1
Iliahi Playground	Wahiawa	3.1			1	1		1				1		1	
Kaala Playground	Wahiawa	2.2			*1	*1		1						1	1
Wahiawa Rec. Center	Wahiawa	10.0	1	1	*1	*1	1	*2	4	1	1	1	74	1	
Whitmore Playground	Whitmore	2.3			*1	*1		1						1	
	TOTAL		1	1	6	6	1	7	6	1	1	2	74	6	3

*Lights available.

of senior citizens. The types of programs offered within the "Wahiawa Complex" are as follows:

ORGANIZED PROGRAMS

Park	Programs
Wahiawa Recreation Center	Winter, Spring, Summer, and Fall programs for all ages consisting of organized sports and classes
Iliahi Playground	Summer Fun
Kipapa Park	Winter, Spring, and Fall programs of organized sports and classes and Summer Fun
Mililani Waena Park	Spring program consisting of tennis classes only
Whitmore	Winter, Spring, and Fall programs consisting of arts and crafts classes and organized sports

One of the most active sports program in the area is that of the Wahiawa Little League. In 1970, the League was comprised of 21 teams with about 310 boys participating. The League season usually is active from April to July. Needs cited by the Wahiawa Little League include a regulation Little League baseball field for tournaments and more playfields for League games and practice. The Little League indicates that these needs will be further compounded if an estimated 500 boys "turnout" in 1972. The Little League currently competes for use of the ballfields with the Pony League's 75 boys, and the community softball leagues' 200 adult players.

CLUBS

The 4-H clubs in the area consist of about 200 youths, mostly girls, ranging in age from 9-19. The clubs are sponsored by the University of Hawaii's Cooperative Extension Service. There are about 20 clubs, some of which meet once a week and others about twice a month. The clubs work on about 100 various projects, which include such diverse interests as photography and electronics, in addition to participation in agricultural related activities. Another active organization in the area is the Wahiawa YMCA which had a total 1971 membership of about 3,069 persons.

Of the total 1,769 were under 18 years of age, 178 were between the ages of 18 and 29, and 1,122 were over 30 years of age. In this last group, about 1/3 were participating members and the remaining 2/3 were financial contributors. One of the more active senior citizens groups in the Wahiawa area is the Rainbow Club which meets once a week, and participates in organized activities, classes, and tours at Wahiawa Recreation Center.

GOLF COURSES

Golf courses within the Wahiawa area consist of the Mililani Golf Course at Mililani, the Hawaii Country Club located off Kunia Road about 5 miles west of Wahiawa Town, Leilehua Golf Course and Kalakaua Golf Course, both of which are at Schofield Barracks. Mililani Golf Course and the Hawaii Country Club are private clubs; however, they are open to the public. The two military clubs are also open to the public. The nearest public golf course is located on the Waipio Peninsula near Waipahu. The golf course, officially named the Ted Makalena Golf Course, was recently opened for play on May 1, 1971.

HIKING TRAILS

Nearby hiking trails are available in the State Forest Reserve area of the Koolau Range directly above Wahiawa Town, Whitmore Village, and the U. S. Army Helemano Radio Station. The trail between Wahiawa Town is about 4 miles in length; starting at California Avenue, the trail subsequently meanders through the U. S. Army East Range training area to the summit of the Koolau Range. Permission from the G-3 section of Schofield Barracks is required to enter the East Range training area. The trail above Whitmore Village is shorter, being about 3 miles in length, and more or less follows the Poamoho Stream in Poamoho Valley. The trail above Helemano Radio Station, in turn, follows the Poamoho Valley ridge line to the summit of the Koolau Range for a distance of 3.4 miles. A trail along the ridge of the Koolau Range allows hikers to follow other trails leading up to the summit of the Koolau Range.

FISHING

Of the total amount of freshwater fishing licenses issued in FY 1970, Wahiawa Sporting Goods estimates that about 50 percent of the licenses were issued to Wahiawa residents, 25 percent were issued to military personnel from Schofield Barracks, and the remaining 25 percent were issued to fishermen for other parts of the island, including a few non-residents.

TABLE I-7

CREEL CENSUS AT WAHIAWA PUBLIC FISHING AREA

	Date/Day	Number of Boat Fishermen	Number of Boats	Number of Shore Fishermen	Total Number of Fishermen
1967	1/17 (Saturday)	8	5	45	53
	2/1 (Wednesday)	1	1	12	13
	3/28 (Tuesday)	4	2	11	15
	4/29 (Saturday)	8	4	42	50
	5/28 (Sunday)	17	8	51	68
	6/9 (Friday)	2	1	14	16
	7/30 (Sunday)	9	3	76	85
	8/14 (Monday)	0	0	14	14
	10/14 (Saturday)	15	8	57	72
	11/17 (Friday)	5	2	29	34
	11/19 (Sunday)	4	3	55	59
	12/12 (Tuesday)	4	2	3	7
1968	1/20 (Saturday)	23	11	48	71
	2/1 (Thursday)	5	4	14	19
	3/3 (Sunday)	11	5	71	82
	4/22 (Monday)	6	3	15	21
	5/19 (Sunday)	21	10	53	74
	6/26 (Wednesday)	1	1	29	30
	8/25 (Sunday)	7	4	69	76
	8/31 (Saturday)	13	7	100	113
	9/25 (Wednesday)	2	1	36	38
	10/19 (Saturday)	10	4	48	58
	11/18 (Monday)	6	4	10	16
	12/4 (Wednesday)	0	0	9	9

TABLE I-7 (Cont'd)

CREEL CENSUS AT WAHIAWA PUBLIC FISHING AREA

	Date/Day	Number of Boat Fishermen	Number of Boats	Number of Shore Fishermen	Total Number of Fishermen
1969	1/18 (Saturday)	2	2	19	21
	3/25 (Tuesday)	2	2	21	23
	7/19 (Friday)	3	2	2	5
	4/13 (Sunday)	8	4	38	46
	5/24 (Saturday)	15	7	51	66
	6/21 (Saturday)	8	4	51	59
	7/8 (Tuesday)	4	2	32	36
	8/28 (Thursday)	4	3	33	37
	9/14 (Sunday)	23	13	57	80
	10/29 (Wednesday)	8	4	31	39
	11/8 (Saturday)	21	11	53	74
	12/5 (Friday)	5	2	12	17
1970	1/27 (Tuesday)	8	6	15	23
	2/8 (Sunday)	23	10	60	83
	3/22 (Sunday)	9	5	81	90
	4/7 (Tuesday)	11	7	22	33
	5/16 (Saturday)	23	12	62	85
	6/8 (Monday)	0	0	21	21
	7/9 (Thursday)	2	1	27	29
	8/29 (Saturday)	15	8	47	62
	9/23 (Wednesday)	5	2	15	20
	10/31 (Saturday)	12	7	41	53
	11/22 (Sunday)	8	7	100	108
	12/15 (Tuesday)	7	3	6	13

From available data, a breakdown of fresh-water licenses issued on Oahu from fiscal year 1968 to fiscal year 1970 is shown on the following table.

TABLE I-8

TOTAL NUMBER OF FISHING LICENSES ISSUED ON OAHU FY 1968 - FY 1970

	FY 1968	FY 1969	FY 1970
Adult Residents	2,695	2,568	3,575
Juvenile Residents	464	526	848
Non-Residents	13	5	13
Tourists	24	38	65
Duplicates[1]	26	22	31
TOTAL	3,222	3,159	4,532

[1]*Duplicates represent those boaters who lost their first license and purchased a new license.*

Creel census tabulations (Table I-7) from 1967-1970 are based on samplings taken by the State Fish and Game Division in each of the respective years. For each 12-month period, 6 weekdays and 6 weekend days were selected at random in order that usage of Wahiawa Fresh Water Fishing area might be sampled and analyzed. For a 12-hour period on each selected date, all fishermen observed were interviewed. The following figures represent only use counts which segregate the total number of fishermen on a given day by (1) the total number of shore fishermen and (2) the total number of fishermen fishing from their boats. In addition, the number of boats observed is also recorded. The data is only a summary compilation of the entire raw data collected during these observations.

TABLE I-9

ESTIMATED NUMBER OF DAILY FISHERMEN
(BASED ON AVERAGES OF 1967-1970 CREEL CENSUS DATA)

Day of Week	Average Number Fishing in Boats	Average Number of Boats	Average Number Fishing Along Shore	Total Number of Fishermen/Day
Sunday	13	7	65	78
Monday	3	2	15	18
Tuesday	6	4	24	30
Wednesday	3	2	22	25
Thursday	4	3	25	29
Friday	4	2	14	18
Saturday	13	7	51	64
Weekly Average	46	27	216	262

ANALYSIS of BACKGROUND DATA

GENERAL

The study site is in an excellent location for a Park, situated on level terrain and contains approximately 12 varieties of trees and shrubs. Use of the site as a park is enhanced by the State's highly successful fish stocking program for the benefit of local anglers. The climate is appealing with a mean annual rainfall of 44.7 inches, and cool, light tradewinds.

Of the site's 66 acres, 36 acres are suitable for land-related recreational activities, such as hiking, picnicking, camping, and bicycling while 20 acres are available for water-oriented activies. Approximately 10 acres of steep slopes are undesirable for any recreational use. Existing trees, shrubs and other types of vegetation, for the most part, enhance the study site and should be retained for their aesthetic value.

Land use designations of the State Land Use Commission and zoning of the City and County of Honolulu permit park development within the study site.

Existing power lines and poles, if left in their present location, will detract from the natural quality of the site; however, landscaping in coordination with Hawaiian Electric Company, may minimize the visibility of such intrusions. The State is allowed to construct, use, cross over and/or under the easements in such a manner as to not create unreasonable interferences. However, any development over HECO's easements must be reviewed by their office.

VALUE OF SITE FOR STATE PARK

The site which is approximately 20 to 30 minutes (by automobile) from downtown Honolulu and an hour from Kailua Town, is well located for use by Oahu residents and can easily serve Oahu's urban population. Its location along a scenic freshwater body provides the State of Hawaii with a rare opportunity to develop a unique State park along the Wahiawa Reservoir. The reservoir represents an unusual and, beautiful environmental feature in the Wahiawa area and, the development of the site for park purposes will preserve and enhance the character of the reservoir at the same time.

The opportunity to participate in freshwater fishing on Oahu is extremely limited and, the development of related recreational facilities i.e., camping and picnicking, will increase and enhance fishing along the shore of the reservoir. The site is readily accessible to all the residents of Oahu and the improved access to the reservoir and the increased fishing opportunities make development of the site for part purposes very desirable.

PARK ACCESS

Access to the site via Walker Avenue is limited. This street has one lane each way with no provisions for parking. However, parking is allowed and traffic is seriously restricted especially during church services in the area. Alternatives to improve the access situation are: (1) provide a new second access to the site and restrict traffic circulation to one way within the study site; (2) widen Walker Avenue and Avocado Street in accordance with the City and County General Plan and provide single access via Walker Avenue.

There are three possible ways to provide an additional access to the site. The first would be to construct an access through the Hawaiian Electric substation site. This would necessitate relocation of the substation, which appears infeasible.

The second would be to provide access from Plum Avenue and Neal Avenue, north of the site. This would require the condemnation of one or two residential lots.

The third possibility is to develop an access along the southern boundary of Wahiawa Intermediate School, through Army lands. This third possibility is thought to be practical. The Army has indicated a willingness to approve the construction of this access, perhaps because of their plans to develop Military Housing east of Rose Street, at the end of the proposed access road. A drawback to providing any second access is the high cost involved and the security problem introduced by having two entrances to the park.

IMPACT OF STATE PARK DEVELOPMENT

A limited economic impact is foreseen by the creation of a State Park in the Wahiawa area since an increase in sales is expected for only those commercial establishments retailing gasoline, food or sporting goods. Such an increase would be caused by the growing number of fishermen, as well as the influx of picnickers, campers, bicyclists, hikers, and nature study enthusiasts.

Development of a State Park, which would retain its natural environment, would bring about significant social and environmental effects to the Whitmore-Wahiawa-Mililani area. If pedestrian and/or bicycling trails are developed within the study site and a pedestrian way constructed from the site to the Botanic Garden, an increase in local pedestrian traffic should be expected. Students of Wahiawa Intermediate, Wahiawa Elementary, and Leilehua High Schools would probably utilize the gulch trail most in walking or bicycling to and from school, as well as occasional walks to and from the State Park. The emergence of trails may also create a local demand for more pedestrian ways and/or

bike trails to be located throughout the Wahiawa Community. Such a result would improve the aesthetics of the community; eliminate minimal amount of air pollution generated by local vehicular traffic; and create a greater sense of community belonging among Wahiawa's residents, by making neighborhoods more accessible and attractive to each other.

The above also pertains to the existence of the park itself, which, for example, might attract housewives from different neighborhoods to meet at the park for a picnic lunch; take their babies for a stroll or walk, or take their children to a large, open, non-designated play area, where non-organized and non-facility based recreational activity would take place. A small sampling of Wahiawa students may find exciting changes in their science and physical education classes as a portion of their educational experiences could be held within the park itself. Students will also enjoy hiking, fishing, bicycling, or quiet contemplation among a natural setting of the State Park.

PARK EXPANSION

In order that optimum use can be made of the natural features of the site, it would be desirable for the park site to also include (1) gulch area above the northeast part of the study site connecting the park to the arboretum, (2) the narrow strips of land between the reservoir and the H-2 Freeway, which will not be acquired by the State Department of Transportation, and (3) a narrow strip of land (outside the study site) along both sides of the reservoir, which extend from the study site's existing trestle to a point approximately 0.7 miles upstream.

Future consideration should be given to addition of the three areas just described to enhance the park from an environmental standpoint. Consideration should also be given to adding the lands immediately east of the site to the park. This area bounded by the Intermediate School, Rose Avenue and the reservoir is owned by the Army and presently unused. It is relatively flat and contains some natural vegetation. It could be used for overnight camping activity as well as other recreational uses.

Expansion into the gulch area, which is owned by Castle and Cooke, Inc., would provide the area with a continuous natural green strip between the Wahiawa Botanic Garden and the study site. The green strip can be used for strolling and hiking and would provide an ideal extension to any trails developed within the proposed park site. Any bicycle trails developed within the proposed park site should also be extended through the gulch area, if possible. In this regard, the County Botanic

Gardens Division of the County Parks Department has expressed interest in expanding the Wahiawa Botanic Garden into the gulch area. The Division's thoughts are to develop an arboretum of forest trees, with understory plantings, from cool tropics of the world. Forest trees might include the diptero carpus from the uplands of Australia, which stands 100 to 150 feet tall when full grown. The area would also contain picnic areas, as well as pedestrian ways which could make the area accessible from the surrounding residential community. The County estimates that this proposal, which would include purchase of land, installation of a rudimentary water system, development of trails, picnic areas, and a restroom facility, would cost approximately $200,000. However, this proposal is not formalized and is not part of any current or future County Capital Improvements Program.

Acquisition of the strip of land between the H-2 Freeway and the reservoir is necessary to maintain a green natural buffer zone between the future highway and the study site. With the selected placing of additional plantings, noise and aesthetics intrusions would be minimized. In the acquisition of the land for the proposed H-2 Freeway, the State Department of Transportation will probably not acquire all land adjacent to the Wahiawa Reservoir. Thus, the State Department of Land and Natural Resources should acquire any remaining land area between the freeway and the reservoir. Such action could be taken by the Department of Land and Natural Resources since the narrow strip of land remaining from the freeway construction would be useless to the Army. Initial efforts should consist of negotiation with the Army and the Department of Transportation to establish the limits, timing and procedures for the adjacent H-2 Freeway property acquisition. The Department of Land and Natural Resources should then proceed to acquire the remaining adjacent strip bordering the reservoir. This probably could best be accomplished by obtaining a short term lease from the local Army Command, followed by permanent "assignment" to the State by Congressional action. The local Army Command has authority to lease properties for a period not to exceed 5 years. Federal lands deeded permanently to the State require Congressional action.

In order to assure that the proposed park site and reservoir are retained in their natural setting and remain protected from future encroachment by environmental intrusions, a buffer zone should at least consist of a 100-foot strip of land extending from the proposed acquisitions bordering the H-2 Freeway to the vicinity of the Army's bridge, immediately upstream from the study site. Supplementary land area along both sides of the stream would also provide the park site with additional area for hiking, rowing, bicycling, picnicking and fishing activities.

If this area were connected to the site with footbridges, park users could take a scenic 2.2-mile hike along both sides of the reservoir. A diversion through the gulch area into the Botanic Garden would increase this hike to a length of approximately 2.7 miles. In addition, the narrow strip of land opposite the study site would further act in minimizing the impact of future highway development if the State Parks Division, with permission of the Army, would place additional plantings along the "new" southern boundary of the park in order that noise from future highway development and traffic could be significantly reduced. In this location, plantings would also visibly screen the H-2 Freeway from the park site.

Unfortunately, the Army has stated that it does not want the park expanded along both sides of the stream since future plans call for the development of a warehouse complex in the area between the stream and Leilehua Golf Course. In addition, a family housing complex, consisting of 966 units on 121 acres, is planned for the area directly east of the Wahiawa Intermediate School, However, the Army is agreeable to connecting an access road to Rose Street from the park.

If the plans of the Army can be modified and both sides of the reservoir can be used, a connection by means of a footbridge across the reservoir would be desirable. If the trestle were reconstructed and at least two other footbridges constructed, park users could make optimum use of additional area across the reservoir. Footbridges, adequate for bicycle traffic should be considered at the following locations: a) at the site of the old railroad trestle; b) at a site approximately 1,500 feet upstream from the eastern property boundary (possibly utilizing the existing piers of a destroyed Army bridge); c) at the old crossing in the lower part of the gulch, which in the past made the study site accessible from Wahiawa Intermediate School (utilizing the existing bridge piers); d) in the area south of the existing concrete foundation. Hikers, fishermen, bicyclists, and picnickers would particularly benefit since they would be able to enter the additional Army land from at least two more points. Additional footbridges would also eliminate the need to "double back" which would enhance the enjoyment of a scenic trail along both sides of the reservoir.

POSSIBLE COORDINATION WITH OTHERS

In order to develop a viable single access via Walker Avenue which can be utilized for the next several years, the widening of Avocado and Walker is required. Coordination with the City and County should be by the Department of Land and Natural Resources which should formally urge the County Traffic Department to make such improvements as soon as possible.

For incorporation of rowing, sailing, paddle boating or other recreational activities in the reservoir, initial contact should be made with the State Attorney General's Land Department to review the liability of the State in this regard. The question of liability is complex since it involves various factors such as the Waialua Sugar Company's water rights; the State's ownership of land within the reservoir impoundment area and its accompanying liability; Act 186 which was passed in the 1969 Legislature for the purpose of encouraging landowners to make land and water areas available to the public by limiting the owner's liability and duty of care; and past liability lawsuits involving the State, the Army, and the Waialua Sugar Company. Once the State's liability status has been reviewed and analyzed, the State Parks Division should act accordingly by 1) initiating action to amend State Fish and Game Regulation Number 31 in order that rowing and other non-motorized boating activities may be allowed on Wahiawa Reservoir and, 2) coordinating any proposed changes with Waialua Sugar Company and the U.S. Army, even though Act 186 may exclude them from any liability.

In addition to those agencies mentioned above, the development of the study site for a State park should be coordinated with the joint users of the new Wahiawa Community Center, which are the State Department of Health and State Department of Social Services and Housing. Their comments concerning whether a State park would be compatible with the types of programs they propose to provide at the Center would be helpful in the ultimate development of the study site for a State park. Coordination should continue with the local schools, especially Wahiawa Intermediate School Student Council, Leilehua High School Student Council, and local community groups such as the Wahiawa Community and Businessmen Association Master Park Plan Committee and the Mililani Town Community Assocation Land Committee, Wahiawa Citizens Advisory Board for Parks and Recreation and Hawaii Freshwater Fishing Association.

In addition to the agencies mentioned above, development of the State Park should also be coordinated with those agencies and groups noted as "sources of information."

POSSIBLE OTHER USES OF THE SITE

Early in 1971, the Hawaii Housing Authority (HHA) made an application to the Federal Housing Assistance Administration of the Department of Housing and Urban Development for needed housing in the Honolulu judicial district. HHA's rationale for this application is that there is a need for 40 dwelling units in the Wahiawa area to accommodate senior citizens and their dependents. HHA feels that 40 dwelling units should consist

of studios and one-bedroom units which would most appropriately meet the needs of the area. Since submittal of the application, HHA has made no effort to find an area for the development of the proposed 40 dwelling units. Generally, HHA either awaits proposals from local developers or, seeks its own possible locations. The latter normally does not occur until approval has been granted to HHA's federal application.

With regard to the study site, the development of 40 dwelling units is quite feasible considering the sufficient quantity of land for providing an open, spacious quality of living. Because of the amount of area available within the study site, an integrated recreational area necessary to accommodate a development of that size could easily be developed. In addition, the site's natural setting, accessibility to nearby commercial areas and community recreational facilities make the site a desirable location for such a development.

If the site were developed with the elderly in mind, residents would encounter no difficulty from the site's topography while participating in recreational activities such as strolling through natural pedestrian ways or trails. Further more, retired persons could enjoy the many recreational aspects appropriate to the reservoir such as fishing, nature study and bicycling. Thus, with thoughtful design the study site could be developed into an aesthetic, practical, and very comfortable environment for living.

Considering other aspects of the study site for such a development, the large number of easements would limit the development aspects of the site since residential structures cannot be erected within the easements. Even though a well-planned neighborhood could be developed within the study site, optimum use of the land should not involve any housing development since the site would tend to afford recreational opportunities to a selected few, who may benefit as much, if the site were developed as a State park. Another minor aspect which would confront HHA would be the existing land use designations and zoning within the study site. The State Land Use Commission has designated the land area within the study site as "Agricultural," except for the 20.1 acres within the reservoir which has been placed in "conservation." The City and County Planning Department has also zoned the site for "agricultural purposes," except for approximately 8 acres in the upper portion of the site which is part of a R-6 residential district. Thus, in consideration of the two-dimensional configuration of the land, as well as the required area necessary for access to any R-6 housing, development does not appear to be economically feasible. In addition, the rules and regulations of the Federal Housing Assistance Administration

stipulate that no State agencies (such as HHA) participating in Federally-insured housing programs may propose or design developments which are in conflict with local use designations and/or zoning.

Although the land is suited for agricultural purposes and approximately 28 acres designated for such use, the limited size of the study site and its detachment from other cultivated lands make it suitable primarily for truck farming operations. However, weather conditions, a limited market, as well as the high cost of land and labor, have discouraged many from entering into the truck farming business on Oahu. Such a trend is evident when viewing the number of farms growing vegetables, melons and fruits (excluding pineapple) which has dropped rather steadily from 682 farms in 1960 to 386 farms in 1969, with slight increases occurring only from 1961 to 1963.

In 1968, Sanford Hill, a consultant for the City and County Parks Department, prepared an island-wide park plan which indicated potential recreation areas and recommended future capital improvement projects. The Wahiawa site was noted as an excellent location for a part of a "Wahiawa Regional Park."

The entire Regional Park as proposed would contain some 220 acres which would also include a considerable amount of adjacent Army lands located east of the study site, as well as the gulch area between the Wahiawa Botanic Garden and the study site. The study area would be used for promoting fishing and boating activities on the reservoir which would be supported by car and trailer parking facilities, boat docking and service facilities, and pedestrian trails to points of interest. Adjacent Army lands would be utilized for a minor sports center which would include an arena for basketball, boxing, gymnastics, outdoor swimming, baseball, softball, tennis, archery, and volleyball. If sufficient Army lands could be made available, an 18-hole public golf course would also be developed. The gulch area would also, hopefully, be acquired in order that one continuous recreation area might be developed.

RECREATIONAL NEEDS

In order to determine the recreational needs of the Whitmore-Wahiawa-Mililani Town area, a series of discussions was held with various groups within the community. In addition, consideration was given to recreational facilities and activities in the area, as well as on other areas on Oahu. Such a detailed recreational survey of the related study area is not required by the scope of study; however, the following recreational needs analysis is provided.

Existing leisure time activities and facilities in Wahiawa and its surrounding areas, generally

center around group experiences such as Little League baseball, swimming classes, hula and ukulele classes, as well as social clubs for teenagers, adults and senior citizens. Existing programs and facilities for organized recreation are adequately provided in Wahiawa and its surrounding areas, with two possible exceptions discussed as follows:

TENNIS

Currently, there is a demand for two more tennis courts in Mililani Town, especially during the months from April through September. However, it is anticipated that such a demand will be met by those tennis courts planned in conjunction with the future Mililani Town Neighborhood Park. Land has already been acquired for this purpose by the City and County Parks Department. Development of the tennis courts is expected in the neighborhood park's second or third developmental increment which is to be in progress sometime in 1973 or 1974. Future demand for tennis courts hopefully will be met by the planned district park for Mililani Town, once the community reaches a population of 25,00 residents.

LITTLE LEAGUE BASEBALL

Needs cited by the leaders of Wahiawa Athletic Association and organizers of local baseball leagues concerning the growing demand of league baseball in the Wahiawa area should be seriously considered. This situation requires cooperation from all agencies concerned which include the Wahiawa Athletic Association, The City Parks Department, and the State Department of Education (DOE). Cooperation among these groups does not necessarily require budget appropriations by the government or large fund-raising campaigns by youths in local baseball leagues. The first step in finding a solution would be a joint meeting between the three groups to discuss and work out what basically may be a simple problem. A suggested solution would be for the DOE to allow the Wahiawa Athletic Association (WAA) to reserve softball fields for Little League practice and games with the understanding that such permission would assume no liability by the DOE in regard to injuries incurred to participants in the Little League. The WAA could assist in this effort by notifying parents of Little League participants concerning the non-liability of DOE. If non-liability status is not legally possible, it should be noted that the Little League already carries an insurance policy which covers participants during play. City Parks should continue reserving the existing fields for Little League games. In addition, they could supply lime and the necessary

equipment ("limer") utilized in lining the softball fields for games. In turn, parents of Little League participants or participants themselves could be scheduled on a rotating basis to "line" the ball fields ayproximately 30 minutes prior to game time. As the demand for playing area increases, Little League organizers could add additional days to the League "schedule" in order to accommodate more games being played. Currently, games are played only on Saturdays and Sundays, whereas other Oahu leagues often schedule midweek games.

Because of increased urbanization on Oahu, the number of remaining natural area where man can enjoy nature is becoming scarce. There is a continuous need for this kind of exposure since nature provides us with good examples for living, as well as a place for individual contemplation and solitude in a graceful setting so diverse from our "routine" and leisure time experiences. Thus, temporary changed in environmental settings, such as urban to nature, are a valuable asset to our lives and should be considered as a necessity when considering the current and future needs of our Oahu environment.

There are no camping facilities in Wahiawa. Nearest camping facilities are at Haleiwa Beach Park which is located approximately 11 miles from Wahiawa Town, but only two camping sites are available there. In addition, 290 other camping sites are available at 17 other locations around Oahu. Campers must obtain permits which allow usage of a site (for a group of 10 persons or less) for one week. During peak months of May through September, the City Parks and Recreation Department generally issues about 500 permits per week and approximately 150-200 permits per week during the months of October through April. Fortunately, only 3 to 4 persons, on the average, utilize one permit which brings usage during the summer months to around 2,000 campers per week.

Since the development of camping areas at Keaiwa Heiau State Park in 1967, almost 9,000 campers have been accommodated in this State Recreation Area. Use of camping facilities are reflected in the following table on a monthly basis. The number of campers using this facility has increased substantially and many more people are camping in the months of November through February.

In addition, the recent influx of motorized camping vehicles in the State should be taken into account in planning additional camping facilities. Since the rental cost of these campers is usually less than a hotel or State-operated cabin and the vacation experience more closely related to camping, the demand for this type of camping is expected to increase. Enlarged parking areas and ancillary facilities

TABLE I-10

CAMPING
KEAIWA HEIAU STATE PARK

YEAR	1967		1968		1969		1970		1971	
	Permits	People	Permits	People	Permits	People	Permits	People	Permits	People
January			5	62	3	40	6	32	16	172
February	N/A	N/A	3	36	7	52	9	114	21	247
March	N/A	N/A	2	31	13	144	12	228	22	232
April	N/A	N/A	6	77	11	243	10	145	32	310
May	N/A	N/A	4	15	17	238	15	205	28	422
June	N/A	N/A	11	233	13	297	21	272	41	462
July	9	626	5	45	16	192	33	536	33	163
August	3	52	8	71	21	246	32	275	47	438
September	5	44	10	83	4	22	24	261	29	190
October	8	65	8	31	9	121	23	262	20	239
November	1	16	8	153	9	92	16	127	N/A	N/A[1]
December	2	30	-	-	8	120	10	95	N/A	N/A[1]
TOTAL	28	833	70	837	131	1807	211	2562	289	2875

[1] *At the time this report was written, data was not available for these months.*

will have to be provided at each site if this demand is to be successfully accommodated.[1] In addition, in providing for such a demand, sufficient land area must be available in order that such facilities do not overwhelm any site with facilites or become semi-permanent residence areas.

There is one limited picnic area which is located in the Wahiawa Botanic Garden; however, no facilities such as tables or fire-pits are provided.

There are limited local or short pedestrian trails. A beautiful walk through the Botanic Garden is available; however, the Garden is designed more with an educational setting in mind which limits leisure time activities to passive strolling through the Garden and eliminates some forms of active recreation which could take place in a completely natural setting.

There are no water-oriented facilities and activities (other than the existing boat ramp and fishing) on the 333-acre Wahiawa Reservoir which is the second largest fresh-water body in Hawaii. No opportunities have been given to non-fishing residents to enjoy the reservoir. Such an opportunity could be provided by allowing non-motorized boating activities, such as rowing, which could coincide with existing fishing activities. However, boating activities should be limited to non-motorized craft since motor boats would be incompatible with fishing and other passive recreational activities.

There are no designated bike trails or bike-ways on Oahu. There are approximately 28,000 bicycles registered with the City and County of Honolulu. "Bikers Hawaii," a local bicyclist organization of approximately 500 members estimates that 50 percent of the bicycles on Oahu are not registered. A bicycle dealer on Waipahu says approximately 20,000 bikes were sold in 1970, whereas, in 1971, it is estimated that over 25,000 bicycles will be sold. With this demand, there are no bike trails or bike-ways to encourage this excellent form of recreation and transportation.

On Oahu, motor bike trails are also few in number; however, their inclusion into the study site would be undesirable considering the site's location to adjacent residential areas and incompatibility with other recommended recreational opportunites.

Community groups generally concur with the above needs and state that if such activities were incorporated into the park, emphasis should be given to maximizing the natural character of the site. Other predominant requests by community groups included a miniature petting zoo, amphitheatre, open (non-designated) active recreational areas, tot play area, boating and fishing piers, Little League practice and game fields, and tennis courts.

1 *The Division of State Parks questions whether providing such facilities at public expense is justifiable.*

In addition to those facilities and activities which have been ascertained to be lacking and desirable, some activities and facilities have been considered but have been discounted as possible uses.

SWIMMING

Swimming could possibly be incorporated with existing water-oriented activities in the reservoir, especially, if one small area in the reservoir was designated for this purpose. The existing water classification for the reservoir indicates the reservoir waters are suitable for swimming. Generally, however, swimming is not considered desirable because of the reservoir's steep banks, the generally muddy waters, the fluctuation of the water level in the reservoir and the hazards of exposed muddy reservoir bottoms during extreme low water levels.

If swimming were to be permitted, some sand should be imported to create a beach area and to provide a suitable bottom material for the swimming area. The swimming area could best be located in one of the shallow inlets east of the launching ramp. (A floating barrier will separate boaters and swimmers.) Swimming would only be possibly when the reservoir is full or nearly so.

HORSEBACK RIDING

Even though Wahiawa is within a rural area only about 65 horses are owned by residents of Whitmore, Wahiawa, Waipio, and Mililani Town, Schofield Barracks and Wheeler Air Force Base. Most horses are owned by military personnel and their dependents residing in the area. Twenty-two families stable their horses at Schofield Barracks. Of these families, the sport is enjoyed by 5 adults and 17 young persons who ride primarily within the military reservation. In 1968, eight military personnel and dependents, owning 10 horses, formed the Saddle Club of Wheeler. After 3 years, the group has grown to 25 members owning 30 horses. The Saddle Club is an organization of young people since most of its members are between 10 and 17 years of age. However, since the study site is not directly accessible from the existing military stables, the site would probably not be used for riding if trails were developed. If at some future time a riding trail system is developed in the Wahiawa area, a trail through the park would generally be acceptable.

While riding trails are needed in the Wahiawa area the study site would be a good location for a stable and riding area. However, this use would require a minimum of 5 acres for an adequate

operation. Because the land available for park use is limited and stables and riding areas cannot be well integrated with other needed facilities, an equistrian facility should not be included on this site.

Because of the recreational needs of the area, the study site should be developed as a State park with emphasis placed on conserving the area's natural beauty. Activities encouraged should include opportunities for hiking, camping, picnicking, bicycling, fishing, non-motorized boating activities such as rowing, as well as active and passive recreation (in open green areas).

SPECIAL DEVELOPMENT CONSIDERATIONS

Several factors which may effect the development of this site have been described in the "Background" section of this report. The possible means for dealing with these are discussed in the following paragraphs.

While the site is quite open, it is relatively sheltered from wind by the surrounding development and tree growth. High winds occur frequently in the Wahiawa area and the existing plant vegetation on the site should provide adequate protection for outdoor activities, except in extreme conditions. Since some rain does occur throughout the year and could interfere with the use of the site, some protection from rain for people picnicking in the park is recommended. A pavilion type shelter for the use of group campers, as well as individual campers is considered desirable. While the pavilion would function primarily as a cooking and eating area for group campers, secondarily, it could provide shelter during periods of rain. Umbrella type rain shelters constructed as a part of individual picnic tables would provide adequate protection at most times.

The site generally slopes toward the reservoir and surface drainage is adequate. Some ponding occurs after periods of rain in the area between the launch access road and the urban development immediately adjacent to the site north of the launch ramp. Surface drainage across the access road occurs during extreme conditions. A small culvert under the road and a drainage channel directed to the reservoir will eliminate this ponding.

The proximity of the site to the reservoir presents two development concerns. One is an aesthetic consideration, the second is a safety consideration. Because of the level of the water within the reservoir fluctuates throughout the year and because the park site is located at the upper end of the reservoir, during periods when a significant draw-down occurs in the reservoir, much of the aesthetic quality of the reservoir is lost. This results

first of all from the absence of the water, and secondly from the exposure of raw, red banks and bottom areas of the reservoir. However, the reservoir bottom does present an attractive area for exploring during dry periods. The bottom has a rolling silty quality and at most times some water remains flowing in the stream at the bottom.

The reservoir itself is confined to a deep gulch with sharply sloping banks. In some places as indicated on the hazards map in the background section of this report, these banks extend above the water line. In other places steep banks are revealed as the water level in the reservoir drops. These banks present a safety problem where either (1) a steep bank extends above the high water line, or (2) where a sharp drop-off at the edge of the reservoir is obscured by vegetation. In both cases there is a potential danger to park users who may be seeking to get to the edge of the reservoir, whether for fishing or other reasons. In both cases the hazard may be alleviated by one of two actions. First, where the bank slope is not severe or does not extend above the high water line, removal of most of the dense, low vegetation presently on the site will reveal the edge of the reservoir enabling fishermen and park users to proceed with due caution. The second method, which is most appropriate to the very steep banks involves the construction of a barrier. While this barrier could be of several types, generally some form of net (chain-link) fencing is believed to be most desirable. Since it is not the intent to fence the reservoir entirely, these barrier fences along areas of the steepest banks need not be high, and need only be of the length appropriate to the extent of the hazard area. A fence three to four feet high should be adequate and the fence should be located close to the high water mark in order to discourage persons from attempting to move between the fence and the water. In most cases these fences could be covered with vines or other vegetation and would function very effectively as barriers. In a few cases it may be desirable to keep the fence free of any vegetation in order to maintain the view through the fence to the water.

The abandoned railroad trestle which presently carries a water line is in an extremely poor state of repair. Use of this trestle by pedestrians or children should be prevented. A fence of six feet in height should be constructed at the point at which the trestle intersects the park site.

The overhead transmission lines represent a kind of hazard for which there is little mitigating action possible, except to prohibit kite flying in the park. In addition, the towers should either be fenced or should have no climbing rungs or other appurtenances

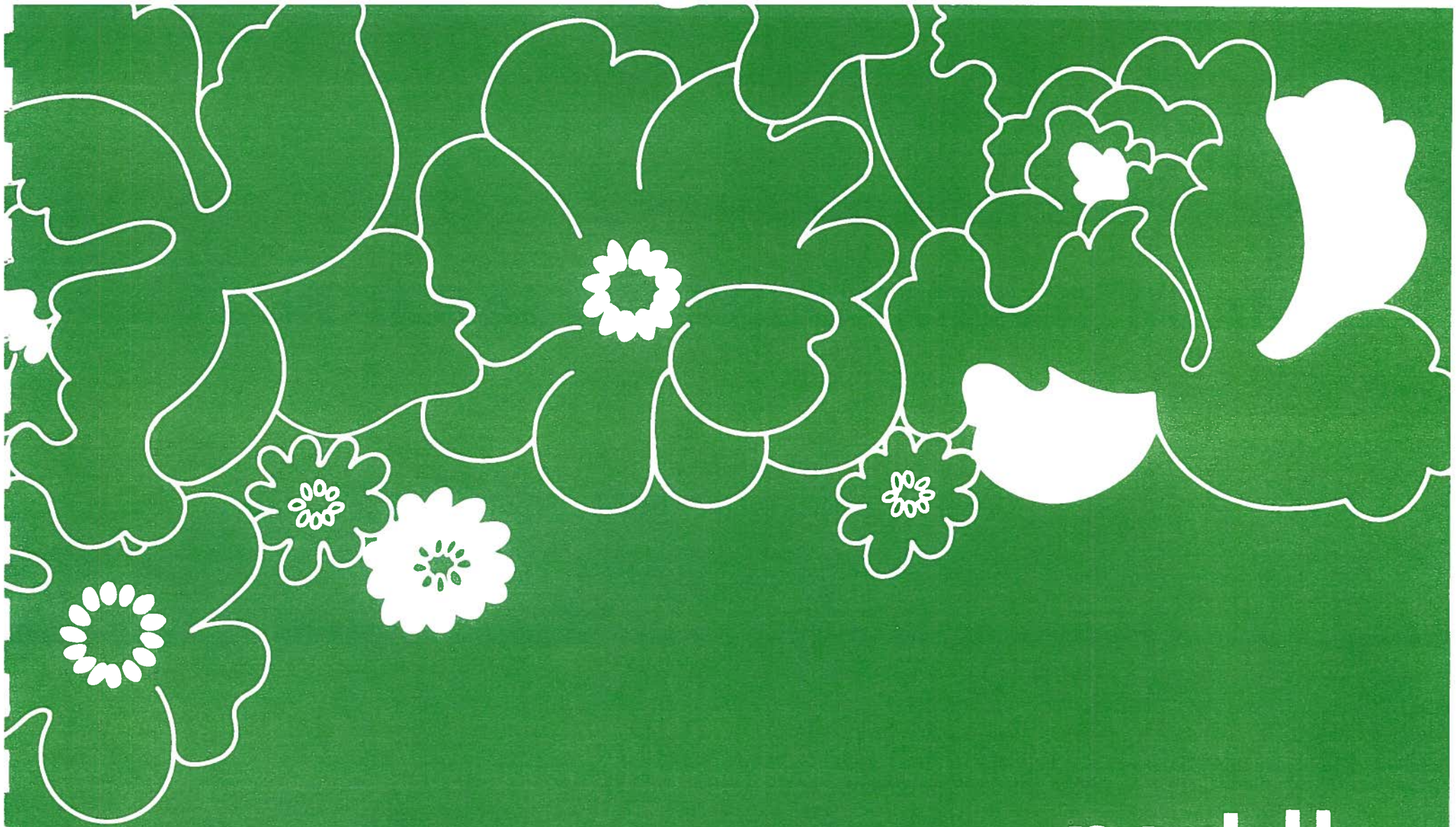
which could be used to climb the tower within twenty feet of the ground.

In order to forewarn users of the park of the potential danger which exists as a result of the parks proximity to the lake, a sign should be posted at the entry indicating that steep and slippery banks may exist at the edge of the reservoir and that due caution should be exercised by adults in approaching the edge of the reservoir and in supervising children who may be using the park. Keeping the park open in character and dense vegetation away from unfenced edges of the reservoir will make the water visible and should warn persons using the park of the hazard of an open body of water, particularly for small children.

DEVELOPMENT PROPOSAL

In consideration of the study site's physical characteristics, projected recreational needs, as well as the social and environmental trends in the surrounding area, the study site should be developed as a park. Activities integrated and encouraged within the park should include hiking, picnicking, overnight camping, bicycling, rowing and fishing. The existing boat ramp which already provides limited recreational use of the study site should remain in the development of the Park as it will assist in introducing non-motorized boating activities to the area, as well as continue to serve local fishermen in their sporting activities. The study site should be expanded to include land in the gulch area for the development of a trail which would "connect" Wahiawa Town to the site.

Special Note: The Division of Parks has stated that the findings of this report do not necessarily cause the Division to conclude that the site should be developed as a State Park rather than a City/County facility. The matters of responsibility for development and jurisdiction are subject to further consideration and resolution. (Letter to Koebig & Koebig dated April 23, 1974).



part II

GENERAL DEVELOPMENT PLANS

INTRODUCTION

Three alternative General Development Plans illustrated in this section are based upon the findings and conclusions presented in Part I of this report, and utilize accepted park design standards and criteria. These plans recognize the concerns of various groups representing the residents of the areas around the park site, and the design features necessary for the efficient operation and maintenance of a State park. Special consideration is also given to incorporation of the standards of the Bureau of Outdoor Recreation and the practices of the State Parks Division in the plans. These alternative Development Plans have been presented and discussed with the community groups who contributed to the preparation of the Investigative Report.

The three alternative plans are similar but contain different solutions to the problems of site access and traffic circulation. The organization of land uses is essentially the same in all three alternatives because specific sections of the site are most approriate to certain activities. The existing boat launching facility and roads have been incorporated in all alternative plans and all anticipate removal of the concrete slabs on the east side of the site.

GENERAL DEVELOPMENT PLAN ALTERNATIVE NO. 1

The Alternative 1 General Development Plan for the site is illustrated on Plate 11. This plan provides nominal separation of day and overnight use activities, of controlled park access and of good access to all portions of the site. The facilities which are recommended in this plan are itemized and defined in Table II-1.

The road and parking layout for this plan provides convenient access to all park activities. The entrance road from Walker Avenue is two-way, through the northern limits of the park to the Wahiawa Community Center, and the loop road is a one-way road through the middle of the site. Parking areas are located near use areas along the loop road. Day and overnight use activities located on the west side and camping on the east side of the park.

Some mixing of activities is anticipated as a result of the loop road. However, with proper signing, designating picnic and camping areas, it is felt that the different activities will be adequately segregated. It is intended that

TABLE II-1

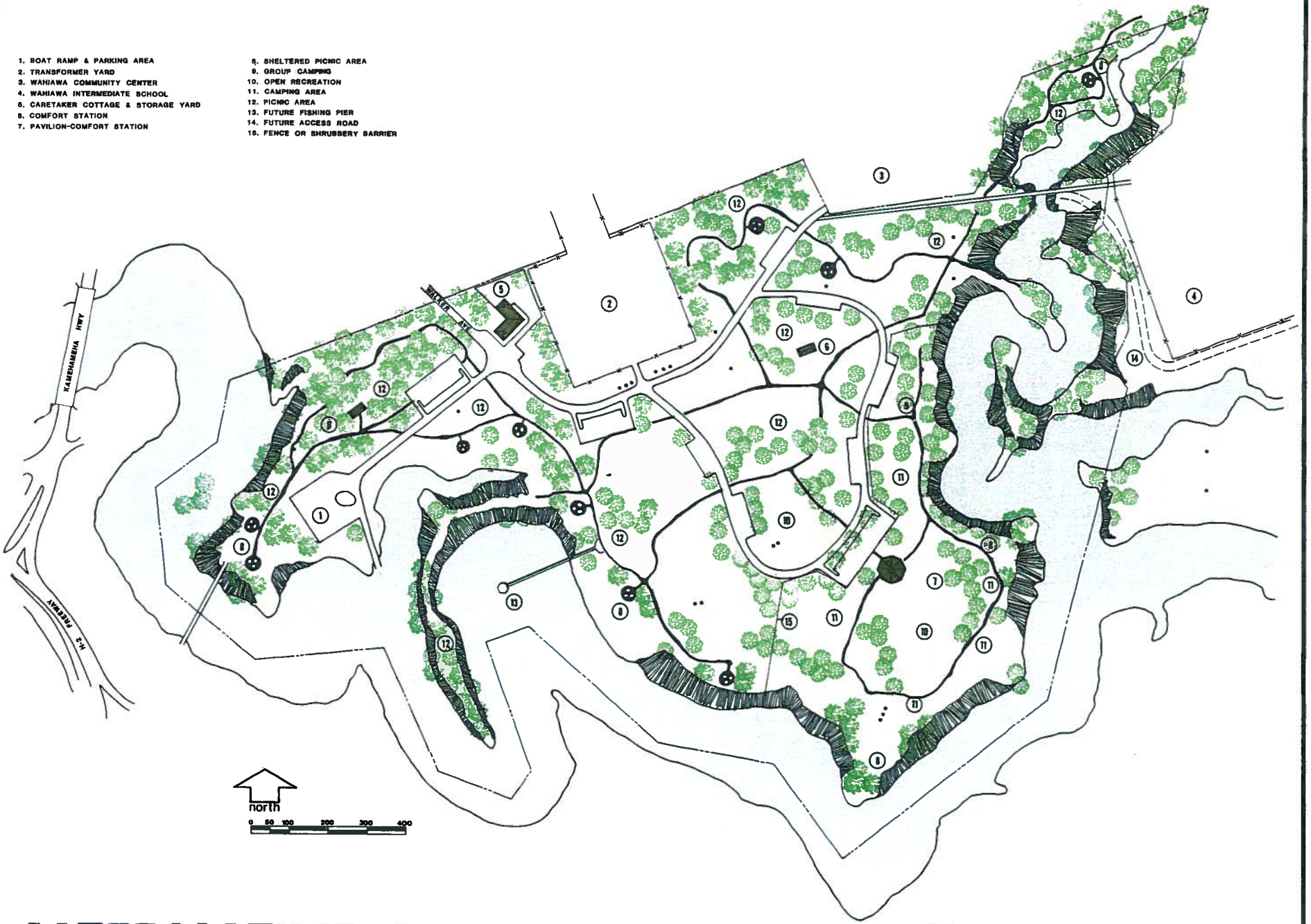
FACILITIES
ALTERNATIVE PLAN NO. 1

Symbol	Facility/Improvement Standard
1	Existing boat ramp and parking area.
2-4	Adjacent properties not included in park.
5	Caretaker Cottage - Approximately 1,200 s.f. (not including garage)
	Storage Yard - 4,000 s.f. of paved area.
6	West Comfort Station (approximately 500 s.f.)
	East Comfort Station (approximately 600 s.f.)
7	Pavilion/Comfort Station (approximately 2,500 s.f.)
8	Sheltered Picnic Area - 10 Cleared areas with 3 covered picnic tables, and 3 firepits each.
9	Group Camping - 2.5 acres provided for 150 persons with 10 cleared sites of 1,000 s.f. each and 10 firepits.
10	Open Recreation - 1 acre for group picnickers use and 1 acre for group campers' use.
11	Camping Area (Family - 10.5 acres provided for 250 persons with 50 cleared site of 1,000 s.f. and 50 firepits.
12	Group Picnic Area - 2.5 acres provided for 150 persons with 10 cleared sites of 1,000 s.f.
	Family Picnic Area - 13 acres for 320 persons with 65 cleared sites of 1,000 s.f. each.
13	Future Fishing Pier - approximately 1,000 s.f. with access catwalk 8 feet wide by 260 feet long.
14	Future Access Road - 24 feet wide by 3,500 feet long (with 30 feet wide by 100 feet long bridge).

Other Facilities (Unnumbered)

Pavement	10 feet wide access road approximately 2,000 feet long. Looping within the park.
	8-foot-wide access road approximately 700 feet long connecting the school to the park.
Parking	220 stalls including buses.
Foot-paths	approximately 4,000 l.f. of 5-foot-wide cleared trails.
Access Bridge	8 feet wide by approximately 100 feet long connecting the school to the park
Land-scaping	Provided throughout the park especially around cleared areas and for screening.

1. BOAT RAMP & PARKING AREA
2. TRANSFORMER YARD
3. WAHIAWA COMMUNITY CENTER
4. WAHIAWA INTERMEDIATE SCHOOL
5. CARETAKER COTTAGE & STORAGE YARD
6. COMFORT STATION
7. PAVILION-COMFORT STATION
8. SHELTERED PICNIC AREA
9. GROUP CAMPING
10. OPEN RECREATION
11. CAMPING AREA
12. PICNIC AREA
13. FUTURE FISHING PIER
14. FUTURE ACCESS ROAD
15. FENCE OR SHRUBBERY BARRIER



ALTERNATIVE 1

WAHIAWA FRESH WATER PARK
GENERAL DEVELOPMENT PLAN

the footpaths be used, in common, by all park visitors. Likewise, the vantage point shelters are intended for use by all.

Provisions have been made for a road connection to Rose Street, east of the park site, to serve possible future access for Wahiawa residents and other park users.

GENERAL DEVELOPMENT PLAN ALTERNATIVE NO. 2

This plan is illustrated on Plate 12. The basic objective of this plan is to keep automobile intrusion to a minimum. This is accomplished by locating all parking and roads along the north edge of the park. Access is from Walker Avenue. As in Alternative Plan 1, day and night use activities are segregated to the west and east sides of the park site respectively.

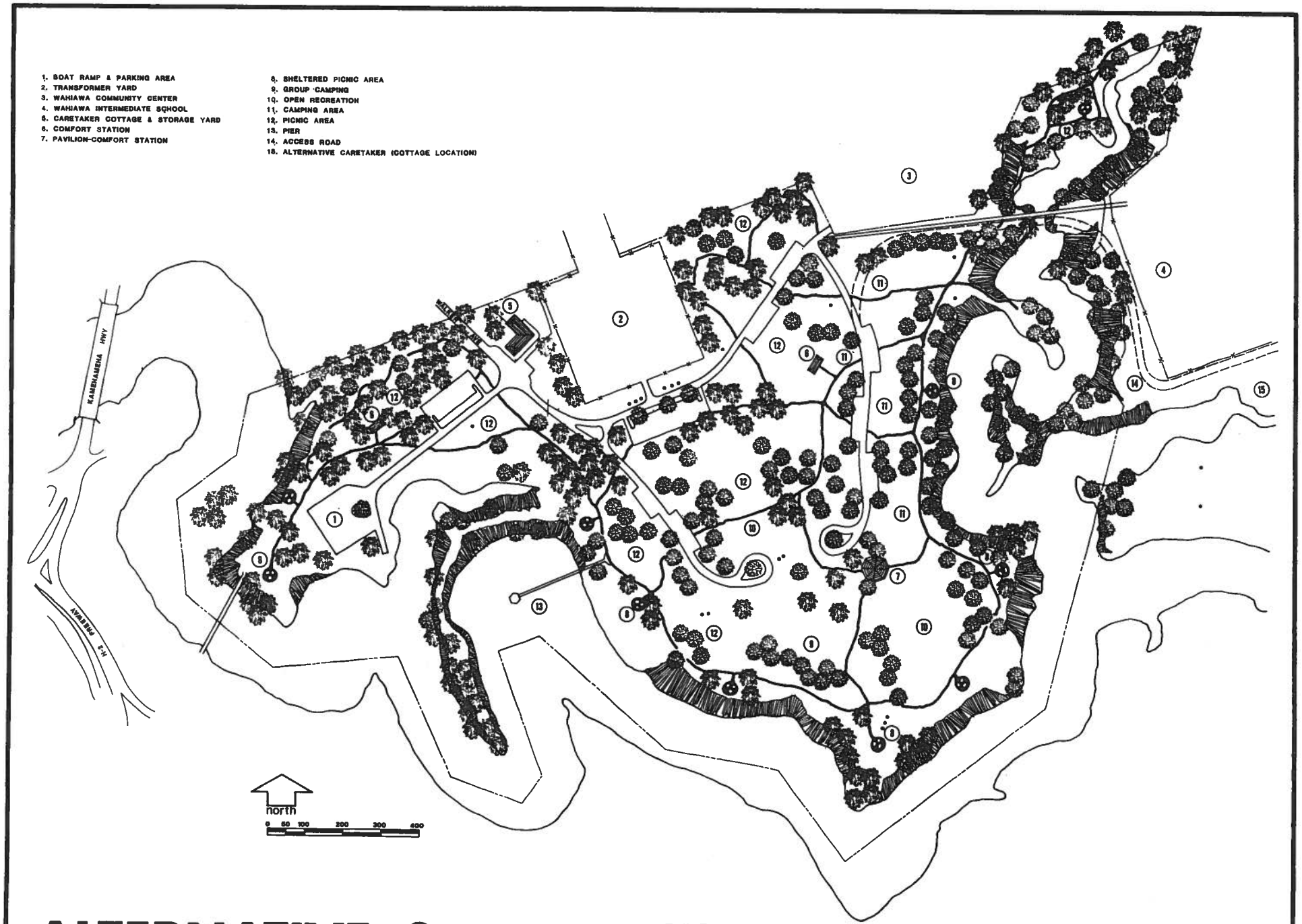
This plan best preserves the natural setting of the park (through the elimination of roads). However, a major concern anticipated is the inconvenience of having the parking areas at a great distance from the use areas. This will be especially true for those who will be forced to carry their tents and supplies some distance to campsites, to picnickers, parents with small children, and for the handicapped and aged.

The physical facilities of this plan are similar to Alternate No. 1 with the exception of the quantities and the elimination of the interior access road. No provisions for a second access and a fishing pier. There are 67 family picnic sites and 52 campsites. This plan will accommodate a total of 900 persons vs. 870 for Alternates No. 1 and 3.

1. BOAT RAMP & PARKING AREA
2. TRANSFORMER YARD
3. WAHIAWA COMMUNITY CENTER
4. WAHIAWA INTERMEDIATE SCHOOL
5. CARETAKER COTTAGE & STORAGE YARD
6. COMFORT STATION
7. PAVILION-COMFORT STATION
8. SHELTERED PICNIC AREA
9. GROUP CAMPING
10. OPEN RECREATION
11. CAMPING AREA
12. PICNIC AREA

ALTERNATIVE 2

WAHIAWA FRESH WATER PARK GENERAL DEVELOPMENT PLAN



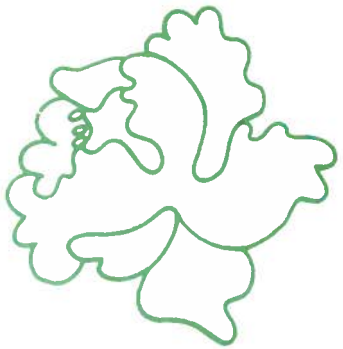
ALTERNATIVE 3

WAHIAWA FRESH WATER PARK GENERAL DEVELOPMENT PLAN

GENERAL DEVELOPMENT PLAN
ALTERNATIVE PLAN NO. 3

This plan (Plate 13) totally segregates the day and overnight use areas of the park. Initially, a common road would link both use areas. However, in the future, a second entrance from Rose Street can serve the overnight use area. The Walker Avenue entrance would continue to serve the day use activities.

The physical facilities in this plan are similar to Alternate No. 1 with exception of the access which is separated to provide better separation of day and night uses. This plan also shows the relocation of the Caretaker Cottage if the future access road is implemented.



GENERAL DEVELOPMENT CONCERNS

The general character of the park, the activities to be included and the standards appropriate to achieve the desired character of development are described in the following paragraphs.

EXISTING FACILITIES

The existing boat launching facility and existing paved roads have been integrated in the park development plan and are to be improved and enhanced with landscaping.

Large, unsightly concrete slabs located along the easterly side of the park are to be removed. The State has made arrangements to have these slabs removed by a military reserve unit as a training exercise.

TRAFFIC

Roads should be kept to a minimum and screened by topography and landscaping to preserve the natural atmosphere of the park. The park road system will have only one access (Walker Street), discouraging motorized sightseeing and undesirable through traffic.

Another access from Rose Street has been considered to serve the park in the future. If this second access is provided little through traffic will result since more convenient commuter routes are available and the route through the park is circuitous.

Large areas of the park are located away from the road system with access to these areas by foot paths. This separation enhances the natural theme of thepark and will provide a sense of isolation for walkers and hikers even though the park is small.

Low intensity lights should be provided in the parking areas of designated night use areas.

MAJOR ACTIVITIES AND RELATED FACILITIES

CAMPING

Two major types of camping sites should be provided; group camping and family camping. Approximately 5-family campsites per acre and 150 group campers per 2.5 acres are recommended.

Parking should be located within 300 feet maximum of all campsites and one car space per unit provided.

Comfort stations should be located within 600 feet of campsites and the number of fixutres provided are shown in Table II-2.

To add to the full enjoyment of the campsites, picnic tables and fire pits should be provided for at each family campsite and group camping unit. Picnic tables with integral rain shelters should be provided at vantage points along the water's edge and adjacent to the campsites and picnic sites.

TABLE II-2

COMFORT STATION FIXTURES

LOCATION	Drinking Fountain	Urinal	Toilet		Lavatory		Showers		Dressing Cubicles	
			M	W	M	W	M	W	M	W
West Comfort Station	1	1	2	3	2	2	-	-	-	-
East Comfort Station	1	1	2	3	2	2	1	1	-	1
Pavilion/Comfort Station*	1	3	3	4	2	2	2	2	-	2

* *Serves group camping area.*

The group campsites should be situated near the pavilion and around a large open recreation area where most group activities take place.

Consideration was given to providing campsites for motorized campers and trailers with utility hook-ups to accommodate all types of camping. However, because of the limited size of this park, camper sites are not included.[1]

PICNICKING

Picnic sites should be located and landscaped to provide privacy and a natural setting. Sheltered picnic areas with tables and fire-pits should be provided along the water's edge to serve picnickers and campers. No more than five picnic sites per acre with 1,000 square feet of cleared ground for each site are recommended. This is true for both family picnicking and group picnicking. The picnic sites should be accessible by foot paths and located within 500 feet of comfort stations and 300 feet of parking areas. One parking stall should be provided for each picnic site.

The group picnic sites should be located adjacent to an open recreation area.

HIKING

The foot paths winding throughout the park provide an excellent opportunity for the novice or casual hiker because of the relatively level terrain and pleasant surroundings. These paths should be graded to follow the natural contours, with swales cut to the banks for drainage. Heavily travelled routes and bicycle paths should be further improved with a graded, compacted crushed aggregate surface course.

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1 *The staff of the Division of Parks made the following comments regarding camping activities proposed for the site: The appropriateness of camping on the scale contemplated in all three alternatives is questionable. Alternatives in the organization of land uses should be considered also. E.g. if topography allows, camping on a small scale in the area near the boat launching access, where it could be readily controlled. This would require showers in the restrooms, otherwise no particularly significant investment for camping per se. If it doesn't pan out, o.k. If demand turns out to be too great for that area, then this report's alternatives could be considered, though there are basic problems of separation of day use and overnight use to be worked out. It simply does not work to say "camping only here and day use there" unless the*

FISHING

The existing boat launching facilities should continue to provide the access to the water for boat launching.

A future fishing pier should be included to provide off-shore fishing. It will be especially attractive to the very young as well as the older fisherman. It is anticipated, however, that initially most fishing will be done from the banks of the reservoir.

BOATING

Present State regulations prohibit boating in the reservoir other than for fishing. Other forms of recreational boating, particularly canoeing and rowing, should be allowed to utilize this natural resource to its fullest extent. Water skiing and motor boat racing are not considered appropriate.

The existing boat launching facilities are adequate for current and future boating needs.

boundaries are physically and visually well established and the circulation worked out so as to minimize intermingling.

BICYCLING

Paved roads within the park should be designated as bikeways. The restricted traffic flow will afford the bicyclist a pleasant and safe route through the park and minimum conflict between autos and bicyclists is expected. Bicycling on the foot paths is not desirable because of natural hazards and conflict with the heavy pedestrian use anticipated.

OPEN RECREATION

A minimum of two acres should be provided for active open recreation, one acre for group picnickers and one acre for group campers. The group campsites and group picnic sites should be located adjacent to these areas for convenience.

Randomly-spaced, smaller open areas should be used for family recreation and small child play areas.

A better alternative for camping could be to use the area accessible from Rose Street if it becomes available.

PAVILION

The pavilion should be centrally located between the open recreation areas and in the midst of the group campsites and the group picnic sites. It provides needed shelter and group cooking facilities for group gatherings. The scale of the building should be usch that the building will be visible from various places in the park. For this reason it should establish the architectural theme for the entire park.

Restrooms should be included and toilets and showers are to be provided.

WEST COMFORT STATION

This comfort station should serve the picnic sites and the boat launching areas and is so situates as to afford easy access from these areas. Shower facilities are not necessary because this comfort station is primarily for day use. The toilet fixtures are as listed in Table II-2.

EAST COMFORT STATION

This comfort station should provide for general use, including use by campers necessitating installation of shower facilities. The toilet and shower fixtures are as listed in Table II-2.

LANDSCAPING

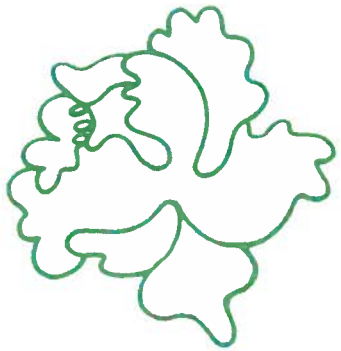
The park site has a natural, primitive character which should be maintained. Generally the terrain and vegetation should not be disturbed except in construction areas where selective removal of trees and undergrowth will be necessary to accommodate new facilities. Around clearings and special use areas, landscape planting should enhance the natural setting.

The visual experience upon entering the park should be of a natural wooded area with a variety of plants and flowering trees. Planting screening should be used to cover the undesirable views of power poles, pavementes, etc., to the extent possible.

A preliminary list of the plant material selected to provide color, shade, screen, and cover includes:

Eucalyptus species
Brisbane Box
Norfolk Island Pines
Shower Trees
Crepe Myrtle
Pink Tecoma
Yellow Poinciana
African Tulip, and
Common Bermuda grass.

Open areas, intended for recreation, camping or picnicking should be turf. These areas should be characteristically rolling, following natural contours for the most part.



PROJECTED PARK USE

GENERAL

The average current and projected summer weekend day participation for selected recreational activities on Oahu are presented in Table II-3. These projections are from the State's "Comprehensive Outdoor Recreation Plan" (SCORP) which was prepared for the Department of Planning and Economic Development of the State of Hawaii.

For the purpose of relating these projections to the proposed Wahiawa Freshwater Park, this information was reduced to the estimated participation for the Wahiawa tributary area based upon population ratios. The primarily tributary area is assumed to be the Wahiawa judicial district with secondary participation by other Oahu residents. The recommended Development Plan concept was the basis for this user analysis.

WALKING

An estimated 77,800 Oahu residents enjoyed walking for pleasure on an average weekend during 1970. The park will provide additional opportunities for pleasure walking by park users who may be using the park for other activities such as camping and picnicking. The extensive trail and path system will maximize such participation.

BICYCLING

The Comprehensive Outdoor Recreation Plan reports that 64,200 individuals participated in bicycling on an average weekend in 1970.

Bicycling as a pastime and a mode of transportation has been increasing rapidly both locally and nationally. Based on this recent popularity in bicycling, it is expected that the Wahiawa site will be popular for bicyclists passing through the area for a specific destination (such as school), as well as for pleasure riding within the park site.

PICNICKING

An estimated 98,900 Oahu residents picnic on an average weekend. Currently, there is only one picnic area in Wahiawa, in Wahiawa Botanical Garden and this facility does not have tables or firepits.

In addition to picnickers from the Wahiawa area, other Oahu residents are expected to use the park facilities because of the attractiveness of the site. The use of this park for picnicking is expected to be limited only by the availability of suitable land for such facilities.

TABLE II-3

TOTAL ACTIVITY OCCASIONS AND WEEKEND USE

ISLAND OF OAHU

Activities	Total Annual Occasions 1970-71	Estimated Average Weekend Activity Occasions of Residents and Tourists	Total 1985 Activity Occasions	Peak Weekend Activity Occasions
Sea swimming	14,106,200	201,500	19,704,203	263,278
Beachgoing	12,982,900	187,900	18,138,142	244,795
Walking for pleasure	7,634,700	89,600	10,664,133	108,712
Picnicking	7,042,800	98,900	9,835,529	138,151
Bicycling	6,628,900	64,200	9,260,561	89,721
Driving for pleasure	4,676,900	68,200	6,537,686	77,182
Fishing from shore, pier	4,680,100	68,800	6,537,686	95,299
Pool swimming	3,633,800	40,600	5,079,342	56,800
Surfing	3,396,900	46,900	4,747,900	61,936
Attending outdoor sports events	2,099,300	53,500	2,933,258	33,332
Attending outdoor cultural events	1,901,000	-	2,659,818	33,862
Beach camping	1,422,200	21,300	1,988,650	29,547

Source: Hawaii SCORP, pp. 113, 114 and 128

PLEASURE BOATING

Boating on the reservoir is currently restricted to trailer-boats used for fishing purposes. Pleasure boating is not permitted at present. Approximately 1,000 launches were made at the existing ramp in 1970. An estimated 1,800 annual launchings are expected at the site in 1985. The existing single-lane ramp is adequate to meet the needs of the area through 1985.

FISHING

Pier and shore fishing was enjoyed by 40,600 individuals on an average weekend as reported by the Comprehensive Outdoor Recreation Plan. Most fishing occurs along the coastal shoreline or in near shore waters. The Wahiawa reservoir offers an opportunity for freshwater fishing which is only available in a few selected areas on Oahu.

Field counts, taken by the State Fish and Game Division, of the number of fishermen utilizing the reservoir reveal that the average weekly number of fishermen was about 260 for the period of 1967 to 1970. Of these, over 80 percent fished from the shoreline with the most fishing activities occurring downstream of the study site. Development of the Wahiawa Park site is expected to greatly increase the fishing activity on the reservoir since related recreational opportunities, i.e., camping and picnicking will be provided within the park site.

The proposed fishing pier will provide a safe and enjoyable fishing experience in the park. Experience in other areas has indicated that the abundance of the catch is relatively unimportant to most people fishing from a pier. The opportunity to try and the experience of dropping a line in the water is particularly appealing to many, especially children. To enhance the fish habitat and improve the catch potential at the pier, truck tires chanined together, such as "shelters" probably should be submerged at the base of the pier.

CAMPING

On an average weekend in 1970, approximately 3,473 Oahu residents participated in camping activities on Oahu.

The attractiveness of the Wahiawa site will draw many campers from all areas on Oahu particularly if group facilities are available. Use will be controlled by the limited area available at the site for providing camping facilities.[1]

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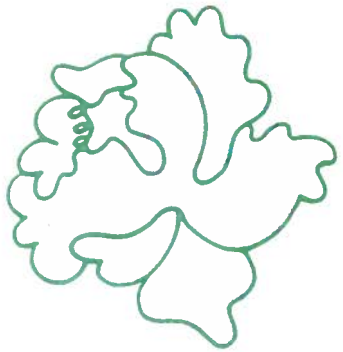
1 *The Division of Parks staff expects campers will be primarily those persons interested in freshwater fishing.*



MAINTENANCE, OPERATION AND MANAGEMENT

MAINTENANCE

Special effort has been made to plan park improvements in such a manner that maintenance will be minimized.

The natural topography of the site will be preserved, insofar as possibly, to take advantage of the present drainage patterns. The soils in the area are sufficiently stable that after landscaping is installed, erosion will not be a problem.

The road system will provide service access to buildings and refuse containers. Maintenance vehicles can also be driven across lawn areas without causing damage, once the lawns are established.

Comfort stations are to be of low maintenance materials, such as ceramic tile flooring and seamless wainscot that can be hosed down. Particular attention will be given to the selection of architectural materials and designs suited to heavy use with only limited maintenance and janitorial services. Restrooms will have little or no glass and will have sloped floors and floor level wall openings for hosing and cleaning.

Most of the trees in the park will be preserved, and since they are well established will require little care. Grass open areas, in most cases, will be bordered by trees, rather than shrubs, for easier mowing, fertilization and maintenance. Areas with natural brush will normally be bordered by footpaths or roads.

Periodic clearing along the trails will be necessary; however, it is expected that normal pedestrian traffic will keep the trails open and only occasional pruning of adjacent vegetation will be required.

Open areas should be grassed with common Bermuda grass. Complete coverage will be secured in 60 to 90 days and the only maintenance required thereafter will be regular mowing and periodic fertilization and aeration.

Irrigation can be accomplished by means of hose bibbs, located approximately 100 feet apart, with portable sprinklers. Normal precipitation during the months of November through March will be sufficient to eliminate irrigation during those months. However, during the remainder of the year regular watering will be necessary. Alternately installation of a "rain bird" type system will probably be desirable to irrigate the lawn areas.

OPERATION AND MANAGEMENT

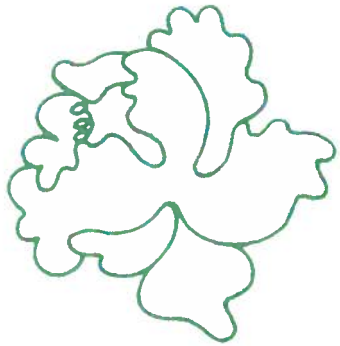
The caretaker's residence will be located near the entrance to the park to provide good access control. In addition, a gate will be provided at the entrance to provide security. In accordance with State policy, the gate is expected to be locked between 6:00 p.m. and 6:00 a.m.

However, the existing Community Health Center shares the same access road as the park. Most activities at the Center will be during the day and both visitors and employees of the Center will normally be out of the area before closing. Whenever evening activities are scheduled, however, arrangements will have to be made with the park caretaker to open the gate to provide access to the Community Health Center. Gate keys should be provided to fire and police officials in the area in the event of emergencies either in the park or at the Community Center. It is recommended that the Department of Health and the Department of Social Services provide security arrangements whenever evening activities are scheduled.

The resident caretaker will provide overall park management, controlling the activities of park users, checking camping permits, and enforcing park regulations.

Ground maintenance and maintenance of the comfort stations and pavilion should be done by another person under the direction of the caretaker.

Day use areas for picnicking are partially separated from overnight use areas (camping) to simplify management and provide more effective control. A nightly surveillance of the road and parking areas will be necessary to ensure that only persons with permits remain in the park after closing.



IMPLEMENTATION & COST ESTIMATE

DEVELOPMENT PRIORITIES

The limited amount of funds available requires that the Wahiawa Freshwater Park be developed in stages. The State Parks Division has established a budget of $150,000 for the first phase improvements. Priority has been given in designating first phase improvements to those improvements necessary to provide a usable park facility at the completion of the first phase.

In general, the Phase I development will integrate the existing facilities and will be confined to the westerly portions of the park designated for picnicking and day usage. Improvements will include caretaker's house, open family picnic sites, footpaths, landscaping, access roads, the west comfort station, and parking. A subsequent phase will expand the development to the east to complete all facilities not included in Phase I, such as the pavilion, sheltered picnic areas, the east comfort station, and the campsites. The recommended Phase I improvement is illustrated on Plate 14.

To maintain the Phase I improvement costs within the established budget, an on-site sanitary disposal system is recommended in lieu of connection to the Wahiawa sanitary system.[1] However, when second phase improvements are made, connection to the community sanitary system is recommended. The Phase I cost estimate for Alternative Plan No. 1 Phase I cost estimate assumes an on-site disposal system and the Phase II cost estimate includes the cost of a complete sanitary collection system with connection to the system serving Wahiawa. If either Alternative Plan 2 or Plan 3 were selected for implementation, consideration should be given to a similar approach as a means to provide more above ground improvements and yet stay with the budget limitations.

Consideration has been given for a future access from Rose Street and a fishing pier (see Plates No. 11 and 13). These future improvements should be considered as the opportunity for implementation develops.

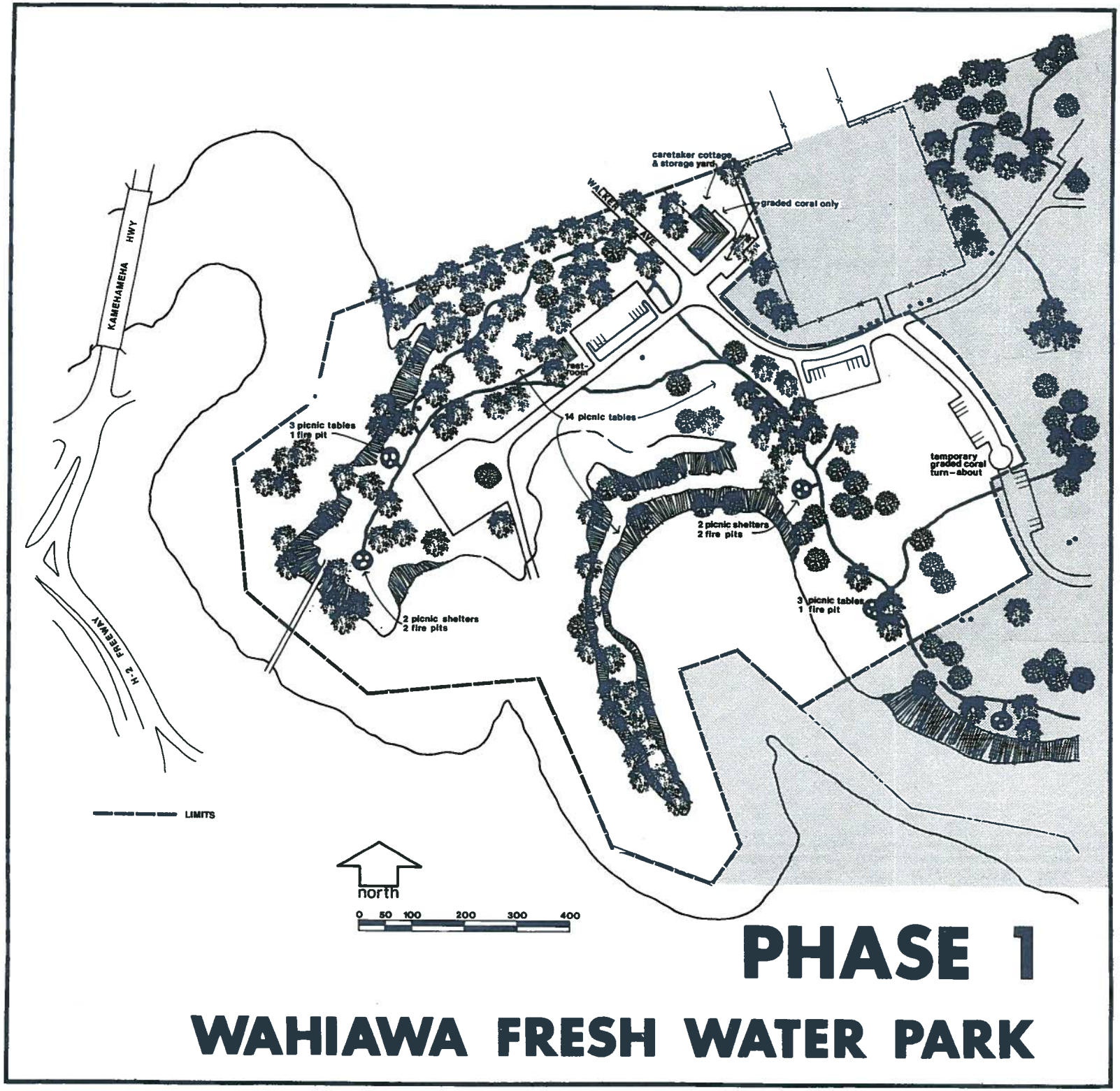
COST ESTIMATES

Complete development of the park is estimated at approximately $660,000 (1971 dollars and costs), excluding the fishing pier and the Rose Street access road.

Tables II-4, II-5, II-6, II-7, II-8, and II-9, itemize the construction costs for Phase I and II of Alternative Plans 1, 2, and 3. The tables do not include the cost of the access road from Rose Street to the site or the cost of the fishing pier. The estimated cost for the future access via Rose Street is approximately $190,000, and for the fishing pier is $90,000

1 *Subsequent to the formation of this recommendation in 1971, new environmental policies and*

regulations regarding sanitary disposal have been developed by State and Federal agencies which may preclude the on-site system. In addition, the experience of the Division of Parks in the part few years with such systems cause the Division to be reticient to install such systems unless absolutely necessary.



PHASE 1

WAHIAWA FRESH WATER PARK

TABLE II-4

GENERAL DEVELOPMENT PLAN - ALTERNATIVE NO. 1
CONSTRUCTION COST ESTIMATE - PHASE I

	Quantity	Unit	Unit Cost	Total
Clearing & Site Preparation	3.4	Ac.	$ 2,000.00	$ 6,800
Paving & Base	4,000	s.y.	6.00	24,000
Landscaping	--	Lump Sum	15,000.00	15,000
Comfort Station	480	s.f.	50.00	24,000
Caretaker Cottage	1,200	s.f.	22.00	26,400
Signs				
Entry	1	Lump Sum	1,000.00	1,000
Information	1	Lump Sum	500.00	500
Picnic Tables	20	Lump Sum	300.00	6,000
Picnic Shelters	4	Lump Sum	2,000.00	8,000
Fire-Pits	6	Lump Sum	100.00	600
Utilities				
Water	--	Lump Sum	9,200.00	9,200
Power	--	Lump Sum	3,600.00	3,600
Telephone	--	Lump Sum	300.00	300
Sewer				
On site disposal system	--	Lump Sum		9,800
			Sub-Total	$134,900
			Contingency (10%)	13,500
			Total Construction Costs[1]	$148,400

[1] *Not including costs for engineering, soils, survey, supervision and inspection, and administration.*

TABLE II-5

GENERAL DEVELOPMENT PLAN ALTERNATIVE NO. 1
CONSTRUCTION COST ESTIMATE - PHASE II

	Quantity	Unit	Unit Cost	Total
Clearing & Site Preparation	8	Ac.	$ 2,000.00	$ 16,000
Paving & Base	7,200	s.y.	6.00	43,000
Landscaping	--	Lump Sum	35,000.00	35,000
Comfort Station	480	s.f.	50.00	24,000
Pavilion/Comfort Station	2,500	s.f.	45.00	112,500
Sheltered Picnic Table	26	Ea.	2,000.00	52,000
& Benches	70	Ea.	300.00	21,000
Fire Pits	84	Ea.	100.00	8,400
Access Bridge	100	l.f.	150.00	15,000
Area Signs	100	Ea.	25.00	2,500
Utilities:				
Water	--	Lump Sum	18,500.00	18,500
Power	--	Lump Sum	12,000.00	12,000
Lights	--	Lump Sum	6,000.00	6,000
Telephone	--	Lump Sum	3,000.00	3,000
Sewer	--	Lump Sum	--	35,000
			Sub-Total	$ 403,900
			Escalation @ 14.5% (6%/year)	58,600
			Sub-Total	$ 462,500
			Contingency 10%	46,300
			Total Construction Costs[1]	$ 508,800

Available Funds: NONE

[1] *Not including costs for engineering, soils, survey, supervision and inspection, and administration.*

TABLE II-6

GENERAL DEVELOPMENT PLAN ALTERNATIVE NO. 2
CONSTRUCTION COST ESTIMATE - PHASE I

	Quantity	Unit	Unit Cost	Total
Clearing & Site Preparation	3.0	Ac.	$ 2,000.00	$ 6,000
Paving & Base	2,000	s.y.	6.00	12,000
Landscaping	--	Lump Sum	15,000.00	15,000
Comfort Station	480	s.f.	50.00	24,000
Caretaker Cottage	1,200	s.f.	22.00	26,400
Signs				
Entry	1	Ea.	1,000.00	1,000
Information	1	Ea.	500.00	500
Utilities				
Water	—	Lump Sum	9,200.00	9,200
Power	—	Lump Sum	3,600.00	3,600
Telephone	--	Lump Sum	300.00	300
Sewer				
Lines	--	Lump Sum	25,000.00	25,000
Lift Pump	—	Lump Sum	9,000.00	9,000
			Sub-Total	$132,000
			Contingency (10%)	13,200
			Total Construction Cost[1]	$145,200

[1] *Costs for design plans and specification, soils, survey, supervision and inspection, and administration are not included.*

TABLE II-7

GENERAL DEVELOPMENT PLAN ALTERNATIVE NO. 2
CONSTRUCTION COST ESTIMATE - PHASE II

	Quantity	Unit	Unit Cost	Total
Clearing & Site Preparation	6.5	Ac.	$ 2,000.00	$ 13,000
Paving & Base	2,000	s.y.	6.00	12,000
Landscaping	--	Lump Sum	30,000.00	30,000
Comfort Station	480	s.f.	50.00	24,000
Pavilion/Comfort Station	2,500	s.f.	45.00	112,500
Sheltered Picnic Table	30	Ea.	2,000.00	60,000
& Benches	90	Ea.	300.00	27,000
Fire Pits	90	Ea.	100.00	9,000
Access Bridge	100	l.f.	150.00	15,000
Area Signs	100	Ea.	25.00	2,500
Utilities				
Water	--	Lump Sum	18,500.00	18,500
Power	--	Lump Sum	12,000.00	12,000
Lights	--	Lump Sum	3,000.00	3,000
Telephone	--	Lump Sum	3,000.00	3,000
Sewer	--	Lump Sum	2,800.00	2,800
			Sub-Total	$ 344,300
			Escalation @ 14.5% (6%/year)	49,900
			Sub-Total	$ 394,200
			Contingency (10%)	39,400
		Total Construction Costs [1]		$ 433,600

[1] *Costs for design plans and specifications, soils, survey, supervision and inspection, and administration are not included.*

TABLE II-8

GENERAL DEVELOPMENT PLAN ALTERNATIVE NO. 3
CONSTRUCTION COST ESTIMATE - PHASE I

	Quantity	Unit	Unit Cost	Total
Clearing & Site Preparation	3.4	Ac.	$ 2,000.00	$ 6,800
Paving & Base	2,600	s.y.	6.00	15,600
Landscaping	--	Lump Sum	15,000.00	15,000
Comfort Station	480	s.f.	50.00	24,000
Caretaker Cottage	1,200	s.f.	22.00	26,400
Signs				
Entry	1	Ea.	1,000.00	1,000
Information	1	Ea.	500.00	500
Utilities				
Water	--	Lump Sum	9,200.00	9,200
Power	--	Lump Sum	3.600.00	3,600
Telephone	--	Lump Sum	300.00	300
Sewer				
Lines	--	Lump Sum	25,000.00	25,000
Lift Pump	--	Lump Sum	9,000.00	9,000
			Sub-Total	$ 136,400
			Contingency (10%)	13,600
			Total Construction Cost[1]	$ 150,000

[1] *Costs for design plans and specifications, soils, survey, supervision and inspection, and administration are not included.*

TABLE II-9

GENERAL DEVELOPMENT PLAN ALTERNATIVE NO. 3
CONSTRUCTION COST ESTIMATE - PHASE II

	Quantity	Unit	Unit Cost	Total
Clearing & Site Preparation	8	Ac.	$ 2,000.00	$ 16,000
Paving & Base	6,067	s.y.	6.00	36,400
Landscaping	--	Lump Sum	35,000.00	35,000
Comfort Station	480	s.F.	50.00	24,000
Pavilion/Comfort Station	2,500	s.f.	45.00	112,500
Sheltered Picnic Table	30	Ea.	2,000.00	60,000
& Benches	90	Ea.	300.00	27,000
Fire Pits	90	Ea.	100.00	9,000
Access Bridge	100	l.f.	150.00	15,000
Area Signs	100	Ea.	25.00	2,500
Utilities				
Water	--	Lump Sum	18,500.00	18,500
Power	--	Lump Sum	12,000.00	12,000
Lights	--	Lump Sum	6,000.00	6,000
Telephone	--	Lump Sum	3,000.00	3,000
Sewer	--	Lump Sum	2,800.00	2,800
			Sub-Total	$ 379,700
			Escalation % 14.5% (6%/year)	55,100
			Sub-Total	$ 434,800
			Contingency (10%)	43,500
			Total Construction Costs[1]	$ 478,300

[1] *Costs for design plans and specifications, soils, survey, supervision and inspection, and administration are not included.*

APPENDIX

SOURCES OF INFORMATION

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Hawaiian Telephone Company

Honolulu Board of Water Supply

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State Department of Transportation

In determining the recreational needs of the Whitmore-Wahiawa-Mililani area, the following groups and individuals were instrumental and partly responsible for the identification and evaluation of community concerns. Concerns were obtained through informal discussions with each of the following groups and individuals, with an exception being the Hawaii Freshwater Fishing Association which formulated their concerns independently at one of their regular meetings in June, 1971: Leilehua High School social studies class (tenth, eleventh, and twelfth grades); Wahiawa Intermediate Schools Student Council and faculty members, Mrs. Edith Tamashiro (science teacher), Mr. Donald Kanagawa (principal), Mr. Roy Higa (counselor), and Mr. Gil Hatter (administrative intern); Mrs. Tyau, principal, and Mr. Melvin Ishikawa, teacher, at Iliahi Elementary School; students participating in Wahiawa Intermediate Drop Out Program, and Mr. Tonaki, teacher-counselor; Wahiawa Citizens Advisory Board for City Parks and Recreation; Mrs. Eugenie Higuchi, Wahiawa Complex Supervisor for the County Parks Department; Wahiawa Community and Businessmen's Association, Park Master Plan Committee; Hawaii Freshwater Fishing Assocation; and, Mililani Town Homeowners Association, Land Committee; and Bikers Hawaii. Valuable concerns were also obtained from Mr. Hiroshi Saito, Wahiawa District Supervisor for the County Parks Department; Mr. Richard Yoshida and Mr. Stanley Shima, both aquatic biologists for the State Fish and Game Division.