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BENJAMIN J. CAYETANO
Governor of Hawaii

STATE OF HAWAII

DEPARTMENT OF LAND AND NATURAL RESOURCES

P. O. Box 621
Honolulu, Hawaii 96809

File No.:OA-2751

MAR 30 1995

MEMORANDUM

To: Gary Gill, Director
Office of Environmental Quality Control

From: Michael D. Wilson, Chairperson
Department of Land and Natural Resources

Subject: Negative Declaration for the Hope Chapel Kaneohe Access Driveway at Kaneohe, Oahu, TMK:4-5-23: por. 2 & 3

The Department of Land and Natural Resources has reviewed the comments received during the 30-day public comment period which began on December 8, 1994. We heve determined that this project will not have significant environmental effect and have issued a negative declaration determination. Please publish this notice as soon as possible in the OEQC Bulletin.

We have enclosed a completed OEQC Bulletin Publication Form and four copies of the final EA. Please contact Sam Lemmo of our Office of Conservation and Environmental Affairs, at 587-0377, should you have any questions.

Attachments

cc: Yukie Y. Ohashi (PBR, Hawaii)
Rob McWilliams (Hope Chapel Kaneohe)
Cecil Santos (DLM)
Kazu Hayashida (State DOT)
Dona Hanaikē (C&C, Parks and Recreation)
Chuck Swanson (C&C, Transportation Services)
Cheryl D. Soon (C&C, Planning Department)
Brooks Harper (USFWS)
David Penn
Robert K. Stender
Kaneohe Neighborhood Board No. 30

1995-04-23-OA-FEA - Hope Chapel Kaneohe Access Driveway

APR 23 1995

Final Environmental Assessment

HOPE CHAPEL KANEOHE ACCESS DRIVEWAY

Conservation District Use Application

February 1995

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Final Environmental Assessment

HOPE CHAPEL KANEOHE ACCESS DRIVEWAY

Conservation District Use Application

February 1995

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INTRODUCTORY INFORMATION

PROJECT TEAM

Applicant:	Hope Chapel Kaneohe 46-001 Kamehameha Highway Kaneohe, HI 96744 Contact: Rob McWilliams Telephone: 235-5814
Applicant's Representative:	Pat Lee 45-248 A Pahikaua Place Kaneohe, HI 96744 Telephone: 247-2889
Planning Consultant and EA Preparer:	PBR Hawaii Pacific Tower, Suite 650 1001 Bishop Street Honolulu, HI 96813 Contact: Yukie Ohashi Telephone: 521-5631

PURPOSE OF THIS DOCUMENT

This Final Environmental Assessment ("EA") has been prepared for Hope Chapel Kaneohe in support of a Conservation District Use Application ("CDUA") to allow the development of an access driveway within the State Conservation District and for the use of lands owned by the State of Hawaii. In addition, this document is intended to support other permit requests including a Stream Channel Alteration Permit ("SCAP"), a U.S. Army Corps of Engineers Section 404 and related State of Hawaii wetlands permits, a 401 Water Quality Certification, and Coastal Zone Management ("CZM") Program Consistency Review. The proposed driveway at TMK 4-5-23: 2 and 3 (pors.) will provide access from Pookela Street to the Hope Chapel property for their proposed church facilities.

The site for the proposed church facilities at the adjacent TMK 4-5-25: 20 is located beyond the Conservation District boundaries on State Urban District land. The entitlements for the church parcel have been previously approved in accordance with the City and County of Honolulu Land Use Ordinance, A-2 Agricultural district and Site Plan Review requirements. None of the property planned for development of the proposed church facilities is included as part of the subject project area. Therefore, this EA provides background information on the church facilities which are relevant to the discussion of the access driveway. The primary purpose of relocating the church driveway from the designated legal access on Puupele Street is to reduce traffic congestion within the Castle Hills subdivision during peak periods and comply with the Site Plan Review conditional approval.

HOPE CHAPEL KANEOHE ACCESS DRIVEWAY
Final Environmental Assessment

This Final EA has been prepared in compliance with the provisions of Hawaii Revised Statutes (HRS) Chapter 343 and Sections 11-200-14 through 11-200-18 of Title 11, Department of Health, Chapter 200, Environmental Impact Statement Rules. As stated in *A Guidebook for the Hawaii State Environmental Review Process*, the content of the EA includes the following: 1) the technical, social, economic and environmental characteristics of the project; 2) the affected environment; 3) a summary of major impacts; 4) alternatives considered that would meet the objectives of the project; 5) the mitigation measures proposed; 6) determination; and 7) identification of consulted agencies.

This report is presented in eight sections. Section 1 provides an introduction and background information on the Applicant, Hope Chapel Kaneohe, and their planning efforts for the construction of their proposed church facilities. Sections 2 and 3 describe the proposed access driveway and the permits and approvals required for its implementation. Section 4 presents a discussion of the physical and human characteristics of the affected environment and Section 5 presents potential impacts and mitigative measures. Alternatives to the proposed action are presented in Section 6 and a determination of environmental affects based on significance criteria is given in Section 7. And finally, letters which were received during the public comment period and the applicant's responses are included in Section 8.

1.0

INTRODUCTION

1.0 INTRODUCTION

Section 1 provides an introduction and background of the proposed development, including location, land ownership, property description and land uses of the surrounding properties. Also included is a description of the background of the planning for the Hope Chapel Kaneohe church facilities. Detailed descriptions of the driveway project are described in Section 2 of this report.

1.1 PROJECT SUMMARY

Project Name:	Hope Chapel Kaneohe Access Driveway
Applicant:	Hope Chapel Kaneohe
Landowner:	Hawaii State Hospital
Tax Map Key:	4-5-23: 2 and 3 (portions)
Project Area:	Approximately 0.9 acre
Existing Use:	Project area - vacant; Other portions used for Hawaii State Hospital facilities, nursery and patient therapy program
Proposed Use:	Access driveway for new church
Land Use Designations:	·State Land Use: Urban and Conservation ·Development Plan: Public Facilities and Preservation ·Zoning: AG-2, General Agriculture P-1, General Preservation
Action Requested:	Conservation District Use Permit
EA Accepting Authority:	Department of Land and Natural Resources
Approving Agency:	Board of Land and Natural Resources

1.2 LOCATION

The area encompassed by this access driveway project consists of 0.9 acre area of land located in K-aneohe, in the judicial district of Koolaupoko, Oahu. The land represents a small portion of two Tax Map Keys: 4-5-23: portions of 2 and 3. Figure 1 identifies the project boundaries in reference to the proposed church facilities parcel and the surrounding land uses. The intermittent Kapunahala Stream is located within the TMK parcel and is approximately 50 to 200 feet from the proposed driveway alignment.

1.3 BACKGROUND

Hope Chapel Kaneohe (the "Applicant") currently holds worship services at the Benjamin Parker Elementary School cafeteria in Kaneohe. In 1987, Hope Chapel Kaneohe acquired a 54-year leasehold interest on a 9.2 acre parcel identified as TMK 4-5-25: 20 with the intention of constructing a permanent church facility for its congregation. The property includes an access easement through Puupele Street in the adjacent Castle Hills subdivision. Without the use of this easement, the church property is landlocked and inaccessible by vehicles.

On September 28, 1993 Hope Chapel received a Site Plan Review permit approval (93/SPR-11) to develop the church facilities from the City and County of Honolulu Director of Land Utilization. The Site Plan Review approval is attached as Appendix A. The approval states that the Hope Chapel Kaneohe church facility "meets all the requirements of a Site Plan Review" and "will provide a service and facility which will contribute to the general welfare of the community-at-large and the surrounding neighborhood". The approval, however, denied Hope Chapel the use of its legal access easement at Puupele Street because of the potential traffic impacts on the Castle Hills subdivision. The Site Plan Review approval, therefore, was conditioned on Hope Chapel obtaining an alternative access to its property.

This EA/CDUA requests permission to construct the alternative access alignment through adjacent Hawaii State Hospital land utilizing Conservation District lands and wetlands. Thus, the Applicant is concurrently seeking State and Federal approvals to allow the construction of the alternative access driveway.

The Applicant has been meeting regularly with representatives of the Castle Hills Homeowners Association ("Castle Hills") who support the proposed access alignment. Since the subject access driveway alignment has been proposed, Castle Hills representatives have publicly supported the project both verbally and in writing, as noted in letters to the Kaneohe Neighborhood Board No. 30 (Appendix A-1). Objections voiced by Castle Hills during the 1993 Site Plan Review approval process were directed at the volume of church related traffic that would be going through their neighborhood during peak periods and not at the church facilities. The proposed alternative access driveway from Pookela Street does not enter the subdivision.

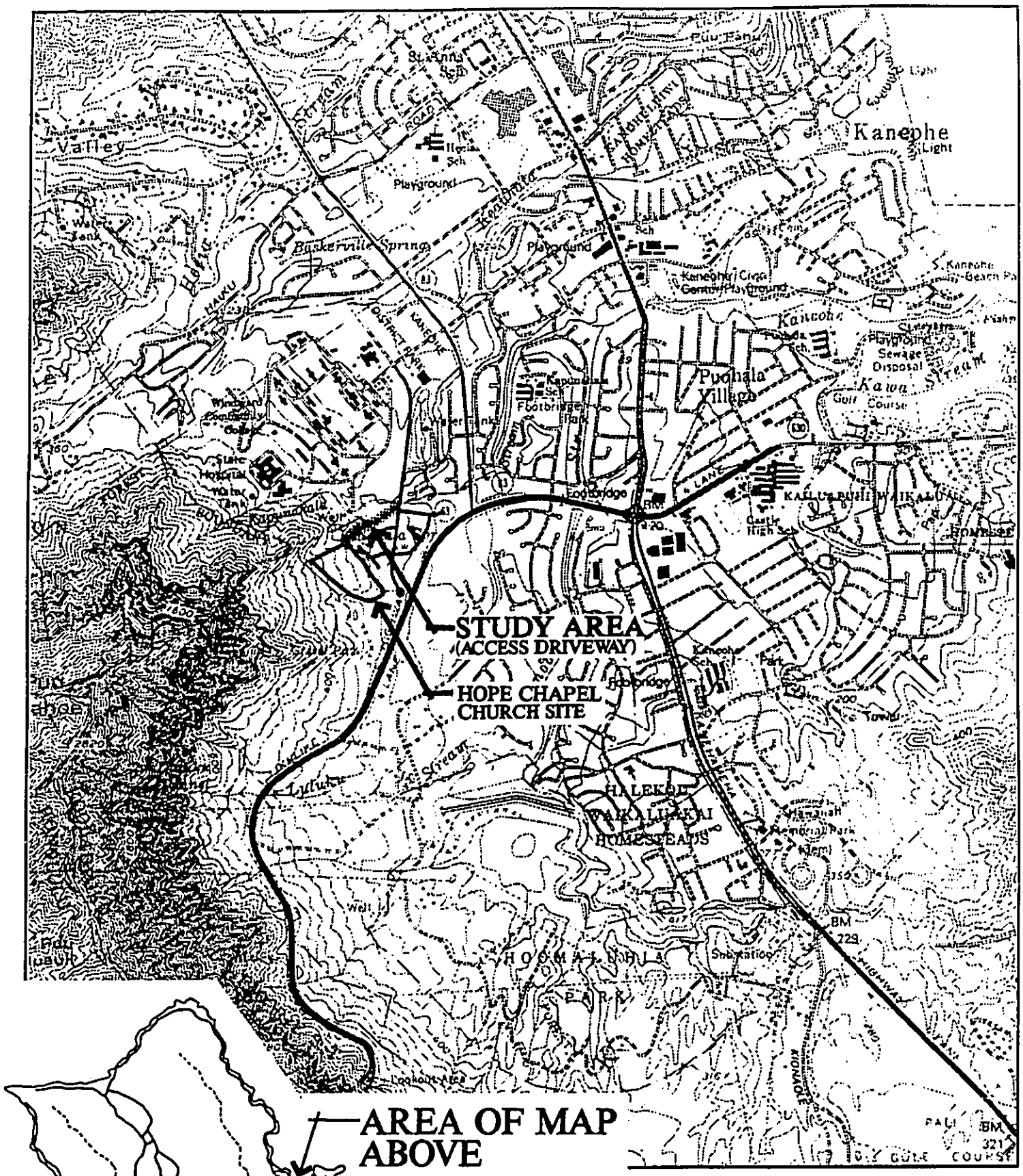


FIGURE 1
LOCATION MAP
HOPE CHAPEL ACCESS DRIVEWAY
KANEOHE, OAHU

The Kaneohe Neighborhood Board No. 30 has also been actively involved in hearing the progress of the Hope Chapel development project and related community concerns between 1990 and 1995. At its meeting on February 16, 1995, the Neighborhood Board unanimously voted to support the proposed access driveway and Conservation District Use Application.

As shown in the site plan (Figure 2), the church facilities will include two buildings consisting of an Auditorium Building and an Office Building. Church services will be held in the Auditorium building. The Site Plan Review approval 93/SPR-11 also approved a Classroom building/day care facility for a total project area of 33,377 square feet. However, at the present time there is no known need for additional child care facilities in the area, therefore, Hope Chapel will not build the third structure in the near term. In addition, paved parking with 260 stalls and a circulation network and attendant infrastructure improvements will be provided. The driveway would connect the proposed Hope Chapel Kaneohe church site from Pookela Street and provide access to the property.

The hours of church operation are planned as follows: Auditorium - Friday 6:00 p.m. to 9:00 p.m., Sunday 7:00 a.m. to 11:30 a.m. and 6:30 p.m. to 9:00 p.m.; Office - Monday to Friday 9:00 a.m. to 5:00 p.m. There will be 25 employees on site Monday to Friday, 3 employees on Friday night, and 10 employees on Sunday.

1.4 LAND OWNERSHIP AND DESCRIPTION OF THE PROPERTY

1.4.1 Landowner

The Hawaii State Hospital ("Landowner") is the owner of the proposed access driveway site, which is part of two parcels which total approximately 193 acres. Authorization by the State Department of Health has been given for Hope Chapel Kaneohe to use the State-owned land and to secure the appropriate land use permits for the driveway construction in a Memorandum of Agreement ("MOA") between the Landowner and Hope Chapel Kaneohe. A copy of the MOA is attached as Exhibit B. The MOA stipulates that Hope Chapel will have non-exclusive rights to the right-of-way easement. The property is classified as ceded lands.

1.4.2 Description of the Property

The proposed driveway will affect less than one acre of two TMK parcels: 4-5-23: 2 & 3 (pors.). These parcels contain a total land area of 193.339 acres (Figure 3). The driveway easement area measures approximately 1,070 feet by 32 feet (0.9 acre) and is generally located parallel to the Castle Hills property boundary.

The area encompassed by the driveway corridor consists of two distinct environments, wetlands and mixed introduced forest. Wetland conditions have been supported with water from Kapunahala Stream, natural springs, and well water discharges. The first 400 feet of the corridor has been delineated as wetland. The remaining length of the driveway extends up a forested slope which is a segment of a finger ridge at the base of the Koolau Range. The mixed forest is composed primarily of exotic tree and brush species.

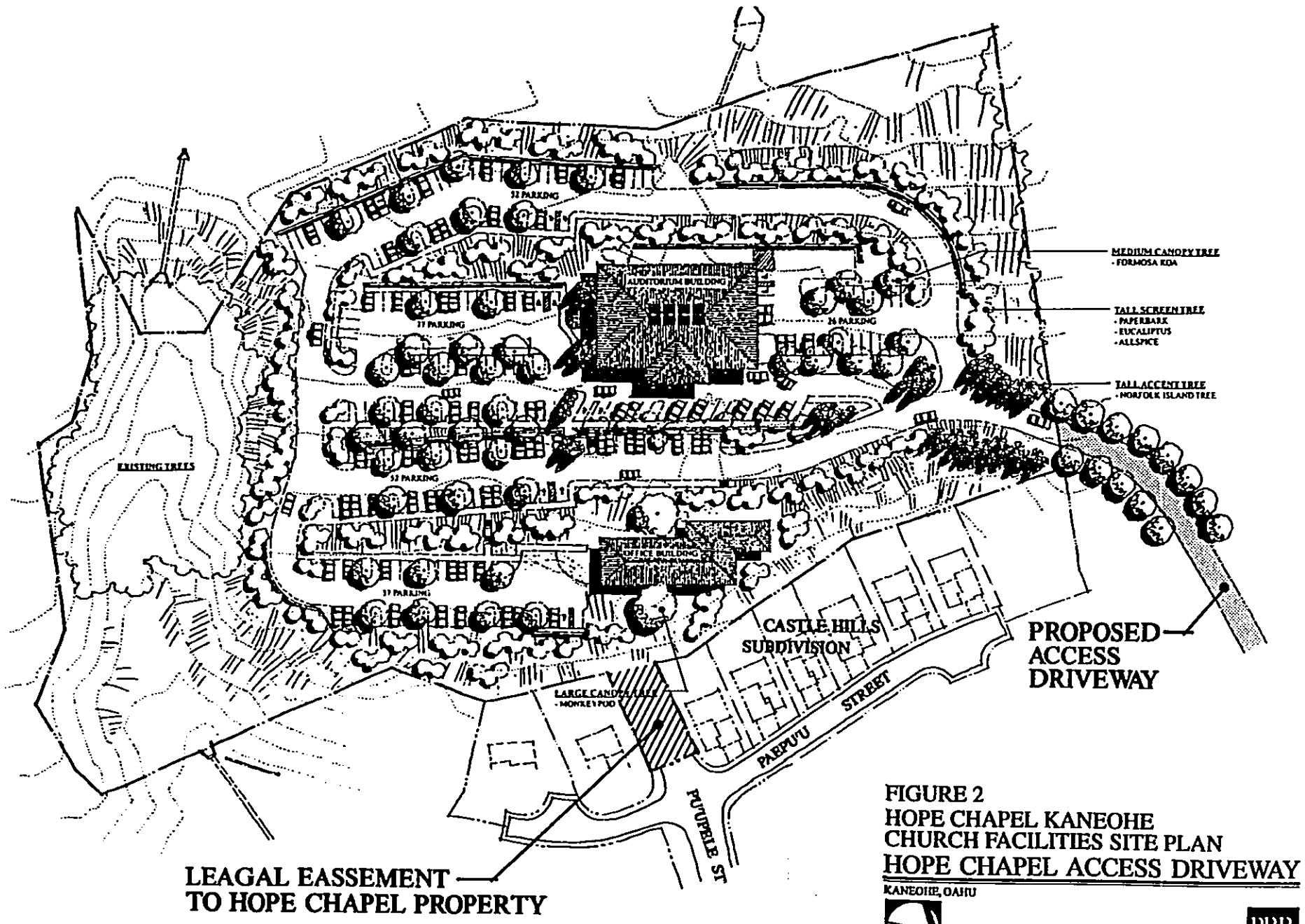
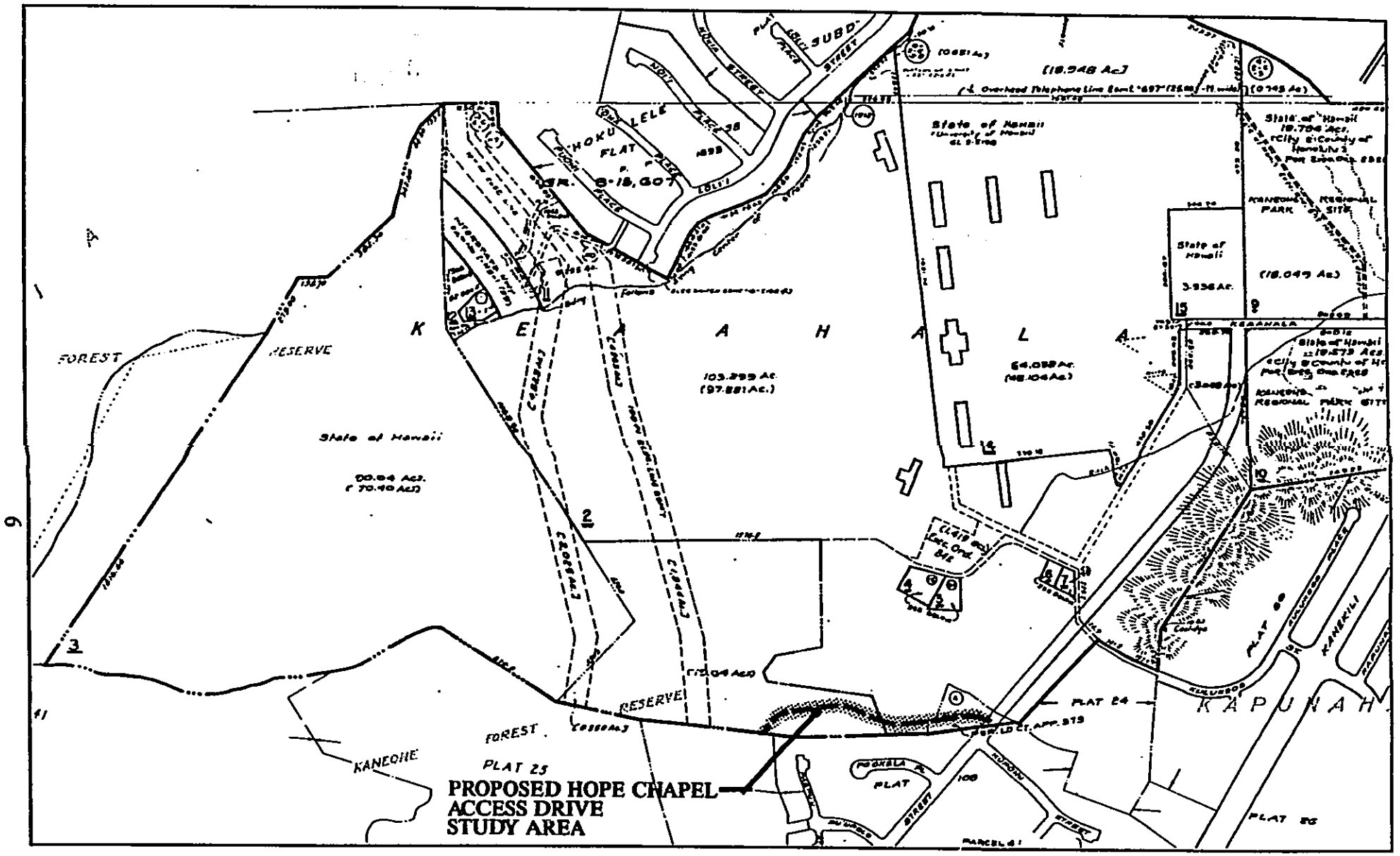


FIGURE 2
HOPE CHAPEL KANEOHE
CHURCH FACILITIES SITE PLAN
HOPE CHAPEL ACCESS DRIVEWAY
KANEOHE, OAHU

NOT TO SCALE



FIRST DIVISION		
ZONE	SEC.	PLAT
4	5	23
CONTAINING 3 PARCELS		
SCALE: 1in.= 300 ft.		

FIGURE 3
TAX MAP KEYS/OWNERSHIP
HOPE CHAPEL ACCESS DRIVEWAY
KANEOHE, OAHU 6/94

0 150 300 600 1200
APPROX. FEET

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The driveway easement area is presently vacant. The opposite portion of the same TMK parcel contains the Hawaii State Hospital and its ancillary uses. None of the existing hospital operations will be impacted by the proposed project. Also within the parcel is the intermittent Kapunahala Stream and the recently constructed drainage improvements at Pookela Street.

1.5 SURROUNDING LAND USES

The Kaneohe community and immediate neighborhood surrounding the property is essentially residential in character with nearby public institutional facilities abutting open space areas established by the wetland and associated drainageways. The proposed access driveway is comprised of approximately 40,000 square feet (0.9 acre) of land and is located adjacent to existing residential and public facility land uses. The subject property is situated approximately 2,000 feet makai of the new H-3 Freeway Hospital Rock tunnel and adjacent to the Castle Hills residential subdivision. The Hawaii State Hospital and the Windward Community College are also located nearby.

1.6 AGENCIES CONSULTED IN THE PREPARATION OF THE EA

The following agencies and organizations have been consulted in the preparation of the Draft and Final Environmental Assessment:

City and County of Honolulu

Department of Land Utilization
Department of Parks and Recreation
Department of Public Works
Department of Transportation Services
Planning Department

State of Hawaii

Department of Agriculture
Department of Land and Natural Resources - Office of Conservation and Environmental Affairs
Department of Land and Natural Resources - Commission of Water Resource Management
Department of Land and Natural Resources - Division of Aquatic Resources
Department of Land and Natural Resources - Division of Land Management
Department of Land and Natural Resources - Historic Preservation Division
Department of Health
Department of Health - Clean Water Branch
Department of Transportation
Hawaii State Hospital
Office of the Attorney General
Office of State Planning - Coastal Zone Management

Federal

U.S. Army Corps of Engineers
U.S. Department of the Interior, Fish and Wildlife Services

Organizations

Castle Hills Homeowners Association
Kaneohe Neighborhood Board #30

2.0

PROJECT DESCRIPTION

2.0 PROJECT DESCRIPTION

This section presents a description of the proposed Hope Chapel Kaneohe Access Driveway, construction activities, and a preliminary development timetable and approximate development costs.

2.1 PROJECT DEVELOPMENT GOALS

The overall goal of the project is to construct an access driveway through State land (designated as Tax Map Keys: 4-5-23: portion of 2 and 3) from Pookela Street to the Hope Chapel Kaneohe property (designated as TMK: 4-5-25: 20) where a new church facility will be developed. The approval for the development of the church facility have been obtained from the City with a condition requiring an alternative access driveway location.

The driveway will serve as a gateway to Hope Chapel's proposed new church facility as shown in Figure 4. It will be used solely by those whose destination is the church. As such, the driveway will provide access for the church's pastoral and administrative staff; church members including adults, youth and children; those providing goods and services and future day care facility users. The driveway will be landscaped to create a sense of an entry to a place of worship, and also, to provide a visual buffer from the adjoining Castle Hills subdivision.

The driveway design does not include easements for infrastructure and utilities such as water, sewer, electricity and communication lines. Hookups for these services will be made at stub-out connectors available at the Puupele Street easement to the church parcel.

2.2 DRIVEWAY DESCRIPTION

The driveway easement is approximately 1,070 lineal feet by 32 feet wide as shown in the preliminary driveway plan in Figure 5. Within the wetland, the driveway will consist of a 24-foot paved surface, rock walls approximately 3 feet wide, and a two-foot planting strip as shown in Figure 6. On the sloped ridge within the Conservation District, the surrounding existing vegetation will remain, thus, strengthening the visual buffer. The full length of the driveway will be wide enough for two lanes and will accommodate emergency vehicles.

2.3 CONSTRUCTION ACTIVITIES

The proposed project entails the alteration of approximately 40,000 square feet of land area, of which approximately 13,500 square feet is located within a wetland in the State Urban District. The balance of approximately 26,500 square feet is located within the State Conservation District but outside of the wetland area.

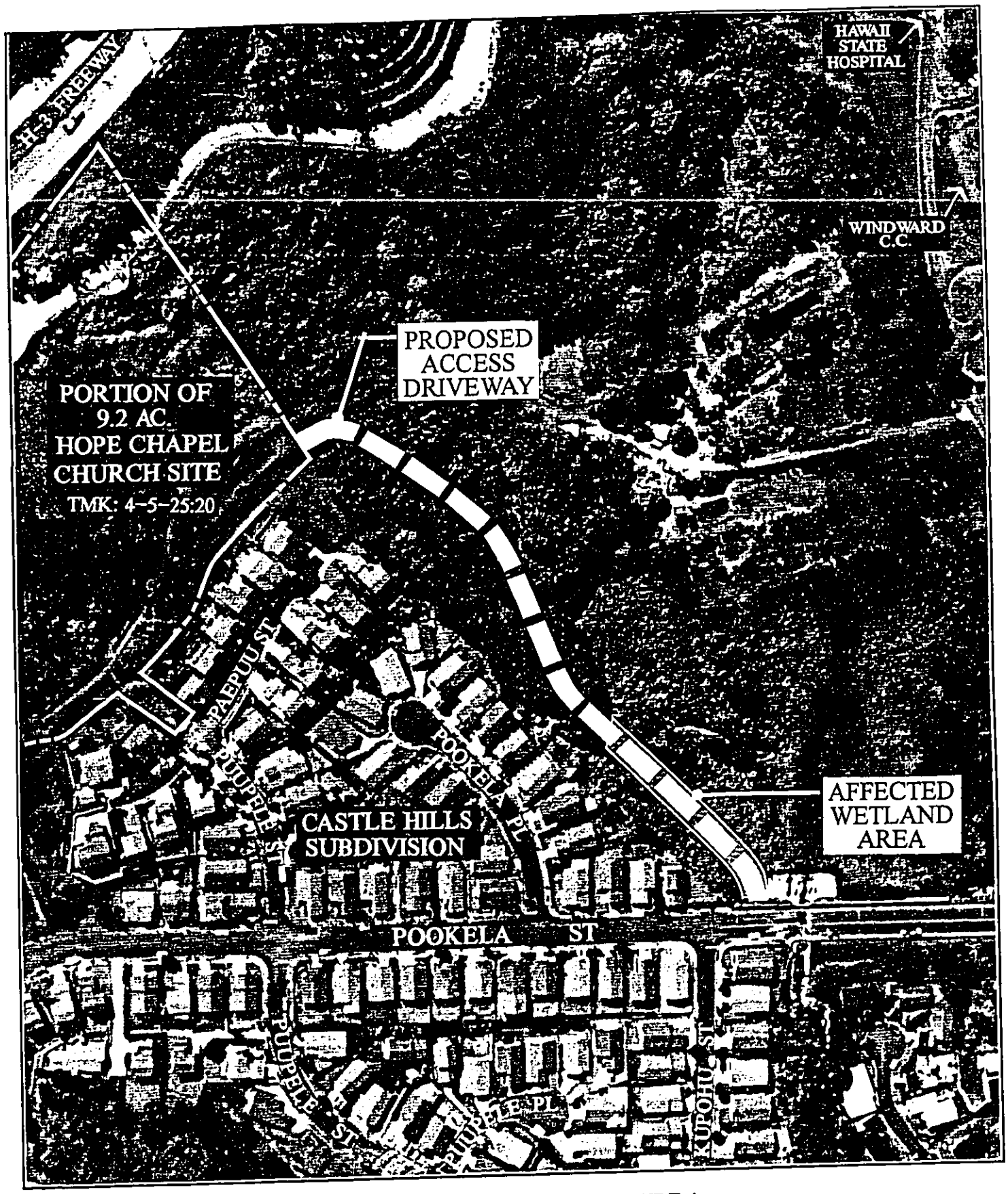

FIGURE 4
PROPOSED ACCESS
DRIVEWAY ALIGNMENT
HOPE CHAPEL ACCESS DRIVEWAY

KANEOHE, OAHU

0 50 100 200 400
FEET

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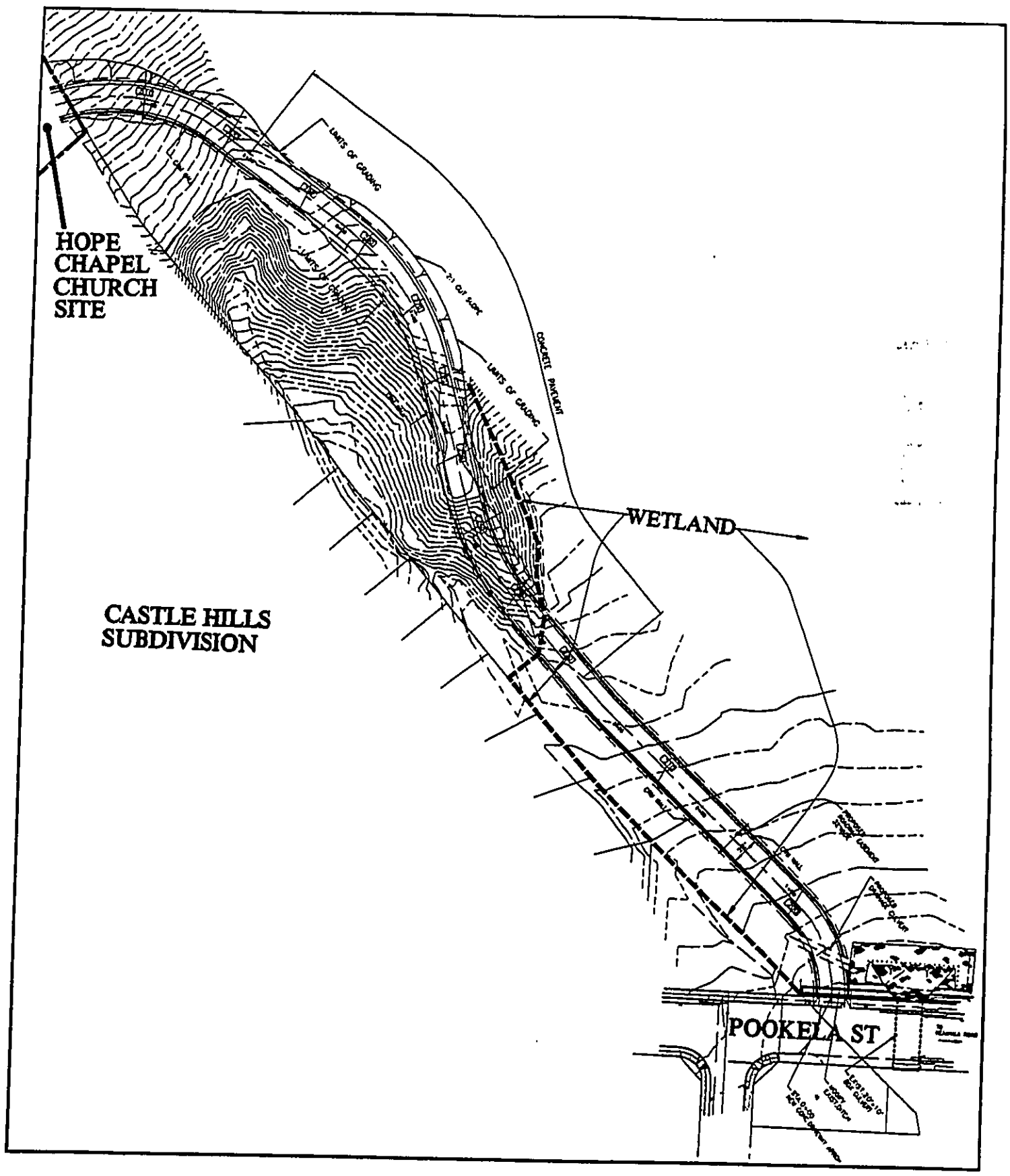

FIGURE 5
PRELIMINARY DRIVEWAY PLAN
HOPE CHAPEL ACCESS DRIVEWAY
KANEOHE, OAHU
0 55 110 220 FEET
6/94
PBR HAWAII

Source: Control Point; Calvin Kim & Assoc., 3/11/94

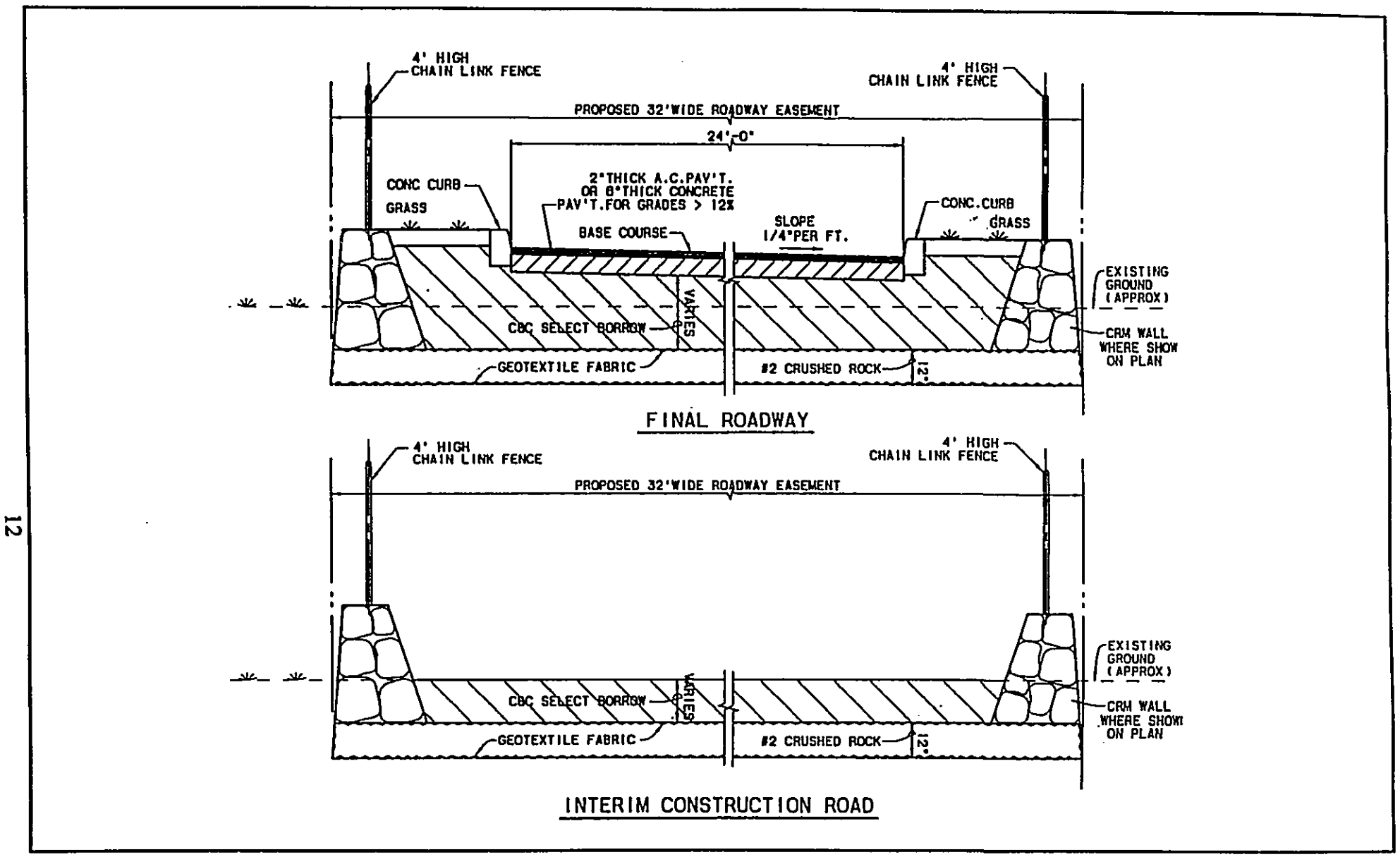

FIGURE 6
TYPICAL SECTION OF DRIVEWAY ACROSS WETLAND
HOPE CHAPEL ACCESS DRIVEWAY
KANEOHE, OAHU

NOT TO SCALE

PBR

Construction of the driveway through the wetland area (approximately 400 lineal feet) will commence first, prior to excavation of upper areas. Clearing and grubbing through the wetland will be limited to the 32 ft width of driveway easement. CRM walls will be constructed along each side of the driveway at the right-of-way line. Geotextile fabric will be laid on the subgrade immediately upon completion of clearing and grubbing; the fabric will be covered by a layer of crushed rock and aggregate subbase material.

Best management practices ("BMPs") in the wetland will be included in the construction activities to maintain water quality. Detailed discussion is included in Section 4.1.6 and Appendix D. Construction activities on the forested slope will involve vegetation clearing, excavation, grading (cut and fill), driveway construction, and planting and landscaping.

Efforts to preserve as much of the area in its natural condition will be made. It is roughly estimated that one to one and a half acres will be disturbed during construction; however, all disturbed areas will be immediately restored by re-vegetation and landscaping.

2.4 DEVELOPMENT TIMETABLE AND APPROXIMATE COSTS

Upon receipt of all approvals, construction of the driveway will occur in two phases beginning in mid-1995 with completion expected in six months. Driveway construction will start at Pookela Street and end at the church site. Construction of the first increment of the proposed church facilities will immediately follow the completion of the driveway.

The preliminary cost estimate for the driveway is $450,000.

CORRECTION

THE PRECEDING DOCUMENT(S) HAS BEEN REPHOTOGRAPHED TO ASSURE LEGIBILITY
SEE FRAME(S)
IMMEDIATELY FOLLOWING

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3.0

REQUIRED LAND USE APPROVALS

3.0 REQUIRED LAND USE APPROVALS

The alternative access connection between the Hope Chapel Kaneohe property and Pookela Street was selected in accordance with conditions imposed by the City and County of Honolulu during the approval process of a Site Plan Review for the Hope Chapel Kaneohe church facilities.

The driveway alignment crosses a forested slope, a wetland, and a concrete channel which connects to the Pookela Street box culvert at Kapunahala Stream.

The entire site is currently designated by the State Land Use Commission as either "Urban" or "Conservation" (Figure 7). The Koolaupoko Development Plan Land Use Map designates the property as Agriculture and Preservation. No public facility improvements are designated on the Koolaupoko Development Plan Public Facilities Map that are applicable to the subject property. Additionally, none of the project is located within the City and County of Honolulu's Special Management Area.

The following is a list of major approvals and permits required for the implementation of the proposed project. During the implementation stages of the project, Hope Chapel Kaneohe will be working with the U.S. Army Corps of Engineers, State of Hawaii, and City and County of Honolulu review agencies for examination and approval of project plans and specifications.

3.1 STATE OF HAWAII

3.1.1 Chapter 343, HRS - Use of State Lands and Use of Conservation District Lands

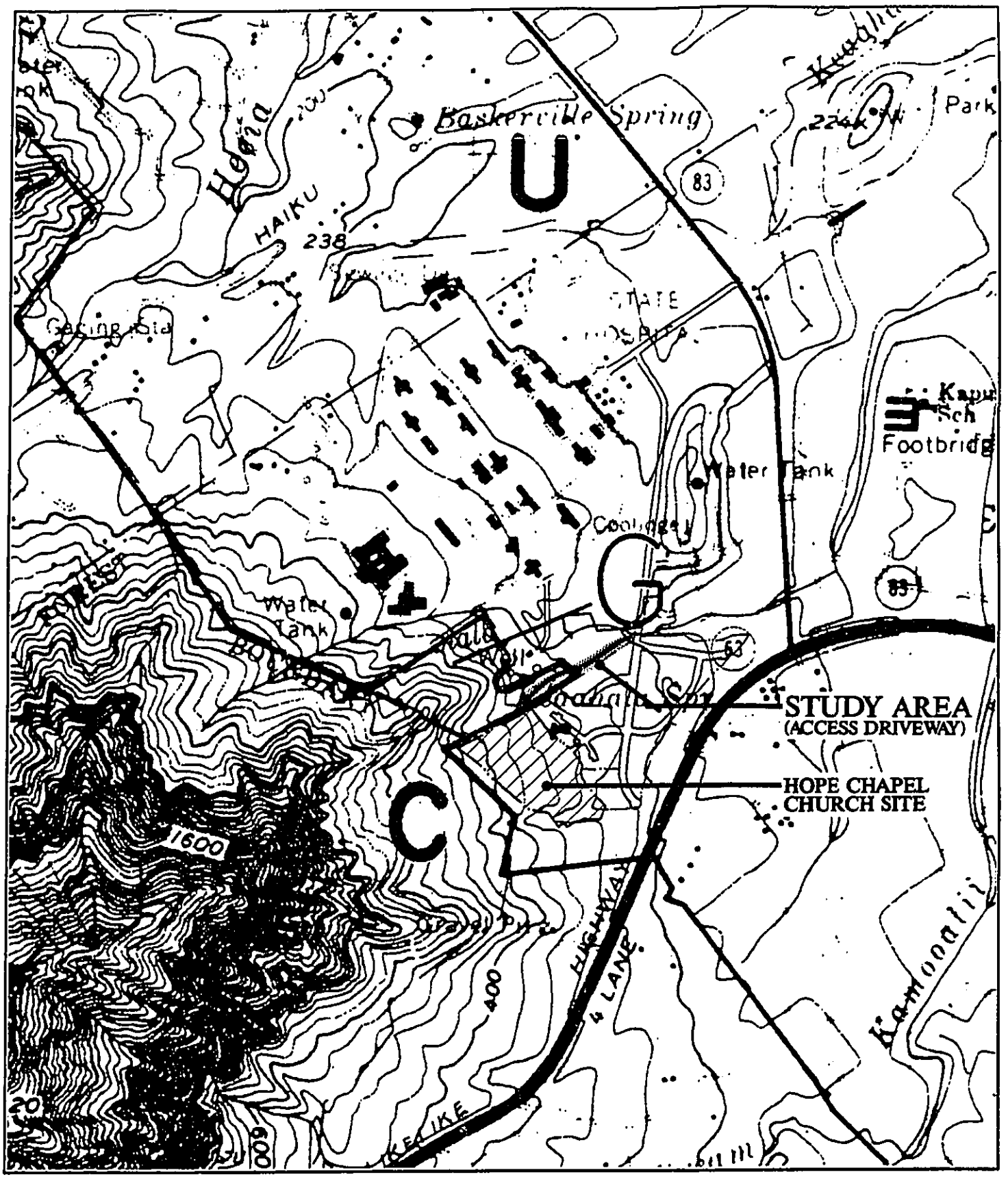
Existing conditions. The land for the proposed driveway is owned by the Hawaii State Hospital. The Landowner and Hope Chapel Kaneohe have entered into a Memorandum of Agreement ("MOA") which provides Hope Chapel with a non-exclusive right-of-way easement of approximately 32 feet for the length of the driveway, measured at 1,070 linear feet. The MOA is being executed by the State Attorney General's office; a copy of the MOA is attached as Exhibit B. A portion of the easement is in the Conservation District.

Chapter 343. The use of State-owned lands and Conservation District lands (described below) trigger Chapter 343, hence, this Environmental Assessment.

Responsible agency. The accepting agency for the Final EA is the Department of Land and Natural Resources.

3.1.2 Conservation District Use Permit

Existing Conditions. A portion of the proposed driveway alignment is located in the State Conservation District, General Subzone (Figure 7). As stated in Title 13, Chapter 2, Administrative



LEGEND

U	SLU URBAN
C	SLU CONSERVATION
G	GENERAL CONSERVATION SUBZONE

Source: State Land Use Boundary Commission, Printed 6/20/94

FIGURE 7
STATE LAND USE BOUDARY MAP/
CONSERVATION SUBZONES
HOPE CHAPEL ACCESS DRIVEWAY

Rules of the Department of Land and Natural Resources, "the objective of [the General Subzone] is to designate open space where specific conservation uses may not be defined, but where urban use may be premature."

Requested Action. A request is being made to allow the construction of the driveway through the General Subzone land in the Conservation District. The project area is surrounded by State Urban District land and urban uses; the site for the proposed church facilities, Castle Hills subdivision, the H-3 Freeway are adjacent to or in close proximity to the project area. Open space will be maintained and vegetation which will be removed during construction will be replaced by landscaping. The driveway will occupy approximately two thirds of an acre and is not inconsistent with the General Subzone Objective.

Responsible Authority. The processing of the CDUA and EA is the responsibility of the Department of Land and Natural Resources, Office of Conservation and Environmental Affairs. The approval of the CDUP is charged to the Board of Land and Natural Resources.

3.1.3 Stream Channel Alteration Permit ("SCAP")

Existing Conditions. Kapunahala Stream which originates at the base of the Koolau Mountain Range flows intermittently in an undefined channel overgrown with Job's tears within the same TMK parcel as the proposed driveway. The construction of the State's Pookela Street extension created a 20-ft by 10-ft drainage box culvert at Kapunahala Stream under Pookela Street.

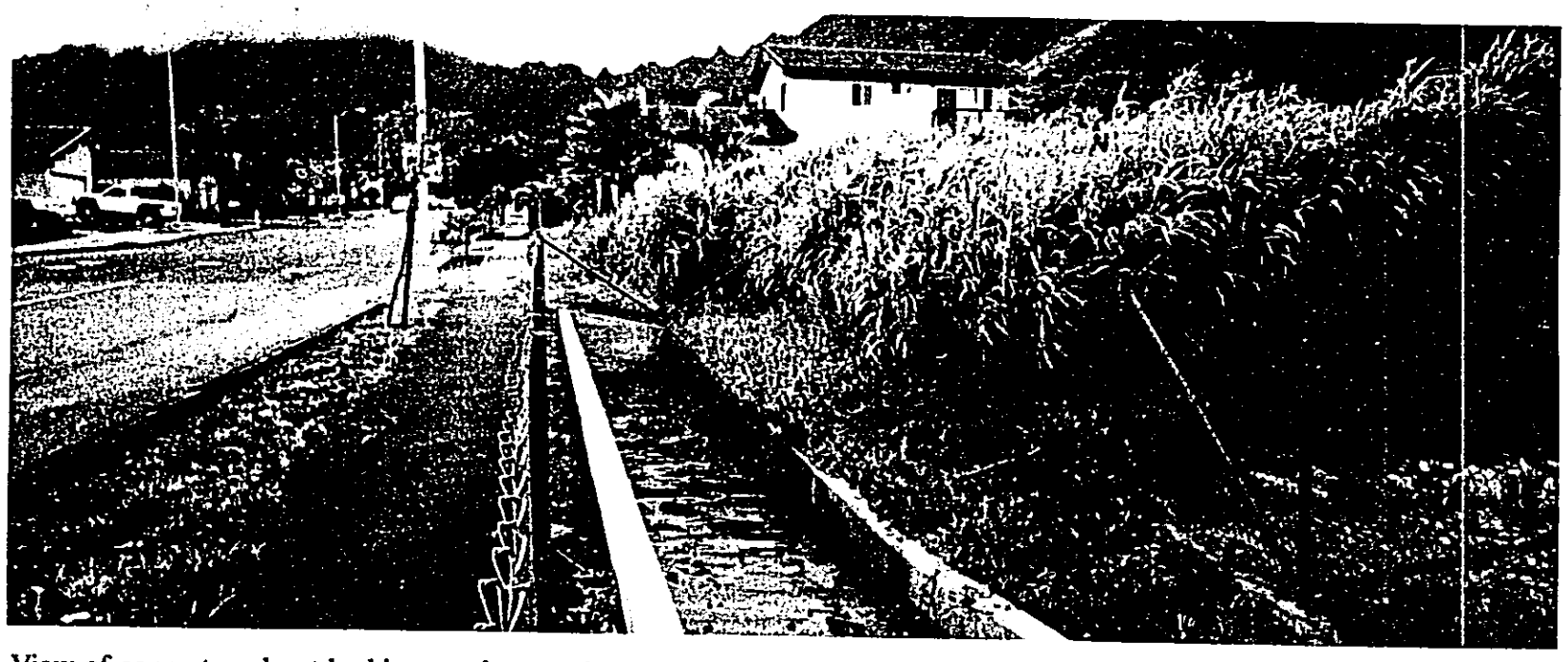
Requested Action. The proposed driveway will require a SCAP to cross over (or modify) a concrete channel which feeds into the box culvert at Pookela Street (Figure 8). A culvert will be designed within the proposed driveway to intercept runoff presently served by the concrete channel.

Responsible Authority. The processing of the SCAP is the responsibility of the Department of Land and Natural Resources Commission on Water Resource Management

3.2 FEDERAL GOVERNMENT

3.2.1 Wetlands Permit - Section 404 Clean Water Act

Existing Conditions. A 400-ft segment of the driveway is situated in a marsh which is dominated by Job's tears. The saturated soil at this location has been delineated as wetland as shown in Figure 5.



View of concrete culvert looking south toward access driveway connection at Pookela Street

FIGURE 8
CONCRETE CULVERT AT
POOKELA STREET
HOPE CHAPEL ACCESS DRIVEWAY
KANEOHE, OAHU

PBR HAWAII

Requested Action. Approximately 13,500 square feet or approximately 0.3 acre of the driveway is situated in a wetland. Construction of this portion of the driveway will require removal of vegetation, dredging and filling to support the driveway. A permit to dredge and fill will be requested to allow this action.

Responsible Agency. The U.S. Army Corps of Engineers has jurisdiction over all wetlands under Section 404 of the Clean Water Act. In addition to the Section 404 permit, associated State approvals include a 401 Water Quality Certification from the Department of Health and a Coastal Zone Management ("CZM") Consistency Review. All three applications have been submitted to the respective agencies in December 1994.

3.3 OTHER APPROVALS AND PERMITS

Permit	Responsible Agency
Disposition for the Use of State Land	Board of Land and Natural Resources
Roadway Entrance Approval	State Department of Transportation
Grading/Building Permit	City and County of Honolulu Department of Public Works

The grading area for the driveway construction will be approximately one acre, which is well under the five-acre minimum required for an National Pollutant Discharge Elimination System ("NPDES") permit. Best management practices ("BMP") would be a requirement of the NPDES permit and will be submitted with the grading permit application for the church facility. To ensure adequate erosion control the Project Engineer has prepared an erosion control plan for the construction of the driveway; this is further discussed in Section 4.1.6 and is attached to this EA as Appendix D.

4.0

DESCRIPTION OF THE AFFECTED ENVIRONMENT

4.0 DESCRIPTION OF THE AFFECTED ENVIRONMENT

The environment surrounding the proposed project is generally characterized as the physical or natural environment and the human or social environment. This section describes the existing conditions and potential impacts to both environments. Impacts and mitigative measures are further described in the following section.

4.1 PHYSICAL CHARACTERISTICS

In general, the project's physical environment includes the existing wetland and the mixed introduced forest. The project is not located in a tsunami zone; lands with an estuary or coastal waters; lands with significant archaeological/historic/cultural resources; or lands with known habitats for rare or endangered plant or animal species. Primary impacts will be on the wetland and forest environments. Soils within the wetland are the only potential constraint, however, engineering design of the driveway can effectively mitigate use of the existing soils as driveway base material.

4.1.1 Climate

Kaneohe is located in Windward Oahu which experiences a cooler climate with relatively high rainfall. Northeasterly tradewinds impinging on the Koolau Mountain Range generate between 50 and 100 inches of rainfall annually within the drainage area. Temperatures in the project area average 72 to 80° F.

The proposed driveway will have no impact on the climate in the nearby vicinity.

4.1.2 Topography

The project area contains two distinct environments, a forested slope and a wetland marsh at the base of the Koolau Mountain Range. Elevations range from approximately 190 to 320 feet mean sea level ("msl"). Within the wetland area a slight slope (1 to 5 percent) ranging from 190 to 220 msl forms a marshy wet meadow. The forested ridge contains slopes characterized as steep (5 to 20 percent) ranging from 220 to 320 msl. Figures 1 and 5 show the contours of the project area.

4.1.3 Physiography and Geology

The marsh and the forested ridge form the dominant natural features within the driveway corridor. The corridor is bordered to the east by Pookela Street and the recently constructed drainage box culvert, to the southeast by the Castle Hills subdivision, to the southwest by a water well and to the north by the marsh and Kapunahala Stream. At this location the intermittent Kapunahala Stream channel is shallow and not clearly defined. The drainage improvements which include a 20-feet by 10-feet box culvert under Pookela Street direct runoff to the culvert invert.

Historically, Kapunahala Spring and Kapunahala Stream probably supplied the marsh with a constant waterflow. Man-made modifications have apparently altered the natural hydrology to the current levels. At the present, rainfall flowing through the stream's mauka watershed and discarded well water collect in the marsh maintaining the wetland character of the property. Although it is difficult to estimate the total quantity of water supplied by the spring, it appears from historic aerial photos that sufficient water was produced to have allowed the use of the property for the agricultural production of wetland crops. A drainage study prepared for the Pookela Street extension and culvert by ParkEn (1992) identified a 125-acre watershed basin that drains at Kapunahala Stream and the marsh.

Presently the marsh is choked with Job's tears, an aggressive exotic species which dominates disturbed stream sides, ditches and freshwater marshes. No open water areas exist, an indication of the accumulation of sediment and organic material over a long period of time. Core samples taken during the archaeological survey revealed that the marsh soils extend to approximately 25 feet. In its present condition, the marsh acts as a sump, providing water purification and storm water retention functions.

The forested ridge formation contains a mix of introduced tree and shrub species and a few native plants. Evidence of past man-made disturbances due to agricultural cultivation and other human activities is present. The slope at this location is steep and grading will require soil stabilization. The graded area of one acre will result in earthwork quantities which have been calculated and estimated to be approximately 1,900 cubic yards excavation and 2,400 cubic yards of fill.

Impacts. The proposed alterations to the existing environment will be limited to cut and fill on 0.6 acre on the ridge, including grading and vegetation removal. In the wetland, vegetation and sediment removal will precede filling to create a foundation for driveway surfacing. Drainage patterns will not be significantly altered except for the area located between the proposed driveway and the Castle Hills subdivision. Flows from this area will be directed in a makai direction toward Pookela Street and moved under the driveway through drainage structures in the driveway subbase. On the forested slope, the driveway will be aligned according to the topography and soils will be stabilized to prevent erosion. As such, the physical alterations required for the driveway will be relatively insignificant compared to the existing overall geological character of the site and region.

4.1.4 Soil Types and Agricultural Capability

The project will result in minimal impact on the availability of agricultural lands within the State of Hawaii. To the extent practicable, wetland agricultural use of lands adjacent to the proposed driveway corridor may be possible, but only with much extensive modification to allow for traditional Hawaiian based agriculture.

Soils in Hawaii are commonly rated in terms of three classification systems: 1) Land Study Bureau ("LSB") Detailed Land Classification; 2) Agricultural Lands of Importance to the State of Hawaii ("ALISH"); and 3) U.S.D.A. Soil Conservation Service ("SCS") Soil Survey.

Detailed Land Classification. The physical characteristics, (i.e., soils of the property) are generally unsuited for most soil-based forms of agriculture. The University of Hawaii's Land Study Bureau Detailed Land Classification of Oahu, has classified the subject property according to overall productivity as Class E primarily within the forested slope and Class C within the wetland. On the forested slope are soils with "E" classification which have "very poor suitability" for productive agriculture (Figure 9) due primarily to the excessively wet condition of the property, steep slopes, and soil type. A rating of "C" is given to the soil in the wetland. The "C" rating indicates that soil based agriculture is possible, but with improvements to control moisture, sunlight, or other climatic conditions.

Agricultural Lands of Importance To The State of Hawaii. Similarly, the State Department of Agriculture Agricultural Lands of Importance to the State of Hawaii (ALISH) system of defining agricultural suitability, designates portions of the property as "not classified" or "other important" agricultural land (Figure 10).

Other Important Agricultural Land, encompassing about 40 percent of the site, is defined as "Land other than Prime or Unique Agricultural Land that is of state-wide or local importance for the production of food, feed, fiber and forage crops. The lands in this classification are important to agriculture in Hawaii yet they exhibit properties, such as seasonal wetness, erodibility, limited rooting zone, slope, flooding, that exclude them from Prime or Unique Agricultural Land classifications."

Soil Conservation Survey. The U.S.D.A. Soil Survey, Islands of Kauai, Oahu, Maui, Molokai, and Lanai, State of Hawaii classifies the subject property into two categories, of which Hanalei silty clay (HnB) comprises the wetland portion of the roadway and Lolekaa silty clay (LoD) the forested ridge. The soils and respective characteristics of each are described below and illustrated on Figure 11.

> HnB-These soils are generally level, but can range up to 6 percent slope. Typically found on stream bottoms and flood plains, this soil is very poorly drained, clay soils that are strongly mottled, and are underlain by peat, muck, or massive marine clay.
>
> LoD-This soil occurs along drainageways and on fans adjacent to the Koolau Range. Runoff is medium to rapid, and the erosion hazard is moderate to severe. Workability is difficult because of the slope. All soils of the Lolekaa Series developed in old, gravely colluvium and alluvium. Natural vegetation consists of guava, Christmas berry, California grass, Hilo grass, and ricegrass.

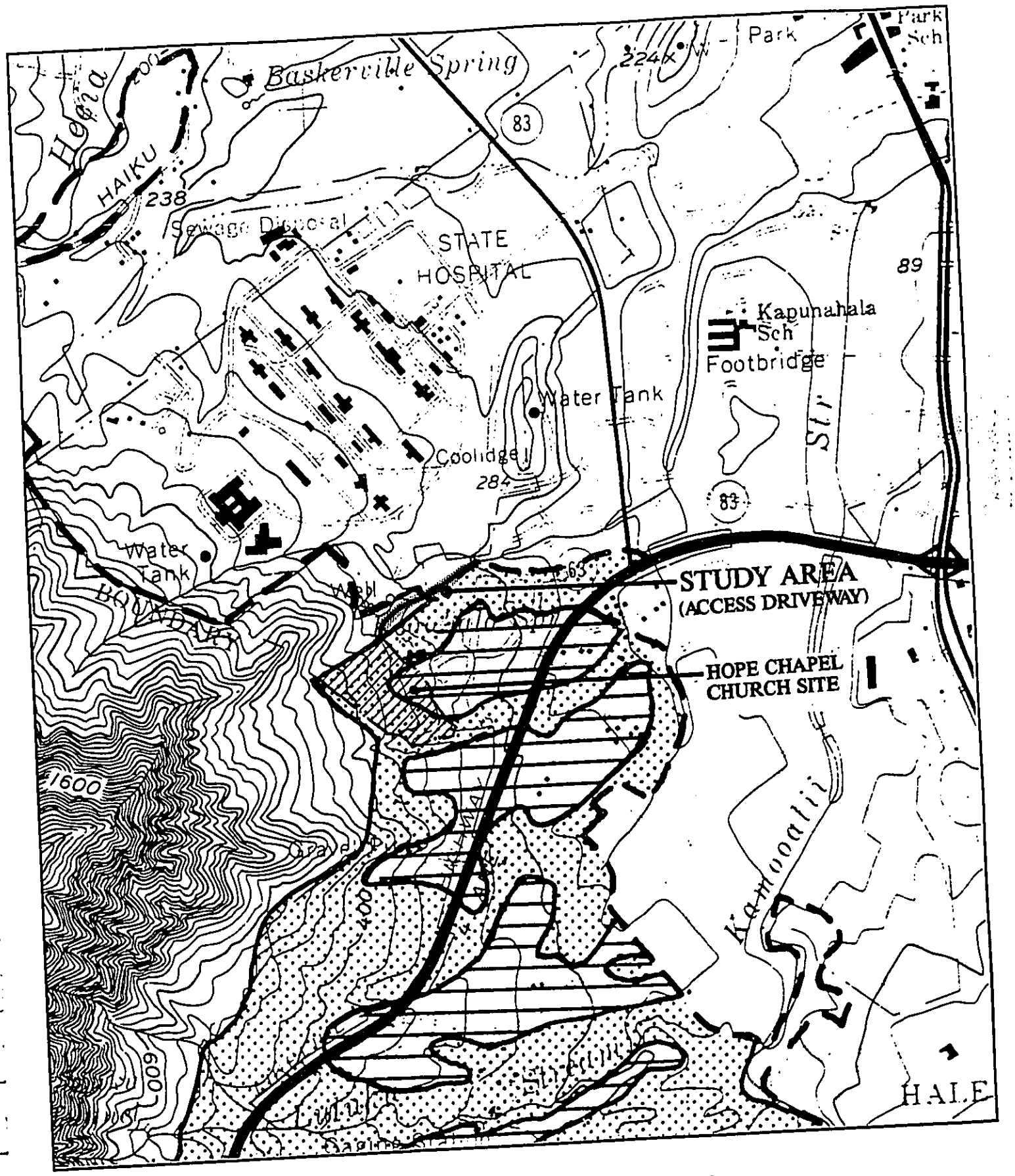
The environmental factors of the site limiting its agricultural potential are primarily the steep slopes, soils and rainfall levels. Rainfall in the project area averages about 50 inches per year, which is sufficient for soil based agricultural crops. However, as with the soils of the project site, other areas on Oahu and in the state exist where topographical conditions are better suited for commercial agriculture. Diversified agricultural crops such as taro cultivation may be appropriate with major modifications (i.e., taro pondfield and bank construction). The mitigation plan which is described in Section 5.4 proposes a taro garden which will restore taro cultivation to this area and concurrently serve the Hawaii State Hospital and Windward Community College.

LEGEND

C14	NON-STONY; OVER 30" DEEP; 0-10% SLOPE; MODERATELY WELL TO IMPERFECTLY DRAINED; FINE TEXTURE
C57	NON-STONY; OVER 30" DEEP; 11-20% SLOPE; WELL DRAINED; MODERATELY FINE TEXTURE
E109	ROCKY; VARIABLE DEPTH; 36-80% SLOPE; MODERATELY TO WELL DRAINED

Source: S.O.H., Land Study Bureau, Univ.of Hawaii, December 1972

FIGURE 9
DITALED LAND CLASSIFICATION
HOPE CHAPEL ACCESS DRIVEWAY
KANEOHE, OAHU
6/94
0 250 500 1000 2000
FEET
PBR HAWAII



LEGEND

- PRIME AGRICULTURAL LAND
- OTHER IMPORTANT AGRICULTURAL LAND
- NOT CLASSIFIED

Source: S.O.H., Dept. of Agriculture, January 1977

FIGURE 10
ALISH
HOPE CHAPEL ACCESS DRIVEWAY
6/94

KANEOHE, OAHU
0 250 500 1000 2000
FEET

PBR HAWAII

LEGEND

HnB HANALEI SILTY CLAY

LoD LOLEKAA SILTY CLAY

Source: U.S. Dept. of Agriculture, Soil Conservation Service & University of Hawaii, Aug. 1972

FIGURE 11
SCS SOIL SURVEY
HOPE CHAPEL ACCESS DRIVEWAY
KANEOHE, OAHU 6/94
0 250 500 1000 2000
FEET
PBR HAWAII

4.1.5 Hydrology and Drainage

The proposed driveway is located within a drainage sub-basin of approximately 5 acres. This sub-basin represents approximately 4 percent of a much larger 125-acre drainage tributary area which contributes runoff to Kapunahala Stream. The majority of this mauka watershed is mountainous, heavily vegetated undeveloped land with exception of the H-3 Freeway. Recent improvements by the State Department of Transportation have re-routed some of the stormwater runoff from the Hospital Rock Tunnel area (which previously drained into the Kahelelani Subdivision) through the Hope Chapel's church property and into the Castle Hills Subdivision drainage system. The remaining runoff flows to the 20-ft by 10-ft Kapunahala Stream box culvert at Pookela Street.

The drainage sub-basin which includes the proposed driveway is approximately 5.0 acres extending from the Castle Hills subdivision between Pookela Street and the H-3 Highway as shown in Figure 12. A small ridge separates this area from the larger main tributary area that feeds the 20-ft by 10-ft Pookela Street Kapunahala Stream box culvert. The ground elevations of the drainage basin range from 190 feet to 460 feet msl.

Storm water runoff has been calculated by Calvin Kim & Associates (July 1994, Appendix C) for pre-development and developed conditions based upon the Rational Method as defined in the Storm Drainage Standards of the City and County of Honolulu, May 1988. Under the existing conditions, peak runoff increase of approximately 5% during a 10-year storm event is calculated at 27 cfs and 36 cfs for a 50-year storm event. The study concludes that the construction of the driveway will result in 1 cfs increase in the peak runoff for a recurrence interval of a 10-year storm and 2 cfs increase in peak runoff for a 50-year storm. This increase in runoff pertains only to the runoff from the five-acre drainage sub-basin.

Impact on the Pookela Street Box Culvert. The existing 20-ft by 10-ft box culvert was recently constructed during the extension of Pookela Street. The analysis for the box culvert was prepared by ParkEn, Inc. and documented in their report titled *Drainage Report for the Castle Hills Access Road, February 1991*. The design of the box culvert was based on a 125-acre drainage basin with a flow rate of 920 cfs. The peak discharge curve of the Storm Drainage Standards (Plate 6) was used in establishing the peak flow. The 5.0-acre drainage sub-basin which encompasses the Hope Chapel driveway is included in the larger 125-acre basin and therefore does not increase the tributary area. The driveway will increase flow by one to two cfs during peak discharges.

The amount of paved area added by the driveway surface area is so small in relation to the 125-acre drainage basin that changes to the runoff coefficient are negligible. Therefore, it is concluded that the proposed driveway will not increase the peak discharge at the box culvert at Pookela Street. In addition to standard drainage improvements, the proposed driveway will utilize a system of catch basins, drains, curbs, and gutters in conformance with all applicable City Department of Public Works design criteria. The design of the proposed driveway has considered the increased runoff generated by impermeable surfaces and includes mitigation measures to ensure that runoff quantities do not exceed the capacity of the existing drainage system and existing streams as determined by the City

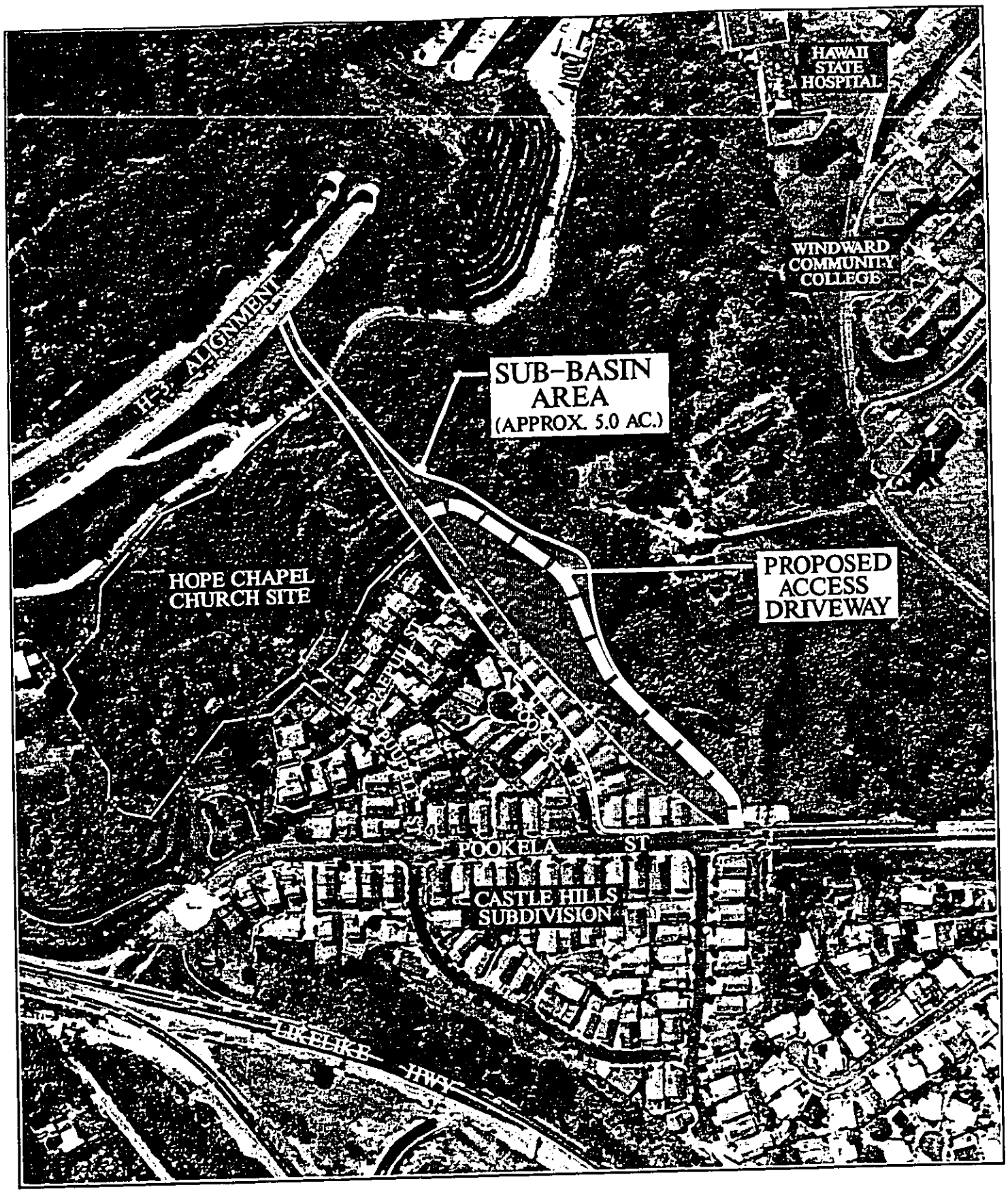


FIGURE 12
DRAINAGE SUB-BASIN AREA
HOPE CHAPEL ACCESS DRIVEWAY

KANEOHE, OAHU 6/94

0 75 150 300 600 FEET

PBR HAWAII

and County of Honolulu Storm Drainage Standards. All applicable permits will be obtained from the State and County prior to any alteration.

4.1.6 Surface Water Quality

Presently, surface water is visible intermittently within the proposed driveway corridor and Kapunahala Stream, and as it drains to the box culvert at Pookela Street. Kapunahala Stream is located within 50 to 200 feet from the driveway alignment and ultimately flows into Kaneohe Stream and Kaneohe Bay.

According to Englund and Filbert (Appendix G), the stream system has been heavily channelized through its entire course similar to other streams in urban areas.

In its existing condition the project site is heavily disturbed by past agricultural and other land uses; however, there is no recent activity showing evidence of water quality impacts. Potential impacts to surface water quality on-site and off (downstream), include both short-term construction-related effects and long-term operational effects.

Short-Term Construction Impacts. The construction period will have the greatest potential for generating suspended sediments in runoff from the project site. The total area that will be disturbed by grading activities is approximately one acre. However, since the driveway is part of the overall church construction project the NPDES permit application will also include the 9.2 church facility site. A Best Management Practices Plan has been prepared for the driveway segment to ensure that the construction of the driveway will not, to the extent practicable, degrade the environment by implementing measures to minimize soil erosion from the construction site. The plan is included as Appendix D.

Erosion and Sediment Controls. Detailed site specific measures are proposed in the BMP Plan to minimize the short-term impact of soil erosion to the wetland and the stream. These include the following construction management techniques which are recommended by the State Department of Health, City and County of Honolulu and Soil Conservation Service:

- Sedimentation basins and sediment traps, silt fences, and gravel cover material will be used to control sediment from entering Kapunahala Stream during consruction.

- Clearing and grubbing through the wetlands will be limited to the 32-feet width of the easement. A geotextile fabric will be laid on the subgrade immediately upon completion of clearing and grubbing, and the fabric in turn will be immediately covered by a layer of crushed rock and aggregate sub-base material.

- CRM walls will be constructed along each side of the driveway to the right-of-way line. This area between the walls will serve as the primary sedimentation basin during construction. Any water-caused soil erosion will be intercepted and confined within the roadway area. Silt screens will be provided at overflow locations to filter any water that may overflow into the wetlands.

- Within the sloped area, excavation to subgrade will be required. All exposed side slopes will be immediately covered with an erosion control fabric or covered with a soil-binding tackifier agent such as Marloc then planted with grass by hydromulching. Expedient revegetation of exposed sloped areas of the site will minimize erosion of soils.

- No graded soils will be left exposed. The driveway will be surfaced with concrete pavement in the lower wetlands portion and by asphalt concrete pavement on the slope.

Long-Term Impacts. Long-term operational activities are not expected to create significant effects, primarily due to the nature of the project. It is unlikely that the driveway will generate any pollutants.

4.1.7 Natural Hazards

No known natural hazards presently exist on the subject property. The Flood Insurance Rate Maps ("FIRM") designate the entire property as Zone X. Drainage structures at Pookela Street have been designed and sized to mitigate flooding at this location.

Earthquakes in the Hawaiian Islands are associated with volcanic eruption or tectonic movement. Oahu is rated in seismic zone one in the Uniform Building Code and volcanic eruption is unlikely. All structures will be constructed for protection from earthquakes in accordance with the Uniform Building Codes adopted by the County.

4.1.8 Botanical Resources

Field studies to assess the botanical resources within the driveway corridor was undertaken by Char and Associates (July 1994). The primary objectives of the survey were to describe the major vegetation types, inventory the flora, search for threatened and endangered plants, and identify areas of potential environmental concern. This report is attached as Appendix E.

Two distinct vegetation types exist in the project area: Coix Marsh and Mixed Introduced Forest. No endangered plant or animal species were found nor are known to exist in the project area. A wetlands delineation survey established the boundaries of the wetland along the Castle Hills property and at the toe of the slope where the Coix marsh and the introduced mixed forest interface.

Coix Marsh. The marsh (also "wetland") consists almost exclusively of Coix or Job's tears (Coix lachryma-jobi) which forms dense robust clumps which exclude other species. Other wetland species include maile pilau vine, primrose willow or kamole, and moonflower vine. Along the perimeter of the marsh where it interfaces the forested uplands, the clumps of Job's tears thin out and smaller herbaceous species are found, including Hilo grass, Glenwood grass, wood fern, hairy sword fern, a Cyperus species, and honohono.

Mixed Introduced Forest. The finger ridge is composed primarily of introduced or alien species, although a few small scraggly 'ohi'a trees and hala trees occur on the upper slopes and a tangle of hau are found on the lower slopes at the marsh interface. Octopus (umbrella tree), native to Australia

and New Guinea, is the most abundant of the introduced trees and forms a somewhat open canopy with the other tree species scattered throughout. These include Java plum, African tulip, fiddlewood, bingabing, and a large forestry planting of paperbark. The trees are about 30 to 50 feet tall, with the larger paperbark trees 60 to 70 feet tall. Shrub cover includes strawberry guava, guava, shoe button ardisia and Christmas berry. A few 'akia shrubs, an endemic species, are found in this subcanopy layer.

The percentage of ground cover varies from 30 to 40 percent in the more heavily shaded areas and almost 80 percent cover in the more open areas. Common ground cover species include basketgrass, hairy swordfern, lauwa'e and Spanish clover. Ornamental species present are plants such as crepe ginger, Ptychosperma palm, taro vine, a Heliconia species, shell ginger, impatiens, and Hilo holly. Fruit trees include lychee and mango.

Discussion. The driveway corridor supports primarily introduced or alien species. None of the plants found on the driveway alignment is a listed, proposed, or a candidate threatened and endangered species; nor is any considered rare and vulnerable. Moreover, there are no sensitive native plant-dominated communities on or adjacent to the proposed access driveway.

The two vegetation types, wetland and forest, appear to have been disturbed at some time in the past as shown by evidence of former uses. These include the presence of old cattle fences, a narrow road, telephone poles, and former landscape plantings. Given these findings, the study concludes that the proposed driveway should not have any significant impact on botanical resources and that there are no botanical reasons to impose any restrictions, conditions or impediments to the project.

4.1.9 Wildlife Resources

To ascertain the existing faunal community, a field survey was conducted by Phillip L. Bruner (June 1994) (Appendix F) to assess the bird and mammal species occurring within the driveway corridor and/or their unique habitats; and to determine the presence or likely occurrence of any native fauna, considered "endangered" or 'threatened". In addition, an evaluation of the quality of the wetland and forest land habitats for native wildlife was prepared. The species list and the general findings of the field survey has received the concurrence of the U.S. Fish and Wildlife Service as noted in a response letter to an inquiry by PBR Hawaii; both letters are included in Appendix F-1.

All major habitats on and near the proposed project site were visited and census stations were distributed to provide a reasonable sample from which relative estimates of bird populations could be derived. The two distinct environments, wetlands and second growth forest, which occur could provide habitat for different species. The wetland was found to be choked with denseJob's tears with no open water areas making the site unsuitable for waterbirds. No waterbirds were noted on the survey.

The property supports the typical array of exotic birds that are expected at this locality and in this type of habitat on Oahu. A total of 12 species of exotic birds were recorded during the field survey. These include the Spotted Dove, Zebra Dove, Common Myna, Red-vented Bulbul, White-rumped Shama, Northern Cardinal, Red-crested Cardinal, Japanese White-eye, Japanese Bush-warbler, House Finch,

Chestnut Mannikin, and Nutmeg Mannikin. Red-vented Bulbul were particularly abundant. No unusual or unexpected species were found.

Based on the location and type of habitats found on the property as well as in the research the following species may also occur in this region of the island: Barn Own, Red-whiskered Bulbul, Red-billed Leiothrix, Hwamei, Java Sparrow, House Sparrow and Common Waxbill.

Although no endemic land birds were recorded on the survey, it was noted that the shorteared Owl or Pueo occurs in grassland habitat, agricultural fields and forests. Past sitings have been made in nearby Haiku Valley. The Pueo is listed as endangered on Oahu by the DLNR. Common amakihi, apapane and 'elepaio are three endemic species which occur in the Koolau Mountains. Common amakihi could on occasion occur in the forested sections of the property. This species is one of the most abundant of the native forest birds.

No open habitat suitable for migratory birds like Pacific Golden-Plover exists on the property and none were noted on the survey. Nor were any nesting seabirds observed on the property. The presence of predators probably renders this site unsuitable for nesting.

A survey for land mammals revealed scats of the Small Indian Mongoose and tracks of cats and pigs. Rats and mice also are likely to occur on the property. Trapping was not conducted to assess the relative abundance of feral mammals.

Discussion. This property contains the usual mix of introduced plants and animals typical of second growth, disturbed forests and vegetation choked wetlands on Oahu. No particularly unique or special habitat features essential to native wildlife were discovered. The loss of wetland due to the proposed access driveway will have no effect on waterbirds since this site is unused and unsuitable for these species. In addition, some forest will be lost as a result of the driveway. Those introduced species which prefer dense cover may decline in abundance at this location. This should not be a concern for the proposed development as these birds are neither native nor endangered. The forested lands are composed of second growth introduced vegetation which is not considered to be important habitat.

4.1.10 Stream Assessment

An assessment of Kapunahala Stream was completed by Englund and Filbert of Pacific Aquatic Environmental (August 1994) to assess for native and introduced stream biota (Appendix G). The assessment begin at Kaneohe Stream at Kaneohe Bay (Kapunahala Stream drains into Kaneohe Stream) and terminated at the origin of Kapunahala Stream channel in the Koolau Mountains.

Kapunahala Stream is intermittent at higher elevations. The stream has been heavily affected by past and current land uses with introduced species dominating the stream fauna. This situation is typical of many streams found in urban areas of Oahu. Based on comparison with historical records, little change in fish species composition has occurred over the past 20 years.

Kapunahala Stream and Kaneohe Stream were found to he inhabited by high numbers of six introduced fish and one crustacean species. This was probably because the system has been almost

entirely channelized from an elevation of approximately 380 ft. downstream to Kaneohe Bay. Two poeciliid species and green swordtails accounted for nearly all the fish numbers and biomass in Kapunahala Stream. Only one native stream 'o'opu (Awaous stamineus) was observed within Kapunahala Stream. No Category 1 Candidate Endangered Lentipes concolor (goby stream fish) were found within the study area. Also, no Category 1 or 2 Candidate endangered Megalagrion damselfly species were encountered.

The degree to which this system has been impacted by channelization and urbanization is reflected in the apparent lack of recruitment by native stream fish. No hinana (returning post larval 'o'opu) were observed, suggesting that little recruitment occurs. A major ecological requirement of 'o'opu is the need to pass through a stream mouth two times during the life of the individual (Kinzie 1990 in Pacific Aquatic Environmental 1994). Channelization of this stream system is believed to interfere with fish migration.

Discussion. Because the system is heavily perturbed, native stream biota are uncommon, and the magnitude of disturbance associated with the proposed driveway is small and no substantial impacts to native aquatic biota are expected. Erosion control measures during construction are recommended to minimize sediment input into both Kapunahala and Kaneohe Stream and ultimately Kaneohe Bay.

The study concluded that the proposed driveway should have no significant impact on native Hawaiian stream fish within the Kapunahala/Kaneohe Stream system or on the island of Oahu. Effects of the proposed driveway would be immeasurable relative to existing perturbations (e.g., introduced fauna and channelization). The impact to native damselflies are also not expected due to their absence in the disturbed Kapunahala/Kaneohe Stream system. Therefore, no significant impacts to nativefish and invertebrates are expected.

4.2 HUMAN ENVIRONMENT

4.2.1 Archaeological and Historic Resources

The archaeological inventory survey of the project corridor was conducted and is described in a report by Robert L. Spear, Ph.D. (Revised January 1995); the report is attached as Appendix H. The purpose of the survey was to determine the presence or absence of significant cultural remains within the project area. A surface survey and a subsurface coring in the wetland area were conducted. In addition, previous archaeology work by Lufty and Williams, Hammatt etal, McAllister, Rosendahl and Allen were researched. Sites of varying significance have been recorded in the vicinity; however, no significant archaeological sites were identified at this site in the survey or reported in the previous research.

Based on the results of previous archaeological work in the area and the review of historical documentation, the pre-contact use of the project area most likely consisted of agricultural activities, especially wetland and dry land cultivation of taro. However, due to the wide spread impact of post-contact ranching and agricultural activities, little, if any, pre-contact surface features were expected

to exist. Post-contact features would probably be associated with ranching or rice and pineapple cultivation.

The methodology of the survey involved walking the proposed driveway corridor which had been flagged in the field prior to the archaeological fieldwork and subsurface testing which consisted of a single eight meter core obtained from the wetland segment of the driveway alignment. The findings indicate that the wetland area within the driveway corridor may be of some antiquity with dates ranging from 2908-2576 B.C. to A.D. 560-768. The analysis of the core samples indicated the presence of charcoal particles in the two uppermost core samples indicating that fire was present in the area during the prehistoric Polynesian period and during historic times but not during pre-human times. A pollen analysis identified the presence of kukui and taro, both Polynesian plant introductions. However, the absence of soils suggesting pondfield cultivation at the location of the core sample within the driveway corridor suggests that taro may have been cultivated in another part of the marsh.

The surface survey located three features; a narrow dirt road, a concentration of historic debris, and a modern outhouse. The outhouse and the historic refuse were determined to be modern and no further work was deemed necessary. The dirt road which possibly originated during the early 20th century agricultural development is depicted on existing topographic maps. Along with the descriptive information included in previous studies, this feature is not considered significant.

Discussion. None of the extant surface features are considered to be archaeologically significant. It was expected that the principal surface, cultural remains that might be found in the project area would consist of agricultural features from the growing of taro, rice, or pineapple. No such remains were identified during the surface survey. However, the wetland core analysis indicates the presence of a few grains of taro pollen, suggesting that a taro pollen producing area is likely to have been elsewhere in the wetland. Discussion of the wetland mitigation plan taro program is later described in Section 5.4.

Based on the results of the survey no further archaeological work was recommended prior to construction. However, because of the discovery of subsurface features, such as *imu* along the windward H-3 Highway corridor, it was recommended that an archaeological monitor be present during ground disturbing activities within the driveway corridor above the wetlands. Although not expected, all work in the immediate area will be halted and the Staff Archaeologist for Oahu Island, State Historic Preservation Division, DLNR, will be immediately informed should human burials be discovered.

The DLNR State Historic Preservation Division was contacted during the preparation of the archaeological inventory survey and report. A copy of the final report has been submitted to the Oahu archaeologist for review.

4.2.2 Roadways and Traffic

An initial Traffic Impact Assessment Report ("TIAR") was prepared by Pacific Planning & Engineering, Inc. ("PPE") (February 1993) for the Hope Chapel Kaneohe proposed church facilities

in relation to the Site Plan Review permit request. The TIAR has subsequently been updated (PPE, February 1995) and is attached as Appendix J. The purpose of the studies was to identify and assess the probable traffic impacts of the church facilities. The 1993 study analyzed the church development and operation utilizing the Puupele Street access. It concluded that "the completed development will have a negligible impact on traffic operations at the intersections of Kahekili Highway with Keaahala Road, and Pookela Street and Puupele Street. The project will have an impact along Puupele Street if cars park along both sides of the road."

At the time of the 1993 study, the Pookela Street extension was under construction and access through Castle Hills was through Pookela Street at Likelike Highway. During the Site Plan Review process, as noted in the Director of Land Utilization's approval (Appendix A), concerns were raised regarding the impact of church related traffic on the internal roadways of the Castle Hills subdivision. Approval of the Site Plan Review was therefore, conditioned on successful attainment of an alternative access to the church property. After considering several alternatives, as described in Section 6 of this report, the subject access alignment was found to be the only remaining viable option for access to the Hope Chapel property. The subject CDUA requests permission to implement the chosen alternative.

The 1995 updated report concludes that the Hope Chapel church facility development, when completed in 1997, will have little impact on traffic operations at the intersections of Kahekili Highway with Keaahala Road and Keaahala Road with Pookela Street.

Three main intersections in the study area were observed. In addition to the existing traffic conditions, the future conditions based on land uses served by the study area roadways as well as planned roadway improvements were analyzed to calculate the projected traffic with and without the Hope Chapel church facility and the future levels-of-service at the intersections.

Intersection of Kahekili Highway and Keaahala Road

With the planned widening of Kahekili Highway in 1995-1996, traffic conditions are expected to improve over the present LOS F operations. The addition of the Hope Chapel development will not significantly alter these conditions.

Intersection of Keaahala Road and Pookela Street

Conditions at the Keaahala Road and Pookela Street intersection may worsen due to increased through traffic heading toward Windward Community College[1]. Motorists making left-turns from the Windward Health Center may experience LOS C operations during the morning peak hour, however, this volume is relatively small. Trips due to Hope Chapel facilities will not significantly affect this condition.

[1] The College, in its Five-Year Master Plan approval is required by Plan Review Use Permit (92/PRU-3 RY) Condition 3 to improve Keaahala Road. Funding is being sought through the State Legislature for the planning, design and construction of the required improvements to City Department of Transportation standards.

Intersection of Pookela Street with Hope Chapel Driveway

The proposed driveway at Pookela Street and Cstle Hills internal roadways are expected to operate at LOS A when the church is completed.

Discussion. When the church facility is completed in 1997, the levels-of service will essentially remain the same as without its development. The largest impact will be on Sundays because of church services, however, light traffic on adjacent roadways will not significantly reduce level-of-service. With the widening of Kahekili Highway to a six-lane divided highway, no mitigating improvements are necessary.

This proposed access driveway through Hawaii State Hospital lands at Pookela Street, completely avoids entrance into Castle Hills. Further, the level of church usage proposed between the 1993 and 1995 studies have not changed and is expected to remain the same at the completion of the project. The Hope Chapel Kaneohe facility has been planned for it maximum optimum growth. Auditorium seating for approximately 550 to 600 people and 260 parking stalls are planned. These built in growth inhibitors are consistent with Hope Chapel's philosophy and practice of starting new churches in different communities. The traffic study, accordingly, evaluated the maximum traffic which is expected to be generated with the development of Hope Chapel's permanent facility.

4.2.3 Noise

The existing background ambient noise levels are generally less than the average noise levels associated with residential land uses. Existing noise results from the natural sounds of wind, foliage and birds, as well as intermittent aircraft and traffic. Other noise on the project area is associated with existing residential areas, traffic at Pookela Street, and sounds associated with the completion of the H-3 Freeway.

In the future, potential noise impacts will be generated from short-term construction activity and long-term operations of the church. Additional ambient future noise levels will likely be generated from traffic on the H-3 Freeway directly above the project area when it opens.

Short-term Construction Impacts. Construction noise is typical of development projects and do not warrant additional mitigation measures.

Long-term Operational Impacts. Traffic noise on the driveway will be noticeable during peak periods (Friday night and Sunday church services). A maximum speed limit on the private driveway will be posted to reduce noise levels during these times. Noise associated with the operation of the church facilities will be mitigated through landscaping, building siting and design in accordance with the Site Plan Review approval.

4.2.4 Air Quality

Both Federal and State standards have been established to control ambient air quality. At present, six parameters are regulated including: 1) particulate matter; 2) sulphur dioxide; 3) nitrogen dioxide;

4) carbon monoxide; 5) ozone; and 6) lead. Hawaii's standards are more stringent than comparable national limits except for sulphur dioxide. Regional and local climate, together with the type and amount of human activity, generally dictate the air quality at a given location. Present air quality is estimated to be good; this is primarily due to the predominant northeast tradewinds.

Construction of the proposed driveway will not significantly impact air quality. Vehicular emissions will increase from construction equipment during the short-term construction period and over the long-term from passenger vehicles. However, State and Federal air quality standards will not be exceeded and no significant adverse impacts are anticipated.

Mitigation measures available to minimize air quality impacts include dust control measures such as frequent watering during construction and rapid establishment of plant materials once grading is completed. However, considering the wetland portion of the driveway, dust will not be a significant contributor of particulates to the existing levels of air quality. However, should mud from the wetland be transported to Pookela Street, washdown will be undertaken to prevent fugitive dust formation. Increased vehicular traffic will not violate state or federal air quality standards based on the moderate level of existing traffic volumes in the project region.

4.2.5 Visual Resources

The subject property, located at the base of the Koolau Mountains exhibits an undulating terrain including steep cliffs, gulches and ridges. There is no single dominant natural feature on the project site, although the backdrop of the Koolau Mountains is dramatic. Predominant natural features such as mountain ridges surround the site. The vacant and under-utilized nature of the property permits the growth of scrub vegetation which impacts the visual qualities of the property. Although the project site is surrounded by very low densities, the property does represent an open space natural resource in the area from a visual perspective. The proposed driveway will be visible from Pookela Street and Castle Hills residences abutting the project area as shown in Figures 13, 13A and 13B. Mitigative measures will include landscaping as shown in Figure 14. Aluminum fencing, painted to blend with the vegetation, will be installed along the wetland portion of the driveway. Consequently, development of the proposed driveway will alter the present vacant condition of the property, but not in a detrimental manner.

4.2.6 Social and Employment Characteristics

Population. The proposed project contains no residential land uses. As such, the proposed driveway construction will not directly impact the existing or future residential population of the area.

Employment. According to the State Department of Labor and Industrial Relations, the estimated average unemployment rate for October 1993 on Oahu was four percent, or approximately 12,650 persons. Presently, no jobs are created by land use activities on the subject property. The proposed driveway project will generate short-term, direct and indirect employment during construction. After construction, church related employment is estimated at approximately 25 persons.

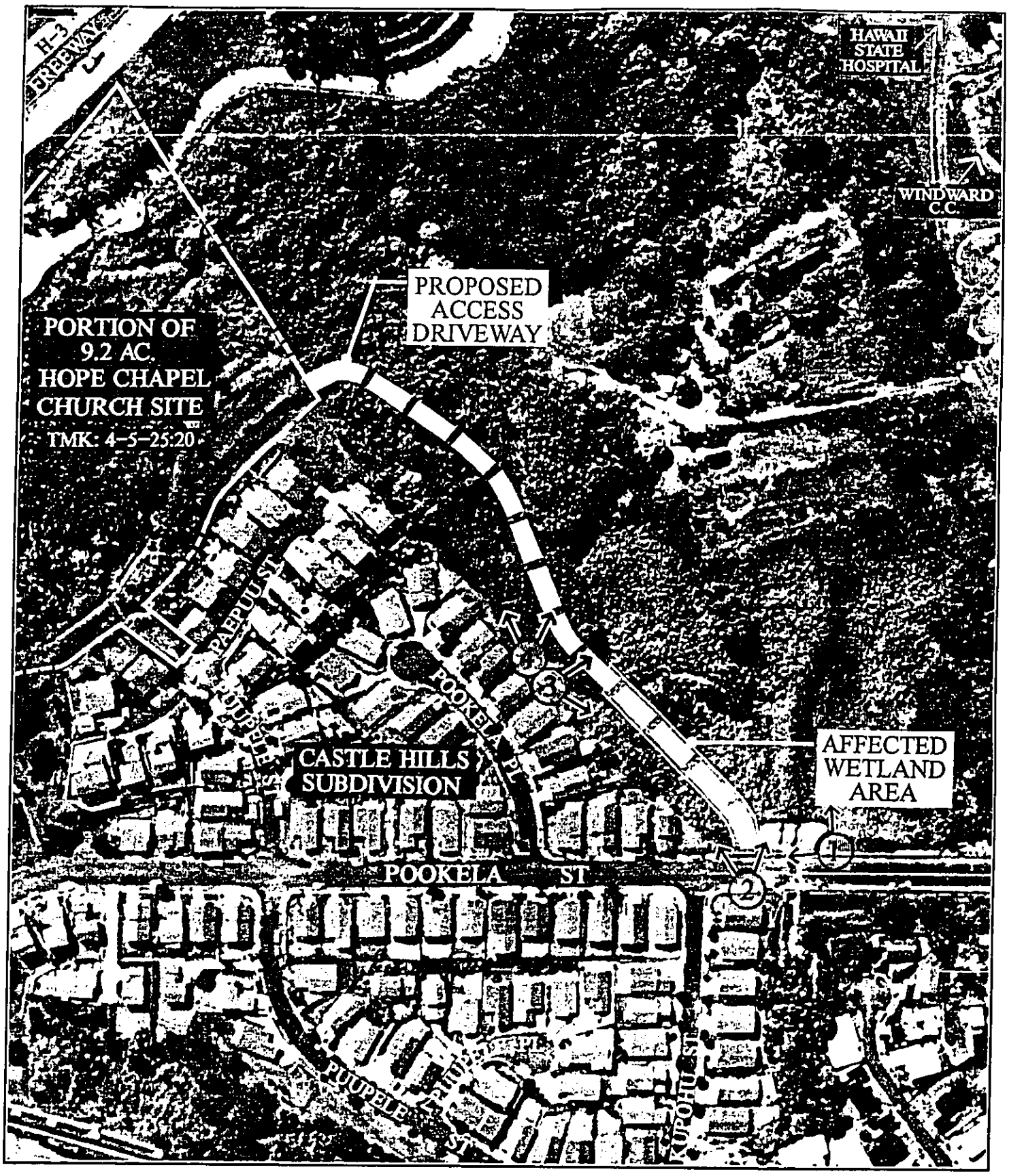
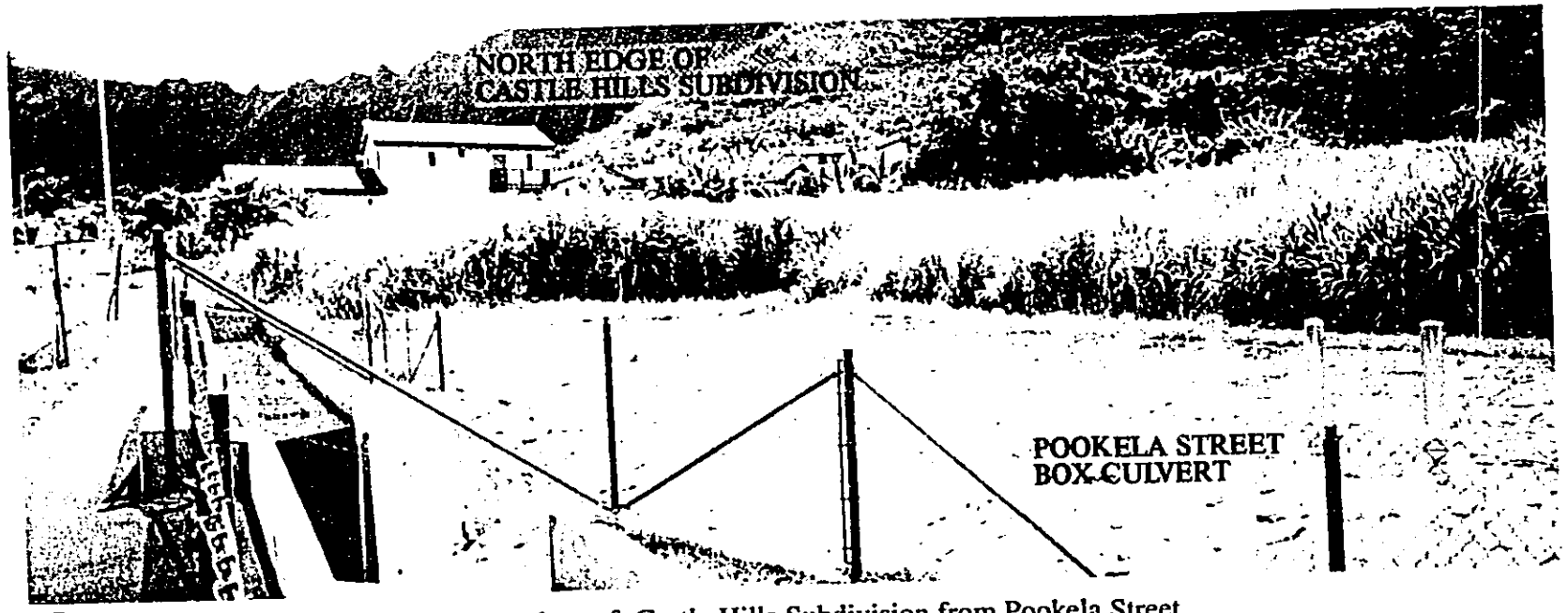


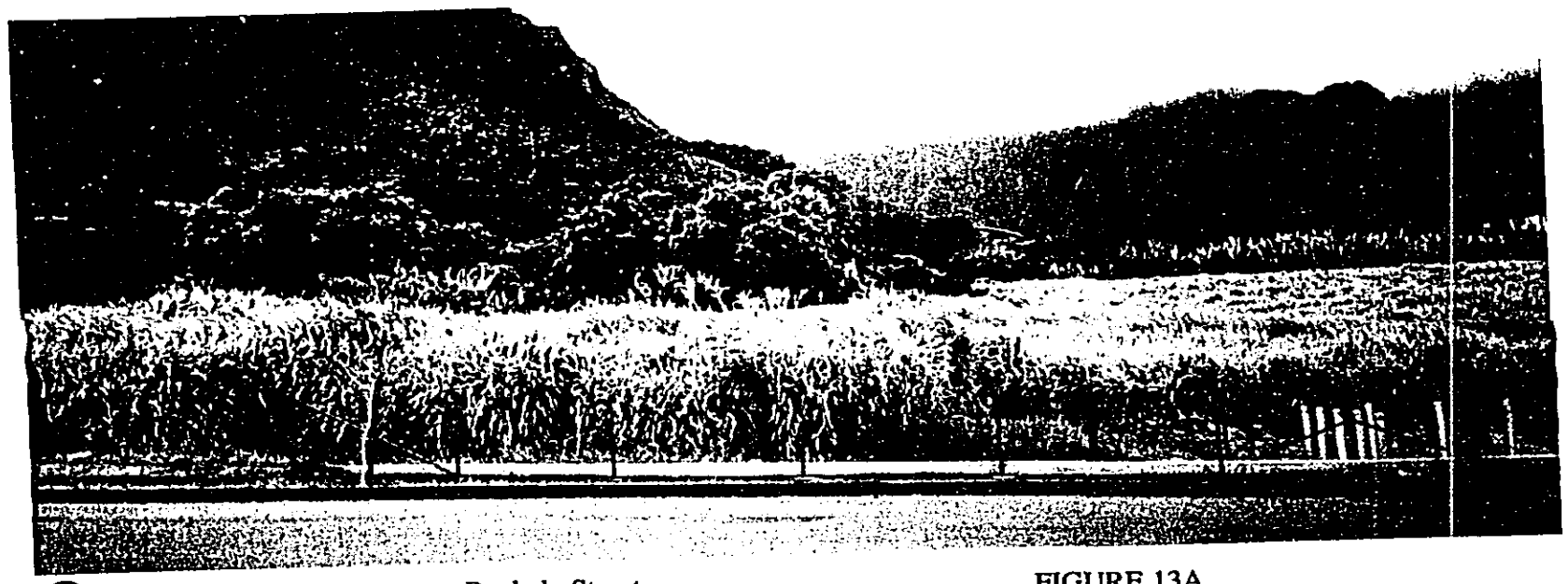
FIGURE 13
KEY MAP - VIEWS OF THE PROPERTY
HOPE CHAPEL ACCESS DRIVEWAY

KANEOHE, OAHU
0 50 100 200 400
FEET

PBR HAWAII



(1) View of box culvert and north boundary of Castle Hills Subdivision from Pookela Street



(2) View of driveway entrance at Pookela Street

FIGURE 13A
VIEWS OF THE PROJECT
HOPE CHAPEL ACCESS DRIVEWAY
KANEOHE, OAHU

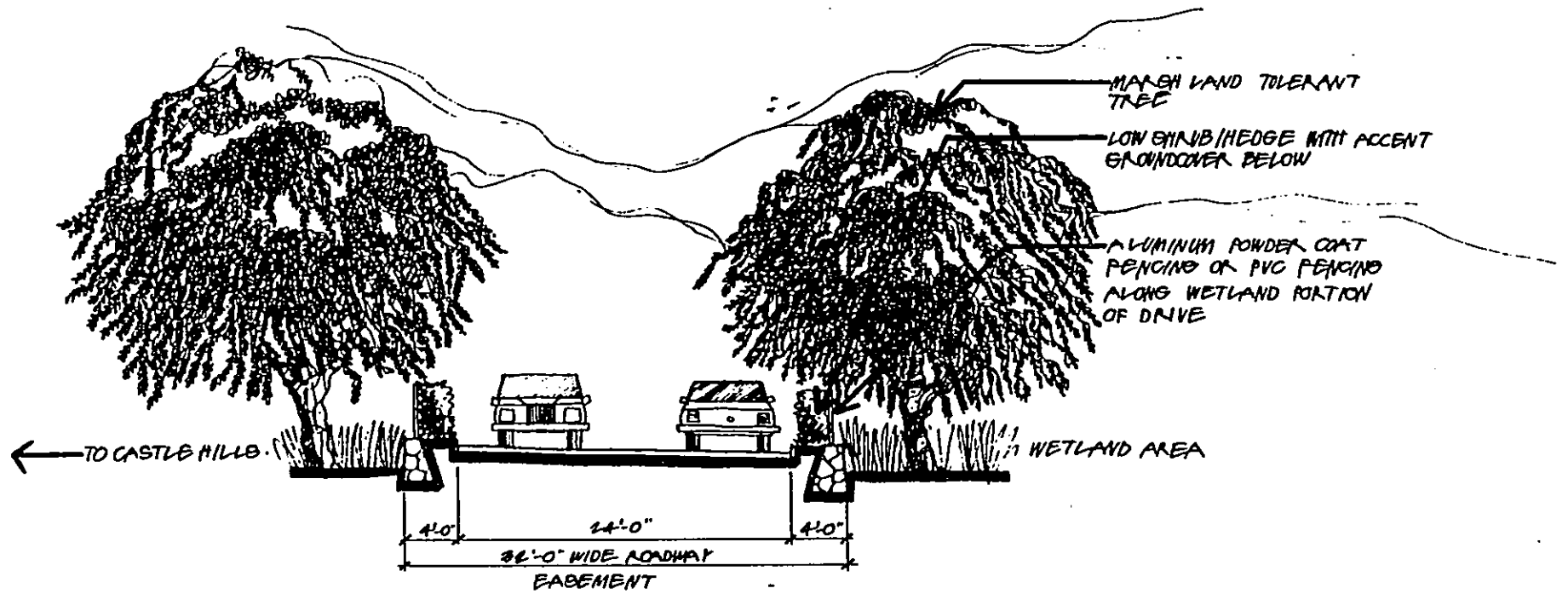
PBR HAWAII

③ View of the driveway corridor from Castle Hills Subdivision

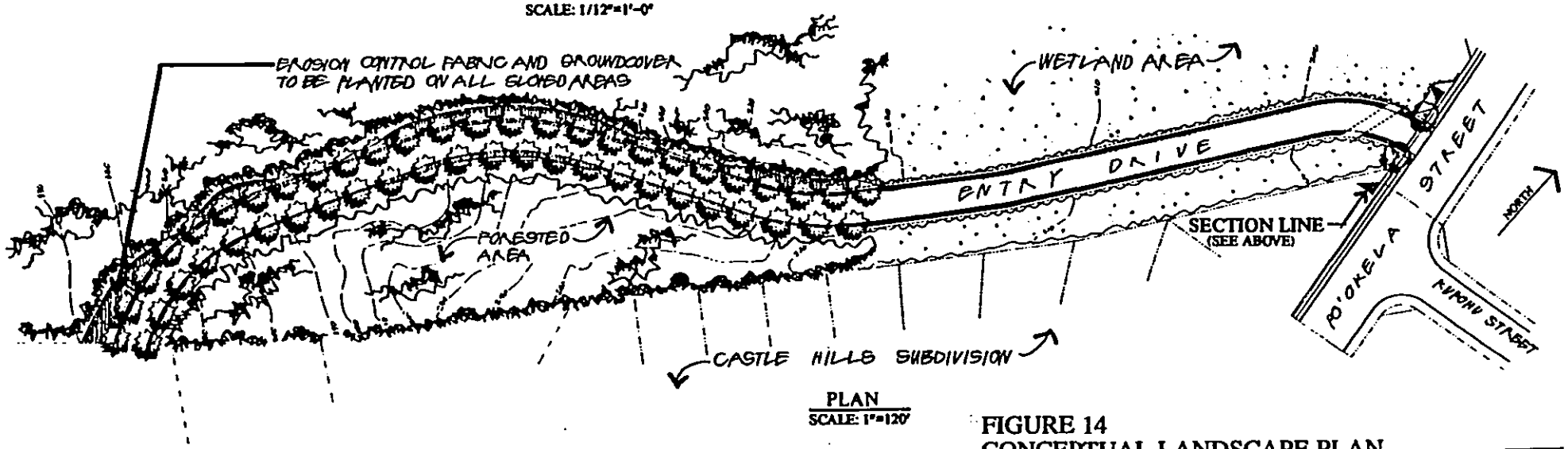
④ View of the driveway corridor from Castle Hills looking mauka

FIGURE 13B
VIEWS OF THE PROJECT
HOPE CHAPEL ACCESS DRIVEWAY
KANEOHE, OAHU

PBR HAWAII



SECTION THROUGH ENTRY DRIVE
SCALE: 1/12"=1'-0"



PLAN
SCALE: 1"=120'

FIGURE 14
CONCEPTUAL LANDSCAPE PLAN
HOPE CHAPEL ACCESS DRIVEWAY
KANEOHE, OAHU

PBR HAWAII

4.2.7 Economic Factors/Government Revenues

Socioeconomic. No significant socioeconomic impacts are associated with the proposed driveway. Only positive impacts from construction related employment and operation of the proposed church improvements will result from the proposed project.

As for the character of the neighborhood, the proposed driveway will not increase the population of the neighborhood, nor will it increase the demand for public services and infrastructure. Indirectly, the economic base of the region will be expanded, employment opportunities will be enhanced, and government revenues will be increased from income taxes paid by construction workers.

Rate and Pattern of Economic Growth and Development. The cost of constructing the proposed driveway is estimated at approximately $450,000. Currently, no economic activity is associated with the site. Other than direct and indirect project related construction jobs, no significant economic impacts are anticipated from development of the proposed driveway.

Public Costs or Revenues. No public costs are associated with the proposed driveway. However, indirect public revenues will be generated by income taxes paid by construction workers.

Impact on Adjacent Residential Land Uses. The proposed driveway does not directly impact any of the adjoining Castle Hills residences. It will, however, create some visual and noise impacts for those residences closest to the driveway. Visually, the project will be integrated into the surrounding area by establishment of a landscape buffer and rock retaining walls. No lighting of the driveway is planned. Noise will be limited to hours of church operation.

Housing. Approval of the project will not increase or decrease the supply of new affordable housing in Kaneohe or Oahu.

Property Values of Existing Homes. The impact of the proposed project on surrounding property values is difficult to assess. According to the Real Property Tax Assessment Office, assessments are based upon primarily two broad factors: 1) The "neighborhood" in which the land is located; and 2) the fair market value of the land. Depending on the value of surrounding homes, the project may have the following effects. As a community oriented church, the project is likely to have a positive effect on surrounding land values by providing a convenient place to attend services. The planned mitigation measures designed to limit the impacts from noise and visual alteration of the property, should result in no significant impacts on surrounding property values. As a wetland area, the property has little or no value for other types of development.

4.2.8 Character of the Community

The proposed driveway will provide Hope Chapel Kaneohe with the opportunity to develop its planned church facilities at TMK 4-5-25:20. As such, the driveway will indirectly impact the character of the neighborhood by facilitating the development of a new church in the community. Compared to further residential development of the church parcel, the proposed project will result in

significantly fewer impacts to the community from a socio-economic perspective. Development of the project will generate construction employment, indirectly expand the economic base of the community, provide new facilities for meetings and community functions, and improve a currently vacant property with little practical value for other land uses.

4.2.9 Infrastructure

All necessary water, sewer, draiange, electrical and communications improvements necessary for the church project will be provided using existing easements within the Castle Hills subdivision and will not be through the proposed driveway. No significant offsite infrastructure improvements will be required for the proposed driveway.

Roadways. Access to the project site is from Pookela Street which was recently extended to provide access into Castle Hills after the closure of the Likelike Highway/Pookela Street intersection. A traffic study was previously conducted during the Site Plan Review process to assess the impact of the church project on area roadways and intersections and has recently been updated to assess the impact with the new access location. The proposed driveway does not alter the traffic volumes at any of the existing intersections including Kahekili Highway/Keaahala Road and Keaahala Road/Pookela Street. The proposed access improves traffic circulation patterns and maintains the existing traffic levels within Castle Hills by completely avoiding the subdivision. By locating the driveway intersection at Pookela Street before entering the Castle Hills subdivision, peak period traffic will have little impact on traffic levels within the Castle Hills residential area.

Water Supply. Potable water infrastructure is not required for the proposed driveway. The only potential need for water would be during construction if conditions are very dry and dust control measures are necessary or if vehicle wash down is required before entering onto the public streets. A water truck will be utilized for these functions. Existing Board of Water Supply water distribution lines are located in Puupele Street. Potable water lines for the church will be connected to existing Board of Water Supply "stub-outs" entering the church property at Puupele Street and will not be located within the proposed driveway right-of-way.

Wastewater Treatment and Disposal. The existing municipal wastewater system stub-outs for the church property are also located in Castle Hills at Puupele Street. Consequently, no wastewater collection lines are required within the proposed driveway right-of-way. According to the City's Department of Wastewater Management, the City's sewer system is adequate to handle projected flows for the future church facilities.

Drainage Facilities. The recently constructed drainage box culvert at Pookela Street has been designed to accommodate stormwater to prevent potential flooding within Kapunahala Stream channel at this location. In addition, the proposed driveway is designed with a drainage capacity within the small 5-acre drainage sub-basin it occupies.

Solid Waste Disposal. At present, solid waste generated in neighboring residential areas is collected and disposed of by the City and County, Department of Public Works, Refuse Division. Vegetation

and soils which are removed and dredged from the wetland will be disposed at a City approved landfill or other facility.

Public Utilities. Electrical power, gas, telephone utilities will be connected through Puupele Street at stub-out connectors for the church facilities. Construction of the driveway will not require these utilities.

4.2.10 Public Services

Police and Fire Protection. Police and fire protection services are located in Kaneohe at the corner of Kamehameha Highway and Wailele Road. Existing and planned police and fire protection services and facilities are considered adequate to service the proposed project.

There will be an occasional and unavoidable demand for both police and fire protection services associated with the overall church development. The applicant will advise both the police and fire departments of project implementation and phasing to permit adequate planning and advance notice of project completion.

As part of the proposed water transmission system, lines with adequate fire flow capacity and fire hydrants will be installed within the church property, improving the fire fighting capabilities in the area. Access for emergency vehicles into the future church site will be established by development of the driveway access improvement.

Health Care Services. Public health care in Kaneohe is provided by various hospitals and clinics located within the community and in Honolulu approximately 15 miles from the property. With the increased number of people in the area during church sponsored activities, there will be an occasional and unavoidable demand for medical services. However, it is expected that there are adequate emergency facilities in Kaneohe to service the project. The driveway alone will not require the expansion of medical facilities in the area.

Schools. The proposed driveway will not impact school enrollment in the area.

Recreational Facilities. The proposed driveway will not impact public recreational facilities in the area. In its present condition, the property provides no public recreational opportunities. Opportunities for passive recreation such as bird watching and diversified agriculture exists on the property, however, the proposed project will not negatively impact these potential recreational resources. No impact on recreational facilities will result from development of the proposed driveway.

5.0

POTENTIAL IMPACTS OF THE PROPOSED ACTION AND MITIGATIVE MEASURES

5.0 POTENTIAL IMPACTS OF THE PROPOSED ACTION AND MITIGATIVE MEASURES

The evaluation of the proposed project's effect on the existing physical and human environment indicates that no major significant adverse impacts are expected to result from the development of the Hope Chapel access driveway. Summarized below are impacts which are generally observed to be short-term construction related or long-term operational effects.

5.1 GENERAL MEASURES

The development of the proposed Hope Chapel Kaneohe church will benefit the community and provide a permanent facility for church members. The church services and programs will provide Windward residents, including adults, youth and children, with opportunities for spiritual fulfillment. In the future, should the Kaneohe area require additional child care facilities for pre-school age children, the Hope Chapel Site Plan Review permit approval will allow the operation of such facilities. All of these positive impacts will be made possible should the required permit requests to implement the driveway construction be approved.

5.2 SHORT TERM CONSTRUCTION IMPACTS

5.2.1 Water Quality Impacts

Construction of the driveway may cause short-term impacts over the six month period anticipated for its completion. Best management practices will ensure that water quality standards are not degraded. The BMP plan outlines erosion and sediment control measures that are summarized in Section 4.1.6 and attached as Appendix D.

5.2.2 Traffic/Noise/Air Quality Impacts

Construction related traffic, noise and air quality impacts will be limited to the six month development period. Mitigative measures will be implemented and the project is not expected to violate County and State standards.

5.3 LONG TERM IMPACTS

5.3.1 Traffic Impacts

The traffic impact on the Castle Hills residences is mitigated by the proposed alignment of the access driveway. As described in Section 4.2.2, the subject alignment completely avoids entrance into Castle Hills. Delays and street congestion on Puupele Street are avoided. Moreover, Hope Chapel will gain an entry which will be a true gateway to its church facilities.

5.3.2 Visual Impacts

The proposed driveway will be a two lane 24-ft paved travelway within a 32-ft right-of-way. The visual impact of the driveway to a few Castle Hills homes located at the northern boundary of the subdivision will be mitigated with the establishment of landscaping which will serve as a visual and noise buffer and help to maintain long-term air quality. The sloped portion will maintain the existing forested conditions as a buffer in addition to the new landscaping along the driveway.

5.3.3 Impacts to Kapunahala Stream

Kapunahala Stream, a tributary of Kaneohe Stream, is channelized along most of its length and dominated by introduced species of fish and invertebrates. A stream assessment concluded that the proposed driveway would have no measurable effects on Kapunahala Stream relative to the existing perturbations (e.g. introduced fauna and channelization), therefore no significant impacts are anticipated.

5.3.4 Impacts to Flora and Fauna

Vegetation. A study of the existing botanical resources within the project area indicated no sensitive plant species or communities in the wetland and the mixed introduced forest. Past human disturbances and the introduction and prevalence of alien species within the driveway corridor indicates that no significant impact on the botanical resources will result from the construction of the driveway.

Wildlife. A terrestrial survey of the property indicated that there are no rare, threatened or endangered species at the site, nor are there any wetland bird species due to the choked conditions of the existing vegetation. Wildlife which occur at the site are exotic species which are commonly found in similar habitats throughout Oahu. Temporary relocation of some birds would occur during construction of the driveway; however, with the establishment of new landscaping this relocation is expected to be of short duration.

5.3.5 Archaeological/Historical/Cultural Impacts

Three features were located in a surface archaeological survey of the driveway corridor: a narrow dirt road, a concentration of historic debris, and a modern outhouse. None of the features were considered to be archaeologically signaificanty. A core sample was obtained from the wetland segment of the driveway alignment. The analysis of the core indicated the presence of a few grains of taro and kukui pollen. The soils however, are not indicative of taro pondfield soils.

5.4 WETLAND IMPACTS

Section 404 of the Clean Water Act requires that wetland functions and values lost to actions such as that proposed in the subject request be mitigated. The affected wetland within the driveway corridor serves a stormwater detention and water purification function. In addition, approximately

0.3 acre of wetland will be irretrievably lost due to the construction of the driveway. This loss will be mitigated by the proposed development of 0.6 acre of wetland taro pondfields to achieve a "no net loss" as prescribed by the Corps of Engineers. A preliminary plan for wetland mitigation is included as Appendix J.

5.4.1 Drainage Function

An existing concrete channel drains the 5-acre sub-basin which includes the driveway. The preliminary driveway plan proposes that an existing concrete channel at Pookela Street be replaced with a new culvert within the driveway, thus allowing the runoff to discharge into the Pookela Street box culvert. The anticipated peak increase in runoff is expected to be minor, however the new culvert designed within the driveway subgrade will prevent flooding over the driveway and along the Castle Hills boundary. In addition, BMP measures as described in Section 4.1.6 and Appendix D include erosion and sediment controls such as sedimentation basins and sediment traps and silt fences.

5.4.2 Development of Taro Pondfields

Presently the Hawaii State Hospital operates a plant nursery and an agricultural program as part of a patient psycho-social rehabilitation program within TMK: 4-5-23:2. The activities involve upland gardening and, on a limited scale, aquaculture. Coordinated discussions with program administrators and the facilities engineer at the Hospital have resulted in the proposal to provide mitigation which will enhance and expand the clinical program.

Hope Chapel will provide the overall planning, coordination, permitting, and initial construction for the development of the physical requirements for the pondfields. Discussions with Windward Community College are being pursued for a joint partnership in the design and long-term maintenance and operation of the taro project. The College has expertise in taro cultivation and will benefit from the project and augment its Polynesian Garden program by providing an opportunity for wetland taro cultivation. This program will further support and enhance its annual Fourth of July Taro Festival.

A conceptual site plan for the taro *lo'i* project is shown in Figure 15. The project is planned to be a working and gathering place for Hospital patients and Windward College students for clinical and educational pursuits, respectively. The major element of the garden is 0.6 acre of taro lo'i pondfields to mitigate the loss of 0.3 acre of wetland. Twelve *lo'i*, each approximately ranging in sizes from 1,800 to 2,200 sq ft. will be irrigated with water originating from the historic Kapunahala Spring located to the west of the mitigation site. The plan would also include an upland garden for sweet potatoes, banana, coconuts and other crops, an *imu*, a toolshed, and a gathering area with a *hale* for resting and shelter. The detailed site design and construction plans will be prepared subject to receipt of the necessary approvals.

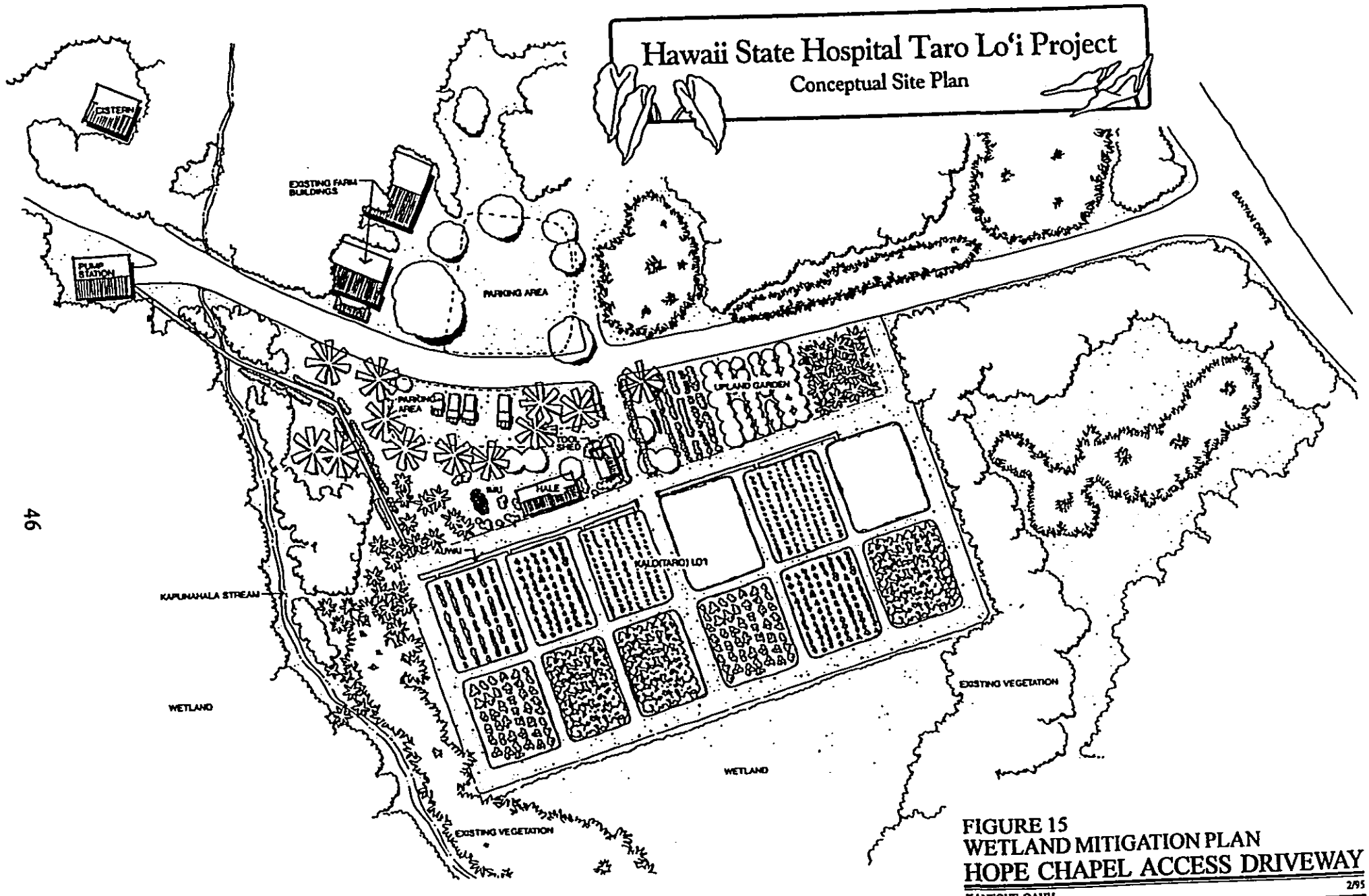


FIGURE 15
WETLAND MITIGATION PLAN
HOPE CHAPEL ACCESS DRIVEWAY
KANEOHE, OAHU
2/95

6.0

ALTERNATIVES TO THE PROPOSED ACTION

6.0 ALTERNATIVES TO THE PROPOSED ACTION

In compliance with the provisions of Title 11, Department of Health, Chapter 200, Environmental Impact Statement Rules, Section 11-200-17(f), the "known feasible" alternatives to the proposed project are limited to those that would allow the objectives of the project to be met, while minimizing potential adverse environmental impacts. As such, several alternatives have been evaluated. The stated objective of the proposed access driveway project is to provide vehicular access to the Hope Chapel Kaneohe church site that will not cause traffic congestion within the adjacent Castle Hills community.

Other possible alternatives to the proposed driveway alignment have been investigated and rejected for the reasons discussed in this section. In addition to the proposed alignment ("the preferred alternative"), the alternatives of No-Action and the use of the legally designated access easement within Castle Hills have been examined and rejected for the reasons described.

6.1 THE PREFERRED ALTERNATIVE

Under the preferred alternative, a portion of Hawaii State Hospital property at Pookela Street would be developed as an access driveway for the Hope Chapel project. This location was recommended by the City and County of Honolulu during the Site Plan Review process. Although wetland and Conservation District lands will be impacted, other alternative locations for the driveway also require the use of Conservation District lands. Use of other properties adjoining the church site were rejected by landowners for various reasons including security and proximity of the H-3 Freeway. The proposed location was selected since visual resources and open spaces are preserved, and mitigation measures are available to ensure no significant environmental impacts will result from the driveway's development. Most significantly, this alternative will not cause reduced levels of service and traffic congestion to Castle Hills by its complete avoidance of entry into the subdivision.

6.2 NO ACTION ALTERNATIVE

The "no-action" alternative would not accomplish the stated objectives of the proposed project which is to provide access to the site of Hope Chapel's proposed new church facilities. This alternative would make the church site essentially unusable and "land-locked." The church would not be built, thus depriving the community of a much needed facility and Hope Chapel would continue to operate out of make-shift facilities at the Benjamin Parker Elementary School cafeteria. This alternative would likely maintain the site as unimproved open space for many years.

6.3 LEGAL ACCESS EASEMENT

The legal access to the church site at TMK: 4-5-25: 20 is through a driveway easement from Puupele Street in Castle Hills. The right to use this easement was denied by the City in approving a Site Plan Review due to the traffic impact during peak periods on the Castle Hills residences. Hope Chapel has pursued alternatives as described in this section; however, should the request for approvals as defined in Section 3 of this report not be successful, the last remaining recourse would be to appeal the City's condition denying use of the legal easement.

6.4 FATHERS OF THE SACRED HEARTS

The Fathers of the Sacred Hearts seminary is located south of the church parcel, and accessed from Kahekili Highway, Keaahala Road, and Pookela Street through the Castle Hills subdivision. A request for an access to the Fathers of the Sacred Hearts was denied. If permission had been granted, the impact to Castle Hills residences at Pookela Street would have created similar peak traffic impacts on Pookela Street.

6.5 H-3 CONSTRUCTION ROAD

A temporary sub-standard roadway built for the purpose of H-3 Freeway construction is aligned mauka, or to the west, of the church property. Permanent usage of this roadway by members of the public is not possible according to the State Department of Transportation, due to conditions of the H-3 permit which requires that it be removed upon the completion of the freeway.

6.6 HAWAII STATE HOSPITAL NURSERY AREA

The Hawaii State Hospital operates an agricultural nursery on its lands at a separate portion of TMK: 4-5-23: 2. The nursery is used in part for a clinical patient rehabilitation program. Supervised agricultural activities are known to be beneficial for bio-psycho-social rehabilitative purposes. The program includes patients, some of whom are court appointed to the hospital. The maintenance of security is therefore required and the hospital has refused to allow an open access driveway through the nursery. The hospital supports use of the property as described in the Preferred Alternative.

7.0

DETERMINATION, FINDINGS AND REASONS FOR SUPPORTING DETERMINATION

7.0 DETERMINATION, FINDINGS AND REASONS FOR SUPPORTING DETERMINATION

To determine whether the proposed action may have a significant impact on the environment, every phase and expected consequences, both primary and secondary, and the cumulative as well as short- and long-term effects have been evaluated. Based on the studies performed and research evaluated, a finding of no significant impact has been found as summarized in this section.

7.1 SIGNIFICANCE CRITERIA

In accordance with the *Guidebook for the Hawaii State Environmental Review Process*, each of the significance criteria listed below has been evaluated and is summarized based on the studies performed for the proposed driveway.

7.1.1 Involves a loss or destruction of any natural or cultural resource

Wetlands. Approximately 0.3 acre of wetland will be affected by the proposed action. The functional value of the wetlands include water purification and storm and surface water storage and detention. The wetland or marsh is a natural sump which collects water, contains soils and organic matter and supports a robust growth of Job's tears, an exotic grass species. In its existing condition the wetland has no value to any of Hawaii's endangered waterbird species, nor any agricultural value. The loss of drainage function will be mitigated by the engineering design of the driveway which will allow waterflow through the sub-grade of the driveway and through culverts. The loss of 0.3 acre of wetland will be mitigated through the development of 0.6 acre of taro pondfields and an upland garden which will be irrigated by excess spring water available on-site.

Conservation Land. The portion of the driveway in the Conservation District is in the General subzone. According to the site assessment studies, the land has been previously disturbed by agricultural and other activities. The botanical and wildlife resources present are comprised of exotic species and no significant losses are expected.

Cultural Resources. An archaeology survey of the property was undertaken which involved a surface reconnaissance and core sample taken within the wetland. No significant cultural resources were identified. The core sample has value for the information it contains. This analyses indicated the presence of a few grains of taro pollen, although the soils are not indicative of pondfield soils which suggests that taro was cultivated elsewhere within the wetland.

7.1.2 Curtails the range of beneficial uses of the environment

The proposed driveway will occupy less than one acre of a 193-acre parcel which contains two distinct environments, wetland and forested land. The location of the driveway at the edge of the property is

well situated for future use of the land and the special micro-environments contained therein. It does not curtail the range of beneficial uses of the environment.

7.1.3 Conflicts with the State's long-term goals or guidelines as expressed in Chapter 344, HRS

Chapter 344 encourages the conservation of natural resources and the enhancement of its quality of life. The proposed driveway does not conflict with the policy guidelines.

7.1.4 Substantially affects the economic or social welfare of the community or state

The construction of Hope Chapel Kaneohe's church facilities is conditioned on the approval of the subject access driveway by the City and County of Honolulu. The driveway itself will not affect the economic well being except in the short-term during the construction period; nor will it affect the social welfare of the community. However, the driveway provides the link to the future church facilities and its completion depends on driveway implementation. The programs that will be provided in the operation of the church include worship services, opportunities for social interaction, counseling and other services that will contribute to the general welfare of its constituents and ultimately to the people of Hawaii.

7.1.5 Substantially affects public health

The proposed driveway will not have any direct or indirect effect on public health.

7.1.6 Involves substantial secondary effects, such as population changes or infrastructure demands

The driveway itself will have no effect on the population of the area or have any infrastructure requirements. The de-facto population during church services on Friday nights and Sundays will range from 100 to 300 people; but the duration of church attendance is confined to short periods of time.

7.1.7 Involves a substantial degradation of environmental quality

The proposed driveway will not degrade environmental quality. Appropriate best management practices will provide safeguards for protection of water quality during the short-term construction period.

7.1.8 Is individually limited but cumulatively has considerable effect on the environment, or involves a commitment to larger actions

Concern has been expressed for the loss of wetlands within the State of Hawaii and the United States. The value of the subject wetland as described above is in its water purification and stormwater detention functions. Other portions of this wetland have been filled for construction of the neighboring

residential subdivision, the Pookela Street extension and box culvert, as well as for agricultural activities, thus, incrementally diminishing the stated functions. The function of the 0.3 acre of wetland which is being filled for the driveway, will comply with Section 404 CWA regulations. Mitigative measures are being coordinated with the U.S. Army Corps of Engineers and a "no net loss" of wetlands will be achieved.

7.1.9 Substantially affects a rare, threatened or endangered species or its habitat

Stream, botanical and wildlife surveys undertaken at the property indicate that no rare, threatened or endangered species occur on the property; moreover, the existing conditions of the wetland is unusable by native waterbird species.

7.1.10 Detrimental affects air or water quality or ambient noise levels

Minimal impacts on air quality and noise are anticipated during construction, but will be limited by normal construction practices (i.e., mufflers, water wagons, construction during daylight hours only, etc.). Over the long-term, traffic noise during peak periods (Sundays) may be a factor, however, a landscape buffer will reduce noise levels. BMPs will be implemented for water quality protection to the extent practicable.

7.1.11 Affects an environmentally sensitive area such as a flood plain, tsunami zone, erosion-prone area, geologically hazardous land, estuary, freshwater area, or coastal waters

The proposed driveway is not located in a flood plain mapped by the FIRM. However, due to the shallow nature of Kapunahala Stream channel at this location, the horizontal spreading of storm water during peak runoff periods was examined. The recent construction of the large box culvert at Pookela Street has been designed for storm events of 100-year duration; therefore, flooding at Kapunahala Stream is not expected to create a hazard to the driveway and the nearby Castle Hills residences makai of Pookela Street. Fresh water which contributes towards the maintenance of the wetland, aside from the loss of 0.3 acre of retention area, will not be affected. Slopes which are altered for driveway construction will be re-vegetated and stabilized to prevent erosion. The location of the site is not in a tsunami inundation area, geologically sensitive land, estuary, or coastal waters.

7.2 DETERMINATION

On the basis of the above criteria, and the discussion of impacts and mitigative measures contained in this document, it is anticipated that the proposed project will not have a significant effect on the environment.

8.0

COMMENTS AND RESPONSES

8.0 COMMENTS AND RESPONSES

The public comment period as required by Chapter 343, Hawaii Revised Statutes, on the Draft EA for the Hope Chapel Kaneohe Access Driveway resulted in the following responses from governmental agencies, community organizations and individuals. The comment letters and responses prepared by the planning consultant are included in this section.

8.1 COMMENTS RECEIVED ON THE DRAFT EA

STATE AGENCIES
Department of Land and Natural Resources
Department of Land and Natural Resources - Commission on Water Resource Management
Department of Land and Natural Resources - Historic Preservation Division
Department of Land and Natural Resources - Division of Land Management
Department of Health
Department of Transportation

CITY AND COUNTY OF HONOLULU
Department of Parks and Recreation
Department of Public Works
Planning Department

FEDERAL AGENCIES
U.S. Fish and Wildlife Service

COMMUNITY INDIVIDUALS
David C. Penn
Robert K. Stender, Jr.

PUBLIC REPRESENTATIVES
Senator Daniel K. Akaka
Councilmember Steve Holmes
Representative Ken Ito
Senator Mike McCartney

8.2 DRAFT EA COMMENT LETTERS AND THE APPLICANT'S RESPONSES

The following section includes letters sent to the Department of Land and Natural Resources in response to the Draft EA for the Hope Chapel Kaneohe Access Driveway. Responses to the comments have been prepared by PBR Hawaii on behalf of Hope Chapel.

BENJAMIN J. CAYETANO
Governor of Hawaii

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES

P. O. Box 621
Honolulu, Hawaii 96809

Chairperson
MICHAEL D. WILSON
Board of Land and Natural Resources

Deputy Director
GILBERT COLOMA-AGARAN

Aquaculture Development
Aquatic Resources
Boating and Ocean Recreation
Bureau of Conveyances
Conservation and Environmental Affairs
Conservation and Resources Enforcement
Forestry and Wildlife
Historic Preservation
Land Management
State Parks
Water and Land Development

REF:OCEA:SKK

JAN 13 1995

FILE NO.: OA-2751
180 Day Exp. Date: 5/22/95
DOC. NO.: 5259

Ms. Yukie Y. Ohashi
PBR Hawaii
1001 Bishop Street
Suite 650
Honolulu, Hawaii 96813

Dear Ms. Ohashi:

SUBJECT: Comments Received During the 30-Day Public Review Period - Draft Environmental Assessment for the Hope Chapel Kaneohe, Access Driveway at Kaneohe, Oahu, TMK: 4-5-23: por. 2 & 3

Please review the attached agency/public comments and respond in writing within forty (45) days of the date of this letter.

The Department will consider your response to these concerns in its final environmental determination.

In addition, please provide the following information:

1. Clearing: Please indicate the approximate number of trees (trees with diameters greater than six inches) that would be removed from the project area.

2. Grading: The draft EA did not identify the amount of fill required for the wetland area, nor the amount of soil excavated on the sloped portion of the project. Please submit calculations (in cubic meters) covering proposed cut and fill operations.

In addition, we have been in contact with the Planning Branch of Department of Transportation, Highways Division who indicate that the intersection of the proposed Hope Chapel access driveway at Pookela Street would not meet County standards. We recommend that you resolve this issue with the appropriate agencies.

Please respond directly to those agencies/public who submitted comments on the draft EA and also provide this office with a copy of your response(s). In addition, please provide a copy of the final EA to Mr. Stender and Mr. Penn, and the community organizations listed on page 7 of the draft EA. Please provide this office with 6 copies of the final EA.

If you do not respond within forty five (45) days of the date of this letter, staff will recommend that the Board of Land and Natural Resources deny the application.

Thank you for your cooperation in this matter. Please feel free to call Sam Lemmo at our Office of Conservation and Environmental Affairs at 587-0377, should you have any questions.

Very truly yours,

MICHAEL D. WILSON

Attachment

cc: OEQC

PBR HAWAII

LAND PLANNING
LANDSCAPE ARCHITECTURE
ENVIRONMENTAL STUDIES

February 27, 1995

Mr. Michael D. Wilson, Chairperson
State of Hawaii
Department of Land and Natural Resources
Kalanimoku Building
1151 Punchbowl Street
Honolulu, Hawaii 96813

DLNR File No.: OA-2751

SUBJECT: HOPE CHAPEL KANEOHE ACCESS DRIVEWAY
DRAFT ENVIRONMENTAL ASSESSMENT ("EA")

Dear Mr. Wilson:

We have reviewed your letter of January 17, 1995 regarding the comments received during the 30-day public review period for the Draft EA for the Hope Chapel Access Driveway.

1) Agency/Public Comments on the Draft EA

We have responded to the comments raised in all letters received on the Draft EA; they are included in the Final EA.

2) Clearing and Replacement of Trees

The tree species found within the driveway corridor include introduced species such as paperbark, eucalyptus, octopus and mango. Approximately 56 trees with a diameter of 6 inches or greater will be removed to construct the 24-ft wide by 1,070-ft long driveway within the 32-ft right-of-way. Approximately 50 medium canopy trees will be planted along the driveway to replace the trees that require removal. In addition, other plantings will be considered, if necessary, to "thicken" the buffer between the driveway and the Castle Hills properties adjacent to the driveway parcel. Appropriate native and non-native plant species will be used. A landscape plan is being prepared for the driveway.

3) Grading

A preliminary grading plan for the driveway has been prepared by the project engineer who estimates that the earthwork quantities for the one acre to be graded will result in excavation of 1,900 cubic yards and fill of 2,400 cubic yards. These calculations are preliminary and will be refined as the engineering design plans for the driveway are completed.

W. Frank Brandt • Thomas S. Witten • R. Stan Duncan • Russell Y.J. Chung

PACIFIC TOWER, SUITE 650 1001 BISHOP STREET HONOLULU, HAWAII 96813 TELEPHONE: (808) 521-5631 FAX: (808) 523-1402
BRANCH OFFICE: HILO LAGOON CENTER 101 AUPUNI STREET, SUITE 310 HILO, HAWAII 96720 TELEPHONE: (808) 961-3333 FAX: (808) 961-4909

4) Driveway Intersection at Pookela Street

A portion of Pookela Street from Kupohu Street (and including the driveway access location) to Keaahala Road is presently owned by the State Department of Transportation ("DOT"). This segment will ultimately be transferred to the City and County of Honolulu Department of Transportation Services ("DTS"). We have met with both the State DOT and the City DTS to clarify and resolve their concerns.

The driveway access at Pookela Street cannot be located across from Kupohu Street due to the presence of existing homes directly across from Kupohu Street. Also, the driveway cannot be located 250 feet further north due to the existing drainage basin and drainage way. As noted in the Technical Memorandum attached to the Traffic Impact Assessment Report in the Final EA, Appendix I, the project traffic engineer has determined that sight distance to and from Kupohu Street and the proposed Hope Chapel driveway is unrestricted and vehicles turning onto Pookela Street can easily be distinguished, thereby eliminating any traffic safety concerns. DOT has concurred with this determination and we presently completing our discussions with the City DTS on this matter

We are appreciative of the assistance and guidance provided by Mr. Sam Lemmo of your staff in the CDUA process. Please contact us if you have any questions or require additional information.

Sincerely,

PBR HAWAII

Yukie Y. Ohashi
Project Planner

S.L.

State of Hawaii
DEPARTMENT OF LAND AND NATURAL RESOURCES
Commission on Water Resource Management
Honolulu, Hawaii

DEC 20 1994

TO: Mr. Roger C. Evans, Administrator
Office of Conservation and Environmental Affairs

FROM: Rae M. Loui, Deputy Director
Commission on Water Resource Management

SUBJECT: Comments to CDUA, Construction of a Driveway, Hope Chapel, Kaneohe, Oahu
FILE. NO. OA-2751

It is our understanding that a stream channel alteration permit application pursuant to Section 131-169-50, HAR, is being prepared for this project.

We are aware that you have received a letter dated November 1, 1994, from Mr. Robert Stender, a resident who owns property downstream of the proposed driveway. We would like to confirm that Mr. Stender's property was damaged as a result of the Department of Transportation's construction work related to the Castle Hills By-pass Road. The Department of Transportation agreed to mitigate damages and restore Mr. Stender's property as part of the after-the-fact stream channel alteration permit for the By-pass Road. Our permit file for this project is available for your review.

We appreciate the opportunity to review and comment on this document.

DH:ss

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LAND PLANNING
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February 27, 1995

Ms. Rae M. Loui, Deputy Director
State of Hawaii
Commission on Water Resource Management
Kalanimoku Building
1151 Punchbowl Street
Honolulu, Hawaii 96813

SUBJECT: HOPE CHAPEL KANEOHE ACCESS DRIVEWAY
DRAFT ENVIRONMENTAL ASSESSMENT ("EA")

Dear Ms. Loui:

We have reviewed your memorandum of December 20, 1994 regarding the Draft EA for the Hope Chapel Access Driveway and have the following responses to offer.

1) Stream Channel Alteration Permit

A Stream Channel Alteration Permit is being prepared and will be submitted to the DLNR Commission on Water Resource Management.

2) Letter From Mr. Robert Stender

We are in receipt of Mr. Stender's letter dated November 1, 1994 and have discussed the concerns which he raised regarding past construction at Pookela Street and the potential impacts of the proposed driveway with him. We will continue to be in contact with Mr. Stender. We thank you for the opportunity to review the permit file on the Pookela Street construction project.

We appreciate your review and comments on the Draft EA. Please contact us if you have any questions or require additional information.

Sincerely,

PBR HAWAII

Yukie Y. Ohashi
Project Planner

W. Frank Brandt • Thomas S. Witten • R. Stan Duncan • Russell Y.J. Chung
PACIFIC TOWER, SUITE 650 1001 BISHOP STREET HONOLULU, HAWAII 96813 TELEPHONE: (808) 521-5631 FAX: (808) 523-1402
BRANCH OFFICE: HILO LAGOON CENTER 101 AUPUNI STREET, SUITE 310 HILO, HAWAII 96720 TELEPHONE: (808) 961-3333 FAX: (808) 961-8989

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

STATE OF HAWAII

DEPARTMENT OF LAND AND NATURAL RESOURCES

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

KEITH AHUE, CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCE

DEPUTIES

JOHN P. KEPPELER II

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

December 16, 1994

MEMORANDUM

LOG NO: 13399
DOC NO: 9412TD21

TO: Roger C. Evans, Administrator
Office of Conservation and Environmental Affairs

FROM: Don Hibbard, Administrator
Historic Preservation Division

SUBJECT: **Conservation District Use Application, Access Driveway for Hope Chapel (File No. OA-2751)**
Kane`ohe, Ko`olaupoko, O`ahu
TMK: 4-5-23: por. 2 & 3

The archaeological inventory survey report submitted with the draft environmental assessment is not complete. It lacks a report on the analysis of the core obtained from the wetland segment of the driveway alignment. Until we have the opportunity to review this report we cannot concur with the determination that the wetland deposits are likely to be significant for their information content alone. We do anticipate concurring with the determination that the three surface features described in the report are not significant. We recommend that any action on this application be deferred until we have the opportunity to review a complete archaeological inventory survey report for this project.

TD:jk

RECEIVED
'94 DEC 20 PM 1:30
DLNR
OCEA

PBR HAWAII
LAND PLANNING
LANDSCAPE ARCHITECTURE
ENVIRONMENTAL STUDIES

February 27, 1995

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

SUBJECT: HOPE CHAPEL KANEOHE ACCESS DRIVEWAY
DRAFT ENVIRONMENTAL ASSESSMENT ("EA")

Dear Mr. Hibbard:

We have reviewed your memorandum of December 16, 1994 regarding the Draft EA for the Hope Chapel Access Driveway and offer the following responses.

1) Final Archaeology Report Submitted

The final archaeology report which includes the results of the analysis of the core obtained from the wetland has been completed by Dr. Robert Spear of Scientific Consultant Services, Inc. and submitted to your office for your review. As noted in the Final EA, Section 4.2.1, the findings indicate that the wetland area within the driveway corridor may be of some antiquity with dates ranging from 2908-2576 B.C. to A.D. 560-768. The analysis of the core samples indicated the presence of charcoal particles in the two uppermost core samples indicating that fire was present in the area during the prehistoric Polynesian period and during historic times but not during pre-human times. A pollen analysis identified the presence of kukui and taro, both Polynesian plant introductions. However, the absence of soils suggesting pondfield cultivation at the location of the core sample within the driveway corridor suggests that taro may have been cultivated in another part of the marsh.

2) Determination on Three Surface Features

We acknowledge your anticipated concurrence that the three surface features located within the slope portion of the driveway corridor are not significant.

W. Frank Brandt • Thomas S. Witten • R. Stan Duncan • Russell Y. J. Chung
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BRANCH OFFICE: HILO LAGOON CENTER 101 AUPUNI STREET, SUITE 310 HILO, HAWAII 96720 TELEPHONE: (808) 961-3333 FAX: (808) 961-1989

We appreciate your review and comments on the Draft EA; your concerns are addressed in the Final EA and the final archaeology report is included in Appendix H. Please contact us if you have any questions or require additional information.

Sincerely,
PBR HAWAII

Yukie Y. Ohashi
Project Planner

Benjamin J. Cayetano
GOVERNOR OF HAWAII

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

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CONVEYANCES
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION PROGRAM
LAND MANAGEMENT
STATE PARKS
WATER AND LAND DEVELOPMENT

LM:JD

JAN - 9 1995

FILE NO.: OA-2751
DOC. NO.: 5148

MEMORANDUM

TO: Roger C. Evans, Administrator
Office of Conservation and Environmental Affairs

FROM: Cecil Santos, Land Agent
Division of Land Management

SUBJECT: Conservation District Use Application

Oahu District Office of Land Management comments that:

1) As TMK: 4-5-23:03 is Zoned Conservation District by the States Land Use Commission and TMK: 4-5-23:02 is set aside to the Dept. of Health by Governors' Executive Order No. 3504.

   a. A Conservation District Use Permit (CDUP) be property obtained.

   b. Full concurrence be given by the Department of Health.

   c. All affected Government Agencies be contacted for comment.

2) We have inspected the site. It will be a steep road up to the church site, cutting through a wooden area. If this is approved there will be needed a substantial construction infrastructure with sufficient retaining walls, culverts and drainage ditches to keep the roadway sound. Also, there will be needed substantial landscaping with trees and maintenance to restore the area.

3) The applicant obtain the required Federal, State and County permits prior to initiating the proposed work.

Should you have any questions, please call John Dooling at 587-0433.

PBR HAWAII

LAND PLANNING
LANDSCAPE ARCHITECTURE
ENVIRONMENTAL STUDIES

February 27, 1995

Mr. Cecil Santos, Land Agent
State of Hawaii
Department of Land and Natural Resources
Division of Land Management
PO Box 621
Honolulu, Hawaii 96809

SUBJECT: HOPE CHAPEL KANEOHE ACCESS DRIVEWAY
DRAFT ENVIRONMENTAL ASSESSMENT ("EA")

Dear Mr. Santos:

We have reviewed your memorandum of January 6, 1995 regarding the Draft EA for the Hope Chapel Access Driveway. The Applicant, Hope Chapel, and planning consultant, PBR Hawaii, have met with your staff in the review process for the preparation of the Draft EA. We appreciate the consultation which has been provided. We offer the following responses to your comments.

1) Land Status

As is indicated in your letter the driveway corridor traverses State Conservation District land (TMK: 4-5-23:03) and State Urban District land (TMK: 4-5-23:02) which is set aside to the Department of Health by Governor's Executive Order No. 3504. The Urban District land includes wetlands.

1a and 1b) Conservation District Use Permit/Department of Health Concurrence

A Conservation District Use Application ("CDUA") has been submitted by the applicant, along with a letter from the Director of Health to allow the processing of the CDUA.

1c) Comments From Affected Government Agency

The Office of Conservation and Environmental Affairs has circulated the CDUA to affected government agencies for their comments. In addition, Hope Chapel has provided copies of the Draft EA to community organizations such as the Castle Hills Community Association and Kaneohe Neighborhood No. 30. Responses to all comments have been prepared and are included in the Final EA.

W. Frank Brandt • Thomas S. Witten • R. Stan Duncan • Russell Y. J. Chung

PACIFIC TOWER, SUITE 650 1001 BISHOP STREET HONOLULU, HAWAII 96813 TELEPHONE: (808) 521-5631 FAX: (808) 523-1402
BRANCH OFFICE: HILO LAGOON CENTER 101 AUPUNI STREET, SUITE 310 HILO, HAWAII 96720 TELEPHONE: (808) 961-3333 FAX: (808) 961-8989

2) Engineering Design for the Driveway on the Slope / Driveway Landscaping

The engineering design for the driveway is being prepared by the project engineer and will be submitted to DLNR as well as the City Department of Public Works for review and approval upon receipt of the Conservation District Use Permit ("CDUP"). All measures to maintain traffic safety and environmental integrity will be incorporated into the design.

Appropriate landscaping through both environments will be established to restore the vegetation, create a visual buffer and to create an entry to the church property. A landscaping plan is being prepared; the plant list will include native and non-native species.

3) Federal, State and County Permits

Required Federal, State and County permits will be obtained prior to construction of the driveway. These include the CDUP, SCAP, Federal wetlands permit and associated State coastal zone consistency and water quality certification, as well as County grading and building permits.

We appreciate your review and comments on the Draft EA. Please contact us if you have any questions or require additional information.

Sincerely,

PBR HAWAII

Yukie Y. Ohashi
Project Planner

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

LAWRENCE MIIKE
DIRECTOR OF HEALTH

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

In reply, please refer to:

January 13, 1995

94-279/epo

To: The Honorable Michael Wilson, Chairperson
Department of Land & Natural Resources

From: Lawrence Miike
Director of Health

Subject: Conservation District Use Application

Applicant: Hope Chapel Kaneohe
File No.: OA-2751
Request: Access Driveway
Location: Kaneohe, Oahu
TMK: 4-5-23: por. 2 & 3

Thank you for allowing us to review and comment on the subject request. We have the following comments to offer:

Nonpoint Source Pollution Concerns

This project is located within the watershed of Kaneohe Bay, one of sixteen Water Quality Limited Segments identified by the Hawaii State Department of Health. State monitoring of Kaneohe Bay shows water quality standards are regularly exceeded for nitrogen, phosphorus, turbidity and fecal coliform. These standards cannot be met unless nonpoint source pollution is controlled. A major source of nonpoint source pollution to the bay is from construction activities.

The control of on-site runoff, erosion, and sedimentation during and after project construction is important because Kapunahala Stream drains into Kaneohe Bay. The following are suggested measures that should be taken to minimize construction impacts:

a. Conduct grubbing, and grading activities during the low rainfall months (April - October).

b. Plant bare areas as soon as grading is completed. To ensure rapid stand development soil amendments, high planting and/or seeding rates, fertilizer, and irrigation should be used.

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DEPT. OF LAND & NATURAL RESOURCES
STATE OF HAWAII

If you should have any questions, please contact Ms. Shirley Nakamura of the Environmental Planning Office at 586-4345.

c: EPO (NPS)

PBR HAWAII
LAND PLANNING
LANDSCAPE ARCHITECTURE
ENVIRONMENTAL STUDIES

February 27, 1995

Mr. Lawrence Miike, Director
State of Hawaii
Department of Health
PO Box 3378
Honolulu, Hawaii 96801

SUBJECT: HOPE CHAPEL KANEOHE ACCESS DRIVEWAY DRAFT ENVIRONMENTAL ASSESSMENT ("EA")

Dear Dr. Miike:

We have reviewed your letter of January 13, 1995 regarding the Conservation District Use Application and Draft EA for the Hope Chapel Access Driveway and offer the following response.

Nonpoint Source Pollution

Best management practices will be implemented in the construction of the access driveway as outlined in the Best Management Plan prepared by the project engineer. The plan is discussed in the Final EA, Section 4.1.6 and Appendix D. The measures which you cite, a) conduct grubbing and grading activities during the low rainfall months of April to October, and b) plant bare areas as soon as grading is completed, are included in the plan.

We appreciate your review and comments on the Draft EA; your concerns have been addressed in the Final EA. Please contact us if you have any questions or require additional information.

Sincerely,

PBR HAWAII

Yukie Y. Ohashi
Project Planner

W. Frank Brandt • Thomas S. Witten • R. Stan Duncan • Russell Y. J. Chung

PACIFIC TOWER, SUITE 650 1001 BISHOP STREET HONOLULU, HAWAII 96813 TELEPHONE: (808) 521-5631 FAX: (808) 523-1402
BRANCH OFFICE: HILO LAGOON CENTER 101 AUPUNI STREET, SUITE 310 HILO, HAWAII 96720 TELEPHONE: (808) 961-3333 FAX: (808) 961-8990

BENJAMIN J. CAYETANO
GOVERNOR

OCEA

KAZU HAYASHIDA
DIRECTOR

DEPUTY DIRECTORS
KANANI HOLT
GLENN M. OKIMOTO
JOYCE T. OMINE

IN REPLY REFER TO:

HWY-PS
2.4146

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

January 13, 1995

RECEIVED
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DEPT. OF LAND & NATURAL RESOURCES
STATE OF HAWAII

TO: MICHAEL WILSON, CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
DEPARTMENT OF LAND AND NATURAL RESOURCES

FROM: KAZU HAYASHIDA
DIRECTOR OF TRANSPORTATION

SUBJECT: CONSERVATION DISTRICT USE APPLICATION (OA-2751)
FOR HOPE CHAPEL ACCESS DRIVEWAY TO POOKELA STREET
KANEOHE, OAHU; TMK: 4-5-23: POR. 2 & 3

We have the following comments on the proposed Hope Chapel driveway:

1. The proposed driveway will connect to a State roadway which we plan to dedicate to the City and County of Honolulu. The proposed driveway must "utilize" a drop-curb type design with geometrics meeting current City standards for private road connections to City streets.

2. For safety reasons, the proposed driveway must connect to Pookela Street directly across from Kupohu Street or be offset 250 feet north of Kupohu Street.

3. Plans for construction within the State right-of-way must be submitted for our review and permit approval.

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PBR HAWAII

LAND PLANNING
LANDSCAPE ARCHITECTURE
ENVIRONMENTAL STUDIES

February 27, 1995

Mr. Kazu Hayashida, Director
State of Hawaii
Department of Transportation
869 Punchbowl Street
Honolulu, Hawaii 96813-5097

SUBJECT: HOPE CHAPEL KANEOHE ACCESS DRIVEWAY
DRAFT ENVIRONMENTAL ASSESSMENT ("EA")

Dear Mr. Hayashida:

We have reviewed your memorandum of January 13, 1995 regarding the Conservation District Use Application for the Hope Chapel Access Driveway and have subsequently met with Mr. Doug Meller and Mr. Paul Hamamoto of your staff. We offer the following responses to the comments and issues which have been raised.

1) Driveway Design

The proposed Hope Chapel access driveway is being designed in conformance with City and County of Honolulu requirements for private road connections to City streets in anticipation that ownership of Pookela Street will be transferred from the State to the City. The design will utilize a drop-curb with the appropriate roadway geometrics.

2) Driveway Connection to Pookela Street

As we discussed with your staff, the driveway access at Pookela Street cannot be located across Kupohu Street due to the presence of existing homes directly across from Kupohu Street. Also, the driveway cannot be located 250 feet further north due to the existing drainage basin and drainage way. As noted in the Technical Memorandum attached to the Traffic Impact Assessment Report in Final EA, Appendix I, Pacific Planning and Engineering, the project traffic engineer, has determined that sight distance to and from Kupohu Street and the Hope Chapel Driveway is unrestricted and vehicles turning onto Pookela Street can easily be distinguished, thereby eliminating any traffic safety concerns. Your staff has concurred with this determination

Moreover, the project's peak traffic does not coincide with the very minimal existing peak traffic originating from this portion of the Castle Hills subdivision. Due to the low volumes of traffic at Kupohu Street and the proposed driveway during peak traffic periods (LOS never less than Level A), your staff felt that the proposed intersection location would be acceptable, provided that the City

W. Frank Brandt • Thomas S. Witten • R. Stan Duncan • Russell Y.J. Chung

PACIFIC TOWER, SUITE 650 1001 BISHOP STREET HONOLULU, HAWAII 96813 TELEPHONE: (808) 521-5631 FAX: (808) 523-1402
BRANCH OFFICE: HILO LAGOON CENTER 101 AUPUNI STREET, SUITE 310 HILO, HAWAII 96720 TELEPHONE: (808) 961-3333 FAX: (808) 961-8989

Department of Transportation Services ("DTS") agrees with this determination. We have had discussions with DTS and are in process of clarifying this issue.

3) Construction Within the State Right-of-Way

Construction plans within the State right-of-way will be submitted for the State DOT's review and permit approval.

We appreciate your review and comments on the Draft EA. Please contact us if you have any questions or require additional information.

Sincerely,

PBR HAWAII

Yukie Y. Ohashi
Project Planner

OEA

1/6

DEPARTMENT OF PARKS AND RECREATION

CITY AND COUNTY OF HONOLULU

650 SOUTH KING STREET
HONOLULU, HAWAII 96813

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DLNR
OCEA

JEREMY HARRIS
MAYOR

DONA L. HANAIKE
DIRECTOR

ALVIN K.C. AU
DEPUTY DIRECTOR

January 4, 1995

5

Mr. Michael Wilson, Chairperson
Board of Land and Natural Resourc
State of Hawaii
1151 Punchbowl Street
Honolulu, Hawaii 96813

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To Yuka Ohgaki	From Sam Ohno
Co. PBR	Co. OCEA/DLNR
Dept.	Phone # 587-0382
Fax # 523-1402	Fax #

Dear Mr. Wilson:

Subject: Comments on Conservatio
No. OA-2751
Access Driveway for Hope Chapel Kaneohe
Kaneohe, Oahu, Hawaii
Tax Map Key 4-5-23: Por. 2 and 3

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DEPT. OF LAND AND NATURAL RESOURCES
STATE OF HAWAII

We have reviewed the Conservation District Use Application No. OA-2751 for the construction of a new access driveway through Conservation lands to provide access for a new Hope Chapel facility. We have concerns about the traffic increases that may be associated with this project.

Under the current proposal, any vehicle traveling to the new Hope Chapel facility will be routed through Keaahala Road, a small street which bisects Kaneohe District Park.

Kaneohe District Park is one of the most heavily used parks on the windward side. The park's facilities include one of the few public pools on the windward side, a gymnasium, space for arts and crafts and aerobics classes, outdoor basketball courts, tennis courts, and fields for football, softball, and soccer. During "league play" for high participation sports like football, it is not uncommon to have 400 users within the park. When the park is at full development, we estimate that park users may reach peaks of up to 600.

We are concerned about increases in the volume of through traffic passing down the middle of our City park. Our concern is for the safety of the park users. Because those park users

272

moving from one area of the park to another have to cross Keaahala Road traffic along this roadway is a concern for our department. These park users are often children who may not be paying full attention to traffic along the roadway.

The problem becomes more severe when the park becomes crowded. At these times, we have larger numbers of people in the park, and the road becomes more congested with automobile traffic and parked cars. Although this has always been an area of concern, we are particularly concerned about those proposals which would significantly increase the flow of traffic through the park or would result in a significant increase in the width and capacity of Keaahala Road.

In the present situation, traffic sometimes backs up from our parking lot, along Keaahala Road all the way to Kahekili Highway. If during such a backlog, 260 additional cars were to try to enter Keaahala Road to go to a function at Hope Chapel, unsafe traffic conditions might be created along Keaahala Road and out on Kahekili Highway.

We are concerned that the traffic study did not adequately address these issues. In addition, we question whether the DOT's approval of the plan is predicated upon the assumption that the Keaahala Road will be widened. One side of the road is a marshy area, and the other side is closely bounded by park facilities. We are not certain that it will be possible to expand the roadway.

Thank you for providing us with the opportunity to review this project. Should you have any questions, please call John Morihara of our Advance Planning Branch at 523-4246.

Sincerely,

For DONA L. HANAIKE
Director

DLH:ei

cc: Department of Transportation
Department of Land Utilization

PBR HAWAII
LAND PLANNING
LANDSCAPE ARCHITECTURE
ENVIRONMENTAL STUDIES

February 27, 1995

Ms. Dona L. Hanaike, Director
Department of Parks and Recreation
City and County of Honolulu
650 South King Street
Honolulu, HI 96813

SUBJECT: HOPE CHAPEL KANEOHE ACCESS DRIVEWAY
DRAFT ENVIRONMENTAL ASSESSMENT ("EA")

Dear Ms. Hanaike:

We have reviewed your letter of January 4, 1995 regarding the CDUA/Draft EA for the Hope Chapel Access Driveway and offer the following responses.

1) Traffic Impacts to Kaneohe District Park

We have checked with staff of the Kaneohe District Park on the hours of peak park usage. As you noted in your letter, Kaneohe District Park is a heavily used park with fields, gymnasium, pool and other facilities. According to District Park staff, peak usage occurs Monday to Friday from 4pm to sunset and all day on Saturday due to usage of the fields by large numbers of people. The fields are not used on Sundays for organized sports. During the football season from August to November usage is exceptionally high, although, again, there is no organized play on Sundays.

The gymnasium, which is presently closed for renovation, normally operates during the following hours: 4pm to 9:30pm Monday to Friday and 1pm to 5pm on Saturday and Sunday.

Peak travel times to and from Hope Chapel will be for church services on Friday night from 7pm to 9:30pm and Sunday from 7am to 12pm. During the weekday, a small number of employees (approximately 25) will commute to the facility via Keaahala Road.

This analysis of peak usage clearly indicates that Hope Chapel's peak travel will occur during non-peak park usage times and should not pose a pedestrian safety concern for children and other park users and will not contribute towards the traffic congestion presently experienced between the District Park's parking lot to Kahekili Highway.

W. Frank Brandt • Thomas S. Witten • R. Stan Duncan • Russell Y.J. Chung
PACIFIC TOWER, SUITE 650 1001 BISHOP STREET HONOLULU, HAWAII 96813 TELEPHONE: (808) 521-5631 FAX: (808) 523-1102
BRANCH OFFICE: HILO LAGOON CENTER 101 AUPUNI STREET, SUITE 310 HILO, HAWAII 96720 TELEPHONE: (808) 961-3333 FAX: (808) 961-8989

2) Kahekili Highway / Keaahala Road Improvements

Our Traffic Impact Analysis Report (February 1995) by Pacific Planning and Engineering has recently been updated and concludes that the development of the Hope Chapel facility will have little impact on traffic operations at the intersection of Kahekili Highway and Keaahala Road due to the planned widening of Kahekili Highway in 1995-1996. In addition, we understand that Keaahala Road improvements are also in the early planning stage to request funding in relation to the Windward Community College Five-Year Master Plan Review Use permit approval. These improvements, when completed, will also alleviate general traffic congestion in the area. We again reiterate that Hope Chapel's peak traffic, which will occur on Friday night and Sunday morning, are during periods when travel is light on the affected roadways, therefore, levels of service will not be diminished.

We appreciate your review and comments on the Draft EA. Please contact us if you have any questions or require additional information.

Sincerely,

PBR HAWAII

Yukie Y. Ohashi
Project Planner

DEPARTMENT OF PUBLIC WORKS

CITY AND COUNTY OF HONOLULU

650 SOUTH KING STREET
HONOLULU, HAWAII 96813

'95 JAN 4 PM 12:52

DLNR
OCEA

JEREMY HARRIS
MAYOR

Kenneth E. Sprague
Acting Director and Chief Engineer

IN REPLY REFER TO:

94-14-0786

December 28, 1994

Mr. Keith W. Ahue, Chairperson
Department of Land and Natural Resources
State of Hawaii
P. O. Box 621
Honolulu, Hawaii 96809

DEPT. OF LAND & NATURAL RESOURCES STATE OF HAWAII

94 DEC 30 P1:01

RECEIVED

Dear Mr. Ahue:

Subject: Your Letter of December 6, 1994, Relating to a Conservation District Use Application No. OA-2751 for an Access Driveway at Kaneohe, Oahu, Hawaii, TMK: 4-5-23: Por. 02 and 03

We have reviewed the application and have the following comments:

ENGINEERING:

Request no increase in storm water volume and flow rate. Storm water eventually enters Kaneohe Bay, which is Class AA and should be protected from storm water pollution. Should there be any questions regarding this matter, please call Chew Lun Lau at 527-5856.

Please submit drainage plans. Should there be any questions regarding this matter, please call Jann Dacanay at 527-6247.

REFUSE COLLECTION:

We have no additional comments on the application. Our previous comment is still applicable. If City refuse collection is intended, the construction drawings for the site work improvements should be submitted for our review and approval. Should there be any questions regarding this matter, please call David Shiraishi at 527-5697.

Very truly yours,

KENNETH E. SPRAGUE
Acting Director and Chief Engineer

PBR HAWAII

LAND PLANNING
LANDSCAPE ARCHITECTURE
ENVIRONMENTAL STUDIES

February 27, 1995

Mr. Kenneth E. Sprague, Director and Chief Engineer
Department of Public Works
City and County of Honolulu
650 South King Street
Honolulu, Hawaii 96813

SUBJECT: HOPE CHAPEL KANEOHE ACCESS DRIVEWAY
DRAFT ENVIRONMENTAL ASSESSMENT ("EA")

Dear Mr. Sprague:

We have reviewed your letter of December 28, 1994 regarding the Draft EA for the Hope Chapel Access Driveway and offer the following responses.

1) Storm Water Volume and Flow Rate.
Our preliminary drainage study for the access driveway (Final EA, Section 4.1.5 and Appendix C) demonstrated that the driveway will not increase the present design runoff at the Pookela Street box culvert. The Hope Chapel church facilites site surface runoff will be routed to the Castle Hills drainage system and runoff rates will be reduced compared to the existing levels due to the proposed on-site stormwater detention system. Therefore, the net effect for the overall church development will be a decrease in stormwater volume and flow rate.

2) Drainage Plans.
The final drainage report will be submitted to DPW for your review and approval prior to construction of the driveway.

3) City Refuse Collection.
Construction plans for the driveway will be submitted to DPW for your review and approval as it is Hope Chpel's desire to participate in the refuse collection services provided by the City.

We appreciate your review and comments on the Draft EA. Please contact us if you have any questions or require additional information.

Sincerely,
PBR HAWAII
Yukie Y. Ohashi
Project Planner

W. Frank Brandt • Thomas S. Witten • R. Stan Duncan • Russell Y. J. Chung

PACIFIC TOWER, SUITE 650 1001 BISHOP STREET HONOLULU, HAWAII 96813 TELEPHONE: (808) 521-5631 FAX: (808) 523-1402
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PLANNING DEPARTMENT
CITY AND COUNTY OF HONOLULU
650 SOUTH KING STREET
HONOLULU, HAWAII 96813

JEREMY HARRIS
MAYOR

CHERYL D. SOON
ACTING CHIEF PLANNING OFFICER
CAROLL TAKAHASHI
DEPUTY CHIEF PLANNING OFFICER

MH 12/94-4679

December 28, 1994

Honorable Keith Ahue, Chairperson
Board of Land and Natural Resources
Department of Land and Natural Resources
State of Hawaii
P.O. Box 621
Honolulu, Hawaii 96809

Dear Mr. Ahue:

Draft Environmental Assessment (EA)/
Conservation District Use Application (CDUA)
No. OA-2751 for Hope Chapel Kaneohe,
Oahu, Hawaii, Tax Map Key: 4-5-23: Por. 2 & 3

In response to your department's request of December 6, 1994, we have reviewed the subject EA/CDUA and have the following comments to offer:

1. The subject site is designated for Public Facilities and Preservation uses on the Koolaupoko Development Plan Land Use Map.

2. There are no publicly funded nor privately funded improvements designated in the general vicinity on the Koolaupoko Development Plan Public Facilities Map.

3. The proposed access driveway satisfies a condition of the Hope Chapel Kaneohe Site Plan Review Permit.

4. It is our understanding that the applicant is concurrently seeking State and Federal approvals to allow the construction of the alternative access driveway. We have no objections to the proposal provided that these approvals are obtained.

Should you have any questions, please contact Matthew Higashida of our staff at 527-6056.

Sincerely,

Cheryl D. Soon

CHERYL D. SOON
Acting Chief Planning Officer

CDS:js

cc: Office of Environmental Quality Control
Hope Chapel Kaneohe
PBR HAWAII

PBR HAWAII

LAND PLANNING
LANDSCAPE ARCHITECTURE
ENVIRONMENTAL STUDIES

February 27, 1995

Ms. Cheryl D. Soon, Chief Planning Officer
Planning Department
City and County of Honolulu
650 South King Street
Honolulu, Hawaii 96813

SUBJECT: HOPE CHAPEL KANEOHE ACCESS DRIVEWAY
DRAFT ENVIRONMENTAL ASSESSMENT ("EA")

Dear Ms. Soon:

We have reviewed your letter dated December 28, 1994 regarding the Draft EA/CDUA for the Hope Chapel Access Driveway and have the following responses to offer.

1) Koolaupoko Development Plan Land Use Map

We acknowledge that the Koolaupoko Development Plan Land Use Map designates the property for Public Facilities and Preservation.

2) Koolaupoko Development Plan Public Facilities Map

We acknowledge that there are no publicly funded or privately funded improvements designated in the general vicinity on the Koolaupoko Development Plan Public Facilities Map.

3) Hope Chapel Kaneohe Site Plan Review Permit

We acknowledge that the proposed access satisfies Condition 1 of the Site Plan Review Permit (Case No. 93/SPR-11).

4) Concurrent Permit Application Processing

Several permits related to the use of Conservation District lands, wetlands and stream channel crossing require permits from the state and federal governments. These permits as identified in Section 3.0 of the Draft EA and Final EA have been filed with the respective agencies and are currently being processed.

W. Frank Brandt • Thomas S. Witten • R. Stan Duncan • Russell Y.J. Chung

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We appreciate your review and comments on the Draft EA. Please contact us if you have any questions or require additional information.

Sincerely,

PBR HAWAII

Yukie Y. Ohashi
Project Planner

United States Department of the Interior

FISH AND WILDLIFE SERVICE

Pacific Islands Ecoregion
300 Ala Moana Blvd., Room 6307
Honolulu, Hawaii 96850

Tel: (808) 541-3441 Fax: (808) 541-3470

TAKE PRIDE IN AMERICA

14

In Reply Refer To: AAP

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

Re: Conservation District Use Application and the September 1994 Draft Environmental Assessment (DEA) for the Hope Chapel Kaneohe Access Driveway
TMK:4-5-23: por. 2 & 3

Dear Mr. Wilson:

The U.S. Fish and Wildlife Service (Service) has reviewed the above-referenced project to relocate a church driveway from its designated legal access on Puupele Street and to construct an alternative access driveway for the new Hope Chapel Kaneohe facility in Kaneohe, Oahu, Hawaii. The applicant, Hope Chapel Kaneohe, proposes to construct a driveway alignment that will cross a forested slope, approximately 0.12 hectares (0.3 acres) of wetland located within the State Urban District, and a concrete channel that connects to the Pookela Street box culvert at Kapunahala Stream. This route will reduce traffic congestion within the Castle Hills subdivision during peak periods and comply with conditions imposed by the City and County of Honolulu during the facility's Site Plan Review process. Clearing and grubbing through the wetland will be limited to the width of the driveway easement. The Service offers the following comments for your consideration.

The DEA adequately describes the existing conditions at the affected site. However, the document provided limited information on the wetland mitigation alternatives that will minimize project-related impacts. Although the document states that mitigation will be addressed during the U.S. Army Corps of Engineers (Corps) Section 404 wetland permit process, it is desirable to review potential mitigation plans during the project planning process. This review allows government agencies to assess whether the implementation of the proposed mitigation will be reasonable, practical, or feasible. Therefore, the Service recommends that the project proponent coordinate and consult with our office and the Corps during the formulation of an acceptable mitigation plan. Furthermore, details of the mitigation plan

should be incorporated into the final EA.

The Service appreciates the opportunity to provide these comments. Should you have any questions regarding our comments, please do not hesitate to contact Fish and Wildlife biologists Michael Ritter or Arlene Pangelinan at 808/541-3441.

Sincerely,

Brooks Harper
Field Supervisor
Ecological Services

cc: Hope Chapel Kaneohe
PBR Hawaii

PBR HAWAII

LAND PLANNING
LANDSCAPE ARCHITECTURE
ENVIRONMENTAL STUDIES

February 27, 1995

Mr. Brooks Harper, Field supervisor
Ecological Services
US Department of the Interior
Fish and Wildlife Service
Pacific Islands Ecoregion
300 Ala Moana Blvd., Room 6307
Honolulu, Hawaii 96813

FWS Reference: AAP

SUBJECT: HOPE CHAPEL KANEOHE ACCESS DRIVEWAY
DRAFT ENVIRONMENTAL ASSESSMENT ("EA")

Dear Mr. Harper:

Thank you for your letter regarding the Draft EA and Conservation District Use Application ("CDUA") for the Hope Chapel Kaneohe Access Driveway. We have met with Mr. Mike Ritter and Ms. Arlene Pangelinan of your staff in a meeting with staff of the Corps of Engineers ("Corps"); we appreciate the consultation which has been provided. We have reviewed your letter and offer the following responses to the comments raised.

1) Wetland Mitigation Alternatives

We have prepared and submitted applications related to Section 404 of the Clean Water Act to request permission from the Corps to fill 0.3 acre of a larger wetland for the construction of the Hope Chapel access driveway. Applications have been submitted to the Corps, the State Department of Health and the Office of State Planning Coastal Zone Management Program. A wetland mitigation plan has been submitted with the applications. We have subsequently discussed the plan with your staff. A description of the plan is included in Section 5.4 and Appendix J of the Final EA.

Briefly, we have analyzed the functions and values of the impacted wetland and prepared a plan which we believe to be appropriate in fulfilling the drainage/water storage functions and agricultural/cultural/historical values. Our studies have indicated that this wetland has no waterbird values due to the lack of open water areas caused by the aggressive cover of the invasive alien Coix lachryma-jobi weed species which dominates the wetland. Earlier consultation with FWS concurred with that finding (see attached letter).

W. Frank Brandt • Thomas S. Witten • R. Stan Duncan • Russell Y. J. Chung

PACIFIC TOWER, SUITE 650 1001 BISHOP STREET HONOLULU, HAWAII 96813 TELEPHONE: (808) 521-5631 FAX: (808) 523-1402
BRANCH OFFICE: HILO LAGOON CENTER 101 AUPUNI STREET, SUITE 310 HILO, HAWAII 96720 TELEPHONE: (808) 961-3333 FAX: (808) 961-3089

Our archaeological study, on the other hand, indicates that portions of this wetland was likely cultivated with taro (Colocasia esculenta) in historic times. The mitigation plan which is proposed will restore taro to this wetland. The plan's objectives are appropriate for the landowner, Hawaii State Hospital, in providing an agricultural activity which will become an important part of the clinical program for patient rehabilitation. In addition, Windward Community College will likely become a partner in this endeavor, integrating wetland taro cultivation into its Polynesian Cultural Garden. Hope Chapel is preparing the plans and overall coordination. When the mitigation plan is approved and the driveway approvals are obtained, Hope Chapel will fund the initial construction of the taro lo'i. We believe this plan has merit and adequately addresses the functions and values of the 0.3 acre wetland area which will be affected by the driveway construction.

2) Consultation with the Corps of Engineers and Fish and Wildlife Service

As mentioned we have consulted with the Corps and the Service through written and verbal communication and have recently met with your staff. We will continue to meet and discuss our progress with Mr. Ritter and Ms. Pangelinan.

We appreciate your review and comments on the Draft EA. Please contact us if you have any further questions or require additional information.

Sincerely,

PBR HAWAII

Yukie Y. Ohashi
Project Planner

Attachment

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Pacific Islands Ecoregion
300 Ala Moana Blvd, Room 6307
P.O. Box 50167
Honolulu, Hawaii 96850

22

In Reply Refer To: MSS

Ms. Yukie Y. Ohashi
Planner
PBR Hawaii
Pacific Tower, Suite 650
1001 Bishop Street
Honolulu, HI 96850

20 JUL 1994

Dear Ms. Ohashi:

We are in receipt of your letter to Mr. Brooks Harper dated June 30, 1994 in which you request a species list and comments for the proposed road development to achieve access to the property in Kaneohe for the Hope Chapel.

A segment of the road will cross a wetland in the State Urban District and continue onto fast land in the Conservation District. The wetland segment will be 440 feet long and occupy 13,300 sq ft of area or approximately 0.30 acres. The remaining driveway portion will traverse Conservation land.

We have reviewed the terrestrial report by Phil Bruner that you provided and made an initial site inspection of the wetland on July 18, 1994. We concur with the species list in Mr. Bruner's report. As indicated in your letter, the wetland is choked with Job's tears and California grass. No waterbirds were evident and no open water is apparent. We concur that the site may have formerly been in taro cultivation. The hydrology of the site is not apparent although the very large drainage culvert adjacent to the wetland feeds to Kapunahala Stream which exits to Kaneohe Bay.

Although the wetland in question does not presently support resources under the jurisdiction of the U.S. Fish and Wildlife Service, degraded wetlands have the potential for restoration and renewed opportunities to attract fish and wildlife resources. Loss of even the relatively minor amount of wetland identified in the project proposal reduces restoration options and contributes to the accumulating losses of wetlands in this State. The proposed use is non-water dependent and other property access opportunities are available. We are unclear as to the reason why the City and County of Honolulu Department of Land Utilization has denied the use of the legal access to the property at the corner of Paepuu and Puupele Streets in the Castle Hills subdivision.

Our Wetlands Branch will be providing additional comments when the Corps section 404 permit action is initiated. Should you have further questions about this letter please contact our Branch of Interagency Cooperation at 808\541-2749.

Sincerely,

Acting

Brooks Harper
Field Supervisor
Ecological Services

cc: Army Corps of Engineers
Operations Division
Ft. Shafter, HI

1995 January 06

Sam Lemmo
State of Hawaii Department of Land and Natural Resources
1151 Punchbowl Street
Honolulu, HI 96813

Subject: Draft Environmental Assessment
Hope Chapel Kaneohe Access Driveway

According to the assessment, Kapunahala stream and wetland has been heavily affected by past and current land uses. Effects of each past, present, and future increment of additional development will almost always be "immeasurable relative to existing perturbations" (Wetland Mitigation Plan p. 3), yet the cumulative effects of all perturbations is probably measurable against an initial pre-perturbation baseline.

Physical characteristics of runoff and drainage within the stream and wetland affect downstream riparian and instream environments. Changes in the pattern, frequency, timing, velocity, magnitude, erosivity, and water quality of runoff and drainage events that occurred due to past wetland manipulations, along with inadequacies in drainage system design, construction, and maintenance, have already caused irreparable harm to downstream properties and instream environments. Unfortunately, none of the numerous parties responsible for the cumulative effects of wetland development is taking responsibility for overall identification, monitoring, and mitigation of these long-term cumulative impacts. It seems only fair that all parties responsible for wetland development contribute to such an evaluation so that each proposed increment of wetland development can be measured against the cumulative impacts of all wetland development, and so that limits on conversion of this wetland to other land uses can be established.

For instance, referenced storm water runoff calculations by Calvin Kim & Associates (July 1994) (Mitigation p. 5) only measure the difference in runoff between two sequential development increments, not the difference between pre-perturbation and post-driveway development conditions. These calculations should also be performed for 2 year, 24 hour events which may play more significant roles in channel formation and erosional impacts due to their greater frequency and possible coincidence with higher levels of antecedent soil moisture.

The Mitigation Plan (p. 9) states that potential impacts to surface water quality include both short-term construction-related effects and long-term operational effects. However, only the potential short-term construction impacts and means of managing them are discussed.

Archaeological study, particularly pollen analysis, may not be the best means of determining if all or parts of the entire wetland, and particularly the affected and mitigation areas, were sites of early taro cultivation. Subsurface testing consisted of a single core from the driveway alignment, a wetland fringe area which is probably not the most likely location of earlier taro cultivation. Furthermore, taro pollen, if present, was probably deposited quite sparsely, since taro flowering is usually quite sparse and inconsistent.

Development of wetland taro pondfields is limited by water supply. In order to determine the feasibility of developing 0.6 acres of pondfields as planned, the temperature and discharge rate of available water should be provided.

Initial excavation of the pondfields using a backhoe is not recommended (Mitigation Plan p. 13), especially without further historical research and subsurface testing which attempts to determine historic pondfield and irrigation system alignments, which should be preserved wherever possible. Benefits of excavation using hand tools and light equipment include:

(1) Less (and more manageable) disruption of soils and vegetation, thus lessening the potential for construction-related soil erosion and associated environmental impacts.

(2) Less (and more manageable) compaction of agricultural soils, thus lessening the difficulty of future tilling and the potential for poor soil performance.

(3) Less (and more manageable) potential for disruption and destruction of archaeological features.

(4) Greater potential for human experience and appreciation of the complete and true work involved in lo‘i kalo (re)construction, especially in the rehabilitation and educational setting proposed in the mitigation plan.

With regard to best management practices for driveway construction, it is recommended that construction be timed to coincide with dry-weather low flows whenever possible. However, all construction should be postponed pending:

(1) comprehensive documentation and analysis of historic changes to stream and wetland hydrology and hydraulics;

(1) reevaluation of the adequacy of existing downstream drainage structures; and

(2) completion of planned improvements to the stream channel immediately downstream of the new Pookela street culvert.

Finally, it would facilitate the public review process if application dates, numbers, and contact persons for other pending approvals (such as Corps of Engineers, Department of Health, and Office of State Planning) were listed in the draft EA.

Thank you for your consideration of these comments.

David C. Penn
University of Hawaii-Manoa Department of Geography
2424 Maile Way, porteus 443
Honolulu, HI 96822
956-7781

pc: Rob McWilliams, Hope Chapel
Yukie Ohashi, PBR
OEQC
Robert K. Stender
Yuklin Aluli

PBR HAWAII

LAND PLANNING
LANDSCAPE ARCHITECTURE
ENVIRONMENTAL STUDIES

February 27, 1995

Mr. David C. Penn
University of Hawaii-Manoa
Department of Geography
2424 Maile Way, Porteus 443
Honolulu, Hawaii 96822

SUBJECT: HOPE CHAPEL KANEOHE ACCESS DRIVEWAY
DRAFT ENVIRONMENTAL ASSESSMENT ("EA")

Dear Mr. Penn:

We have reviewed your letter of January 6, 1995 regarding the Draft EA for the Hope Chapel Access Driveway. We note that most of your comments are in reference to the Wetland Mitigation Plan which has been submitted as part of the Section 404 Clean Water Act application to the Corps of Engineers. We have reviewed your comments and offer the following responses.

1) Perturbations to the Wetland

While we are in agreement that the cumulative effect of wetland loss would be valuable to assess within the Kapunahala wetlands, we are uncertain if a pre-perturbation condition can adequately be assessed. Over the course of decades, since the development of the Hawaii State Hospital, a number of land uses have been developed including Windward Community College and more recent residential and public facility development. We recognize that previous unmitigated development has occurred. We note that this project is possibly the first in this wetland to propose mitigation to achieve a no net loss of wetlands.

2) Drainage Study

The drainage tributary area, in which the proposed driveway is located is only 5 acres. The total tributary area (or watershed) for the Pookela Street box culvert is 125 acres and includes a portion of the Hawaii State Hospital site. No flows will be diverted from the Hope Chapel church facilities site to this watershed. Our hydrologic and hydraulic analysis show that there will be no increase in the peak design runoff over the present undeveloped condition at the Pookela Street box culvert due to the construction of the Hope Chapel driveway. The drainage plans will be submitted to the City and County Department of Public Works for approval.

W. Frank Brandt • Thomas S. Witten • R. Stan Duncan • Russell Y. J. Chung

PACIFIC TOWER, SUITE 650 1001 BISHOP STREET HONOLULU, HAWAII 96813 TELEPHONE: (808) 521-5631 FAX: (808) 523-1102
BRANCH OFFICE: HILO LAGOON CENTER 101 AUPUNI STREET, SUITE 310 HILO, HAWAII 96720 TELEPHONE: (808) 961-3333 FAX: (808) 961-8989

3) Short-Term and Long-Term Drainage Impacts / Best Management Practices

The drainage improvements for the Hope Chapel church facility site, which drains primarily to the Castle Hills drainage system, calls for the construction of a storm water detention system to reduce peak discharges into the Castle Hills system. This will also have a corresponding reduction in the discharge to Kapunahala Stream. The Hope Chapel project does have a beneficial impact upon the drainage of the area and will not cause increased runoff.

4) Archaeological Study - Pollen Analysis

The archaeology study has been finalized and includes the results of the core obtained from the driveway corridor. As noted in the Final EA, Section 4.2.1, a pollen analysis identified the presence of kukui and taro, both Polynesian plant introductions. However, the absence of soils suggesting pondfield cultivation at the location of the core sample within the driveway corridor suggests that taro may have been cultivated in another part of the marsh.

The wetland mitigation plan, which has been submitted to the Corps of Engineers is currently under review. Our preliminary assessment based on previous work done by the Bishop Museum indicates that the mitigation area may have been a more likely location for taro production. Future studies would help to confirm this assessment.

5) Development of Wetland Taro Mitigation Program

Water Supply. Our initial indication from the Hawaii State Hospital Facilities Engineer is that water supply to irrigate the proposed taro lo'i is sufficiently available at the present time. Moreover, overall water availability will increase within the near-term when Windward Community College, a present user of the Hospital's water system, connects to the Board of Water Supply system. Water in the Hospital's system is derived from the nearby Kapunahala Springs; water quality and temperature is believed to be adequate for taro cultivation.

Construction Methods for Taro Pondfields. The detailed plan for construction methods for the pondfields will be prepared by the cooperating parties in this endeavor. We agree that traditional forms of farming methods are valuable for the reasons you cite and will be considered in the planning process. As we discussed in our telephone conversation, we welcome your participation in the planning process as we would like to utilize the expertise many in our community possess.

6) Public Review Process

The construction of the proposed driveway requires several permits as indicated in the Draft EA, Section 3. Multi-agency review of the various components of an individual project requires

coordination, and as the applicant we attempt to keep all agencies informed. Plan preparation is sequential and applications are submitted as those plans are developed. Moreover, agencies operate within their own time schedule which is often unpredictable to the applicant. Therefore information such as application dates, numbers and contact persons may not always be available at the start of the approval process.

We appreciate your review and comments on the Draft EA. Please contact us if you have any questions or require additional information.

Sincerely,

PBR HAWAII

Yukie Y. Ohashi
Project Planner

ROBERT K. STENDER, JR.
45-823 Kupohu Street, Kane'ohe, Hawai'i 96744
Res. 247-9315--Bus. 842-8356

November 1, 1994

Mr. Samuel Lemmo
State of Hawai'i, Office of Conservation and Environmental Affairs
P.O. Box 621
Honolulu, Hawai'i, 96809

Dear Mr. Lemmo:

Aloha kāua. I have recently read the Conservation District Use Permit application that was submitted to your office by PBR Hawai'i, on behalf of the Hope Chapel Four Square Church. As a resident and homeowner in the Castle Hills subdivision, I would like to take this opportunity to voice my concerns about this application since the construction of this proposed access road may adversely affect the conservation lands at Kea'ahala, my property and the properties of my neighbors who live makai of the construction along Kapunahala Stream.

Background

During the summer of 1992, the State Department of Transportation authorized the construction of an access road between Kea'ahala Road and the Castle Hills subdivision. The road originally constructed without proper permits from the Department of Land and Natural Resource, cut across the heart of Kea'ahala Springs, a wetland area zoned as conservation land. Environmental damage caused by the DOT's road construction was devastating. Native goby fish which formerly existed on my property were exterminated by stream pollution and large amounts of gravel run-off. Erosion of soil and stream banks caused large trees to fall. A retaining wall on my property was damaged and fell into the stream. After road construction was completed, increased water flow accelerated erosion on my property. This lasting effect of the access road construction: erosion, caused by increased water run-off is my primary concern.

Since the summer of 1992, I have been telephoning and writing to different State agencies to inform them of the problem of increased water, silt and gravel flowage through my property. I have met with State experts and engineers about my concerns and the DOT and I are in process of negotiating the construction of grouted rubble pavement to slow erosion on my property. However, more new construction is now in progress. *Hina Mauka* a State Department of Health development now under construction on the northern tip of Kea'ahala Wetlands will further increase rain run-off into Kapunahala Stream. The proposed church access road on the south corner of the wetland would also advance rain run-off.

During the Castle Hills access road construction, the DOT installed a 10' X 20' box culvert which should accommodate rain run-off from a 100-year storm. However, this new culvert was constructed five hundred feet mauka of an old 5' X 5' box culvert directly makai of my property. How will run-off water from a 100-year storm funnel from a 10' X 20' box culvert into a 5' X 5' box culvert? I have posed this question to DOT personnel and have not received a satisfactory answer. I believe the only possible answer is that my property will be flooded. It concerns me that this could possibly happen and that the DOT did not take this possibility into consideration before building over the wetland.

The wetlands of Kea'ahala serve important environmental, practical and aesthetic functions. They serve as a refuge for birds and aquatic life. They act as would a sponge holding large amounts of water and releasing it more slowly than paved asphalt. They protect lowlying property by mitigating against rapid rain run-off. Their beauty add to the quality of life enjoyed by all people in the district.

Current Conservation District Use Permit

The conservation district use permit application prepared by PBR Hawai'i for the Four Square Hope Chapel Church is well done. The application addresses many of the environmental and erosion concerns which were initially ignored by the State Department of Transportation. If the DOT had done a similar application and accompanying study, many of the associated problems caused by the Castle Hills access road construction could have been addressed or avoided altogether. The Four Square Hope Chapel Church application does address the soil and water erosion factor during their access road construction phase through the use of "Best Management" construction methods. I feel

confident that these construction methods will protect soil and the environment from erosion during the construction phase.

However, what seems to be lacking is a study of the total aggregate effect of run-off water added by all new construction: the new Hope Chapel access road; the Castle Hills access road; and, the Hina Mauka Health Project. Has anyone studied problems which may arise during a major rain storm at Kea'ahala in light of all the new construction over the wetland area? While the Hope Chapel application was not intended to address the cumulative effect of rain run-off caused by all these new construction within the conservation district; the problem remains that property owners, such as myself will feel their full effects of increased water run-off caused which is sure to cause increased soil erosion on our properties, possible flooding in the event of large storms, property loss or perhaps worse.

Conclusion

I believe that any future construction (such as those proposed by the Four Square Hope Chapel Church) which may cause more run-off water to be channelled directly into the Kapunahala stream should be deferred until an engineering study can be conducted to determine the safety and/or vulnerability of affected homes and property makai of new State road and facility constructions and the proposed Hope Chapel construction. The State of Hawai'i should take the lead in conducting such a study to protect citizens and property. Perhaps a third party could be contracted to complete such a study with input from all concerned including the State Departments of Transportation and Health, Hope Chapel and the affected community. The consequences of not conducting such a study may be devasting to people living along Kapunahala Stream like myself, my family and my neighbors.

Sincerely,

Robert K. Stender, Jr.

Robert K. Stender, Jr.

cc Yukie Ohashi, PBR Hawai'i
Keith Ahue, Department of Land and Natural Resources
Rex. Johnson, Department of Transportation
Ray Shiroma, Department of Transportation
Yuklin Aluli, Attorney at Law
David Penn, Native Hawaiian Legal Corporation

PBR HAWAII

LAND PLANNING
LANDSCAPE ARCHITECTURE
ENVIRONMENTAL STUDIES

February 27, 1995

Mr. Robert K. Stender, Jr.
45-823 Kupohu Street
Kane'ohe, Hawai'i 96744

SUBJECT: HOPE CHAPEL KANEOHE ACCESS DRIVEWAY
DRAFT ENVIRONMENTAL ASSESSMENT ("EA")

Dear Mr. Stender:

We have reviewed your letter of November 1, 1994 regarding the Draft EA for the Hope Chapel Access Driveway and offer the following responses to your comments.

1) Background Information on Past Construction Activities Within the Drainage Basin

We appreciate the information which you provide in your letter regarding the past construction activities related to the Pookela Street extension and drainage culvert construction in the vicinity of your residence and other Castle Hills properties located makai of Pookela Street. We have met and discussed the problems with DLNR staff and will be reviewing the file in preparation for the Stream Channel Alteration Permit application. We note the following clarification regarding your comments.

As part of our planning process for the Hope Chapel driveway we prepared studies related to the wetland. This included studies on wildlife, vegetation and the biological resources of Kapunahala Stream. Our findings indicate that the wetlands value is in its storm water retention and water purification functions as you have stated. The existing condition of the marsh however, is densely covered with Job's Tears (Coix lachryma-jobi) and no open water is available to make the wetland useful as a refuge for waterbirds and aquatic life. This finding has received the concurrence of the U.S. Fish and Wildlife Service. We do agree the area is beautiful, especially with the Koolaus as a dramatic backdrop. The driveway will be appropriately landscape to maintain those aesthetic qualities. Also, for clarification, the wetland is in the State Urban District and the forested area of the driveway corridor is in the Conservation District.

2) CDUA Process

Thank you for acknowledging that our CDUA application is well done. Hope Chapel endeavors to be a good steward of its resources and has thoroughly evaluated the potential impacts of its project.

Short-Term and Long-Term Drainage Impacts / Best Management Practices. The drainage improvements for the Hope Chapel site, which drains primarily to the Castle Hills system, calls for

W. Frank Brandt • Thomas S. Witten • R. Stan Duncan • Russell Y. J. Chung

PACIFIC TOWER, SUITE 650 1001 BISHOP STREET HONOLULU, HAWAII 96813 TELEPHONE: (808) 521-5631 FAX: (808) 523-1402
BRANCH OFFICE: HILO LAGOON CENTER 101 AUPUNI STREET, SUITE 310 HILO, HAWAII 96720 TELEPHONE: (808) 961-3333 FAX: (808) 961-8989

the construction of a storm water detention system to reduce peak discharges into the Castle Hills drainage system. This will also have a corresponding reduction in the discharge to Kapunahala Stream. The Hope Chapel project will have a beneficial impact upon the drainage of the area and will not cause increased runoff.

We would like to emphasize that every effort will be made to minimize soil erosion during construction. An NPDES permit from the Department of Health will be obtained for work at the construction site and the approved Best Management Practice Plan to reduce soil erosion will be followed.

Impact of Driveway on Downstream Properties. The drainage tributary area, in which the proposed driveway is located is only five acres as discussed in the Final EA, section 4.1.5. This five acre sub-basin is part of a larger 125 acre watershed. The total tributary area for the Pookela Street box drain is 125 acres and includes a portion of the Hawaii State Hospital site. No flows will be diverted from the Hope Chapel site to this watershed. Our hydrologic and hydraulic analyses show that there will be no increase in the peak design runoff over the present undeveloped condition at the Pookela Street box culvert due to the construction of the Hope Chapel driveway. The drainage plans will be submitted to the City and County Department of Public Works for approval.

Cumulative Engineering Study. The preliminary drainage report prepared by the project engineer and published in the Draft and Final EA as Appendix C will be finalized and submitted to the City Department of Public Works for review and approval. In addition, a Best Management Practice Plan has been prepared and will be finalized and submitted with grading permit applications and also a Department of Health National Pollutant Discharge Elimination System ("NPDES") permit. The redundancy which is built into the permitting system provides a safeguard that this project will be implemented in compliance with the rules and regulations of the governmental agencies. We also note that Hope Chapel is setting a precedent in providing mitigative measures for the loss of a small amount of wetland, whereas, previous developments have been unmitigated. In that regard, we strongly feel that the Hope Chapel driveway has fully complied and studied all drainage aspects and impacts and should not be subject to a cumulative engineering study.

We appreciate your review and comments on the Draft EA; your concerns are addressed in the Final EA. Please contact us if you have any questions or require additional information.

Sincerely,

PBR HAWAII

Yukie Y. Ohashi
Project Planner

CE4
HWB

DANIEL K. AKAKA
HAWAII

WASHINGTON OFFICE
720 HART SENATE OFFICE BUILDING
WASHINGTON, DC 20510
TELEPHONE: (202) 224-6361

HONOLULU OFFICE
3104 PRINCE JONAH KUHIO KALANIANAOLE FEDERAL BUILDING
P.O. BOX 50144
HONOLULU, HI 96850
TELEPHONE: (808) 522-8970

United States Senate

WASHINGTON, DC 20510-1103

MEMBER
COMMITTEE ON ENERGY AND NATURAL RESOURCES
COMMITTEE ON GOVERNMENTAL AFFAIRS
COMMITTEE ON INDIAN AFFAIRS
COMMITTEE ON VETERANS' AFFAIRS

February 13, 1995

RECEIVED
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DLNR
OCEA

Mr. Michael Wilson
Chairman
Dept. of Land & Natural Resources
Kalanimoku Building
1151 Punchbowl Street
Honolulu, HI 96813

Dear Mr. Wilson:

I am writing to you at the request of Hope Chapel Kaneohe regarding their permit application to construct an access driveway on conservation land. It is my understanding that the application is pending review by your department. I would appreciate whatever assistance you can provide to ensure that the church's application is given due consideration.

Thank you for your assistance with this matter.

Aloha pumehana,

Daniel K. Akaka

DANIEL K. AKAKA
U.S. Senator

RECEIVED
95 FEB 21 P1:57
DEPT. OF LAND & NATURAL RESOURCES
STATE OF HAWAII

PBR HAWAII
LAND PLANNING
LANDSCAPE ARCHITECTURE
ENVIRONMENTAL STUDIES

February 27, 1995

Senator Daniel K. Akaka
United States Senate
720 Hart Senate Office Building
Washington, D.C. 20510

SUBJECT: HOPE CHAPEL KANEOHE ACCESS DRIVEWAY
DRAFT ENVIRONMENTAL ASSESSMENT ("EA")

Dear Representative Akaka:

On behalf of Hope Chapel Kaneohe, we wish to express our appreciation for your letter encouraging the due consideration of the Conservation District Use Application before the Board of Land and Natural Resources.

Hope Chapel's congregation of Windward Oahu families and individuals is honored to receive your support and encouragement.

Sincerely,

PBR HAWAII

Yukie Y. Ohashi
Project Planner

W. Frank Brandt • Thomas S. Witten • R. Stan Duncan • Russell Y.J. Chung

PACIFIC TOWER, SUITE 650 1001 BISHOP STREET HONOLULU, HAWAII 96813 TELEPHONE: (808) 521-5631 FAX: (808) 523-1402
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STEVE HOLMES
Councilmember
(808) 547-7002

CITY COUNCIL

CITY AND COUNTY OF HONOLULU
HONOLULU, HAWAII 96813-3065 / TELEPHONE 547-7000

February 3, 1995

Mr. Samuel J. Lemmo
State Department of Land & Natural Resources
Office Conservation & Environmental Affairs
1151 Punchbowl Street, Room 131
Honolulu, HI 96813

Dear Mr. Lemmo:

I've had the opportunity to review Hope Chapel's plans for the site above the Castle Hills Subdivision and would like to express my support for their Conservation District Use Application.

I have met with Hope Chapel representatives, walked the site, and attended many meetings, and feel that this is a worthy project. Hope Chapel worked very hard to reach a good compromise with the neighboring residents of the Castle Hill Subdivision. I believe that this project is in keeping with Federal wetland laws to provide for no net loss. As a former taro farmer, I'm particularly pleased with this project. Given the size of the wetlands, I don't believe it is a suitable bird habitat, and it is best used for such a traditional Hawaiian demonstration project. I would further note that Windward Community College could use it as part of their celebration of taro culture in Hawaii and having an active taro patch nearby seems most appropriate.

If you have any questions, please call me at 523-4035. I urge your prompt processing of the CDUA application.

Sincerely,

Steve Holmes
Councilmember, District II

SH:tlc

PBR HAWAII

LAND PLANNING
LANDSCAPE ARCHITECTURE
ENVIRONMENTAL STUDIES

February 27, 1995

Councilmember Steve Holmes
City and County of Honolulu
Honolulu Hale
530 South King Street
Honolulu, Hawaii 96813

SUBJECT: HOPE CHAPEL KANEOHE ACCESS DRIVEWAY DRAFT ENVIRONMENTAL ASSESSMENT ("EA")

Dear Councilmember Holmes:

On behalf of Hope Chapel Kaneohe, we wish to express our appreciation for your support and encouragement of the access driveway CDUA. Hope Chapel has made every good faith effort as a good neighbor and steward in its goal to construct a new church facility. The proposed wetland taro mitigation program will be an additional benefit especially for the patients at the Hawaii State Hospital and the students at the Windward Community College. Hope Chapel Kaneohe is excited to be a participant in this culturally significant Hawaiian demonstration project.

Again we thank you for your supportive letter.

Sincerely,

PBR HAWAII

Yukie Y. Ohashi
Project Planner

W. Frank Brandt • Thomas S. Witten • R. Stan Duncan • Russell Y.J. Chung

PACIFIC TOWER, SUITE 650 1001 BISHOP STREET HONOLULU, HAWAII 96813 TELEPHONE: (808) 521-5631 FAX: (808) 523-1402
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HOUSE OF REPRESENTATIVES
THE EIGHTEENTH LEGISLATURE
STATE OF HAWAII
STATE CAPITOL
HONOLULU, HAWAII 96813

February 6, 1995

Mr. Samuel Lemmo, Planner
Office of Conservation & Environmental Affairs
Department of Land and Natural Resources
1151 Punchbowl Street, Room 131
Honolulu, Hawaii 96813

Dear Mr. Lemmo:

I am writing in support of Hope Chapel Kaneohe's Conservation District Use Application to allow the development of an access driveway within the State Conservation District and for the use of lands owned by the State of Hawaii.

The proposed driveway at TMK 4-5-23:2 and 3 will provide access from Pookela Street to the Hope Chapel property for their proposed church facilities. The primary purpose of relocating the church driveway from the designated legal access on Puupele Street is to reduce traffic congestion within the Castle Hills subdivision during peak periods and comply with the Site Plan Review conditional approval.

I have spoken to many residents in the Castle Hills subdivision who support Hope Chapel's proposed access driveway because it will help ease the flow of traffic through this quiet residential area.

I urge the Department of Land and Natural Resources to approve Hope Chapel's Conservation District Use Application for the residents of Kaneohe. If you have any questions, or would like to discuss this matter further, please call me at 586-8470. Thank you.

Sincerely,

Ken Ito
Representative
48th House District

RECEIVED
'95 FEB 7 PM 2:26
DLNR
OCEA

PBR HAWAII

LAND PLANNING
LANDSCAPE ARCHITECTURE
ENVIRONMENTAL STUDIES

February 27, 1995

Representative Ken Ito
State of Hawaii
House of Representatives
State Capitol
Honolulu, Hawaii 96813

SUBJECT: HOPE CHAPEL KANEOHE ACCESS DRIVEWAY
DRAFT ENVIRONMENTAL ASSESSMENT ("EA")

Dear Representative Ito:

On behalf of Hope Chapel Kaneohe, we wish to express our appreciation for your supportive letter encouraging the approval of the Conservation District Use Application for the proposed access driveway which will allow the construction of a new church facility for Hope Chapel Kaneohe.

Hope Chapel and the Castle Hills Community Association have been engaged in discussions to resolve the traffic impact concerns of the residents. We are pleased that the proposed alignment has received Castle Hills' full support.

Sincerely,

PBR HAWAII

Yukie Y. Ohashi
Project Planner

W. Frank Brandt • Thomas S. Witten • R. Stan Duncan • Russell Y.J. Chung

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The Senate
The Eighteenth Legislature
of the
State of Hawaii

STATE CAPITOL
HONOLULU, HAWAII 96813

December 15, 1994

Mr. Keith Ahue
Chairperson
Board of Land & Natural Resources
P.O. Box 621
Honolulu, HI 96809

Dear Chair Ahue: Keith

SUBJECT: HOPE CHAPEL KANEOHE
ACCESS DRIVEWAY

Thank you for the opportunity to comment on the Environmental Assessment conducted by PBR Hawaii for the subject project.

Considerable debate over the location of Hope Chapel in the Castle Hills Subdivision has taken place during recent years. I believe there has been a genuine attempt on the part of Hope Chapel to work with and resolve concerns from the community and am confident that the proposed solution of an access road will minimize the impact of increased traffic in the residential neighborhood. I also feel that the additional cost of approximately $500,000 to build an access road demonstrates Hope Chapel's good faith and desire to be a good neighbor.

I am pleased to support the findings of the Environmental Assessment and ask for the Board's favorable consideration, so that the community can move forward.

Sincerely,

Mike

Mike McCartney
State Senator
23rd Senatorial District

cc: Kaneohe Neighborhood Board
Hope Chapel
Chair-Designee Mike Wilson

PBR
HAWAII

LAND PLANNING
LANDSCAPE ARCHITECTURE
ENVIRONMENTAL STUDIES

February 27, 1995

Senator Mike McCartney
State Capitol
Honolulu, Hawaii 96813

SUBJECT: HOPE CHAPEL KANEOHE ACCESS DRIVEWAY
DRAFT ENVIRONMENTAL ASSESSMENT ("EA")

Dear Senator McCartney:

On behalf of Hope Chapel Kaneohe, we wish to express our gratitude for your faithful support and acknowledgement of the efforts Hope Chapel has made over these many years to resolve the concerns of the Kaneohe community in its attempt to build a new church facility.

Thank you for your letters written to encourage support for the access driveway Conservation District Use Permit.

Sincerely,

PBR HAWAII

Yukie Y. Ohashi
Project Planner

W. Frank Brandt • Thomas S. Witten • R. Stan Duncan • Russell Y.J. Chung

PACIFIC TOWER, SUITE 650 1001 BISHOP STREET HONOLULU, HAWAII 96813 TELEPHONE: (808) 521-5631 FAX: (808) 523-1402
BRANCH OFFICE: HILO LAGOON CENTER 101 AUPUNI STREET, SUITE 310 HILO, HAWAII 96720 TELEPHONE: (808) 961-3333 FAX: (808) 961-8989

APPENDICES

LIST OF APPENDICES

APPENDIX A

Site Plan Review Approval: City and County of Honolulu Department of Land Utilization, September 28, 1993

DEPARTMENT OF LAND UTILIZATION
CITY AND COUNTY OF HONOLULU
650 SOUTH KING STREET
HONOLULU, HAWAII 96813 • (808) 523-4432

FRANK F. FASI
MAYOR

DONALD A. CLEGG
DIRECTOR

LORETTA K.C. CHEE
DEPUTY DIRECTOR

93/SPR-11(sc)

September 28, 1993

Mr. Robert McWilliams
Hope Chapel Kaneohe
45-270 William Henry Road
Kaneohe, Hawaii 96744

Dear Mr. McWilliams:

Application for Site Plan Review for a
Meeting Facility and Day-Care Facility
Hope Chapel Kaneohe; Tax Map Key 4-5-25: 20

Your request for a Site Plan Review for the establishment of a meeting facility and day-care facility was APPROVED WITH CONDITIONS, pursuant to the attached "Findings of Fact, Conclusions of Law, and Decision and Order".

The approval of the Site Plan Review is subject to meeting the conditions of the above order.

Pursuant to Section 8.60-2.C. of the Land Use Ordinance, the provisions of this Order shall become final 30 days after the date of mailing or delivery of this order. You may appeal this Order to the Zoning Board of Appeals (ZBA) as provided by Section 6-909 of the City Charter. Please note that an appeal to the ZBA shall not stay any provision of this Order.

If you have any questions, please contact the Zoning District Changes Branch at 523-4299.

Very truly yours,

DONALD A. CLEGG
Director of Land Utilization

DAC:sc
93spr11.snc

Attachment

DEPARTMENT OF LAND UTILIZATION OF THE CITY AND COUNTY OF HONOLULU

STATE OF HAWAII

IN THE MATTER OF THE APPLICATION)
OF)
HOPE CHAPEL KANEOHE) CASE NO. 93/SPR-11
FOR A SITE PLAN REVIEW PERMIT)

FINDINGS OF FACT, CONCLUSION OF LAW, AND DECISION AND ORDER

I. APPLICATION

A. Basic Information

APPLICANT	:	Hope Chapel Kaneohe
LANDOWNER	:	The Fathers of the Sacred Hearts
LOCATION	:	Puupele Street, Kaneohe (Exhibit 1)
TAX MAP KEY	:	4-5-25: 20
LAND AREA	:	9.2 acre portion of a 11.436 acre parcel
STATE LAND USE DISTRICT	:	Urban District
DEVELOPMENT PLAN LAND USE MAP	:	Agriculture, Public Facility, Residential (Exhibit 2)
PUBLIC FACILITIES MAP	:	Kahekili Highway - additional right-of-way, within 6 years; Likelike Highway - additional right-of-way, beyond 6 years; H-3 Freeway (Exhibit 3)
EXISTING ZONING	:	AG-2 General Agricultural District, R-5 Residential District (Exhibit 4)
EXISTING USE	:	Vacant (Exhibit 5)
SURROUNDING LAND USE	:	Residential, H-3 Freeway, Conservation lands

REQUEST : Site Plan Review to establish a meeting facility and day-care facility

B. Proposal

The applicant proposes to construct a 17,349 square-foot church auditorium (meeting facility), 7,898 square-foot administrative building and an 8,902 square-foot youth/classroom building (day-care facility). The auditorium will consist of a general assembly area, bookstore (utilized only by church members) and classrooms. The youth/classroom building will primarily be used as a day-care facility. Hope Chapel currently holds worship services at the Ben Parker Elementary School cafeteria in Kaneohe.

II. FINDINGS OF FACT

On the basis of the evidence presented, the Director has found:

A. Description of Site/Surrounding Uses

Hope Chapel Kaneohe will be located on a 9.2 acre portion of an 11.4 acre parcel identified by Tax Map Key 4-5-25: 20. The irregular shaped parcel moderately slopes towards Puupele Street and is currently undeveloped. A large portion of the parcel is zoned AG-2 General Agricultural District. The flag stem or access off Puupele Street is zoned R-5 Residential District.

The site is bounded to the north by the Hawaii State Hospital, Windward Community College and State conservation lands; to the south by Fathers of the Sacred Hearts Seminary; to the west by the H-3 Freeway and State conservation lands; and to the east by Castle Hills Subdivision.

B. Proposed Structures

The project will include the following structures, to be constructed over three phases:

STRUCTURE/USE	PHASE	SIZE
Auditorium Building Auditorium (Assembly Area) Bookstore Classrooms	I (construction to commence as soon as all required permits are obtained)	17,439 sq. ft.
Administration Building Offices	II (construction to commence within 3 years)	7,898 sq. ft.
Youth Center/Classroom Building (Day-Care facilities) Classrooms Nursery	III (construction to commence within 5 years)	8,902 sq. ft.

C. Proposed Schedule of Operations

STRUCTURE	USE	HOURS OF OPERATION	ATTENDANCE
Auditorium	Services & Bookstore	Friday 7:00 pm - 9:00 pm Sunday 7:00 am - 8:00 am 8:15 am - 9:30 am 10:00 am - 11:30 am 6:30 pm - 8:00 pm Wednesday (quarterly) 7:00 pm - 9:00 pm	75 to 175 50 to 75 200 to 325 200 to 325 100 to 150 100
	Shepherd's Meeting	Tuesday (bi-monthly) 7:00 pm - 9:00 pm Tuesday (monthly) 7:00 pm - 9:00 pm	12 to 20 50
	Weddings	Saturday (approx. 25 times a year) 10:00 am 7:00 pm	 6 to 200 6 to 200
Administration Building	Business Offices	Monday - Friday 9:00 am - 5:00 pm	15 to 24 (18 full-time 7 part-time)
	Church Council	Saturday (bi-monthly) 7:00 am - 10:00 am	12
	Classes	Saturday (bi-monthly) 7:00 am - 9:00 am	20
	Leadership Meeting	Saturday (quarterly) 8:00 am - 5:00 pm	20 to 30
Youth Center/ Classroom Building	Day-Care Facility	Monday - Friday 7:00 am - 6:00 pm	75 students Teachers 6 full-time 4 part-time

D. Public Agencies' Review and Comment

Public agencies were requested to evaluate the impact of the project on their facilities and services. Their responses, attached as Exhibit 6, are summarized as follows:

1. State Department of Transportation (DOT):

   a. The traffic study should be updated to include traffic projections for the next 10 years and should include traffic impacts of the proposed Coast Guard Housing project located at the end of Haiku Road, within the Coast Guard Omega Naval Station.

   b. Additional mitigative measures to Keaahala Street should be evaluated.

   c. The use of the H-3 construction access road as an alternate route to the project site will not be allowed. In addition, the application should address alternatives to mitigate traffic impact on Puupele Street.

   d. All work done within the State highway right-of-way must be submitted to DOT for review and approval.

2. State Department of Land and Natural Resources State Historic Preservation Division requested that action on this application be deferred until the applicant makes a commitment to complete the historic preservation review process. Alternatively, a condition should be attached to the approval stipulating that the applicant must submit an acceptable archaeological inventory survey report and mitigation plan to its office. It was further stated that Appendix D of the application incorrectly summarizes the results of an archaeological reconnaissance survey.

3. State Department of Health (DOH):

   a. Wastewater Branch: No objections to the project, provided that it is connected to the public sewers.

   b. Clean Water Branch: The project may be subject to a National Pollutant Discharge Elimination System (NPDES) permit, which is required for any discharge to waters of the State.

   c. Noise and Radiation Branch: Activities associated with the construction phase of the project must comply with the provisions of Title 11,

Administrative Rules Chapter 43, "Community Noise Control for Oahu." Traffic noise from heavy vehicles travelling to and from the project site must be minimized within residential areas and must comply with the provisions of Title 11, Administrative Rules Chapter 42, "Vehicular Noise Control for Oahu."

4. Department of Public Works (DPW):

   a. Engineering: The applicant should address the impact of storm water discharges and comply with the National Pollutant Discharge Elimination System regulations. Also, access to the site should be constructed with a standard concrete driveway.

   b. Refuse Collection: Although this project qualifies for City refuse collection, there are not enough details to determine if the City can provide refuse service. If City refuse collection service is intended, the construction drawings for the site work improvements should be submitted to DPW for review and approval.

5. Department of Wastewater Management indicated that the local sewer system is available and adequate to accommodate the proposed project. However, the connection of the project must wait until the sewer from the Kaneohe Wastewater Treatment Plan (WWTP) is diverted to the Kailua WWTP which is scheduled to be completed by the end of 1993.

6. Department of Transportation Services (DTS):

   a. The vehicular access point should be constructed as a standard City dropped driveway.

   b. The driveway grade should not exceed 5% for a minimum distance of 35 feet from the curb line.

   c. Landscaping should be placed in locations where it does not interfere with the vehicular sight lines.

   d. On Sundays, between the hours of 6:30 a.m. to 12:30 p.m., parking should only be allowed on one side of Puupele Street, from the project entrance to Pookela Street. This will provide two-way traffic on Puupele Street during the anticipated peak service period. The abutting residents should be made aware and concur with the proposed parking restriction.

e. Sunday services and all other major functions should be scheduled to minimize the amount of two-way traffic generated by the project.

f. Preliminary construction plans for all work within the City right-of-way should be submitted to DTS for review. A signage plan showing the parking restrictions on Puupele Street should be included in these plans.

g. Community traffic concerns should be resolved prior to the start of construction.

h. Alternate access to the project site should be studied to minimize the impacts of the affected residents.

7. Honolulu Fire Department (HFD): No adverse impact on HFD facilities or services.

8. Board of Water Supply (BWS): No objections. On-site fire protection requirements should be coordinated with the Fire Prevention Bureau of the HFD.

9. Honolulu Police Department (HPD): Not opposed to the project.

10. Planning Department:

a. Additional information on the proposed grading and on existing slope and soil conditions, including the potential soil suitability, should be provided.

b. Proposed access via Puupele Street may negatively impact the residential subdivision since the existing streets were designed to serve only single-family homes.

11. State Department of Human Services:

a. The proposed day-care facility would be required to meet all licensing requirements specified in Title 17, Hawaii Administrative Rules, Chapter 892.1 for children ages 2 years and above.

b. The upper floor classroom in the proposed Youth Center/Classroom building may not be permitted by the Building Department.

E. Community Concerns

Informational notices were sent to various community organizations, public officials and the Kaneohe Neighborhood Board No. 30.

This department has received numerous letters, petitions and surveys both opposing and supporting the proposed project from Castle Hills residents, Hope Chapel members, the Kaneohe Neighborhood Board No. 30 and State officials.

A review of correspondence submitted to DLU indicates that the Castle Hills residents perceive their community as being close-knit and peaceful. They fear that their tranquil and safe neighborhood will be negatively affected by the proposed project. Their concerns are summarized as follows:

1. Traffic. The roads were designed for a residential subdivision and not to accommodate the traffic that will be generated by the proposed project. Also, a few of the residents contend that the traffic impact assessment did not accurately depict the potential impacts from the proposed project.

   The residents have suggested that the applicant find an alternate access route to the proposed project that circumvents the subdivision.

2. Noise. The proposed project will generate noise during and after construction.

3. Drainage. The residents state that a drainage problem currently exists within the subdivision. They fear that the proposed project, located above the subdivision, will increase runoff and intensify the drainage problem.

   A private consultant submitted an Engineering Geologic Review of the proposed project at the request of the Castle Hills Community Association. The review suggests that additional information on drainage be submitted.

4. Safety. The increase in traffic will threaten the safety of pedestrians and children that play outside. Also, the residents feel that their "safe" and "close-knit" community will be endangered by the large volume of traffic and strangers that will be passing through the subdivision.

The Kaneohe Neighborhood Board No. 30 recommended that construction of the project be delayed until a number of road improvements are completed.

Hope Chapel members and State officials support the proposed project because they believe that the services and facilities that will be provided by the proposed project will be an asset to the community.

On August 24, 1993, this Department held a public hearing at the Kaneohe Public Library. Approximately 200 people attended the hearing. The testimony received reflected the same concerns mentioned in the preceding paragraphs.

F. Chapter 343, Hawaii Revised Statutes (HRS)

The proposal is not subject to the provisions of Chapter 343, Hawaii Revised Statutes, the Environmental Impact Statement Law.

III. ANALYSIS

A. Project Impacts

1. Land Use

The project site is designated Urban on the State Land Use Map; Agriculture, Residential and Public Facility on the Koolaupoko Development Plan Land Use Map; and zoned AG-2 General Agricultural District and R-5 Residential District.

Meeting and day-care facilities are permitted within the AG-2 General Agricultural District subject to an approved Site Plan Review.

2. Noise

The proposed project will generate noise that may impact the surrounding area. However, a 4-foot high concrete block wall and a row of trees and hedges along the edge of the property line, between the church and the Castle Hills residences, will be installed as a buffer.

The applicant states that the noise levels at the nearest residences will be well within the acceptable levels as determined noise regulations administered by the Sate Department of Health.

3. Lighting

The applicant did not submit any plans for exterior lighting. Any proposed exterior lighting should be shielded from adjoining uses and shall be submitted to the Director of Land Utilization for review and approval.

4. Traffic

Access to the project site is from Puupele Street, a 28-foot wide roadway within the Castle Hills subdivision.

The applicant submitted a traffic impact assessment that was prepared in May 1991, and updated in February 1993. The assessment indicated that the proposed project would have negligible impacts on traffic operations at the intersections of Kahekili Highway and Keaahala Street, and Pookela Street and Puupele Street. Along Puupele Street, traffic flow may be delayed when cars are parked along both sides of the street.

The assessment accounted for planned improvements along Kahekili Highway, including its widening to a six-lane divided highway, and recommends that the signal timing at the intersection of Kahekili Highway and Keaahala Street be adjusted to accommodate those planned improvements. It also recommended that Sunday services be scheduled with at least a 30-minute interval between each service and carpooling among church members be encouraged to mitigate traffic conflicts along Puupele Street.

The State Department of Transportation (DOT) recommended that the traffic assessment be updated to reflect traffic projections for trip generation to the Year 2003, and include the proposed Coast Guard Housing project, in Haiku. The DOT also recommended that the applicant evaluate additional mitigative measures along Keaahala Street. Mitigative measures identified by DOT include widening Keaahala Street from Pookela Street to Kahekili Highway, installing improvements along the Kaneohe Hospital side of the street, and separating all movements.

The DOT expressed concerns over the volume of traffic that will be traveling through Puupele Street. Although Puupele Street is not within its jurisdiction, the DOT suggested that alternatives to mitigate the potential impacts to the neighborhood be addressed.

The City's Department of Transportation Services (DTS), also recognizing the potential traffic conflicts within the neighborhood, recommended the following:

a. Restrict parking on Puupele Street to only one side of the street between the hours of 6:30 a.m. and 12:30 p.m. on Sundays in order to provide two-way traffic on Puupele Street during the anticipated peak service period. DTS also recommended that the abutting residents along this street be made aware

of and concur with the proposed parking restriction.

b. Schedule Sunday services and all other major functions to minimize the amount of two-way traffic generated by the project.

c. Evaluate alternative access routes to the project site to minimize the impacts on the affected residents.

The applicant has proposed the following mitigative measures:

a. Install additional parking spaces on Hope Chapel's property for use by the Castle Hills residents, 24 hours a day, in exchange for the Sunday parking restriction along Puupele Street.

b. Schedule Sunday services and other community services so that traffic will be primarily one-way, either entering or exiting the project site.

c. Hire off-duty police officers to direct traffic during peak hours of operation.

d. Study the following alternative access routes:

   1) Access from the Fathers of the Sacred Hearts Seminary property, south of the project site.

   2) Travel through the Hawaii State Hospital, north of the project site.

   3) Use of the existing H-3 Freeway maintenance road, mauka of the project site.

Notwithstanding these mitigation measures, the anticipated volume of traffic travelling on Puupele Street, which is basically a cul-de-sac within the residential subdivision, still poses major traffic safety and community impact issues. The residents, DOT and DTS agree that the increase in the volume of traffic will have negative impacts on the surrounding community. In addition, owners or administrators of the properties affected by the proposed alternative access routes have indicated in writing to the applicant that all three routes are not available for the use of Hope Chapel. Therefore, in accordance with DTS' recommendation, the applicant will be required to identify an alternative access route to the project site.

5. Visual Impacts

The proposed structures will be designed and constructed of materials similar to those of the adjacent subdivision to minimize visual impacts. In addition, the proposed structures will not exceed the maximum height of 25 feet and will be set back from existing land uses by a minimum of 80 feet.

6. Drainage

The applicant submitted a preliminary drainage report, dated February 1993, to the Department of Public Works (DPW) for review and approval. The DPW determined that the report was acceptable.

The applicant states that all drainage improvements will comply with the Storm Drainage Standards of the City and County of Honolulu.

B. Compliance with Land Use Ordinance (LUO) Requirements

1. AG-2 General Agricultural District

STANDARD	LUO PROVISION	PROJECT SITE
MIN. LOT AREA	2 acres for other uses	± 11.34 acres
MIN. DEPTH/WIDTH	150'	± 910'/350'
FRONT YARD	15'	± 70'
SIDE/REAR YARD (for non-agricultural uses)	10'	± 150'/480'/80'
MAX. BUILDING AREA	10% of zoning lot for non-agricultural structures	7%
MAXIMUM HEIGHT	25'	25'

The proposed project meets all of the AG-2 General Agricultural District standards.

2. Site Plan Review Minimum Development Standards for Meeting Facilities:

STANDARD	LUO PROVISION	PROJECT SITE
Travel way	22 ft.	28 ft.
Lot Size	20,000 sq. ft.	11.436 acres
Buffering	6-foot high solid wall and/or landscaping when adjoining lots are zoned country, residential, apartment or apartment mixed use	4' high wall and landscaping
Minimum Street Frontage	75 ft.	44 ft.

The proposed project meets all of the above minimum development standards for meeting facilities except for the 75-foot minimum street frontage. However, a variance from this standard was requested and approved by the Director of Land Utilization on November 27, 1992.

3. Site Plan Review Minimum Development Standards for Day-Care Facilities:

STANDARD	LUO PROVISION	PROJECT SITE
Common activity area	Set back a minimum of 15 feet from adjoining lots in country, residential, apartment or apartment mixed use districts or 6' high wall/landscaping	Set back approximately 90', 4' high wall and landscaping
Drop-off Area	> 25 children: an area = 4 standard-sized parking spaces	Area equivalent to 10 standard-sized spaces
Travel way	22 ft.	28'

The proposed project meets all of the LUO's minimum development standards for day-care facilities. However, the proposed day-care facility will also be required to meet the indoor and outdoor space requirements of the State Department of Human Services (DHS).

C. Parking/Loading

Parking requirements for the proposed project under the LUO are as follows:

USE	LUO REQUIREMENT	PARKING REQUIRED
Assembly area @ 8,808 sq. ft.	1 per 75 sq. ft.	117.44
Day-Care Facility @ 75 students	1 per 10 students	7.5
Offices @ 6,344 sq. ft.	1 per 400 sq. ft.	15.86
Bookstore @ 541 sq. ft.	*accessory	0
Classrooms (located in both the auditorium and youth center/classroom buildings)	*accessory	0
Nursery	*accessory	0
	TOTAL	141 spaces

*Classrooms and nursery are used in conjunction with Sunday services by children (younger than the 6th grade). The adults and older children attend Sunday services while the younger children attend Sunday school. The bookstore is utilized only by members of the Hope Chapel Kaneohe congregation.

A total of 141 off-street parking spaces are required for the project. The applicant is proposing to provide 261 spaces.

Of the 141 required parking spaces, 5 spaces are required to be designated for the physically handicapped. The applicant is proposing to designate 10 of the 261 spaces for the physically handicapped.

The LUO requires that loading spaces be provided relative to total floor area. Based upon the proposed floor area of 34,239 square feet, two loading spaces are required. The applicant is proposing to provide two loading spaces, adjacent to the auditorium building.

D. Landscaping

According to the landscape plan submitted by the applicant, the proposed project will be heavily landscaped throughout the entire site. Flowering trees will be planted in the courtyards and norfolk island pines will be used to mark the entry to the auditorium building. Eucalyptus trees will be planted along the perimeter of the development while formosa koa trees will be used for shading and screening within the open parking areas.

IV. CONCLUSIONS OF LAW

The Director hereby makes the following Conclusions of Law:

The proposed Hope Chapel Kaneohe meets all of the requirements for a Site Plan Review for a meeting facility and a day-care facility. It will provide a service and facility which will contribute to the general welfare of the community-at-large and the surrounding neighborhood, provided the concerns, as indicated in the ANALYSIS section of this report, are mitigated as set forth in the following DECISION AND ORDER.

V. DECISION AND ORDER

Based on the FINDINGS OF FACT and CONCLUSIONS OF LAW, the application for a Site Plan Review for a meeting facility and day-care facility for Hope Chapel Kaneohe, in general accordance with the exhibits on file at the Department of Land Utilization, is APPROVED subject to the following conditions:

1. The applicant shall not use Puupele Street, or any other roadways within the Castle Hills subdivision, as access to the project site. An alternate access route shall be identified.

   a. The applicant shall submit a revised site plan and landscape plan, identifying the proposed alternate access route, to the Director of Land Utilization for review and approval within three years of the effective date of this permit. Copies of the revised site plan shall also be submitted to the Department of Transportation and Department of Transportation Services for review and approval. The revised site plan shall use Likelike Highway and Kahekili Highway as reference points when identifying the alternate access route. If an approved alternate access route cannot be designated within the time period stated above, this permit shall become null and void.

      1) The landscape plan shall also indicate that a 4-foot high solid wall and landscaping will be installed as a buffer from noise and light wherever there are adjoining residentially zoned properties.

   b. The applicant shall submit an updated traffic impact assessment and accompanying mitigative measures to the State Department of Transportation and Department of Transportation Services for review and approval within three years of the effective date of this permit. The updated traffic impact assessment shall be based upon the alternate access route and shall include the proposed Coast Guard Housing project and the following mitigative measures along Keaahala Street:

1) widening Keaahala Street from Pookela Street to Kahekili Highway;

2) installing improvements along the Kaneohe Hospital side of Keaahala Street; and

3) separating all movements.

2. The operation of the facility shall be limited to the hours between 6:00 a.m. and 9:30 p.m.

3. The bookstore shall be utilized only by members of the Hope Chapel Kaneohe congregation and shall not be open to the public.

4. The day-care facility shall meet all licensing requirements specified in Title 17, Hawaii Administrative Rules, Chapter 892.1 for children ages 2 years and above.

5. All exterior lighting shall be shielded from adjoining uses. Prior to the application for grading and /or building permits, the applicant shall submit an exterior lighting plan to the Department of Land Utilization for review and approval.

6. Prior to the application for grading and/or building permits, the applicant shall submit a final drainage and soil suitability report to the Department of Public Works for review and approval.

7. Preliminary construction plans for all work within any affected City right-of-way shall be submitted to the Department of Transportation Services for review and approval.

8. Preliminary construction plans for all work within any affected State right-of-way shall be submitted to the Department of Transportation for review and approval.

9. The applicant shall immediately stop work and contact the State Historic Preservation Division for review and approval of proposed mitigation measures should any previously unidentified historic sites (including but not limited to artifacts, shell, bone, or charcoal deposits, human burials, rock or coral alignments, pavings or walls) be encountered during the development of the project approved under this Site Plan Review. Work in the immediate area shall be stopped until the SHPD is able to assess impacts and make further recommendations for appropriate mitigation measures.

10. This Site Plan Review does not constitute compliance with other Land Use Ordinance or governmental agencies' requirements. They are subject to separate review and approval. The applicant shall be responsible for insuring

that the final plans for the project approved under this permit comply with all applicable Land Use Ordinance and other governmental agencies' provisions and requirements.

11. Any modification to or expansion of the project approved under this Site Plan Review shall be subject to review and approval by the Director of Land Utilization.

12. The Director of Land Utilization may modify the conditions of this Site Plan Review by imposing additional conditions, modifying existing conditions, or deleting conditions deemed satisfied upon a finding that circumstances related to the approved project have significantly changed so as to warrant a modification to the conditions of approval.

13. The applicant and/or landowner shall notify the Director of Land Utilization of:

    a. Any change in uses on the property;

    b. Termination of any uses on the property; and/or

    c. Transfer in ownership of the property or any uses on the property.

    The Director shall then determine the appropriate disposition of this Site Plan Review and facilities.

14. On an annual basis, corresponding with the anniversary of the effective date of this Site Plan Review, the applicant shall submit a written status report to the Department of Land Utilization documenting its satisfaction of and/or describing its progress toward complying with each condition of approval for this permit.

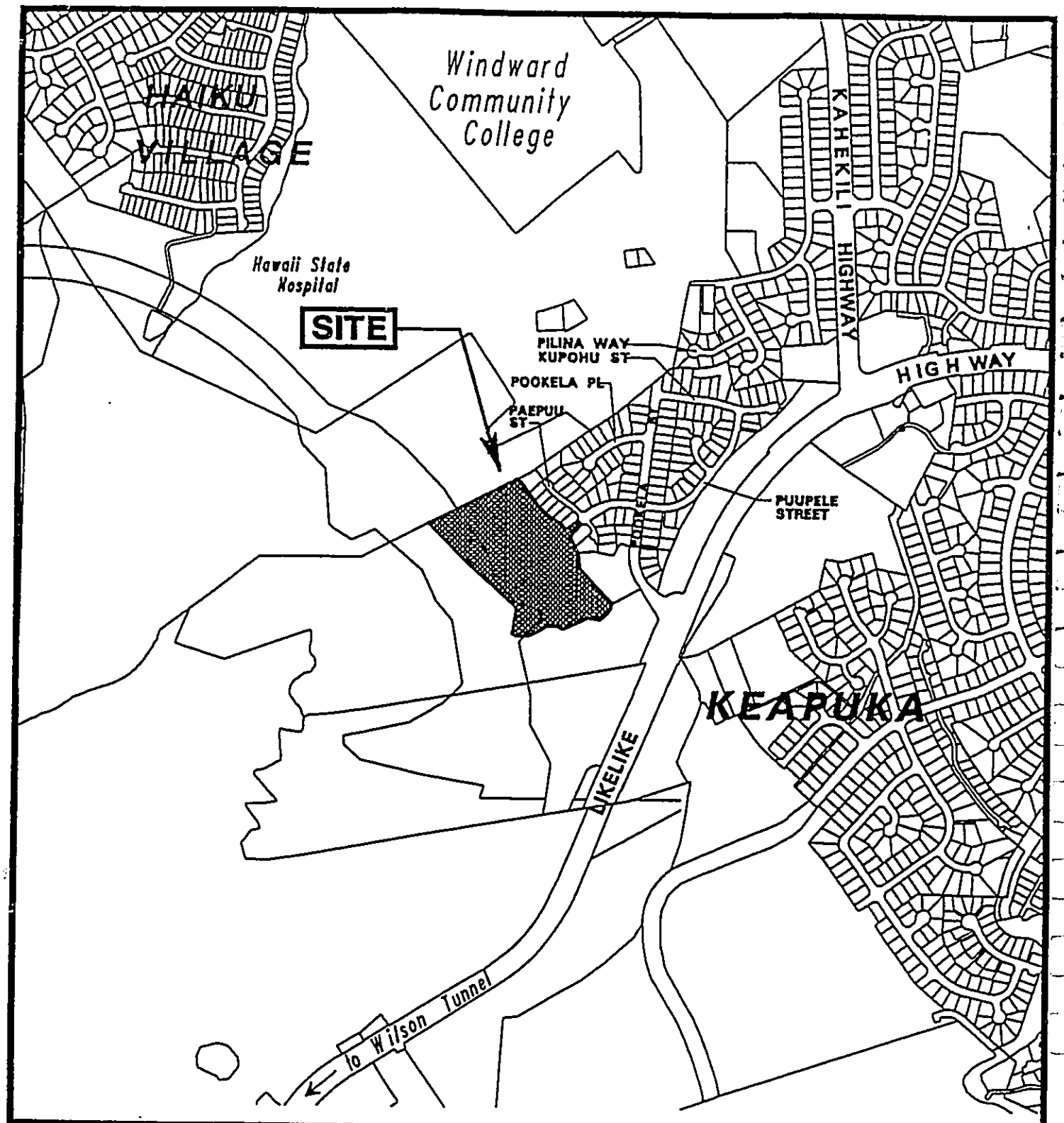
15. In the event of noncompliance with any of the conditions set forth herein, the Director of Land Utilization may terminate all uses approved under this Site Plan Review or halt their operation until all conditions are met or may declare this Site Plan Review null and void.

Dated at Honolulu, Hawaii, this 28th day of September, 1993.

DEPARTMENT OF LAND UTILIZATION
CITY AND COUNTY OF HONOLULU
STATE OF HAWAII

By _____
DONALD A. CLEGG
Director of Land Utilization

DAC:lg
Attach.
93spr11.snc



LOCATION MAP

KANEOHE

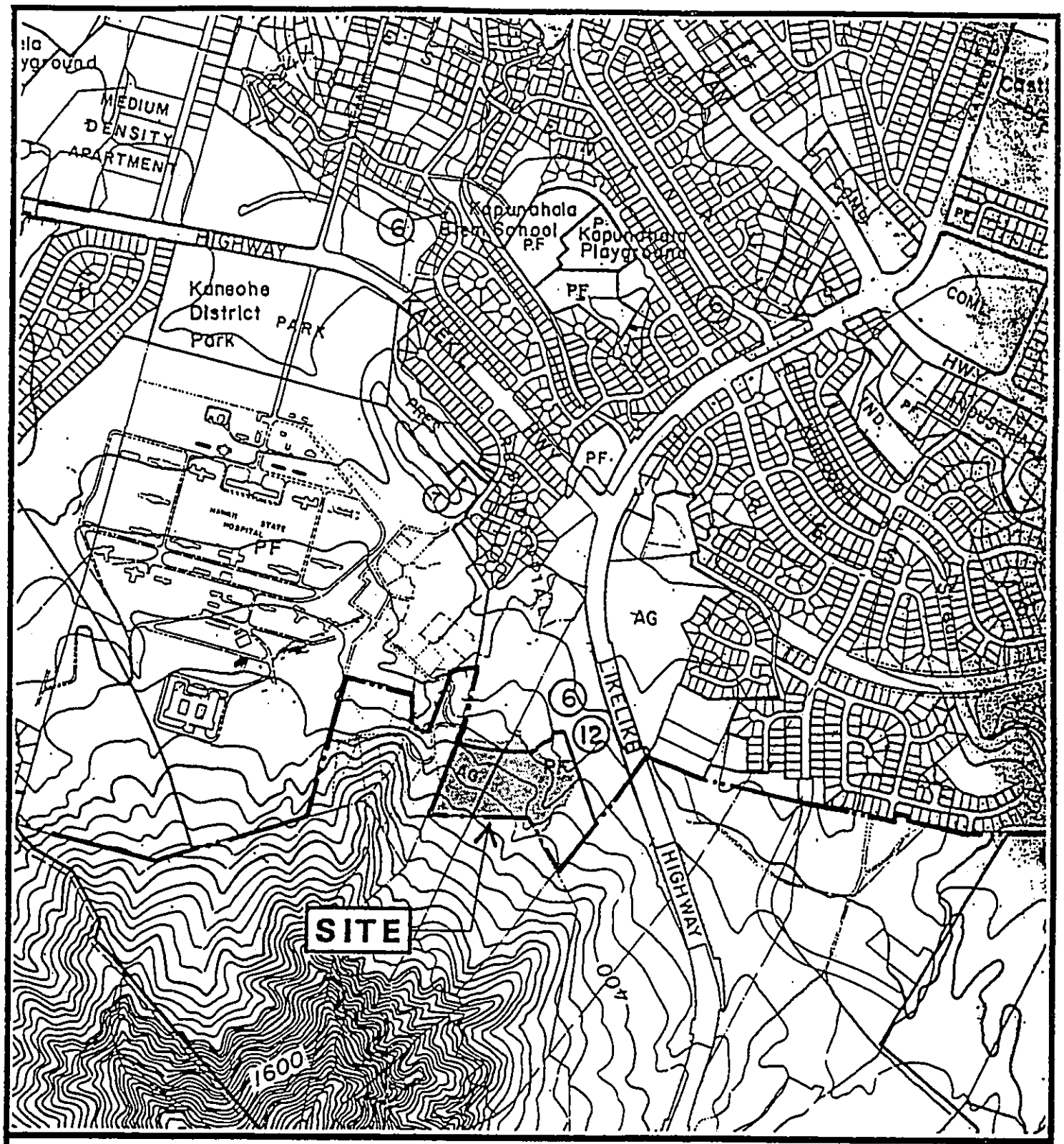
FOLDER NO.: 93/SPR - 11

TAX MAP KEY: 4-5-25 : 20

PREPARED BY: Department of Land Utilization
City and County of Honolulu

DATE PREPARED: JUNE 1993

EXHIBIT 1



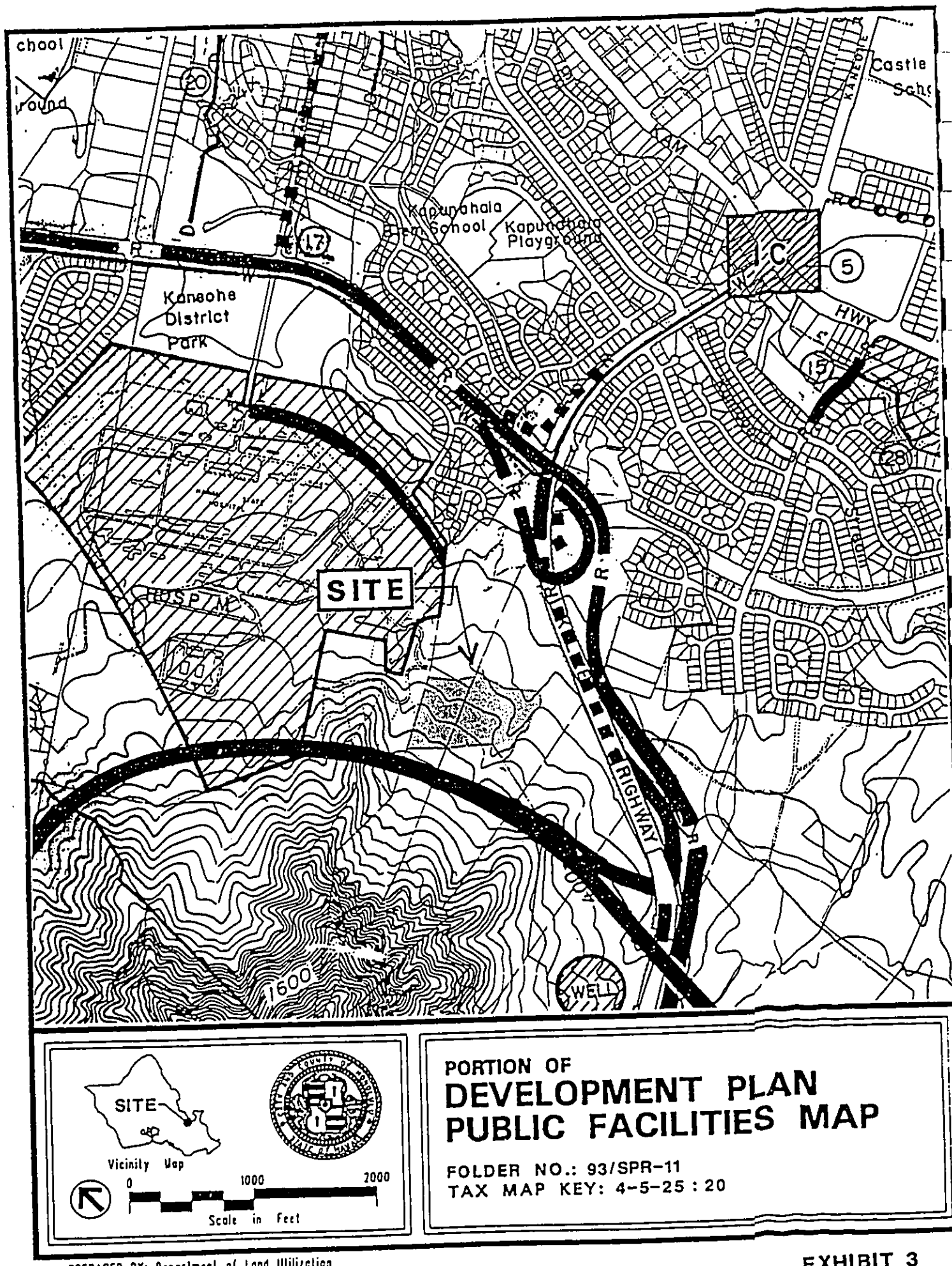
PORTION OF

DEVELOPMENT PLAN LAND USE MAP

FOLDER NO.: 93/SPR-11
TAX MAP KEY: 4-5-25 : 20

PREPARED BY: Department of Land Utilization
City and County of Honolulu

EXHIBIT 2



PORTION OF

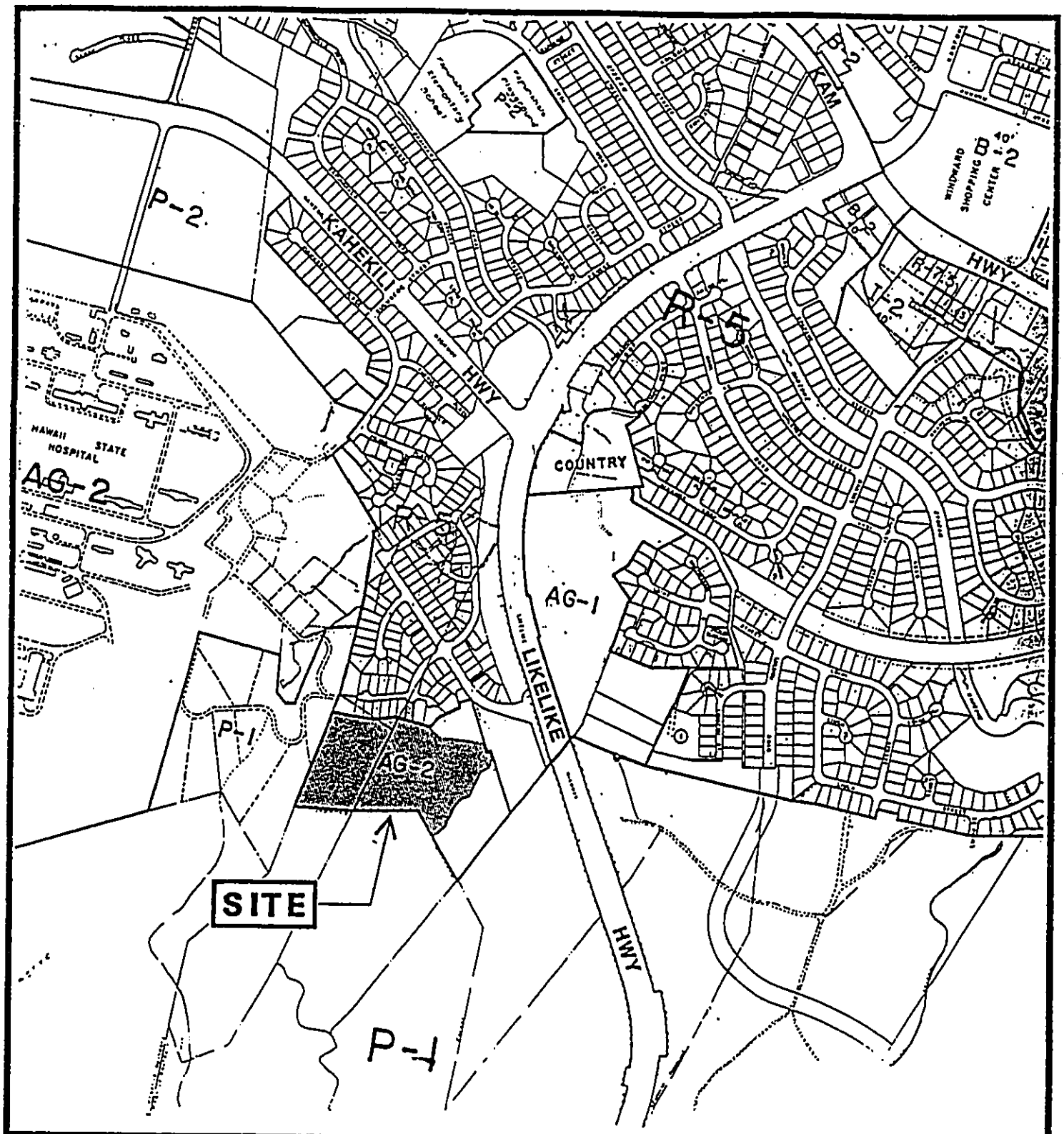
DEVELOPMENT PLAN PUBLIC FACILITIES MAP

FOLDER NO.: 93/SPR-11
TAX MAP KEY: 4-5-25 : 20

PREPARED BY: Department of Land Utilization
City and County of Honolulu

DATE PREPARED: 6/93

EXHIBIT 3



PORTION OF

EXISTING ZONING MAP

HEEIA-KANEOHE-MAUNAWILI

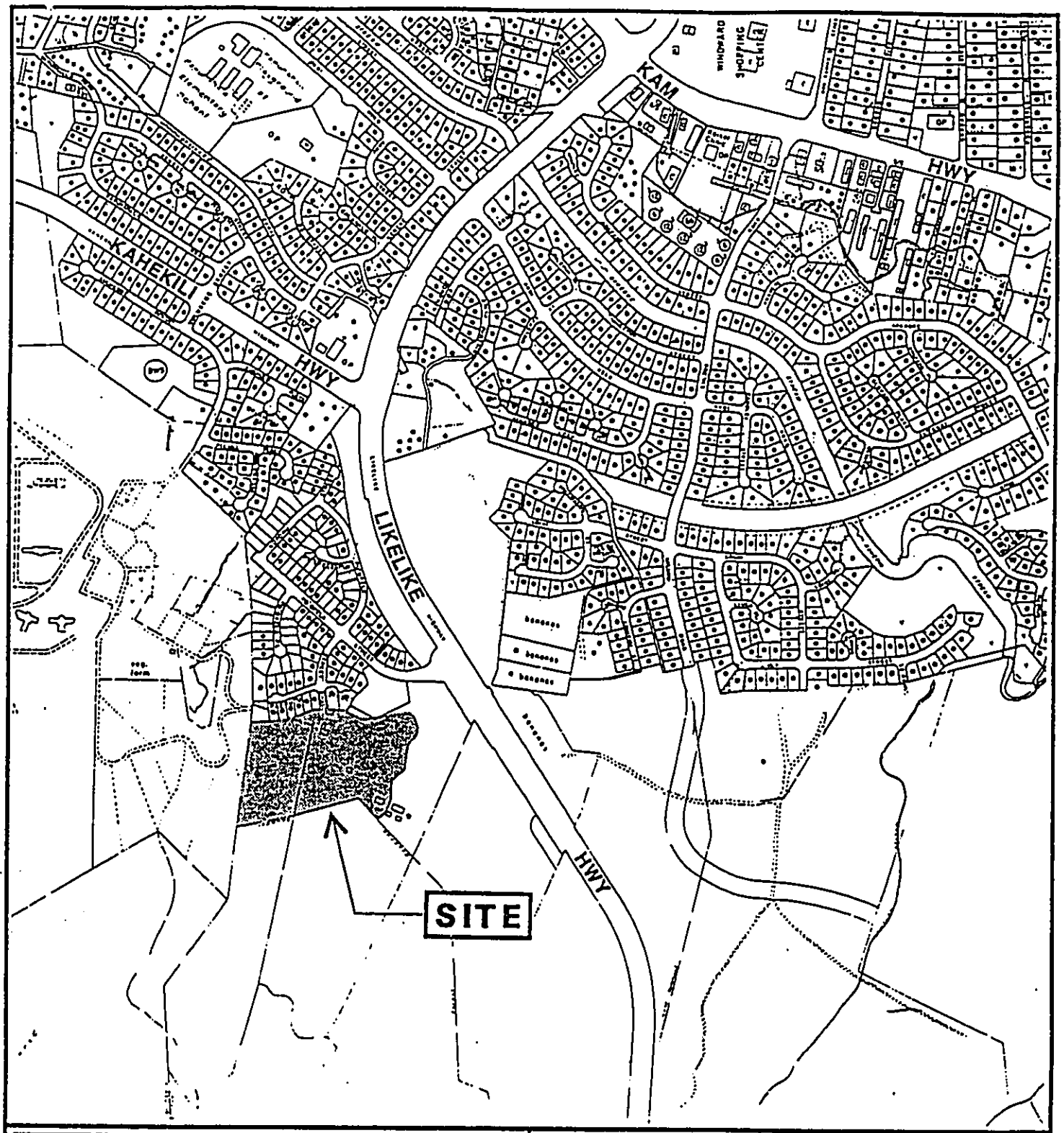
FOLDER NO.: 93/SPR-11

TAX MAP KEY: 4-5-25 : 20

PREPARED BY: Department of Land Utilization
City and County of Honolulu

DATE PREPARED: 6/93

EXHIBIT 4



LEGEND

RESIDENTIAL
SINGLE-FAMILY
TWO-FAMILY
MULTI-FAMILY
HOTEL & MOTEL
COMMERCIAL
INDUSTRIAL
AGRICULTURAL
PUBLIC FACILITIES
QUASI-PUBLIC FACILITIES
PARKS & RECREATION
CEMETERY
TRANSPORTATION
UTILITIES
MILITARY
VACANT
UNDER CONSTRUCTION

PORTION OF

EXISTING LAND USE MAP

FOLDER NO. : 93/SPR-11
TAX MAP KEY : 4-5-25 : 20

0 800 1600
Scale in Feet

Data Compiled By: Planning Department
Prepared by: Department of Land Utilization
City & County of Honolulu

DATE: DECEMBER 1988

EXHIBIT 5

JOHN WAIHEE
GOVERNOR

REX D. JOHNSON
DIRECTOR

DEPUTY DIRECTORS
KANANI HOLT
JOYCE T. OMINE
AL PANG
CALVIN M. TSUDA

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

'93 SEP 10 AM 7 20

IN REPLY REFER TO:
HWY-PS
2.8220

September 8, 1993

Mr. Donald A. Clegg, Director
Department of Land Utilization
City and County of Honolulu
650 South King Street
Honolulu, Hawaii 96813

Dear Mr. Clegg:

Subject: Application for a Site Plan Review for a Meeting Facility and Day-Care Facility Hope Chapel Kaneohe; TMK: 4-5-25: 20

Thank you for your letter of July 12, 1993, requesting our comments on the proposed project.

We have the following comments:

1. The traffic study should be updated to reflect traffic projections for trip generation for 10 years from now. Traffic generated from the proposed Coast Guard Housing project should also be included in the report.

2. The applicant shall evaluate additional mitigative measures to Keaahala Street. These should include but not be limited to widening Keaahala Street from Pookela Street to Kahekili Highway, improving it on the hospital side of the street, and separating all movements.

3. While we may not have jurisdiction over the traffic impacts of the proposed development on the existing Castle Hills subdivision, we want to express our views regarding this issue. On June 6, 1990, we were invited to a community meeting sponsored by Representative Terrance Tom at the Benjamin Parker Elementary School in Kaneohe. At the meeting, we heard the developer present several alternative access plans for the church other than the use of Puupele Street. One of the alternatives involved use of our H-3

EXHIBIT 6

construction access road, which we will not allow. We do not know what happened to the two other alternatives, one using the existing seminary access road and the other, a new road connecting to the State Hospital roadway system. We feel that the proposed church will generate a lot of new traffic that will cause tremendous changes in the volume of traffic using Puupele Street and suggest that alternatives to mitigate this impact should be addressed to your satisfaction.

4. All work done within the State highway right-of-way must be submitted for our review and approval.

Sincerely,

Rex D. Johnson
Director of Transportation

93.0012.

JOHN WAIHEE
GOVERNOR OF HAWAII

KEITH AHUE, CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCE

DEPUTIES

JOHN P. KEPPELER II
DONA L. HANAIKE

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

STATE OF HAWAII

DEPARTMENT OF LAND AND NATURAL RESOURCES

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

August 9, 1993

Donald A. Clegg
Director of Land Utilization
Department of Land Utilization
City and County of Honolulu
650 South King Street
Honolulu, Hawaii 96813

LOG NO: 9076
DOC NO: 9308td08

Dear Mr. Clegg:

SUBJECT: **Application for a Site Plan Review for a Meeting Facility and Day-Care Facility, Hope Chapel Kaneohe (93/SPR-11)**
Kane'ohe, Ko'olaupoko, O'ahu
TMK: 4-5-25: 20

Thank you for the opportunity to review this application. The applicant is at an early stage in the historic preservation review process. We ask that action on this application be deferred until the applicant makes a commitment to complete the historic preservation review process, or that a condition stipulating that the applicant submit an acceptable archaeological inventory survey report and mitigation plan to our office be attached to any approved permit.

The application incorrectly summarizes the results of an archaeological reconnaissance survey that is included as Appendix D. First, a reconnaissance survey is insufficient to establish the presence or absence of historic sites; an acceptable inventory survey is needed. The reconnaissance survey report provides insufficient information to determine the significance of the historic sites at the project parcel. Thus, we cannot concur that there are no significant historic sites on the property. Second, the reconnaissance survey report notes a "high potential for subsurface remains." Based on work immediately mauka of the project parcel these subsurface remains, if present, might include residential platforms, agricultural features, and cooking ovens, and these would be significant for the information on Hawaiian history and prehistory that they contain. The applicant must develop a plan to identify and treat any significant subsurface remains that would be disturbed by construction activities.

If you have any questions please call Tom Dye at 587-0014.

Sincerely,

DON HIBBARD, Administrator
State Historic Preservation Division

TD:jl

93-C1142

JOHN WAIHEE
GOVERNOR OF HAWAII

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

JOHN C. LEWIN, M.D.
DIRECTOR OF HEALTH

'93 SEP 9 AM 10 17

In reply, please refer to:

September 8, 1993

93-213/epo

Mr. Donald A. Clegg, Director
Department of Land Utilization
City & County of Honolulu
650 South King Street
Honolulu, Hawaii 96813

Dear Mr. Clegg:

Subject: Application for a Site Plan Review for a Meeting Facility and Day-Care Facility (93/SPR-11)
Hope Chapel Kaneohe
TMK: 4-5-25: 20

Thank you for allowing us to review and comment on the subject project. We have the following comments to offer:

Wastewater

The subject project is located within the county sewer service system. As the area is sewered, we have no objections to the proposed project, provided that the project is connected to the public sewers.

The developer should work closely with the County to assure the availability of additional treatment capacity and adequacy for the project. Non-availability of treatment capacity will not be an acceptable justification for use of any private treatment works.

If you should have any questions on this matter, please contact Ms. Lori Kajiwara of the Wastewater Branch at 586-4290.

Water Pollution

A National Pollutant Discharge Elimination System (NPDES) permit is required for any discharge to waters of the State including the following:

1. Storm water discharges relating to construction activities for projects greater than five acres;

2. Storm water discharge from industrial activities;

3. Construction dewatering activities;

4. Cooling water discharges less than one million gallons;

5. Ground water remediation activities; and

6. Hydrotesting water

Any person wishing to be covered by the NPDES general permit for any of the above activities should file a Notice of Intent with the Department's Clean Water Branch at least 90 days prior to commencement of any discharge to waters of the State.

Any questions regarding this matter should be directed to Mr. Denis Lau of the Clean Water Branch at 586-4309.

Noise

1. Activities associated with the construction phase of the project must comply with the provisions of Title 11, Administrative Rules Chapter 43, "Community Noise Control for Oahu."

   a. The contractor must obtain a noise permit if the noise levels from construction activities are expected to exceed the allowable levels of the rules.

   b. The contractor must comply with the requirements specified in the rules pertaining to construction activities, and additional conditions issued with the permit.

2. Traffic noise from heavy vehicles travelling to and from the project site must be minimized within residential areas and must comply with the provisions of Title 11, Administrative Rules Chapter 42, "Vehicular Noise Control for Oahu."

If you should have any questions on this matter, please call Jerry Haruno, Environmental Health Program Manager, Noise and Radiation Branch at 586-4701.

Very truly yours,

JOHN C. LEWIN, M.D.
Director of Health

c: Wastewater Branch
Clean Water Branch
Noise & Radiation Branch

93.061

DEPARTMENT OF PUBLIC WORKS

CITY AND COUNTY OF HONOLULU

650 SOUTH KING STREET
HONOLULU, HAWAII 96813

'93 AUG 11 AM 10 41

...F LAND UTILIZATION
HONOLU...

FRANK F. FASI
MAYOR

C. MICHAEL STREET
DIRECTOR AND CHIEF ENGINEER
KENNETH E. SPRAGUE
DEPUTY DIRECTOR

IN REPLY REFER TO
93-14-0547

August 10, 1993

MEMORANDUM

TO: MR. DONALD A. CLEGG, DIRECTOR
DEPARTMENT OF LAND UTILIZATION

FROM: C. MICHAEL STREET, DIRECTOR AND CHIEF ENGINEER
DEPARTMENT OF PUBLIC WORKS

SUBJECT: YOUR MEMORANDUM 93/SPR-11(SC) OF JULY 12, 1993, RELATING TO AN APPLICATION FOR A SITE PLAN REVIEW FOR A MEETING FACILITY AND DAY-CARE FACILITY, HOPE CHAPEL KANEOHE, OAHU, HAWAII, TAX MAP KEY: 8-7-26: 57 AND 68

We have reviewed the application and have the following comments:

ENGINEERING:

The application should address the impact of storm water discharges associated with construction activities on water quality of the receiving waters.

Also, the application should state what structural or non-structural Best Management Practice (BMP) will be provided to control and reduce the discharge of pollutants as outlined in the National Pollutant Discharge Elimination System (NPDES) regulations (40 CFR Part 122, Subpart B, for municipal storm sewer systems).

Should there be any questions please call Chew Lun Lau at extension 5856.

Adequate parking should be provided on-site. Access to the project site should be constructed with a standard concrete driveway.

Should there be any questions, please call Warren Miyashiro at extension 4071.

REFUSE COLLECTION:

Although this project qualifies for City refuse collection, there are not enough details to determine if the City can provide refuse service. We would empty three-cubic-yard size containers furnished by the church. If the City refuse collection service is intended, the construction drawings for the site work improvements should be submitted for our review and approval.

Should there be any questions, please call David Shiraishi at extension 5697.

C. MICHAEL STREET
Director and Chief Engineer

DEPARTMENT OF WASTEWATER MANAGEMENT
CITY AND COUNTY OF HONOLULU
650 SOUTH KING STREET
HONOLULU, HAWAII 96813

FRANK F. FASI
MAYOR

KENNETH M. RAPPOLT
DIRECTOR

FELIX B. LIMTIACO
DEPUTY DIRECTOR

In reply refer to:
WPC 93-99

July 30, 1993

MEMORANDUM

TO: MR. DONALD A. CLEGG, DIRECTOR
DEPARTMENT OF LAND UTILIZATION

FROM: KENNETH M. RAPPOLT, DIRECTOR
DEPARTMENT OF WASTEWATER MANAGEMENT

SUBJECT: APPLICATION FOR A SITE PLAN REVIEW FOR A MEETING FACILITY AND DAY-CARE FACILITY
HOPE CHAPEL KANEOHE; TAX MAP KEY: 4-5-25:20

The local sewer system is available and adequate to accommodate the proposed Hope Chapel project. However, the connection of the project must wait until the sewer from the Kaneohe Wastewater Treatment Plant (WWTP) is diverted to the Kailua WWTP. We expect that the diversion will be completed by the end of this year.

Please understand that this letter shall not be construed as our reserving sewage capacity for this project. Sewage capacity reservation is contingent on our review and approval of a "sewer connection application" form that has not yet been submitted.

If you have any questions, please call Mr. Dennis Nishimura at extension 6091.

KENNETH M. RAPPOLT
Director

93.06168

File No.: 93/SPR-11(SC)

93 AUG 17 PM 3 32

DEPARTMENT OF LAND UTILIZATION

SUMMARY DESCRIPTION

APPLICANT	:	Hope Chapel Kaneohe
LANDOWNER	:	The Fathers of the Sacred Hearts
REQUEST	:	Site Plan Review for Meeting Facility and Day-Care Facility
LOCATION	:	Pu'upele Street, Kaneohe
TAX MAP KEY	:	4-5-25: 20
LAND AREA	:	11.436 Acres
DEVELOPMENT PLAN LAND USE MAP	:	Residential and Agriculture
PUBLIC FACILITIES MAP	:	Likelike Highway - Additional right-of-way and new streets beyond six years.
EXISTING ZONING	:	R-5 Residential District and AG-2 General Agricultural District
EXISTING USE	:	Vacant
SURROUNDING LAND USE	:	Residential, H-3 Freeway, Conservation lands
PROPOSAL	:	Construct an auditorium building, administration building and youth center/classroom building to accommodate church services, Sunday school, church office activities and a day-care facility.

TRANSPORTATION SERVICES
Department

TE-2804
PL93.1.296

Comments:

See attached.

AUG 13 1993
Date

By
JOSEPH M. MAGALDI, JR., Director

'88 JUN 14 PM 3 33

Based on our review of the SPR application and previous discussions between the applicant and members of my staff, we have the following concerns:

1. The vehicular access point should be constructed as a standard City dropped driveway.

2. The driveway grade should not exceed 5 percent (5%) for a minimum distance of 35 feet from the curb line.

3. Landscaping should be placed in locations where it does not interfere with the vehicular sight lines.

4. On Sundays, between the hours of 6:30 a.m. - 12:30 p.m., parking should only be allowed on one side of Puupele Street, from the project entrance to Pookela Street. This will provide two-way traffic on Puupele Street during the anticipated peak service period. The abutting residents should be made aware and concur with the proposed parking restriction.

5. Sunday services and all other major functions should be scheduled to minimize the amount of two-way traffic generated by the project.

6. Preliminary construction plans for all work within the City right-of-way should be submitted to our department for review. A signage plan showing the parking restrictions on Puupele Street should be included in these plans.

7. Community traffic concerns should be resolved prior to the start of construction.

Should you have any questions, please contact Lance Watanabe of my staff at local 4199.

DEPARTMENT OF TRANSPORTATION SERVICES

CITY AND COUNTY OF HONOLULU

HONOLULU MUNICIPAL BUILDING
650 SOUTH KING STREET
HONOLULU, HAWAII 96813

FRANK F. FASI
MAYOR

JOSEPH M. MAGALDI, JR.
DIRECTOR

AMAR SAPPAL
DEPUTY DIRECTOR

'93 SEP 10 PM 2 57

September 8, 1993

MEMORANDUM

TO: DONALD A. CLEGG, DIRECTOR
DEPARTMENT OF LAND UTILIZATION

FROM: JOSEPH M. MAGALDI, JR., DIRECTOR

SUBJECT: HOPE CHAPEL KANEOHE
SUPPLEMENT TO SITE PLAN REVIEW (SPR)
TMK: 4-5-25: 20

This is a follow-up to our comments made on the subject SPR submitted to your department dated August 13, 1993.

Please add the following comment:

8. Alternative access to the project site should be studied to minimize the impacts on the affected residents.

Should you have any questions, please contact Lance Watanabe of my staff at local 4199.

JOSEPH M. MAGALDI, JR.

93-0515

FIRE DEPARTMENT

CITY AND COUNTY OF HONOLULU

3375 KOAPAKA STREET SUITE H425
HONOLULU, HAWAII 96819-1869

FRANK F. FASI
MAYOR

DONALD S M CHANG
FIRE CHIEF

RICHARD R. SETO-MOOK
DEPUTY FIRE CHIEF

August 4, 1993

'93 AUG 9 PM 1 47

TO: DONALD A. CLEGG, DIRECTOR
DEPARTMENT OF LAND UTILIZATION

FROM: DONALD S. M. CHANG, FIRE CHIEF

SUBJECT: APPLICATION FOR A SITE PLAN REVIEWED FOR A MEETING FACILITY AND DAY-CARE FACILITY HOPE CHAPEL KANEOHE: TAX MAP KEY 4-5-25: 20

We have reviewed the subject material provided and foresee no adverse impact in Fire Department facilities or services. Fire protection services provided from Kaneohe and Aikahi engine companies with ladder service from Kaneohe are adequate.

Should you have any questions, please call Assistant Chief Attilio Leonardi of our Administrative Services Bureau at 831-7775.

DONALD S. M. CHANG
Fire Chief

AKL:ny

File No.: 93/SPR-11(SC)

DEPARTMENT OF LAND UTILIZATION

SUMMARY DESCRIPTION

APPLICANT	:	Hope Chapel Kaneohe
LANDOWNER	:	The Fathers of the Sacred Hearts
REQUEST	:	Site Plan Review for Meeting Facility and Day-Care Facility
LOCATION	:	Pu'upele Street, Kaneohe
TAX MAP KEY	:	4-5-25: 20
LAND AREA	:	11.436 Acres
DEVELOPMENT PLAN LAND USE MAP	:	Residential and Agriculture
PUBLIC FACILITIES MAP	:	Likelike Highway - Additional right-of-way and new streets beyond six years.
EXISTING ZONING	:	R-5 Residential District and AG-2 General Agricultural District
EXISTING USE	:	Vacant
SURROUNDING LAND USE	:	Residential, H-3 Freeway, Conservation lands
PROPOSAL	:	Construct an auditorium building, administration building and youth center/classroom building to accommodate church services, Sunday school, church office activities and a day-care facility.

'93 AUG 5 PM 2 31

Department of Land Utilization
Summary Description
93/SPR-11(SC)
Page 2

Board of Water Supply
Department

Comments:

We have no objections to the proposed site plan review.

The availability of water will be confirmed when the building permits are submitted for our review and approval. When water is made available, the applicant will be required to pay our Water System Facilities Charges for source-transmission and daily storage.

If a three-inch or larger meter is required, the construction drawings showing the installation of the meter should be submitted for our review and approval.

The on-site fire protection requirements should be coordinated with the Fire Prevention Bureau of the Honolulu Fire Department.

If you have any questions, please contact Sandy Nahoopii at 527-6122.

Kazu Hayashida, 8/4/93

KAZU HAYASHIDA Date
Manager and Chief Engineer

PLANNING DEPARTMENT

CITY AND COUNTY OF HONOLULU

650 SOUTH KING STREET
HONOLULU, HAWAII 96813

'93 OCT 19 PM 3 16

...UTILIZATION
...HONOLULU

FRANK F. FASI
MAYOR

ROBIN FOSTER
CHIEF PLANNING OFFICER

ROLAND D. LIBBY, JR.
DEPUTY CHIEF PLANNING OFFICER

TH 7/93-1728

August 18, 1993

MEMORANDUM

TO: DONALD A. CLEGG, DIRECTOR
DEPARTMENT OF LAND UTILIZATION

FROM: ROLAND D. LIBBY, JR., ACTING CHIEF PLANNING OFFICER
PLANNING DEPARTMENT

SUBJECT: APPLICATION FOR A SITE PLAN REVIEW (SPR)
FOR A MEETING FACILITY AND DAY-CARE FACILITY
HOPE CHAPEL, KANEOHE, OAHU, HAWAII - 93/SPR-11
TAX MAP KEY: 4-5-25: 20

In response to your memorandum of July 12, 1993, we have reviewed the subject SPR and offer the following:

1. The proposed site is on lands designated Agriculture, Residential and Public Facility. The Development Plan Special Provisions for Koolaupoko establishes a general height limit for Agriculture, Residential and Public Facility land uses of 25 feet.

2. We recommend that additional information be required on the proposed grading and on existing slope and soil conditions, including the potential soil suitability to support the proposed development.

3. Proposed access to the project site via Puupele Street may pose difficulties since the existing streets were designed to serve only single-family homes in a residential subdivision.

4. Noise generated from various proposed activities and programs may be a source of complaint by neighboring Castle Hills' residents.

Thank you for the opportunity to comment on this matter.

Should you have any questions, please contact Tim Hata of our staff at 527-6070.

ROLAND D. LIBBY, JR.
Acting Chief Planning Officer

RDL:ft

JOHN WAIHEE
GOVERNOR

WINONA E. RUBIN
DIRECTOR

LYNN N. FALLIN
DEPUTY DIRECTOR

LESLIE S. MATSUBARA
DEPUTY DIRECTOR

STATE OF HAWAII
DEPARTMENT OF HUMAN SERVICES
P. O. Box 339
Honolulu, Hawaii 96809-0339

September 15,1993

93/SPR-11(SC)

Mr. Donald A. Clegg
Director of Land Utilization
City and County of Honolulu
650 South King Street
Honolulu, Hawaii 96813

Dear Mr. Clegg:

Application for a Site Plan Review for a
Meeting Facility and Day-Care Facility
Hope Chapel Kaneohe; Tax Map Key 4-5-25: 20

We apologize for the delay in our reply to your letter dated July 12, 1993. To prevent any future delays in our responses to your Department, we understand that Ms. Sharon Chigawa will be recommending that your Department send a copy of your letters directly to the Licensing and Registration Unit, which is responsible for the licensing of the child care programs.

Should your Department grant Hope Chapel Kaneohe approval for a Site Plan Review (SPR) Permit to operate a Day-Care Facility on this property, we would require them to meet all licensing requirements specified in Title 17, Hawaii Administrative Rules, Chapter 892.1 for children ages 2 years and above.

Some of the requirements would include a fenced outdoor playground area; a written disaster plan for fire, flood, or other natural disasters such as an earthquake, hurricane or tsunami; a kitchen which would comply with the Department of Health, Sanitation Codes should they prepare hot meals on site; and the child care facility satisfactorily meeting the City and County Building's and Fire Prevention Bureau's codes.

We noted that the Hope Chapel Kaneohe had specified in their application that there will be an upper floor classroom for students. It has been our department's general experience that child care for preschool aged children is not permitted on the second floor by the Building Department. Their proposed number of 75 students in a 3,200 square feet facility meets the licensing requirement of a minimum of 35 square feet per child. Furthermore, their proposed number of ten toilets and eight lavatories are

sufficient to meet their enrollment of 75 children, which requires five toilets and five lavatories.

Should you have any questions regarding the licensing requirements, please contact Elaine Rabacal, Supervisor of the Licensing and Registration Unit at 586-7090.

Sincerely,

Winona E. Rubin
Director

APPENDIX A-1

Castle Hills Community Association Correspondence

CASTLE HILLS PRIMARY ACCESS COMMITTEE
c/o Oishi's Property Management
750 Amana Street, Suite 101
Honolulu, Hawaii 96714

July 19, 1994

Mr. Robert McWilliams
Hope Chapel Kaneohe
45-270 William Henry Road
Kaneohe, Hawaii 96744

Dear Mr. McWilliams:

This is to confirm the support of Castle Hills Community for Hope Chapel proposed access road located on State land adjacent to the Castle Hills Community to your property. Hope Chapel has included in proposed plan to alleviate traffic congestion in Castle Hills. We appreciate the ongoing effort by all concerned and offer our support to your cause of gaining permits for your access road. We are encouraged by your cooperation by resolving and addressing community concerns as outlined in Castle Hills Community Association's Board of Directors letter of April 2, 1994.

Again, please be assured that we will support you in this endeavor and if you have any concerns please call.

Sincerely,

Gregory J. Flick
Chairman

April 2, 1994

Mr. Rod McWilliams
Hope Chapel
Kaneohe, HI 96744

Dear Mr. McWilliams:

Castle Hills Community Association's Board of Directors recently presented to its owners/residents the primary plan for Hope Chapel's proposed access road. The proposed access road to their property is located on State land adjacent to the Castle Hills Community.

Our residents expressed their concerns and we offer the following proposals for your consideration:

1. Flooding: Detail 3 does not indicate elevations of the proposed roadway structure in relation to the abutting Castle Hills properties. Please provide elevations at appropriate intervals.

2. Drainage: Similar to Item 1 above. The plan view shows undeveloped area between the roadway and the abutting properties. Reference: TMK 4-5-108-56 through 4-5-108-67.

   a. The abutting property owners propose a drainage culvert be installed to prevent flooding of their properties.

   b. The indicated proposed drainage culvert at Sta. 0.40 does not indicate its size. We suggest that the drainage culvert under the access road be adequate in size and be regularly maintained to preclude flooding.

   c. The surface water accumulating on the access driveway would flow onto Pookela Street. We propose that the existing ditch at Sta. 0.00 be utilized to catch the driveway water runoff before it flows onto Pookela Street.

3. Lighting: There are no provisions for street lighting. If a street lighting system is planned, we are concerned about the intensity and intruding lights into the adjacent homes. We do not have any solutions to offer at this time; however, reserve the right for input as plans are formalized.

4. Traffic: Vehicular nuisance generated by autos, trucks and buses are noise, headlights, dust, noxious fumes and congestion. We propose landscaping between the access driveway and Castle Hills to mask or shield such nuisance.

   As to congestion, the sharp 90 degree right turn from Pookela Street onto the proposed access driveway could impede the continuous movement of traffic entering and leaving Castle Hills Community. We suggest restriping Pookela Street at the driveway entrance as follows:

   a. Stripe a right turn stacking lane of adequate length along the mauka curb and provide for an open lane for through traffic to Castle Hills.

   b. Stripe a long merging lane for Hope Chapel's traffic after exiting the access driveway on the mauka half of Castle Hills outbound, leaving the makai half open for through traffic.

5. The proposed access driveway entry onto the Hope Chapel site at Sta. 10+67 is scaled at 30'0" from the west corner of residential property TMK 4-5-108-31. We propose that the access driveway centerline be moved 46'0" away from the property TMK 4-5-108-31. 35'

6. Security: The proposed access driveway would potentially make Castle Hills homes vulnerable to undesirable elements, providing easier access and quicker getaway. We would like Hope Chapel to address this concern.

If the above concerns are incorporated in the final plans, the community would be in support of the access road. Once the final plans are drawn, we would like to review them.

Sincerely,

Gregory T. Flint, Spokesman
Board of Directors
Castle Hills Community Association

APPENDIX B

Copy:
Memorandum of Agreement Between Hawaii State Hospital and Hope Chapel Kaneohe

MEMORANDUM OF AGREEMENT

THIS MEMORANDUM OF AGREEMENT is made as of the _____ day of _____, 1994, by and between the STATE OF HAWAII, through its Department of Land and Natural Resources and Department of Health, hereinafter referred to as "State", and International Church of the Foursquare Gospel, also known as Hope Chapel Kaneohe, whose principal place of business is 45-270 William Henry Road, Suite 204, Kaneohe, Hawaii 96744, hereinafter referred to as "Hope Chapel".

RECITALS:

WHEREAS, Hope Chapel desires to build a new sanctuary and meeting hall facility on property located at Puupele Street, Kaneohe, Hawaii, and identified by Tax Map Key Number [1] 4-5-25:20 (the "Hope Chapel Site");

WHEREAS, the Department of Land Utilization of the City and County of Honolulu ("DLU") granted to Hope Chapel approval of Hope Chapel's application for site plan review to permit the construction of certain improvements on the Hope Chapel Site pursuant to Findings of Fact, Conclusion of Law, and Decision and Order (Case No. 93/SPR-11) dated September 28, 1993 (the "Site Plan Review Approval") subject to the fulfillment of several conditions, among which was the condition that access to the Hope Chapel Site not be through Puupele Street and an alternate access to the Hope Chapel Site be identified and submitted for review and approval of DLU within three years of the date of the Site Plan Review Approval;

WHEREAS, State owns land adjoining the Hope Chapel Site (the "State Land") which is under the control of its Department of Land and Natural Resources and Department of Health over which Hope Chapel believes the required alternate access can be located to afford Hope Chapel the alternate access required by the Site Plan Review Approval; and

WHEREAS, State is willing to grant to Hope Chapel an access easement through the State Land as hereinafter described on the terms and conditions hereinafter described;

AGREEMENT:

NOW, THEREFORE, in consideration of the mutual covenants and agreements contained herein, the parties hereby agree as follows:

1. State agrees to grant to Hope Chapel an access easement over and across that portion of the State Land identified as TMK 4-5-23: Por. 2 and Por. 3 and shown on Exhibit A attached hereto and made a part hereof (the "Access Easement"). The boundaries of the access easement may be adjusted from time to time by any governmental agency as applicable, with the consent of State and Hope Chapel.

2. The Access Easement shall be appurtenant to and shall specifically benefit the Hope Chapel Site and shall run with the land; provided, however, that the Access Easement may be used by State in connection with any future expansion of the State Hospital located on the State Land; and provided, further, that the State's use of the easement shall not unreasonably interfere with Hope Chapel's use of the easement.

3. Hope Chapel agrees to pay for all costs incurred in the design, permitting and construction of any improvements required to the Access Easement to permit Hope Chapel to use the Access Easement for access to the Hope Chapel Site, including, without limitation, the costs of subdividing the State Land to obtain approval of the easement from DLU.

4. Hope Chapel agrees to maintain, at its sole cost and expense, all improvements located within the Access Easement, including, without limitation, any roadway, landscaping and lighting; provided however, that when State shall require the use of the Access Easement, State and Hope Chapel shall share such costs and expenses on the basis of use as mutually determined by the parties from time to time.

5. Hope Chapel agrees to keep in full force and effect a commercial general liability insurance policy with respect to the Access Easement, naming State as additional insured, with limits not less than the following for the specified categories: Bodily Injury and Property Damage Combined Single Limit -- $1,000,000 per occurrence.

6. A grant of easement document in form and content acceptable to State and Hope Chapel shall be executed containing the above terms and conditions and such other terms and conditions as the parties shall mutually agree upon.

IN WITNESS WHEREOF, State and Hope Chapel have caused this agreement to be executed as of the date and year first above written.

STATE OF HAWAII
By its Department of Land and Natural Resources

By_____
Its Chairperson of the Board of Land and Natural Resources

STATE OF HAWAII
By its Department of Health

By_____
Its Director

"State"

..\cls\hope\hopeAG1B.cls
063094

INTERNATIONAL CHURCH OF THE FOURSQUARE GOSPEL

By_____
Its

"Hope Chapel"

APPROVED AS TO FORM:

_____
Deputy Attorney General

..\cls\hope\hopeag1b.cls

APPENDIX C

Preliminary Drainage Report, Access Driveway to the Hope Chapel Church at Kaneohe, Hawaii

TMK: 4-5-23: 2 and 3 (Portions)

PRELIMINARY DRAINAGE REPORT

ACCESS DRIVEWAY
TO THE
HOPE CHAPEL CHURCH

at Kaneohe, Oahu, Hawaii
Tax Map Key: 4-5-23:2 and 3

Prepared For:

HOPE CHAPEL FOURSQUARE CHURCH
45-270 William Henry Road, Suite 204
Kaneohe, Hawaii 96744

Prepared By:

CALVIN KIM & ASSOCIATES, INC.
1050 Queen Street Suite 300
Honolulu, Hawaii 96814

JULY 1994

I. PROJECT DESCRIPTION

The Hope Chapel Kaneohe is proposing to construct an access driveway from Po'okela Street to their proposed church complex located on TMK 4-5-25:20. The driveway location is shown in Exhibit 1. The proposed driveway is approximately 1070 feet long and will be 24-feet wide between concrete curbs (Exhibit 2). The driveway will be paved with asphalt concrete and with Portland cement concrete for driveway grades that exceed 12 percent. The driveway is located entirely within State lands, of which the first 400 lineal feet from Po'okela Street will be in wet lands.

II. TOPOGRAPHY

The proposed driveway is located within a small drainage basin (approximately 5.0 acres - Exhibit 3) that extends along the Castle Hills Subdivision from Po'okela Street to the H-3 Highway. A small ridge separates this area from the larger main tributary area that feeds the 20-ft x 10-ft Po'okela Street Kapuuahala Stream box culvert. Ground elevations range from 190 feet to 460 feet (mls). The area is well covered with vegetation and is undeveloped.

III. RUNOFF COMPUTATION

A. Design Parameters

The calculations for storm water runoff has been based upon the Rational Method as defined in the Storm Drainage Standards of the City and County of Honolulu, May 1988. The following values were used in the computations:

One-hour Rainfall:	i = 3.0 inches/hour (Tm = 10 years) i = 4.0 inches/hour (Tm = 50 years)
Runoff Coefficient:	C = 0.70 (Natural Area)
Length of Tributary Area:	1400 feet
Average Ground Slope:	19 percent
Area of Drainage Basin:	5.0 Acres

B. Runoff Computations - Predevelopment Condition

The Time of Concentration is estimated at 7 minutes (from Plate 5 of the Storm Drainage Standard) which leads to a correction factor of 2.6 (Plate 4). Therefore, the estimated peak runoff is as follows:

$Q = C I A$

Where C = Runoff Coefficient
I = Rainfall Intensity (One-hour rainfall multiplied by the correction factor)
A = Area of Drainage Basin

10-Year Recurrence Interval

$Q = (0.70)(3.0)(2.6)(5.0) = 27$ cfs

50-Year Recurrence Interval

$Q = (0.70)(4.0)(2.6)(5.0) = 36$ cfs

C. Runoff Computations - Developed Condition

The impact of constructing the driveway will be a change in the runoff coefficient. No changes are expected in the time of concentration factor or in the drainage areas. The composite runoff coefficient value has been computed as follows:

Pavement Areas	0.64 Acres	@ 0.90	=	0.58
Ground Areas	4.36 Acres	@ 0.70	=	3.05
Totals	5.00 Acres			3.63

$$\text{Composite C} = \frac{3.63}{5.0} = 0.73$$

10-Year Recurrence Interval

$Q = (0.73)(3.0)(2.6)(5.0) = 28$ cfs

50-Year Recurrence Interval

$Q = (0.73)(4.0)(2.6)(5.0) = 38$ cfs

The access driveway results in a 1 cfs increase in the peak runoff for a recurrence interval of 10 years and a 2 cfs increase in the peak runoff for a recurrence interval of 50 years. This increase in peak runoff only pertains to the runoff from the 5 acre drainage basin.

D. Impact on the 20-ft x 10-ft Box Culvert

The existing 20-ft x 10-ft box culvert was constructed under the extension of Po'okela Street as part of the Castle Hills Access Road. The analysis for the box culvert was prepared by ParEn, Inc. and documented in their report titled "Drainage Report for the Castle Hills Access Road, February 1991".

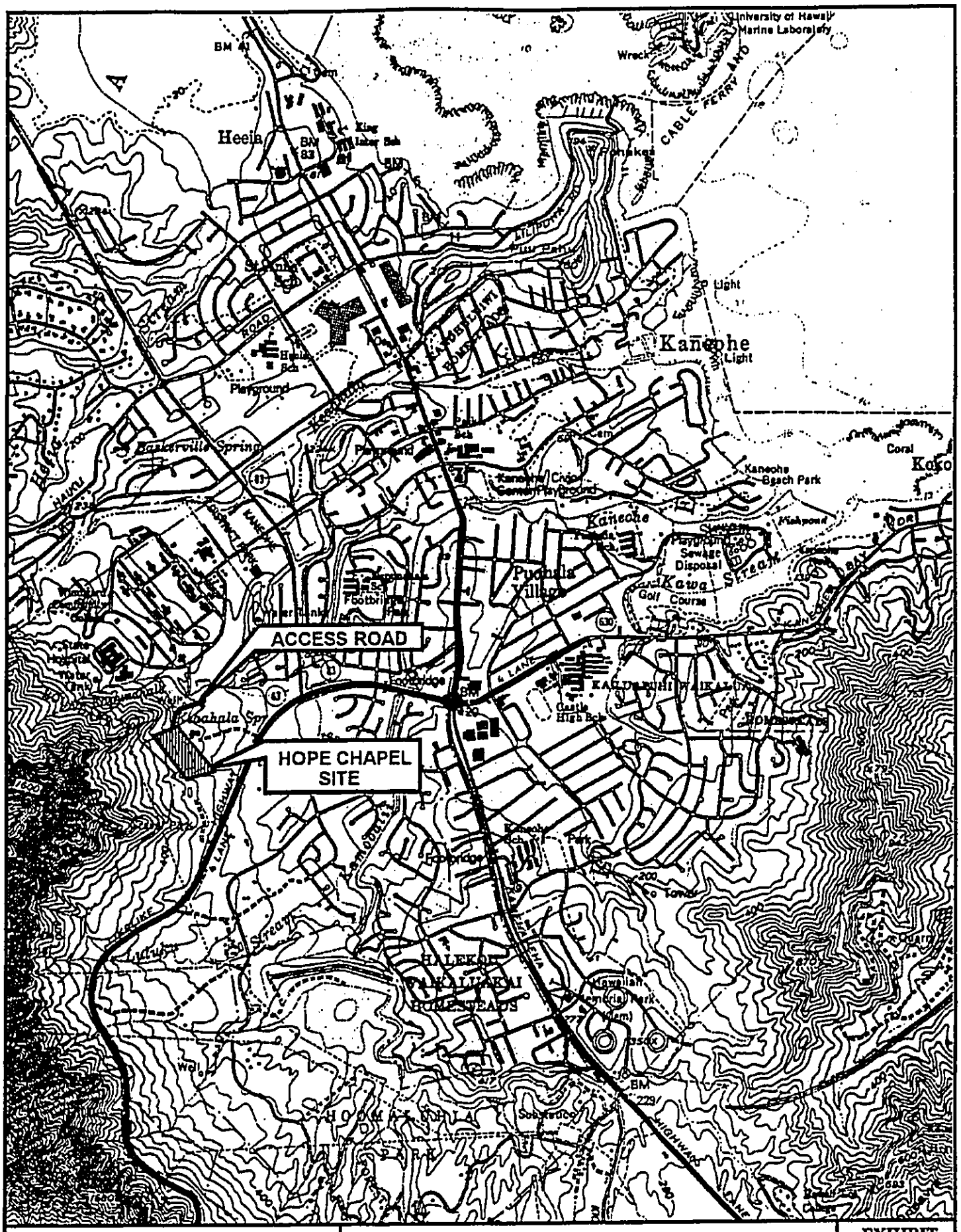
The design values for the box culvert were determined to be A = 125 acres and Q = 920 cfs. The peak discharge curve of the Storm Drainage Standards (Plate 6) was used by ParEn in establishing the peak flow. Since the Hope Chapel driveway does not increase the tributary area, there will be no change in the peak discharge to the 20-ft x 10-ft box culvert.

Even if the rational method were used in lieu of the peak discharge curve, the amount of paved area added is so small in relation to the 125-acre drainage basin that the changes to the runoff coefficient are negligible.

SUMMARY AND CONCLUSION

A. The Hope Chapel driveway does not increase the peak discharge at the 20-ft x 10-ft box culvert at Po'okela Street.

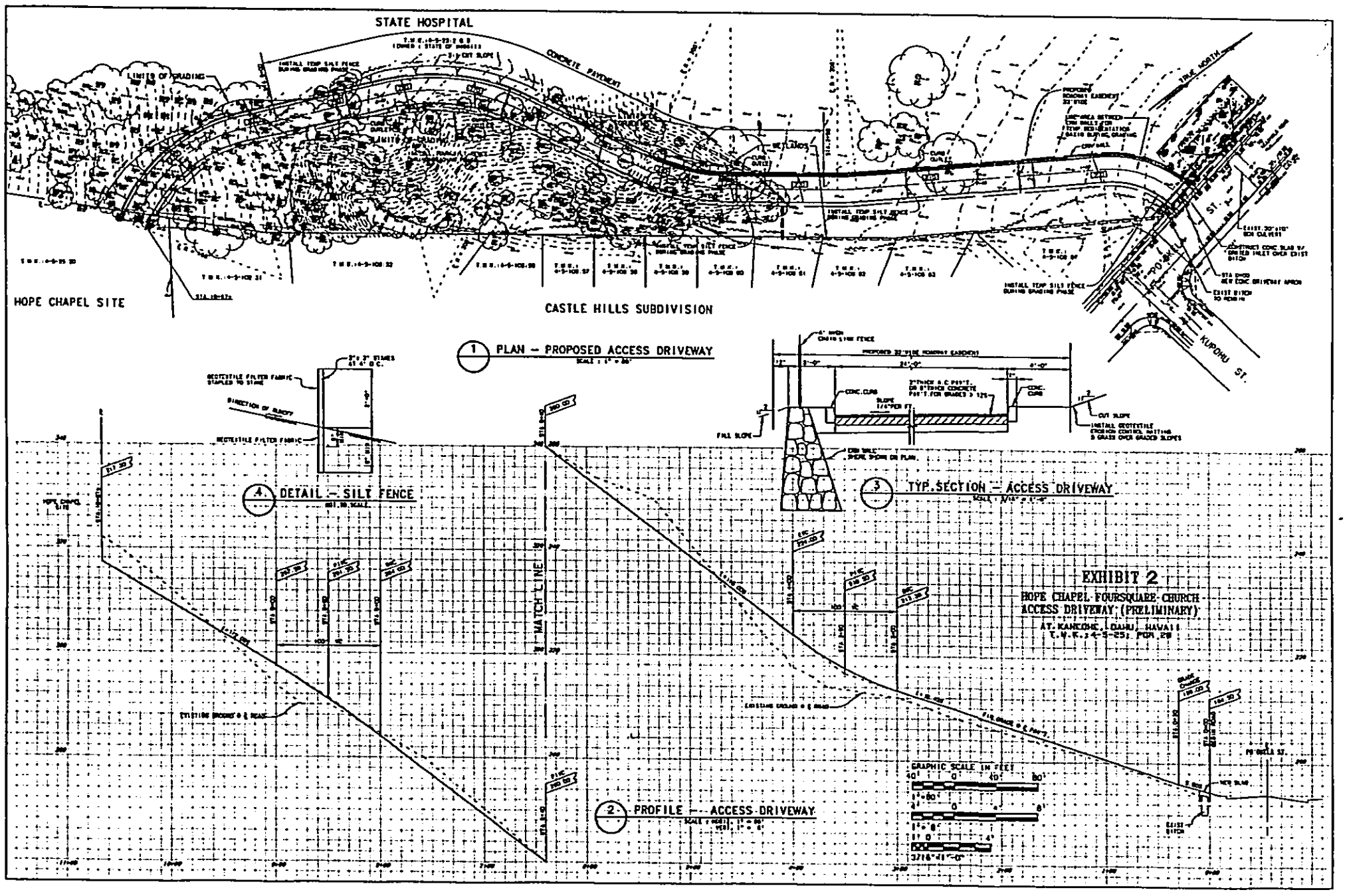
B. The drainage basin in which the proposed driveway is located totals 5 acres. The design flow from this area at Po'okela Street is 28 cfs for Tm = 10 years and 38 cfs for Tm = 50 years.



USGS MAP KANEOHE QUADRANGLE Scale: 1" = 2000'	N	HOPE CHAPEL LOCATION MAP

EXHIBIT

1


STATE HOSPITAL
HOPE CHAPEL SITE
CASTLE HILLS SUBDIVISION
LIMITS OF GRADING
CONCRETE PAVEMENT
INSTALL TEMP. SILT FENCE
TRUE NORTH
KUPOHU ST.
1 PLAN – PROPOSED ACCESS DRIVEWAY
2 PROFILE – ACCESS DRIVEWAY
3 TYP. SECTION – ACCESS DRIVEWAY
4 DETAIL – SILT FENCE
MATCH LINE
EXISTING GROUND ℄ ROAD
FIN. GRADE ℄ PAVT.
GRAPHIC SCALE IN FEET
EXHIBIT 2
HOPE CHAPEL FOURSQUARE CHURCH
ACCESS DRIVEWAY (PRELIMINARY)
AT KANEOHE, OAHU, HAWAII
T.M.K.: 4-5-25: POR. 28

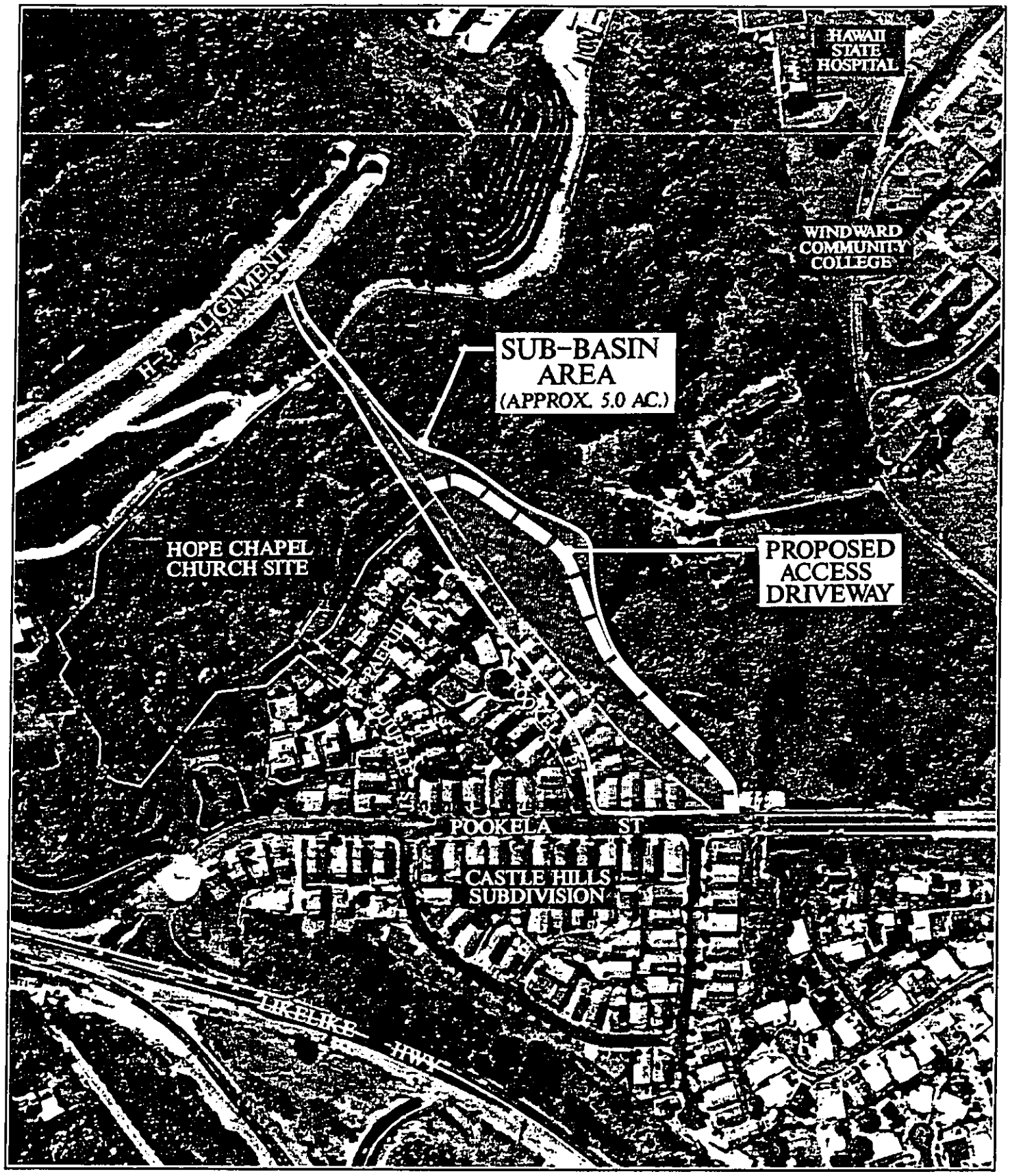


EXHIBIT 3

HOPE CHAPEL ACCESS DRIVEWAY
DRAINAGE RUNOFF MAP

SCALE: 1" = 300'

N

APPENDIX D

Best Management Practice Plan
Construction of the Hope Chapel Access Road
At Kaneohe, Hawaii

TMK: 4-5-23: 2 and 3 (Portions)

BEST MANAGEMENT PRACTICE PLAN

CONSTRUCTION OF THE HOPE CHAPEL ACCESS ROAD

AT KANEOHE, OAHU, HAWAII
TMK: 4-5-23:2 and 3

Prepared for:

HOPE CHAPEL FOURSQUARE CHURCH
45-270 William Henry Road, Suite 204
Kaneohe, Hawaii 96744

Prepared by:

CALVIN KIM & ASSOCIATES, INC.
1050 Queen Street Suite 300
Honolulu, Hawaii 96813

July 1994

I. PROJECT DESCRIPTION

The Hope Chapel Kaneohe is proposing to construct a multiple building facility on a 9.2 acre site in Kaneohe, Hawaii (TMK: 4-5-25:20). The site for this is located between the Castle Hills development (formerly Bethaney Gardens) and the H-3 Freeway presently under construction. The project location is shown in Exhibit 1.

The proposed Hope Chapel complex will consist of three buildings described as follows:

1. Main Building including the Auditorium and Offices ..... 17,600 Sq. Ft.
2. Administration Building ..... 7,900 Sq. Ft.
3. Youth Center ..... 8,900 Sq. Ft.

Access into the Hope Chapel site will be from Po'okela Street by means of a driveway constructed through the adjacent State Hospital lands as shown in Exhibit 2. The easement requested from the Department of Land and Natural Resources will be 32 feet wide. The actual pavement width will be 24 feet wide with concrete curbs on each side. The centerline length of the driveway through State lands is approximately 1070 lineal feet.

Since the access road will be constructed as a separate project, this Best Management Practice Plan (BMP) focuses solely on the construction of the road through the State lands. The construction of facilities within the Hope Chapel site will be covered under a separate BMP.

II. SITE DESCRIPTION

A. SITE CHARACTERIZATION

1. History of Land Use

The site is an undeveloped area with the lower portion determined to be a wetland. The upper portion is located within the State Conservation district.

Ground elevations vary from 195 feet at Po'okela Street to 330 feet (msl) at the Hope Chapel site.

2. Potential and Actual Pollution Sources in the Past

There is no evidence of pollution sources from past activities in the area.

3. Potential Pollution Present from the Operation of Construction Activity

Any pollution from the construction activity will primarily be soil erosion during construction. The fine soil materials contained can be picked-up and transported by storm runoff to Kapunahala Stream. Equipment will be refueled on the site. However, fuel will not be stored on the site.

The grading work consists of excavation for the pavement, installation of crushed aggregate materials and backfill behind rock walls. The total area graded is less than one acre.

No utility lines will be installed in the driveway except for a street light conduit. However, there will be drainage culverts required.

The Universal Soil Loss Equation factor E is estimated at 28. Therefore erosion hazards are considered minimal.

4. Proposed Corrective and Preventive Measures

a. Construction of the driveway through the wetlands area (approximately 400 lineal feet of driveway) will be done first, prior to excavation of upper areas.

b. Clearing and grubbing through the wetlands will be limited to the 32-feet width of the easement. A geotextile fabric will be laid on the subgrade immediately upon completion of clearing and grubbing and the fabric in turn shall be immediately covered by a layer of crushed rock and aggregate subbase material.

c. CRM walls will be constructed along each side of the driveway at the right-of-way line. Any water-caused soil erosion will now be intercepted and confined to the roadway area. Silt screens will be provided at overflow locations to filter any water that may overflow into the wetlands area.

d. The driveway will be brought up to grade with aggregate subbase course and base course material.

e. The balance of the driveway shall be excavated to subgrade. The driveway section of the excavation shall be immediately covered with a layer of aggregate subbase course material. All exposed sideslopes shall be immediately covered with an erosion control fabric or covered with a soil-binding tackifier agent such as Marloc by the Reclamare Co.

f. All graded areas shall be planted with grass by hydromulching.

g. The driveway pavement shall be constructed beginning from the concrete pavement followed by the asphalt concrete pavement.

B. SOIL DESCRIPTION

Wetlands Area: Hanalei Silty Clay (HnB)

Upper Area: Lolekaa Silty Clay (LoB)

C. AREA GRADED : 1 Acre

D. NATURE OF CONSTRUCTION ACTIVITY

The primary construction activity will be clearing and grubbing, grading CRM walls and construction of the pavement.

Construction will involve the following:

1. Clear and grub work site.
2. Excavate to subgrade.
3. Grass graded areas or provide erosion control fabric.
4. Construct CRM walls.
5. Construct subbase and base courses.
6. Install drain culverts and street light conduits.
7. Construct asphalt concrete and concrete pavements.

E. AREA OF WORK SITE : 1 Acre

F. RUNOFF COEFFICIENT AFTER CONSTRUCTION

C = 0.73

G. VOLUME OF RUNOFF FOR 1-INCH RAINFALL

V = (1/12) (0.73) (1) (43,560) = 2,650 cf
or 19,820 gallons

H. INCREASE IN IMPERVIOUS AREAS

Proposed 0.62 Acres (Paved)

III. APPLICABLE COUNTY REQUIREMENTS

A. Chapter 14 Articles 13, 14, 15 & 16 as related to Grading, Soil Erosion and Sediment Control of the Revised Ordinances of Honolulu, 1990, as amended.

IV. SITE SPECIFIC PLAN

A. EROSION AND SEDIMENT CONTROLS

1. Construction Management Techniques

a. Sedimentation basins and sediment traps, silt fences, and gravel cover material will be the primary construction measures to control sediments from entering Kapunahala Stream.

(1) The primary sedimentation basin will be between the CRM walls constructed for the driveway above Po'okela Street. The walls will serve as a barrier to direct surface runoff into the wetlands area.

(2) Smaller sediment traps will be constructed at intervals along the upper roadway.

(3) Excavation for pavement structures will form depressed areas which will serve as sedimentation traps until filled with crushed aggregate materials (base course and subbase course). These materials are less erodible than soil materials.

(4) Efforts will be made to keep pollutants from entering the existing storm drainage system which lead to Kapunahala Stream and Kaneohe Bay. Good housekeeping and good control of material storage will be practiced. Care will be taken to prevent spills of fuel, oil, and other liquid contaminants.

b. Soil erosion control measures shall be installed prior to any grading work.

c. The Contractor shall continuously inspect and maintain the soil erosion control measures as noted in the following paragraphs. Accumulated sediment deposits shall be removed if more than 10 percent of the available volume is filled.

2. Stabilization Practice for Area Disturbed by Construction

a. Cleared and graded areas in which no work is done within a 14 calendar day period shall be immediately covered with a geotextile fabric or with a granular material.

3. Structural Practices

a. The roadway shall be constructed in two phases. The largest area being excavated or graded at any one time is 0.5 acres.

b. The erosion control requirements includes the construction of a continuous CRM wall along the road to prevent runoff from flowing directly into the wetlands area from the work site. Runoff will generally be contained within the pavement area excavation. The excavated areas will be covered

with a granular aggregate material (base course material). Silt screens will be provided at overflow areas to filter any water that may overflow into the wetlands area.

c. All graded and exposed areas will be paved with asphalt concrete or will be grassed.

d. Work areas, haul roads, and material stock piles will be watered and kept moist or a granular blanket provided for dust control. Mud tracked onto paved areas will be cleaned immediately.

e. Men and equipment shall be available at all times, including non-working hours, to handle emergency situations during heavy rainstorms and/or high winds.

4. Schedule for Implementing Controls

Estimated Starting Date - May 1, 1995
Estimated Completion Date - December 1, 1995

(1)	Mobilization	05/01/95 - 05/07/95
(2)	Clear and Grub Phase I Area	05/08/95 - 05/24/95
(3)	Install Geotextile Filter Fabric	05/25/95 - 05/26/95
(4)	Construct CRM Walls	05/27/95 - 06/30/95
(5)	Construct Subbase Course and Sedimentation Basin	07/01/95 - 07/15/95
(6)	Clear and Grub Phase II Area	07/16/95 - 07/31/95
(7)	Excavate to Subgrade and Construct Sediment Traps at Inlet	08/01/95 - 08/31/95
(8)	Construct Subbase Course	08/15/95 - 09/07/95

(9)	Hydromulch Graded Areas	09/01/95 - 09/01/95
(10)	Install Drains and Walls	09/08/95 - 09/30/95
(11)	Construct Base Course and Pavement	10/01/95 - 11/13/95
(12)	Install Fence and Signs	11/01/95 - 11/13/95
(13)	Final Cleanup and Demobilization	11/14/95 - 12/01/95

B. STORM WATER MANAGEMENT CONTROLS AFTER CONSTRUCTION

1. The access driveway will be covered with a permanent asphalt concrete pavement, 2" minimum A.C. thickness, and landscaping which will be maintained continuously.
2. Washing of vehicles within the roadways will be prohibited.
3. Maintenance of vehicles, trucks and carriers in the container yard area where there are open drains will be prohibited. All servicing shall be done in areas where oil and fuel spills can be intercepted by isolated traps.
4. The storm drains will be checked annually and cleaned by hand or by mechanical methods if necessary. Flushing of storm drains will not be permitted, unless the water and silt is pumped into a sedimentation basin or tanks and prevented from being discharged into existing streams.
5. No velocity dissipation devices were required for this project. Outlet velocities will be designed to be under 10 feet per second or no greater than existing stream velocities. Any drains constructed in this project are privately owned.

C. OTHER CONTROLS

1. Waste Disposal Practice

   a. Waste Materials

All waste materials will be collected and stored in a securely lidded metal dumpster. The dumpster will meet all city and state solid waste management regulations. All trash and construction debris from the site will be deposited in the dumpster. The dumpster will be emptied a minimum of twice per week or as often as necessary. No construction waste materials will be buried onsite. Operator's supervisory personnel will be instructed regarding the correct procedure for waste disposal. Notices stating these practices will be posted in the office trailer and the Operator will be responsible for seeing that these procedures are followed.

b. Hazardous Waste

All hazardous waste materials will be disposed of in the manner specified by local or state regulations or by the manufacturer. Operator's site personnel will be instructed in these practices and will be responsible for seeing that these practices are followed.

c. Sanitary Waste

All sanitary waste will be collected from the portable units a minimum of once per week, or as required.

2. Tracking of Sediments by Construction Vehicles

a. Onsite construction routes used by vehicles shall be paved or covered with a layer of aggregate base or subbase material, 6 inch minimum

thickness. Vehicles shall not enter existing paved roads from the construction site if wheels are muddy. All wheels shall be cleaned before entering Po'okela Street.

b. Vehicles shall not drive onto the project site if the site is in a muddy condition.

c. Existing roads that have been tracked with mud or dirt shall be immediately cleaned by brooming. Watering may be used only if the resulting runoff is into a sedimentation basin. Water shall not be used to flush dirt and debris into the storm drainage system.

3. Compliance with State and County Regulations

a. All work will be monitored by the inspection staff of the City and County of Honolulu (for grading) and by representatives of Calvin Kim & Associates, Inc. (Consultant Engineers).

D. TIME WHEN MEASURES WILL BE IMPLEMENTED

1. Erosion control measures shall be installed prior to the start of any grading or excavation work.

2. Waste disposal facilities and sanitary facilities during construction shall be provided at the start of construction.

3. The time schedule for this project is shown in the section, "Schedule for Implementing Controls".

V. INSPECTION AND MAINTENANCE PROCEDURES

A. EROSION AND SEDIMENT CONTROL INSPECTION AND MAINTENANCE PRACTICES

1. All control measures will be inspected at least once each week and following any rainfall event of 0.5 inches or greater.

2. All measures will be maintained in good working order. If a repair is necessary, it will be initiated within 24 hours after the inspection.
3. Built-up sediment will be removed from silt fences when it has reached one-third the height of the fence.
4. Silt fences will be inspected for depth of sediment, tears, and secure fabric attachment to fence posts, and for stability of fence posts embedded in the ground.
5. The sediment basin will be inspected for depth of sediment. Built-up sediment will be removed when it reaches 10 percent of the design capacity and at the end of the job.
6. Diversion dikes or berms will be inspected and any breaches will be repaired immediately.
7. A written maintenance inspection record will be made promptly after each inspection by the Operator.
8. The Operator will select a minimum of three personnel who will be responsible for inspections, maintenance and repair activities, and for filling out the inspection and maintenance report.
9. Personnel selected for the inspection and maintenance responsi-bilities will receive training from the Operator. They will be trained in all the inspection and maintenance practices necessary for keeping the erosion and sediment control used onsite in good working order.

B. POLLUTANT CONTROL (GOOD HOUSEKEEPING)

1. Material Pollution Prevention Plan

a. Applicable materials or substances listed below are expected to be present onsite during construction. Other materials and substances not listed

below shall be added to the inventory.

Concrete	Petroleum Based Products
Cleaning Solvents	Sealants
Wood	Bituminous Materials

b. Material management practices will be used to reduce the risk of spills or other accidental exposure of materials and substances to storm water runoff. An effort will be made to store only enough product required to do the job.

c. All materials stored onsite will be stored in a neat, orderly manner in their appropriate containers and, if possible, under a roof or other enclosure.

d. Products will be kept in their original containers with the original manufacturer's label.

e. Substances will not be mixed with one another unless recommended by the manufacturer.

f. Whenever possible, all of a product will be used up before disposing of the container.

g. Manufacturer's recommendations for proper use and disposal, as well as applicable Federal, State or City and County regulations, will be followed.

h. The Operator will conduct a daily inspection to ensure proper use and disposal of materials and containers.

2. Hazardous Material Pollution Prevention Plan

a. These practices are used to reduce the risks associated with hazardous materials, such as petroleum products, solvents, cleaning agents, paints and other hydrocarbon products.

b. Products will be kept in original containers unless they are not resealable.

c. Original labels and materials safety data will be retained; they contain important product information.

d. Surplus products must be disposed of, according to manufacturer's instructions or local and state recommended methods for proper disposal will be followed.

3. Onsite and Offsite Product Handling Plan

a. The following product specific practices will be followed onsite:

(1) Petroleum Based Products:

All onsite vehicles will be monitored for leaks and receive regular preventive maintenance to reduce the chance of leakage. Petroleum products will be stored in tightly sealed containers which are clearly labeled. Any asphalt substances used onsite will be applied according to the manufacturer's recommendations.

(2) Concrete Trucks:

Concrete trucks will be allowed to wash out or drum wash water only at a designated area, onsite or offsite, where water will runoff into a sedimentation basin. Water will not be discharged into the drainage system or into waters of the State or the United States. The Operator shall contact the Drinking Water Branch of the Department of Health at 586-4258 to

receive permission to designate a disposal site. The Operator will clean the disposal site as required or as requested by the Owner of the site.

4. Offsite Vehicle Tracking

   a. A stabilized construction entrance shall be provided to help reduce vehicle tracking of sediments. The paved street (Po'okela Street) leading to the site entrance will be cleaned daily or as required to remove any excess mud, dirt or rock tracked from the site. Dump trucks hauling material from the construction site will be covered with a tarpaulin.

5. Spill Control Plan

   a. Manufacturer's recommended methods for spill cleanup will be clearly posted and site personnel will be made aware of the procedures and the location of the information and cleanup supplies.

   b. Materials and equipment necessary for spill cleanup will be kept in the material storage area onsite.

   c. All spills will be cleaned up immediately after discovery.

   d. The spill area will be kept well ventilated and personnel will wear appropriate protective clothing to prevent injury from contact with any hazardous substance.

   e. Spills of toxic or hazardous material will be reported to the appropriate state or local government agency, regardless of the size.

f. The Spill Prevention Plan will be posted and adjusted to include measures to prevent spills and how to cleanup the spills. A description of the spill, what caused it, and the cleanup measures will also be included.

g. The Operator will be the spill prevention and cleanup coordinator. He will designate at least three site personnel who will receive spill prevention and cleanup training. These individuals will each become responsible for a particular phase or prevention and cleanup. The names of responsible spill personnel will be posted in the material storage area and in the officer trailer onsite.

VI. TIME TABLE FOR MAJOR CONSTRUCTION ACTIVITIES

Estimated Starting Date - May 1, 1995
Estimated Completion Date - December 1, 1995

(1) Mobilization	05/01/95 - 05/07/95
(2) Clear and Grub Phase I Area	05/08/95 - 05/24/95
(3) Install Geotextile Filter Fabric	05/25/95 - 05/26/95
(4) Construct CRM Walls	05/27/95 - 06/30/95
(5) Construct Subbase Course and Sedimentation Basin	07/01/95 - 07/15/95
(6) Clear and Grub Phase II Area	07/16/95 - 07/31/95
(7) Excavate to Subgrade and Construct Sediment Traps at Inlet	08/01/95 - 08/31/95
(8) Construct Subbase Course	08/15/95 - 09/07/95
(9) Hydromulch Graded Areas	09/01/95 - 09/01/95
(10) Install Drains and Walls	09/08/95 - 09/30/95

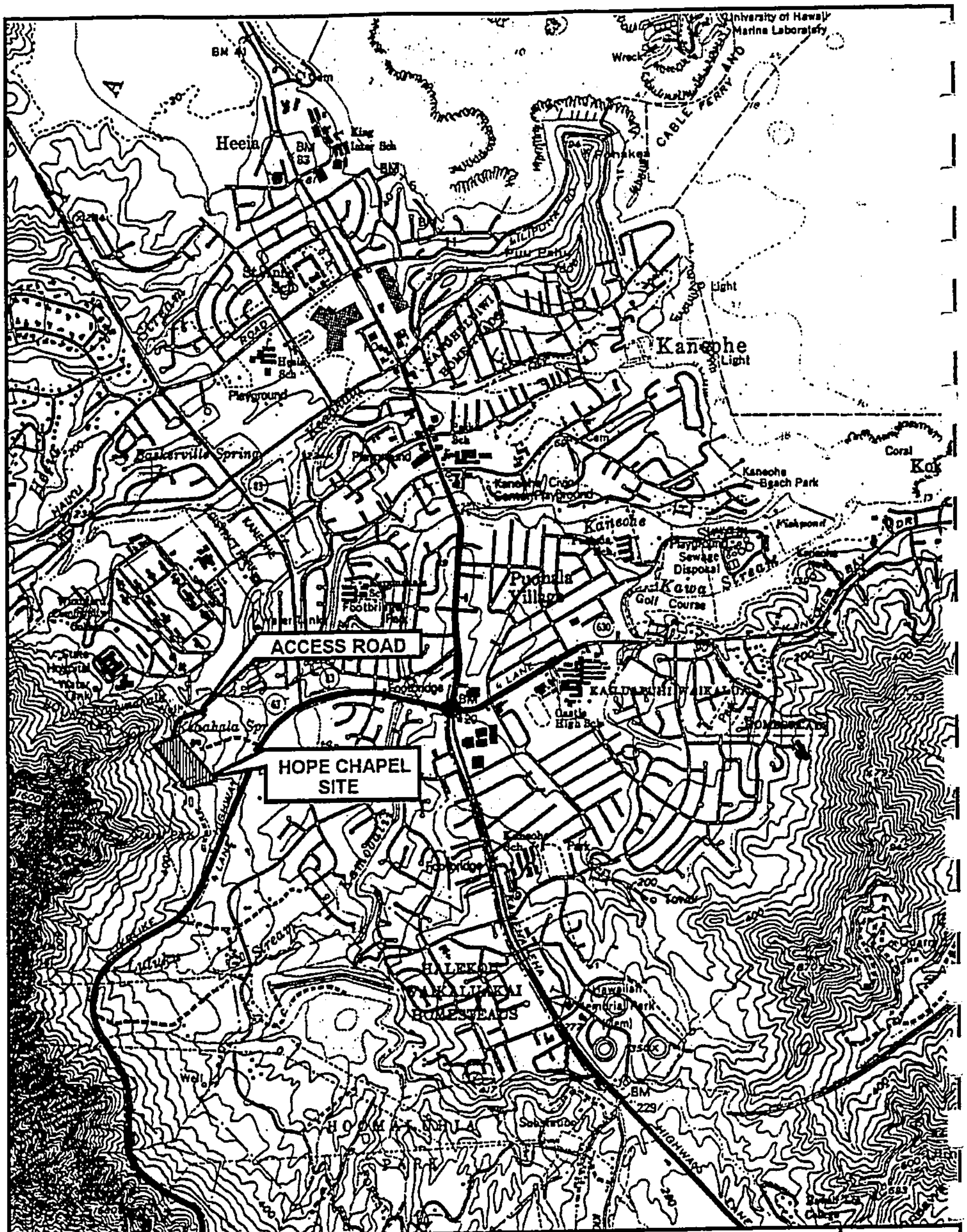
(11) Construct Base Course and Pavement	10/01/95 - 11/13/95
(12) Install Fence and Signs	11/01/95 - 11/13/95
(13) Final Cleanup and Demobilization	11/14/95 - 12/01/95

VII. IDENTIFICATION OF NON-STORM WATER DISCHARGES AND POLLUTION PREVENTION MEASURES

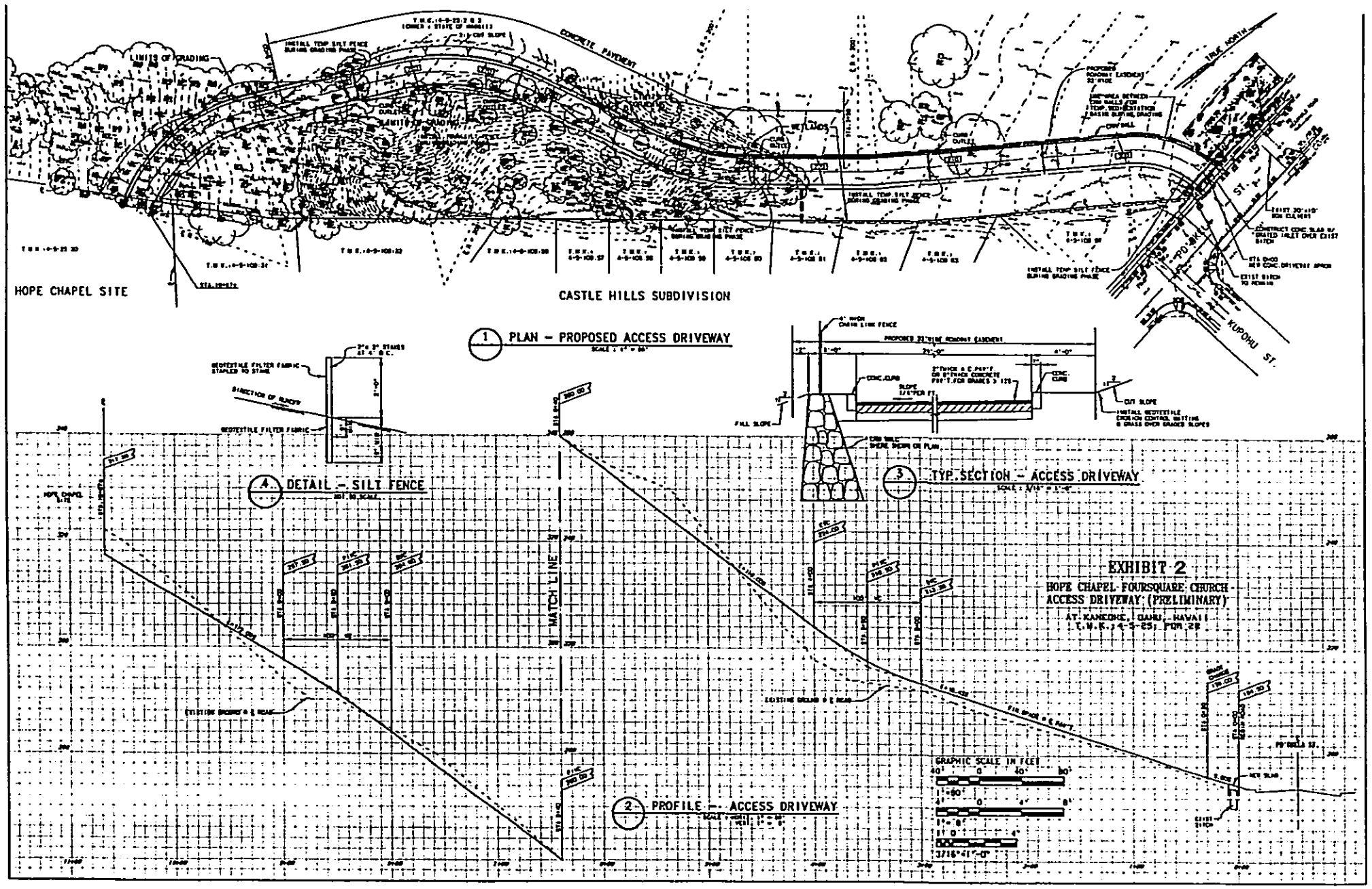
A. Dewatering is not expected for this project. However, should dewatering of trenches or structural excavations be necessary, it will be handled under a separate NOI to be submitted by the Contractor. Any water quality tests required by the NOI shall be conducted by the Contractor. Any special treatment process required to remove contaminant substances shall be provided. Water will be pumped to the sedimentation basins and not into the storm drainage system.

B. No sanitary wastes will be generated by this project after construction.

C. No other non-stormwater discharges are anticipated.



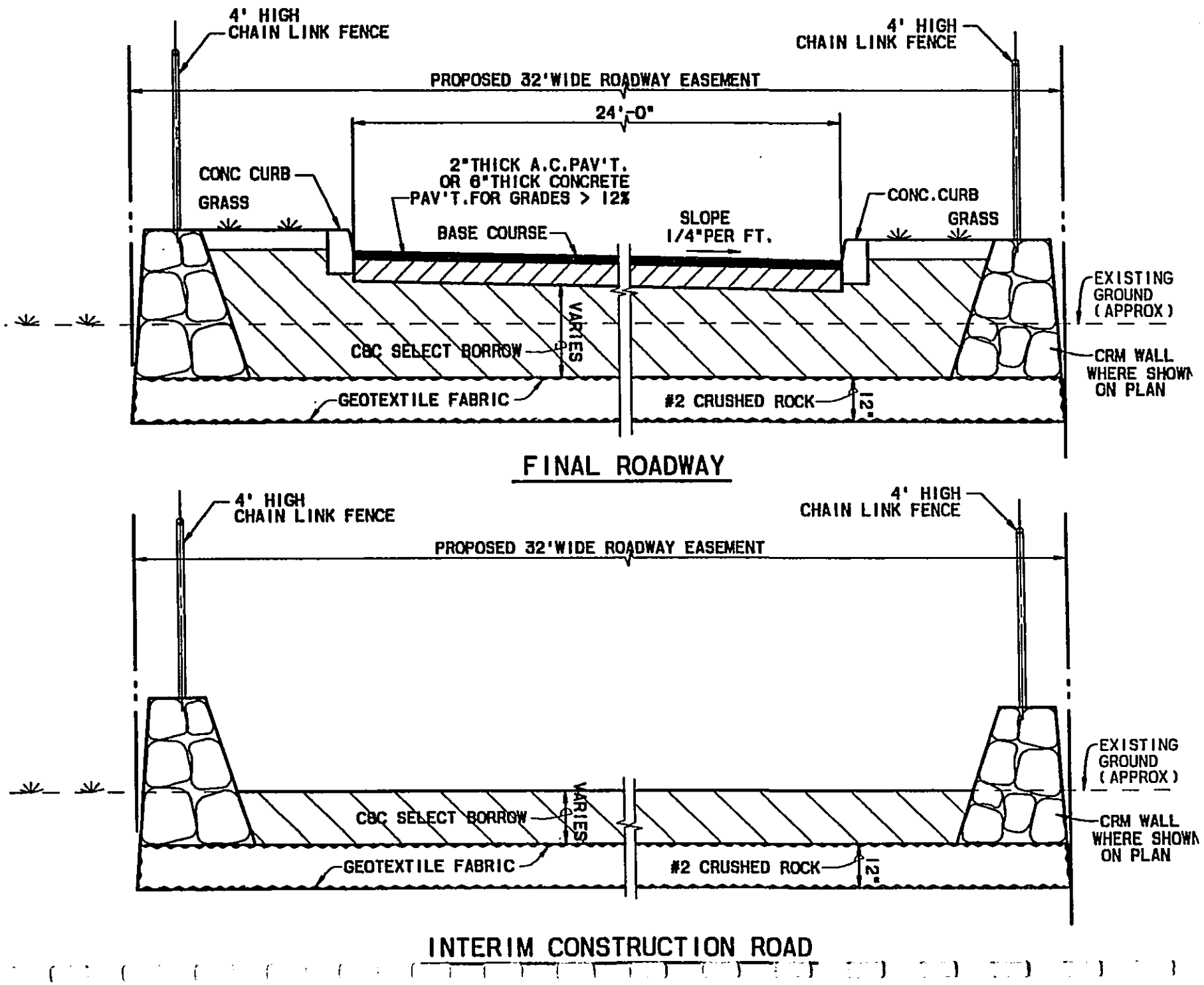
USGS MAP KANEOHE QUADRANGLE Scale: 1" = 2000' N	HOPE CHAPEL LOCATION MAP	EXHIBIT 1


HOPE CHAPEL SITE
CASTLE HILLS SUBDIVISION
KUPOHU ST.
1 PLAN – PROPOSED ACCESS DRIVEWAY
2 PROFILE – ACCESS DRIVEWAY
3 TYP. SECTION – ACCESS DRIVEWAY
4 DETAIL – SILT FENCE
MATCH LINE
GRAPHIC SCALE IN FEET
EXHIBIT 2
HOPE CHAPEL FOURSQUARE CHURCH
ACCESS DRIVEWAY (PRELIMINARY)
AT KANEOHE, OAHU, HAWAII
T.M.K. 4-5-25: PAR. 28

HOPE CHAPEL

TYPICAL SECTION
ACCESS DRIVEWAY ACROSS WETLANDS

EXHIBIT 3



APPENDIX E

Botanical Survey, Hope Chapel Access Driveway, Ko'olau Poko District, Island of O'ahu

BOTANICAL SURVEY
HOPE CHAPEL ACCESS DRIVEWAY
KO'OLAU POKO DISTRICT, ISLAND OF O'AHU

by

Winona P. Char

CHAR & ASSOCIATES
Botanical Consultants
Honolulu, Hawai'i

Prepared for: PBR HAWAII

July 1994

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BOTANICAL SURVEY
HOPE CHAPEL ACCESS DRIVEWAY
KO'OLAU POKO DISTRICT, ISLAND OF O'AHU

INTRODUCTION

The proposed Hope Chapel access driveway begins off of Po'okela Street, crosses over an existing wetland dominated by Job's tears, and continues upslope through a forest composed primarily of introduced species. The driveway will cross through TMK: 4-5-23: Por 2, and Por 3. The driveway will cross over lands in the Conservation District and wetlands in the Urban District.

Field studies to assess the botanical resources found on the proposed access driveway corridor were conducted on 17 June 1994. The primary objectives of the survey were to: 1) describe the major vegetation types; 2) inventory the flora; 3) search for threatened and endangered species as well as rare and vulnerable plants; and 4) identify areas of potential environmental concerns or problems and propose appropriate mitigation measures.

SURVEY METHODS

Prior to undertaking the field studies, a search was made of the pertinent literature to familiarize the principal investigator with other botanical studies conducted in the general area. Topographic maps and a recent colored aerial photograph were examined to determine vegetation cover patterns, terrain characteristics, access, boundaries, and reference points. Access was

from Po'okela Street and the Castle Hills subdivision.

Prior to the field studies, the driveway alignment had been flagged and surveyed by the engineers. For our studies, a corridor 100 feet in width, that is, 50 feet on each side of the center line, was surveyed. A walk-through survey method was used. Notes were made on plant associations and distribution, substrate types, topography, exposure, drainage, etc. Plant identifications were made in the field; plants which could not be positively identified were collected for later determination in the herbarium, and for comparison with the most recent taxonomic literature.

DESCRIPTION OF THE VEGETATION

Two major vegetation types are recognized on the driveway corridor. The Coix marsh, a wetland, occurs on soils mapped as "HnB", Hanalei silty clay, 2% to 6% slopes (Foote et al. 1972); this soil type is considered a hydric soil (U.S. Soil Conservation Service 1990). Coix or Job's tears (Coix lachryma-jobi) is listed as a facultative wetland ($FACW^{+}$) indicator species by Reed (1988). A FACW species usually occurs in wetlands (estimated probability 67% to 99%), but may occasionally be found in nonwetlands; a "+" sign indicates a frequency toward the higher end of the category. The mixed introduced forest occurs on 'Alaeloa silty clay soils ("AeE", ALF"). These are well-drained soils found on uplands; slopes are gently sloping to very steep (Foote et al. 1972).

The two vegetation types are described in more detail below. A list of all the species inventoried during the survey is presented at the end of the report.

Coix Marsh

This wetland consists almost exclusively of Coix or Job's tears

which forms robust clumps, 6 to 8 feet tall. The dense clumps of Job's tears tend to exclude other species and so there are only a few plants of maile pilau vine (Paederia scandens), primrose willow or kamole (Ludwigia octovalvis), and moonflower vine (Ipomoea alba) within the marsh itself. Along the perimeter of the marsh where it interfaces the forested uplands, the clumps of Job's tears thin out, probably because of the shadier environmental conditions, and a number of smaller herbaceous species are found. These include Hilo grass (Paspalum conjugatum), Glenwood grass (Sacciolepis indica), wood fern (Christella parasitica), hairy sword fern (Nephrolepis multiflora), a Cyperus species, and hono-hono (Commelina diffusa).

The driveway alignment crosses over a small raised area or "island" within the marsh. This "island" supports a few trees of Java plum (Syzygium cumini) and hau (Hibiscus tiliaceus) as well as a thorny thicket of wait-a-bit or Mysore thorn (Caesalpinia decapetala). A few plants of taro (Colocasia esculenta) and banana (Musa X paradisiaca) are also found in this area.

A wetlands delineation survey to identify the boundaries of the Coix marsh within the driveway corridor has also been undertaken. The information will be used in a request to the U.S. Army Corps of Engineers to fill approximately 13,500 square feet of the marsh for the construction of the proposed driveway. Compensatory mitigation measures will be proposed at a separate location of the wetland.

Mixed Introduced Forest

This forest is composed primarily of introduced or alien species, although there are a few small scraggly 'ohi'a trees (Metrosideros polymorpha), 6 to 12 feet tall, and hala trees (Pandanus tectorius) on the upper slopes, and a tangle of hau on the lower slopes where it abuts the marsh. Octopus or umbrella tree

(Schefflera actinophylla), native to Australia and New Guinea, is the most abundant of the introduced trees and forms a somewhat open canopy with the other tree species scattered throughout; these include Java plum, African tulip (Spathodea campanulata), fiddlewood (Citharexylum caudatum), bingabing (Macaranga mappa), and a large forestry planting of paperbark (Melaleuca quinquenervia). The trees are about 30 to 50 feet tall, with the larger paperbark trees 60 to 70 feet tall and with trunks 2 to 3.5 feet in diameter.

A more or less open layer of shrubs, 3 to 20 feet tall, which includes strawberry guava (Psidium cattleianum), shoe button ardisia (Ardisia elliptica), guava (Psidium guajava), and Christmas berry (Schinus terebinthifolius), as well as saplings of the tree species mentioned above, is found beneath the trees. A few 'akia shrubs (Wikstroemia oahuensis), an endemic species, are found in this subcanopy layer.

The percentage of ground cover is variable, about 30 to 40% in the more heavily shaded areas and almost 80% cover in the more open areas. Common ground cover species include basketgrass (Oplismenus hirtellus), hairy sword fern, lauwa'e (Phymatosorus scolopendria), and Spanish clover (Desmodium sandwicensis). Where the tree cover is sparse, more light reaches the ground and there is a more or less dense cover of Glenwood grass, Hilo grass, two species of Spanish clover (Desmodium incanum, D. sandwicensis), Asiatic pennywort (Centella asiatica), partridge pea (Chamaecrista nictitans), owi (Stachytarpheta dichotoma), hairy sword fern, pala'a fern (Sphenomeris chinensis), and Chinese ground orchid (Spathoglottis plicata).

A number of ornamental species are also found within this vegetation type. These include crepe ginger (Costus speciosus), Molineria recurvata, several clumps of Ptychosperma palm, taro vine (Epipremnum pinnatum), a Heliconia species, shell ginger

(Alpinia zerumbet), impatiens (Impatiens wallerana), and Hilo holly (Ardisia crenata). A very large, old specimen of lychee (Litchi chinensis) and a few old common mango trees (Magifera indica) can also be found near the corridor.

DISCUSSION AND RECOMMENDATIONS

The proposed Hope Chapel access driveway will cross over a marsh dominated by Coix along its lower one-third and mixed introduced forest along its upper two-thirds. Both of these vegetation types are composed primarily of introduced or alien species; introduced species are all those plants brought to the Hawaiian Islands, intentionally or accidentally, by humans after Western contact. Of a total of 67 species inventoried on the driveway corridor, 56 (84%) are introduced; 6 (9%) are originally of early Polynesian introduction; and 5 (7%) are native. Of the natives, 3 are indigenous, that is, they are native to the Hawaiian Islands and elsewhere, and 2 are endemic, that is, they are native only to the islands. The 2 endemic species are 'ohi'a (Metrosideros polymorpha) and 'akia (Wikstroemia oahuensis).

None of the plants found on the driveway corridor is a listed, proposed, or candidate threatened and endangered species (U.S. Fish and Wildlife Service 1989, 1990, 1994a, 1994b); nor is any considered rare and vulnerable (Wagner et al. 1990). There are no sensitive native plant-dominated communities on or adjacent to the proposed access driveway (Hawai'i Heritage Program 1994).

The two vegetation types appear to have been disturbed at some time in the past and there is much evidence of former use. These include the presence of old cattle fences, a narrow road bed with small hollow tile structures, telephone poles, and former landscape plantings.

Given the findings above and the limited nature of the project, the proposed Hope Chapel access driveway should not have any significant negative impact on the botanical resources. There are no botanical reasons to impose any restrictions, conditions, or impediments to the project.

It is recommended that areas disturbed by construction activities, especially on the steeper slopes, be replanted as soon as possible to prevent soil loss and discharge of sediment into the wetland. Where the driveway crosses the marsh, plantings would be utilized to screen the driveway from the neighboring Castle Hills subdivision. It is recommended that plants already in the area be used for landscaping. Hau would be a good candidate as it can be trained to form a dense thicket and is easily propagated from cuttings.

PLANT SPECIES LIST -- Hope Chapel Access Driveway

A checklist of all those vascular plant species inventoried on the driveway corridor during the field studies is presented below. The species are arranged alphabetically by families within each of three groups: Ferns, Monocots, and Dicots. The taxonomy and nomenclature of the Ferns follow Lamoureux (1988); the flowering plants, Monocots and Dicots, are in accordance with Wagner et al. (1990); ornamental species not listed in Wagner et al. follow St. John (1973).

For each species, the following information is provided:

1. Scientific name with author citation.
2. Common English and/or Hawaiian name(s), when known.
3. Biogeographic status. The following symbols are used:
   E = endemic = native only to the Hawaiian Islands
   I = indigenous = native to the Hawaiian Islands and also elsewhere throughout the Pacific
   P = Polynesian = plants originally of Polynesian introduction prior to Western contact (Cook's discovery of the islands in 1778); not native
   X = introduced or alien = all those plants introduced to the islands, intentionally or accidentally, after Western contact; not native
4. Presence (+) or absence (-) of a particular species within each of two vegetation types recognized within the driveway corridor (see text for description):
   m = Coix Marsh
   f = Mixed Introduced Forest

Scientific name	Common name	Status	Vegetation type m	f
FERNS				
BLECHNACEAE (Blechnum Family)				
Blechnum occidentale L.	blechnum	X	-	+
LINDSAEACEAE (Lace Fern Family)				
Sphenomeris chinensis (L.) Maxon	pala'a	I	-	+
NEPHROLEPIDACEAE (Sword Fern Family)				
Nephrolepis multiflora (Roxb.) Jarrett ex Morton	hairy sword fern	X	+	+
POLYPODIACEAE (Common Fern Family)				
Phymatosorus scolopendria (Burm.) Pic.-Ser.	laua'e, lauwa'e	X	-	+
THELYPTERIDACEAE (Wood Fern Family)				
Christella parasitica (L.) Levl.	*wood fern, oak fern*	X	+	+
FLOWERING PLANTS				
MONOCOTS				
AGAVACEAE (Sisal Family)				
Cordyline fruticosa (L.) A. Chev.	ti, ki	P	-	+
AMARYLLIDACEAE (Amaryllis Family)				
Molineria recurvata (Aiton f.) Herb.	molineria	X	-	+
ARACEAE (Aroid Family)				
Colocasia esculenta (L.) Schott	taro, kalo	P	+	-
Epipremnum pinnatum (L.) Engl.	taro vine, pothos	X	-	+

Scientific name	Common name	Status	Vegetation type m	f
ARECACEAE (Palm Family)				
Cocos nucifera L.	coconut, niu	P	-	+
Ptychosperma sp.		X	-	+
COMMELINACEAE (Spiderwort Family)				
Commelina diffusa N.L. Burm.	honohono	X	-	+
COSTACEAE (Costus Family)				
Costus speciosus (J. Konig) Sm.	crepe ginger, Malay ginger	X	-	+
CYPERACEAE (Sedge Family)				
Cyperus sp.		X	+	-
HELICONIACEAE (Heliconia Family)				
Heliconia sp.	heliconia	X	-	+
MUSACEAE (Banana Family)				
Musa X paradisiaca L.	banana, maia	X	+	+
ORCHIDACEAE (Orchid Family)				
Arundina graminifolia (D. Don) Hochr.	bamboo orchid	X	-	+
Spathoglottis plicata Blume	Chinese ground orchid	X	-	+
PANDANACEAE (Hala Family)				
Pandanus tectorius S. Parkinson ex Z.	pandanus, hala	I	-	+
POACEAE (Grass Family)				
Andropogon virginicus L.	broomsedge	X	-	+
Brachiaria mutica (Forssk.) Stapf	California grass	X	-	+
Coix lachryma-jobi L.	Job's tears	X	+	-
Oplismenus hirtellus (L.) P.Beauv.	basketgrass	X	+	+
Panicum maximum Jacq.	Guinea grass	X	-	+
Paspalum conjugatum Bergius	Hilo grass, mau'u Hilo	X	+	+

Scientific name	Common name	Status	Vegetation type m	f
Pennisetum purpureum Schumach.	Napier grass, elephant grass	X	-	+
Sacciolepis indica (L.) Chase	Glenwood grass	X	+	+
ZINGIBERACEAE (Ginger Family)				
Alpinia zerumbet (Pers.) B.L. Burtt & R.M. Sm.	shell ginger	X	-	+
Zingiber zerumbet (L.) Sm.	shampoo ginger, 'awa puhi kuahiwi	P	+	+
DICOTS				
ANACARDIACEAE (Mango Family)				
Mangifera indica L.	mango, manako	X	-	+
Schinus terebinthifolius Raddi	Christmas berry, wilelaiki	X	-	+
APIACEAE (Parsley Family)				
Centella asiatica (L.) Urb.	Asiatic pennywort, pohe kula	X	-	+
ARALIACEAE (Ginseng Family)				
Schefflera actinophylla (Endl.) Harms	octopus tree, umbrella tree	X	-	+
ASTERACEAE (Daisy Family)				
Emilia fosbergii Nicolson	pualele	X	-	+
BALSAMINACEAE (Touch-me-not Family)				
Impatiens wallerana J.D. Hook.	impatiens	X	-	+
BIGNONIACEAE (Bignonia Family)				
Spathodea campanulata P. Beauv.	African tulip tree	X	-	+

Scientific name	Common name	Status	Vegetation type m	f
CONVOLVULACEAE (Morning-glory Family)				
Ipomoea alba L.	moonflower, koali pehu	X	+	-
EUPHORBIACEAE (Spurge Family)				
Aleurites moluccana (L.) Willd.	kukui, tutui	P	-	+
Macaranga mappa (L.) Mull. Arg.	bingabing	X	-	+
Phyllanthus debilis Klein ex Willd.	niruri	X	-	+
FABACEAE (Pea Family)				
Caesalpinia decapetala (Roth) Alston	wait-a-bit, Mysore thorn, puakelekino	X	+	+
Chamaecrista nictitans (L.) Moench	partridge pea, lauki	X	-	+
Desmodium incanum DC.	Spanish clover, ka'imi	X	-	+
Desmodium sandwicense E. Mey.	Spanish clover, chili clover, pua pilipili	X	-	+
Leucaena leucocephala (Lam.) de Wit	koa-haole, ekoa	X	-	+
Mimosa pudica var. unijuga (Duchass. & Walp.) Griseb.	sensitive plant, sleeping grass, puahilahila	X	-	+
LAMIACEAE (Mint Family)				
Hyptis pectinata (L.) poit.	comb hyptis	X	-	+
MALVACEAE (Mallow Family)				
Hibiscus tiliaceus L.	hau	I?	+	+
MELASTOMATACEAE (Melastome Family)				
Clidemia hirta (L.) D. Don	clidemia, Koster's curse	X	+	+
Melastoma candidum D. Don	melastoma	X	-	+
MYRSINACEAE (Myrsine Family)				
Ardisia crenata Sims	Hilo holly	X	-	+
Ardisia elliptica Thunb.	shoe button ardisia	X	-	+

Scientific name	Common name	Status	Vegetation type m	Vegetation type f
MYRTACEAE (Myrtle Family)				
Melaleuca quinquenervia (Cav.) S.T. Blake	paperbark	X	-	+
Metrosideros polymorpha Gaud.	'ohi'a, 'ohi'a lehua	E	-	+
Psidium cattleianum Sabine	strawberry guava	X	-	+
Psidium guajava L.	guava, kuawa	X	-	+
Syzygium cumini (L.) Skeels	Java plum	X	+	+
MORACEAE (Mulberry Family)				
Ficus microcarpa L.f.	Chinese banyan	X	-	+
ONAGRACEAE (Evening Primrose Family)				
Ludwigia octovalvis (Jacq.) Raven	primrose willow, kamole	P?	+	-
PASSIFLORACEAE (Passion Flower Family)				
Passiflora laurifolia L.	yellow granadilla	X	-	+
ROSACEAE (Rose Family)				
Rubus rosifolius Sm.	thimbleberry	X	-	+
RUBIACEAE (Coffee Family)				
Paederia scandens (Lour.) Merr.	maile pilau	X	+	+
SAPINDACEAE (Soapberry Family)				
Litchi chinensis Sonn.	litchi, lychee	X	-	+
THYMELAEACEAE ('Akia Family)				
Wikstroemia oahuensis (A. Gray) Rock	'akia	E	-	+
VERBENACEAE (Verbena Family)				
Citharexylum caudatum L.	fiddlewood	X	-	+
Stachytarpheta dichotoma (Ruiz & Pav.) Vahl	owi, oi	X	-	+
Stachytarpheta urticifolia (Salisb.) Sims	nettle-leaved vervain, owi, oi	X	-	+

LITERATURE CITED

Foote, D.E., E.L. Hill, S. Nakamura, and F. Stephens. 1972. Soil survey of the islands of Kauai, Oahu, Maui, Molokai, and Lanai, State of Hawaii. U.S. Department of Agriculture, Soil Conservation Service, Washington, D.C.

Hawai'i Heritage Program, The Nature Conservancy of Hawai'i. 1994. Summary listing of Hawaiian natural communities. Memorandum. February 1994.

Lamoureux, C.H. 1988. Draft checklist of Hawaiian pteridophytes, "Kupukupu O Hawai'i Ne'i". Lyon Arboretum, University of Hawai'i, Manoa.

Reed, P.B., Jr. 1988. National list of plant species that occur in wetlands: Hawaii (Region H). U.S. Fish and Wildlife Service Biological Report 88(26.13).

St. John, H. 1973. List and summary of the flowering plants in the Hawaiian Islands. Pacific Tropical Botanical Garden, Memoir No. 1, Lawai, Kauai.

U.S. Fish and Wildlife Service. 1989. Endangered and threatened wildlife and plants. 50 CFR 17.11 & 17.12.

_____ . 1990. Endangered and threatened wildlife and plants; Review of plant taxa for listing as Endangered and Threatened Species; Notice of review. Federal Register 55(35): 6184-6229.

_____ . 1994a. Endangered and threatened wildlife and plants; Endangered status for 11 plant species from the Ko'olau Mountain Range, island of O'ahu, HI. Federal Register

59(59): 14482-14493.

_____ . 1994b. Plants, Hawaiian Islands, Listed, proposed or candidate species under the U.S. Endangered Species Act, Updated: March 28, 1994. Unpublished list, Pacific Islands Office, Honolulu.

U.S. Soil Conservation Service. 1990. Hydric soils list for the State of Hawaii. Unpublished list, Honolulu Office. May 1990.

Wagner, W.L., D.R. Herbst, and S.H. Sohmer. 1990. Manual of the flowering plants of Hawai'i. 2 vols. University of Hawai'i Press and B.P. Bishop Museum Press, Honolulu. B.P. Bishop Museum Special Publication No. 83.

APPENDIX F

Avifaunal and Feral Mammal Survey of Land Proposed for an Access Road for Hope Chapel, Kaneohe, Oahu

AVIFAUNAL AND FERAL MAMMAL SURVEY OF LAND PROPOSED FOR AN ACCESS ROAD FOR HOPE CHAPEL, KANEOHE, OAHU

Prepared for

PBR-Hawaii

by

Phillip L. Bruner
Assistant Professor of Biology
Director, Museum of Natural History
BYU-Hawaii
Environmental Consultant - Faunal (Bird & Mammal) Surveys

17 June 1994

INTRODUCTION

The purpose of this report is to summarize the findings of a one day (11 June 1994) bird and mammal field survey of a proposed Hope Chapel access roadway (TMK 4-5-23:Por. 2 and Por. 3), Kaneohe, Oahu (Fig. 1). Also included are references to pertinent literature as well as unpublished faunal reports.

The objectives of the field survey were to:

1- Document what bird and mammal species occur on the property or may likely be found there given the type of habitats available.

2- Provide some baseline data on the relative (estimated) abundance of each species.

3- Determine the presence or likely occurrence of any native fauna particularly any that are considered "Endangered" or "Threatened".

4- Evaluate the quality of the wetland and conservation, forest land habitat for native wildlife.

GENERAL SITE DESCRIPTION

Figure One indicates the limits of the lands surveyed for birds and mammals. Two habitat types exist on the site: a wetland heavily overgrown with tall grass and no open water; and a second growth forest of exotic trees. The topography of the forested area is steep while the wetland has a more gentle slope.

Weather during the field survey was partly cloudy with brief light rain. Winds were from the east at 10-20 mph.

STUDY METHODS

Field observations were made with binoculars and by listening for vocalizations. These observations were concentrated during the peak bird activity period of early morning and late afternoon. This was done in order to gain a more accurate estimate of bird populations. At a few scattered locations eight minute counts were made of all birds seen or heard (Fig. 1). Between these count (census) stations any unusual observations of birds or mammals were also noted. These data provide the basis for the relative (estimated) abundance figures given in this report (Table 1). Published and unpublished reports of birds known from similar habitat were also consulted in order to acquire a more complete picture of the possible species that might

be expected (Pratt et al. 1987; Hawaii Audubon Society 1993; Pyle 1987, 1988, 1989; Bruner 1989, 1992a, 1992b, 1993). Records of feral mammals were limited to visual sightings and to the presence of scats and tracks. No attempts were made to trap mammals in order to obtain data on their relative (estimated) abundance and distribution.

Scientific names used in this report follow those given in Hawaii's Birds (Hawaii Audubon Society 1993). Field Guide to the Birds of Hawaii and the Tropical Pacific (Pratt et al. 1987) and Mammal Species of the World (Honacki et al. 1982).

RESULTS AND DISCUSSION

Resident Endemic (Native) Land Birds:

No endemic land birds were recorded on the survey. The Short-eared Owl or Pueo (Asio flammeus sandwichensis) occurs in grassland habitat, agricultural fields and forests (Pratt et al. 1987). Pueo are listed as an endangered species on Oahu by the State of Hawaii Division of Forestry and Wildlife. Two Pueo were seen three years ago in the nearby Haiku Valley (Bruner 1993). Common Amakihi (Hemignathus virens), Apapane (Himatione sanguinea) and 'Elepaio (Chasiempis sandwichensis) are three other endemic species which occur in the Koolau mountains directly upslope of this site. Common Amakihi may on occasion occur in the forested sections of this property. This species is one of the most abundant of the remaining native forest birds.

Resident Endemic (Native) Waterbirds:

No wetland habitat suitable for waterbirds was found on the property. Dense tall grass covers the entire wetland. No waterbirds were recorded on the survey.

Migratory Indigenous (Native) Birds:

No open habitat suitable for migratory birds like Pacific Golden-Plover (Pluvialis fulva) exists on the property. No migratory birds were noted on the survey.

Resident Indigenous (Native) Seabirds:

No nesting seabirds were observed on the property. The presence of predators probably renders this site unsuitable for nesting. The White-tailed Tropicbird (Phaethon lepturus) frequents areas with steep cliffs. They are often seen soaring on the updrafts and nest in crevices on the cliff face. This species potentially could occur above this site. They are not endangered. None were recorded on this survey.

Exotic (Introduced) Birds:

A total of 12 species of exotic birds were recorded during the field survey (Table 1).

Based on the location and type of habitats found on the property as well as information provided in Pratt et al. 1987; Hawaii Audubon Society 1993; Pyle, 1987, 1988, 1989; Bruner 1989, 1992a, 1992b, 1993)

the following species may also occur in this region of the island: Barn Owl (Tyto alba), Red-whiskered Bulbul (Pycnonotus jocosus), Red-billed Leiothrix (Leiothrix lutea), Hwamei (Garrulax canorus), Java Sparrow (Padda oryzivora), House Sparrow (Passer domesticus) and Common Waxbill (Estrilda astrild).

Feral Mammals:

Scats of the Small Indian Mongoose (Herpestes auropunctatus) were found along with tracks of cats and pigs. Rats and mice also likely occur on the property. No trapping was conducted in order to assess the relative abundance of feral mammals.

Oahu records of the endemic and endangered Hawaiian Hoary Bat (Lasiurus cinereus semotus) are limited (Tomich 1986; Kepler and Scott 1990). No bats were found on this survey. Whether or not this species occurs in this area is unknown. They are known to roost solitarily in trees and occur in upland forests as well as in coastal habitats. This species feeds on insects and is active at dusk.

CONCLUSION

A brief field survey such as this one can provide only a limited perspective of the wildlife which utilize the area. The number and relative abundance of each species may vary throughout the year

due to available food resources and reproductive success. Exotic species sometimes prosper only to later disappear or become a less significant part of the ecosystem (Williams 1987; Moulton et al. 1990). Thus only long term studies can provide a comprehensive view of the bird and mammal populations in a particular area. Nevertheless, some general conclusions related to bird and mammal activity at this site can be drawn. The following comments summarize the findings of this survey.

1- All major habitats on and near the proposed project site were visited and census stations were distributed so as to provide a reasonable sample from which relative estimates of bird populations could be derived.

2- No endemic land birds were recorded. The only likely species that might occur in this area are: Pueo and Common Amakihi. The Pueo is listed as endangered on Oahu by the State of Hawaii. Common Amakihi is not endangered.

3- No migratory birds were found on the survey. No habitat suitable for these species occurs at this location.

4- The property supports the typical array of exotic birds one would expect at this locality and in this type of habitat on Oahu.

No unusual or unexpected species were found. Some species that usually can be found in this type of environment were not recorded. This may be due to several factors some of which are: survey too brief, too few individuals to detect or presently no localized populations of these species. Red-vented Bulbul were as usual particularly abundant.

5- A trapping program would be required in order to obtain more definitive data on mammals. The brief observations of this survey did not reveal any unusual observations of mammals. It is likely that the number of rats,cats, mice, mongoose and pigs are typical of similar habitats nearby. The endangered Hawaiian Hoary Bat was not recorded at this site but it is known from Oahu. The potential for this species at this site is unknown due to our limited knowledge of this animals distribution and ecology.

6- This property contains the usual mix of introduced plants and animals typical of second growth, disturbed forests and vegetation choked wetlands on Oahu. No particularly unique or special habitat features essential to native wildlife were discovered. The loss of wetland habitat due to the proposed access road will have no effect on waterbirds since this site is unused and unsuitable for these species. Some forest will be lost as a result of the

access road. Those introduced species which prefer dense cover may decline in abundance at this location. This should not be a concern for the proposed development as these birds are neither native nor endangered and the forested lands are composed of second growth introduced vegetation.

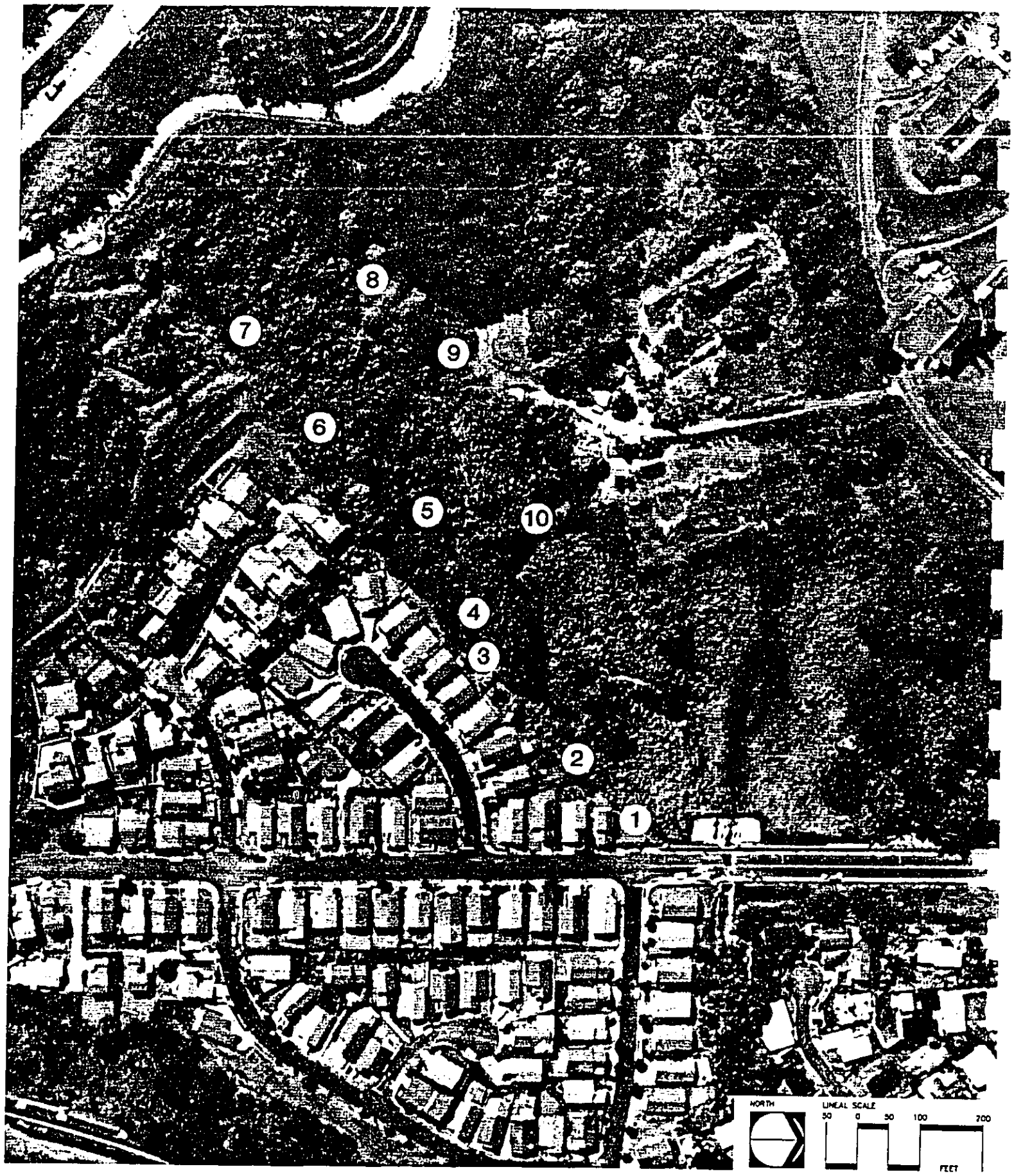

Fig. 1. Location of faunal survey with census stations marked as solid circles.

TABLE 1

Exotic (introduced) birds recorded at the site of a proposed access road for Hope Chapel, Kaneohe, Oahu

COMMON NAME	SCIENTIFIC NAME	RELATIVE ABUNDANCE*
Spotted Dove	Streptopelia chinensis	U = 2
Zebra Dove	Geopelia striata	C = 5
Common Myna	Acridotheres tristis	U = 2
Red-vented Bulbul	Pycnonotus cafer	A =18
White-rumped Shama	Copsychus malabaricus	C = 5
Northern Cardinal	Cardinalis cardinalis	C = 6
Red-crested Cardinal	Paroaria coronata	R = 2
Japanese White-eye	Zosterops japonicus	A =10
Japanese Bush-warbler	Cettia diphone	R = 3
House Finch	Carpodacus mexicanus	C = 8
Chestnut Mannikin	Lonchura malacca	R = 2
Nutmeg Mannikin	Lonchura punctulata	R = 2

*(see page 11 for key to symbols)

KEY TO TABLE 1

Relative (estimated) abundance = Number observed on eight minute counts in appropriate habitat.

A = abundant (10+)

C = common (5-10)

U = uncommon (less than 5)

R = recorded only once on survey or not on census stations

SOURCES CITED

Bruner, P. L. 1989. Survey of the avifauna and feral mammals of two parcels of land adjacent to Old Kalanianaole Highway, Windward, Oahu. Unpubl. ms. Prep. for Gordon A. Chapman Consulting Services, Honolulu.

_____ 1992a. Survey of the avifauna and feral mammals ar TMK 4-2-05:01 Olomana, Kailua, Oahu. Unpubl. ms. Prep. for PBR-Hawaii, Honolulu.

_____ 1992b. Survey of the avifauna and feral mammals at Honolulu BWS Nuuanu Tunnel 3A, Oahu. Unpubl ms. Prep. for Hawaii Pacific Engineers, Inc., Honolulu.

_____ 1993. Survey of the avifauna and feral mammals at the US Coast Guard Haiku Valley Omega Station, Kaneohe, Oahu. Unpubl. ms. Prep. for Woodward-Clyde Consultants, Honolulu.

Hawaii Audubon Society. 1993. Hawaii's Birds. Fourth Edition. Hawaii Audubon Society, Honolulu.

Honacki, J. H., K. E. Kinman and J. W. Koeppl ed. 1982. Mammal species of the World: A taxonomic and geographic reference. Allen Press, Inc. and the Association of Systematic Collections. Lawrence, Kansas.

Kepler, C. B. and J. M. Scott. 1990. Notes on distribution and behavior of the endangered Hawaiian Hoary Bat (Lasiurus cinereus semotus) 1974-1983. 'Elepaio 50(7):59-64.

Moulton, M. P., S. L. Pimm and N. W. Krissinger. 1990. Nutmeg Mannikin (Lonchura punctulata): a comparison of abundance in Oahu vs. Maui sugarcane fields: evidence for competitive exclusion? 'Elepaio 50(10):83-85.

Pratt, H. D., P. L. Bruner and D. G. Berrett. 1987. A field guide to the birds of Hawaii and the tropical Pacific. Princeton Univ. Press.

Pyle, R. L. 1987. Honolulu Christmas Count - 1986. 'Elepaio 47(5):51-53.

_____ 1988. Honolulu Christmas Count - 1987. 'Elepaio 48(3):19-21.

_____ 1989. Honolulu Christmas Count - 1988. 'Elepaio 49(2):7-9.

Tomich, P. Q. 1986. Mammals in Hawaii. Bishop Museum Press.

Williams, R. N. Alien Birds on Oahu. 1944-1985. 'Elepaio 47(9):87-92.

APPENDIX F-1

Letter From U.S. Department of the Interior, Fish and Wildlife Service, July 20, 1994

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Pacific Islands Ecoregion
300 Ala Moana Blvd, Room 6307
P.O. Box 50167
Honolulu, Hawaii 96850

In Reply Refer To: MSS

Ms. Yukie Y. Ohashi
Planner
PBR Hawaii
Pacific Tower, Suite 650
1001 Bishop Street
Honolulu, HI 96850

20 JUL 1994

Dear Ms. Ohashi:

We are in receipt of your letter to Mr. Brooks Harper dated June 30, 1994 in which you request a species list and comments for the proposed road development to achieve access to the property in Kaneohe for the Hope Chapel.

A segment of the road will cross a wetland in the State Urban District and continue onto fast land in the Conservation District. The wetland segment will be 440 feet long and occupy 13,300 sq ft of area or approximately 0.30 acres. The remaining driveway portion will traverse Conservation land.

We have reviewed the terrestrial report by Phil Bruner that you provided and made an initial site inspection of the wetland on July 18, 1994. We concur with the species list in Mr. Bruner's report. As indicated in your letter, the wetland is choked with Job's tears and California grass. No waterbirds were evident and no open water is apparent. We concur that the site may have formerly been in taro cultivation. The hydrology of the site is not apparent although the very large drainage culvert adjacent to the wetland feeds to Kapunahala Stream which exits to Kaneohe Bay.

Although the wetland in question does not presently support resources under the jurisdiction of the U.S.. Fish and Wildlife Service, degraded wetlands have the potential for restoration and renewed opportunities to attract fish and wildlife resources. Loss of even the relatively minor amount of wetland identified in the project proposal reduces restoration options and contributes to the accumulating losses of wetlands in this State. The proposed use is non-water dependent and other property access opportunities are available. We are unclear as to the reason why the City and County of Honolulu Department of Land Utilization has denied the use of the legal access to the property at the corner of Paepuu and Puupele Streets in the Castle Hills subdivision.

Our Wetlands Branch will be providing additional comments when the Corps section 404 permit action is initiated. Should you have further questions about this letter please contact our Branch of Interagency Cooperation at 808\541-2749.

Sincerely,

Acting

Brooks Harper
Field Supervisor
Ecological Services

cc: Army Corps of Engineers
Operations Division
Ft. Shafter, HI

PBR HAWAII

LANDSCAPE ARCHITECTURE
PLANNING
ENVIRONMENTAL STUDIES

June 30, 1994

Mr. Brooks Harper, Field Supervisor
Pacific Islands Office
Ecological Services
U.S. Fish and Wildlife Service
P.O. Box 50167
Honolulu, HI 96850

Subject: **Consultation for the Hope Chapel Kaneohe Proposed Access Driveway**
TMK: 4-5-23: 02 and 03 (pors.), Koolaupoko, Oahu, Hawaii

Dear Mr. Harper:

I have just spoken with Ms. Margo Stahl of your staff who was very helpful in providing information on the review process of applications being handled by the U.S. Army Corps of Engineers, State of Hawaii Department of Health and the Office of State Planning. We are seeking approvals for a Nationwide permit, 401 Water Quality Certification and a Coastal Zone Management Certification to construct an access driveway for a proposed church in Kaneohe. This letter is to request your review and determination if there are any species of concern at the site.

PBR Hawaii is assisting Hope Chapel Kaneohe in the planning for an access driveway to their 9.2-acre property. Hope Chapel's overall goal is to build a church facility for its congregation. The attached Exhibit 1, is a location map showing the access driveway study area and the church site in relation to the surrounding land uses, including the Hawaii State Hospital, Windward Community College, Castle Hills residential subdivision and the recently constructed segment of the H-3 freeway. The legal access to the property is through the abutting residential subdivision. However, in a Site Plan Review approval, the City and County of Honolulu Department of Land Utilization has denied the use of the legal access and required that Hope Chapel pursue an alternative access through adjacent State land because of the objection of the abutting residents. All possible alternatives have been studied and the only remaining alternative is the proposed one which traverses land owned by the Hawaii State Hospital. A Memorandum of Agreement between the landowner and Hope Chapel Kaneohe is being executed for the use of the State land for driveway construction purposes.

As shown on the attached Exhibit 2, a segment of the driveway will be crossing a wetland in the State Urban District and continue onto fast land in the Conservation District. The segment in the wetland will be 440 feet long and occupy 13,300 sq ft of area or approximately 0.30 acre. The remaining driveway portion will traverse Conservation land; a CDUA will be filed with DLNR in early July.

W. Frank Brandt • Thomas S. Witten • R. Stan Duncan • Russell Y. J. Chung

PACIFIC TOWER, SUITE 650 1001 BISHOP STREET HONOLULU HAWAII 96813 TELEPHONE 808 521-5631 FAX: 808 523-1402
BRANCH OFFICE HILO LAGOON CENTER 101 AUPUNI STREET SUITE 104 HILO HAWAII 96720 TELEPHONE 808 961-3333 FAX 808 961-0929

Studies to assess the botanical and wildlife resources have been conducted and our findings indicate that there are no significant plant species or communities, nor are there any wildlife values in the wetland, which, in its existing condition, is choked with Job's tears. No open water areas exist. As requested by Ms. Stahl, the terrestrial report by Phil Bruner is attached. The archaeology assessment indicates that there is a good likelihood that taro cultivation was once practiced at this location.

We are working on a mitigation plan in conjunction with the Hawaii State Hospital. The Hospital presently operates an agricultural program for patient therapy. The mitigation concept is to develop wetland agricultural pondfields for taro or lotus root cultivation, thus recapturing cultural values of this wetland. The mitigation will involve the construction of 26,600 sq ft, or 0.61 acre of pondfields or lo'i. A water source for irrigation exists nearby. Our plans will be solidified and presented in both narrative and visual format in the next couple of weeks for your review. Upon receipt of approvals, detailed engineering drawings for the mitigation will be submitted for agency approval.

We feel that this plan has many merits. The enhancement of the wetland will provide increased water retention capacity, thereby improving stormwater control, while at the same time providing openwater habitat for waterbirds. In addition, it will augment the Hospital's agricultural program for its patients and help to increase cultural and (potentially) economic values.

The members of Hope Chapel Kaneohe have been planning and fundraising for this building project since 1988. The permits and approvals identified above for the driveway represent the last major approvals before construction can begin. This new access plan is supported by the residents of Castle Hills. Please call me at 521-5631 if you have any questions or if you require any additional information. We appreciate your assistance.

Sincerely yours,

PBR HAWAII

Yukie Y. Ohashi
Planner

Attachments

cc: Rob McWilliams, Hope Chapel Kaneohe
Paula Ayers, Hawaii State Hospital
Margo Stahl, U.S. Fish and Wildlife Service

1347.01hope.fws

APPENDIX G

Kapunahala Stream Assessment
Proposed Hope Chapel Kaneohe Access Driveway
Koolaupoko District, Oahu

KAPUNAHALA STREAM ASSESSMENT
PROPOSED HOPE CHAPEL KANEOHE ACCESS DRIVEWAY
KO'OLAUPOKO DISTRICT, O'AHU

Prepared for:
PBR Hawaii for Hope Chapel Kaneohe
Pacific Tower, Suite 650
1100 Bishop Street
Honolulu, Hawaii 96813

Prepared by:
Randall Filbert and Ron Englund
Pacific Aquatic Environmental
2106 Waiola St., Suite H
Honolulu, Hawaii 96826

August 16, 1994

TABLE OF CONTENTS

EXECUTIVE SUMMARY

Pacific Aquatic Environmental was retained by the Hope Chapel Kaneohe to complete a biological assessment of the Kapunahala Stream system, Oahu. The assessment was conducted to meet regulatory requirements associated with the proposed construction of the Hope Chapel Kaneohe Driveway. The assessment was conducted between 21 and 23 July 1994, beginning at Kaneohe Stream estuary (Kapunahala Stream drains into Kaneohe Stream) and terminating at the origin of Kapunahala stream channel in the Koolau Mountains. The stream system was divided into six reaches, and 11 sampling stations were assessed for native and introduced stream biota (fish, molluscs, amphibians, crustaceans, and aquatic insects).

Kapunahala Stream is intermittent at higher elevations and was dry (containing no aquatic biota) above 250 ft during this assessment. Kapunahala Stream has been heavily affected by past and current land-use. Consequently, introduced species dominate the stream fauna; this situation is typical of many streams found in urban areas of Oahu. Only one species of native endemic 'o'opu fish, *Awaous stamineus*, was encountered. No Category 1 Candidate Endangered *Lentipes concolor* (goby stream fish) were found within the study area. Based on comparison with historical records, little change in fish species composition has occurred over the past 20 years. No Category 1 or 2 Candidate endangered *Megalagrion* damselfly species were encountered.

Because the system is heavily perturbed, native stream biota are uncommon, and the magnitude of disturbance associated with the proposed Hope Chapel Kaneohe Driveway is small, no substantial impacts to native aquatic biota are expected. Erosion control measures during construction are recommended to minimize sediment input into both Kapunahala and Kaneohe Streams which ultimately drain into Kaneohe Bay.

1.0 INTRODUCTION

Pacific Aquatic Environmental was retained by Hope Chapel Kaneohe to perform a biological assessment of the Kapunahala Stream system, Kaneohe, Oahu. The objective of the assessment, conducted between 21 and 23 July, 1994, was to qualitatively evaluate the occurrence and longitudinal distribution of native and introduced stream fishes, reptiles and amphibians, and macroinvertebrates (insects, crustaceans, and molluscs). An emphasis of the assessment was to evaluate whether or not *Megalagrion* damselflies, certain of which are listed as Category 1 or 2 candidates on the Federal Register (Dodd et al. 1985), were present. In addition, a brief evaluation of riparian (streamside) vegetation and habitat characteristics was conducted.

Because the life-cycles of native stream organisms (fish ['o'opu], molluscs, and crustaceans) include migration to and from the ocean, it was necessary to assess the entire stream system (approximately 2.7 mi) from headwater to estuary. Because Kapunahala Stream is a tributary of Kaneohe Stream (USGS quadrangle map, Kaneohe, Hawaii), we conducted this assessment from the Kaneohe Stream estuary to the origin of Kapunahala Stream in the Koolau Mountains (about 880 ft [244 m]) (Figure 1). The survey was conducted by Ron Englund and Randall Filbert.

2.0 STUDY AREA

The Kapunahala Stream watershed is small, with an approximate area of 0.40 mi^2 (USGS 1992). The stream originates at the base of cliffs on the windward side of the south-central Koolau Mountains at approximately 900 feet elevation. The stream descends along a steep profile through wooded valley with sloping walls. The northern boundary of Kapunahala Watershed consists of the Hawaii State Hospital and the campus of Windward Community College, and the southern boundary is the Castle Hills residential subdivision.

Upstream of the Kapunahala Well the stream channel is moderately disturbed due to the presence of the H-3 overpass and associated service roads (500 ft approximate elevation). Between the Kapunahala Well and Pookela Street, the area adjacent to the proposed driveway, the historic stream channel has been disrupted. Flow in this section is almost exclusively the result of seepage from the Kapunahala Well. Approximately 200 yd down-gradient of the well stream flow becomes subterranean. The historical channel, located on the south side of a large wet meadow adjacent to a small ridge, was dry during this assessment. Flow in this area is either subterranean or disbursed throughout the meadow so that no perceptible channel exists. Water is again present on the north side of the meadow adjacent to Pookela Street. It is uncertain whether or not water from the well resurfaces or if flow originates from a separate spring source. At Pookela Street the channel has been heavily modified and water flows under the road through a large box culvert. Between Pookela Street and Kahekili Highway Kapunahala Stream flows between the Castle Hills and Bethany subdivisions. The stream in this section has been channelized and the riparian zone was comprised exclusively of introduced plant species. Downstream of Kahekili Highway, Kapunahala Stream has been heavily channelized, consisting

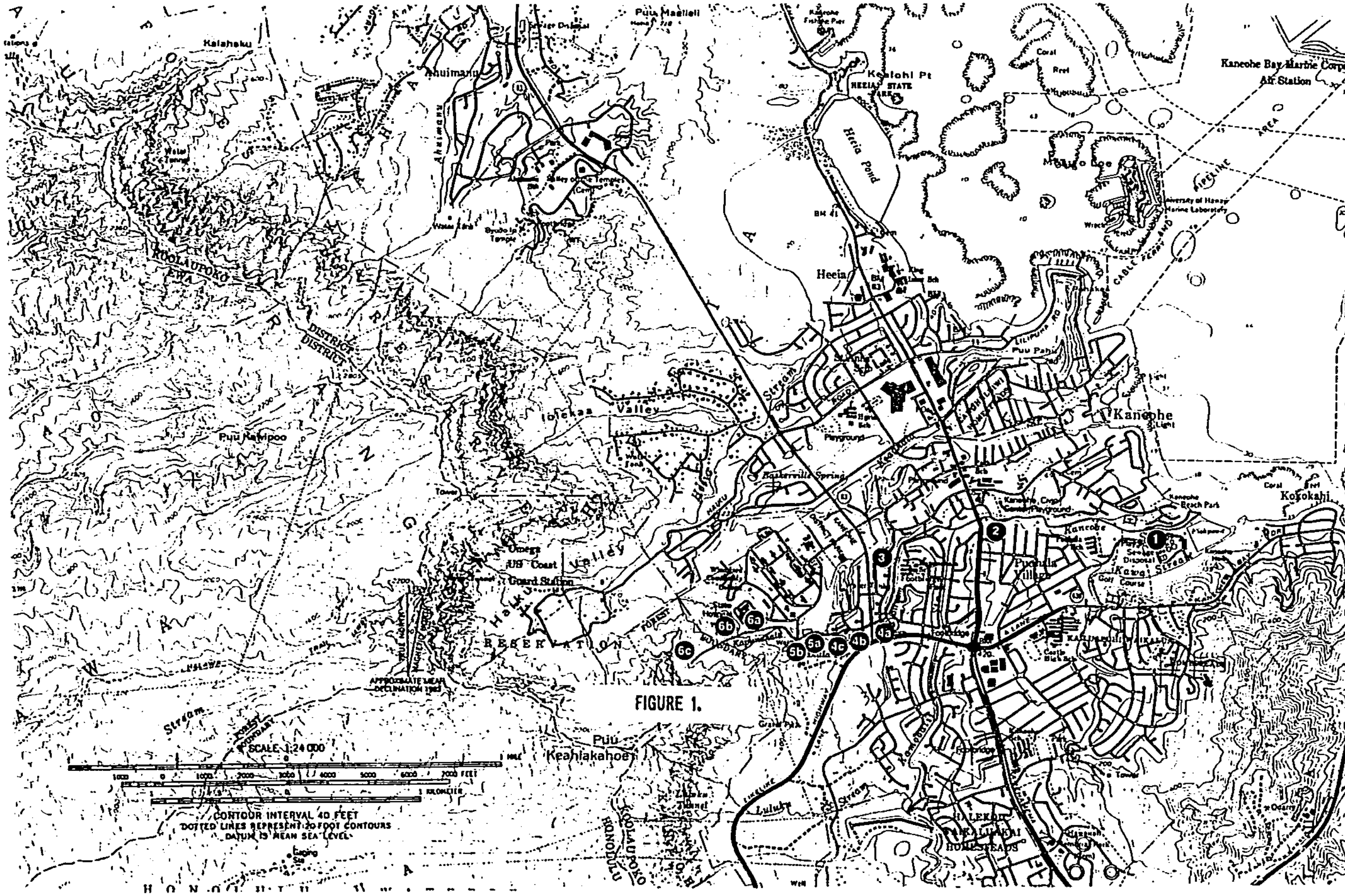
Kaneohe Bay Marine Corps Air Station
Kealohi Pt
HEEIA STATE PARK
Heeia Pond
Heeia
Kaneohe
Kokokahi
Puu Maelieli
Ahuimanu
Kalahaku
KOOLAUPOKO
EWA
DISTRICT
Puu Keahiakahoe
Ioleka'a Valley
Puu Kawipoo
Omega US Coast Guard Station
Baskerville Spring
Pohakea Village
Kaneohe Stream
Golf Course
Kaneohe Beach Park
Coral Reef
Luluku
HONOLULU
HAIKU
RESERVATION
FOREST
SCALE 1:24 000
1 MILE
1000 0 1000 2000 3000 4000 5000 6000 7000 FEET
1 KILOMETER
CONTOUR INTERVAL 40 FEET
DOTTED LINES REPRESENT 20 FOOT CONTOURS
DATUM IS MEAN SEA LEVEL
APPROXIMATE MEAN DECLINATION 1983
Stream
1
2
3
4a
4b
4c
5a
5b
6a
6b
6c

FIGURE 1.

almost exclusively of a concrete-lined channel. The stream maintains this character to its confluence with Kaneohe Stream. From its confluence with Kapunahala Stream to the ocean, Kaneohe Stream consists almost completely of an artificial (mostly concrete-lined) channel. The South Fork Kapunahala Stream, which has been gauged by the USGS since 1987, has an average flow of 2.56 ft^3/s (based on a five-year period).

For this assessment, Kapunahala Stream system was delineated into representative reaches based on field reconnaissance and information from USGS quadrangle maps. Between 1 and 3 sampling stations were established in each reach (Table 7.1; Figure 1). The following paragraphs provide a description of all sampling stations in Kapunahala and Kaneohe Streams.

2.1 SAMPLING STATION 1 (elevation: 0 ft)

Sampling station 1 was chosen to represent conditions in Reach 1 (the Kaneohe Stream estuary). The estuary extends upstream about 0.18 mi from its mouth at Kaneohe Bay. We observed the estuary in the area adjacent to the Kaneohe Sewage Treatment Facility (Photo 1). The estuary has been channelized, and the banks have been stabilized with boulders. The water in this portion of the estuary is deep and highly turbid (visibility was several inches), and the substrate likely consists of fine particles.

2.2 SAMPLING STATION 2 (elevation: 0 to 40 ft)

Reach 2 extended from the Kaneohe Stream estuary upstream approximately 0.90 mi to the confluence of Kapunahala and Kamooalii Streams (Photo 2). Sampling Station 2 extended from immediately downstream of the Kaneohe Civic Center Playground, under Kamehameha Highway to the point at which Kapunahala and Kamooalii Streams join. The channel in this section has been highly modified. Upstream of the highway the channel is comprised of a concrete flume with patches of natural substrate (primarily gravel and cobble). Downstream of the highway the channel and banks are largely composed of natural material, although the channel appears to have been straightened and widened.

2.3 SAMPLING STATION 3 (elevation: 60 ft)

This station was selected to represent conditions in Reach 3. This reach extended 0.60 mi from the confluence of Kapunahala and Kamooalii Streams to the confluence of Kapunahala Stream and an unnamed tributary (just downstream of the Koolau Baptist Church). The station was located adjacent to the Kapunahala School footbridge. Again, the stream consists of a concrete channel with no natural substrate. During this assessment, the wetted area of the channel was about 40 ft wide, and depth averaged 2-3 inches.

2.4 SAMPLING STATIONS 4a THROUGH 4c (elevation: 150 to 200 ft)

Sampling stations 4a through 4c were chosen to portray conditions in Reach 4. Reach 4 extends 0.30 mi from the confluence of Kapunahala Stream and the unnamed tributary upstream to

Pookela Street. Near Kahekili Highway (Stations 4a and 4b) Kapunahala Stream is channelized and consists primarily of sections of concrete with little natural substrate. During this assessment, this section of stream was wide and shallow (2-3 inches deep). In the area immediately downstream of Pookela Street (Station 4c), the channel is composed of natural material (mostly clay and sand) but has been straightened (Photo 3).

2.5 SAMPLING STATIONS 5a AND 5b (elevation: 220 to 240 ft)

Reach 5 extended 0.15 mi from Pookela Street to the Hawaii State Hospital Well. Although the channel is indistinct in the meadow area upstream of Pookela Street, the Kapunahala Stream goes underneath Pookela Street through a recently constructed concrete box culvert (Photo 4). Sampling station 5a (Photo 5) was located in the historical channel adjacent to the large wet meadow up-gradient of Pookela Street, which is about 600 ft down-gradient of the Hawaii State Hospital Well. This portion of the channel is directly adjacent to the project area; the project area is separated from this portion of channel by a small ridge located on the south side of the wet meadow. The proposed driveway will run on the north side of the small ridge. The historical Kapunahala Stream channel is located on the south side of this small ridge.

Station 5b was located immediately downstream of the confluence of the Kapunahala Stream and the well inflow channel. During late July, Station 5a was dry except for small isolated puddles of stagnant water. Station 5b, located within the horticultural area associated with the well, contained very little flow (Photo 6).

2.6 SAMPLING STATIONS 6a THROUGH 6c (elevation: 380 to 880 ft)

Sampling stations 6a through 6c were chosen to represent conditions from just up-gradient of the Hawaii State Hospital Well 0.59 mi to the origin of Kapunahala Stream (Reach 6). This reach of stream is intermittent and was dry during late July. Sampling station 6a was located adjacent to the Hawaii State Hospital. Channel gradient at station 6a is considerably higher than at downstream sections, and substrate consists of larger particles (i.e., cobble and small boulders). Station 6b was located directly beneath the H-3 overpass. Channel gradient is high and substrate consists of large boulders interspersed with sand. Station 6c was located at the headwater of Kapunahala Stream (Photo 7). The channel here is less defined than downstream. Gradient is high (>10%) and substrate consists of large boulder and cobble as well as patches of exposed bedrock. There was little evidence that the channel had contained appreciable amounts of flow at any time in the recent past. Specifically, the channel was almost completely invaded by terrestrial herbaceous plants.

3.0 METHODS

3.1 GENERAL METHODS

At each sampling station, water temperature and altitude were measured, channel substrate was evaluated, and the dominant riparian vegetation was identified. Temperature was measured with a hand-held thermometer, and altitude was estimated using a combination of the USGS quadrangle map (Kaneohe) and a Casio altimeter. At Station 5b, pH was measured with a Corning PS-15 pH meter. Photographs were taken at each site to provide a characterization of channel conditions and to document field work. Total stream length and reach lengths were calculated with planimeter readings taken from the USGS quadrangle map.

3.2 FISH

Qualitative fish sampling consisted of two methods: hand netting and above-water visual observation conducted while hiking in around the stream. The purpose of netting was to verify above-water observations. Total length was estimated for the one native fish observed, and observations of spawning behavior or coloration were noted for all fish species. Snorkeling point counts (Baker and Foster 1992) were not used because depths were too shallow to allow snorkeling at Stations 2 through 5b, and visibility was too low in the estuary (Station 1). The channel was dry at the remaining stations. Moreover, quantitative population estimates (i.e., point counts) for 'o'opu would have been inappropriate in Kapunahala Stream due to low densities of native fish (Baker and Foster 1992).

For this study, the native stream fish, 'o'opu nakea, was referred to as *Awaous stamineus*. Based on recent research (Watson 1991), an alternative scientific name, *A. guamensis*, has been proposed for this species. To avoid confusion the older, more familiar species name is used in this report.

3.3 REPTILES AND AMPHIBIANS

Reptiles and amphibians were sampled by above-water observation and hand nets.

3.4 AQUATIC INVERTEBRATES (insects, crustaceans, molluscs)

Benthic (living on the stream bottom) stream invertebrates were sampled using a combination of above-water observation, hand nets, and benthic kick samples. Kick sampling involves placing a fine mesh net directly on the streambed while the substrate immediately upstream is disturbed. Invertebrates clinging to the rocks are displaced downstream and captured in the net. We used aerial hand-nets to capture adult aquatic insects (The adult stages of some stream insects, including the Category 1 and Category 2 Candidate *Megalagrion* species, live above the stream and in the surrounding riparian zone). Aquatic insect sampling effort in this survey focused on the order **Odonata** (dragonflies and damselflies) and emphasized species in the genus *Megalagrion*.

4.0 RESULTS

4.1 FISH

Station 1: Only introduced convict cichlids (*Cichlasoma nigrofasciatum*) and tilapia (*Tilapia* spp.) were observed at Station 1 (Table 7.2).

Station 2: Fish species observed or captured in Station 2 included liberty molly (*Poecilia sphenops*), green swordtail (*Xiphophorous helleri*), convict cichlid, and tilapia (Table 7.2). Of these introduced species, liberty molly and convict cichlid were most abundant (Photo 8). Density of these species was estimated to be as high as 30 individuals/yd^2 in some sections of the stream (generally low-velocity areas along the stream margin). Both mollies and convicts were spawning during the stream assessment (late July).

Station 3: *Poecilia* spp. were observed in this section of Kapunahala Stream. However, because of shallow depths and unnatural substrate conditions (concrete-lined channel), fish densities were low.

Stations 4a through 4c: A single 'o'opu nakea (*Awaous stamineus*), approximately 3.5 in total length, was observed in Station 4b (immediately upstream of Kahekili Highway) (Photo 9). This was the only endemic fish species encountered during the assessment. Reach 4 was dominated by guppies (*Poecilia reticulata*), although a single male green swordtail was captured in Station 4c.

Stations 5a and 5b: High densities (>30/yd^2) of guppies were captured at Station 5b. Station 5a was dry except for small isolated puddles formed in depressions in the channel. Consequently no fish were found in this area.

Stations 6a through 6c: Kapunahala Stream is intermittent up-gradient of the Hawaii State Hospital Well. This portion of the stream was not flowing during this (21-23 July) assessment.

4.2 REPTILES AND AMPHIBIANS

Amphibians: Adult and larval giant marine toads (*Bufo marinus*) were observed and captured in Station 2 only (Table 7.2). Toad eggs were also present in slow-flowing areas near the stream bank. No other amphibian species were encountered in Kapunahala or Kaneohe Streams during this assessment.

Reptiles: A single dead softshell turtle (*Trionyx sinensis sinensis*) was found in Station 4a (Table 7.2). No other reptile species were encountered in Kapunahala or Kaneohe Streams during this assessment.

4.3 MACROINVERTEBRATES

Insects: No federally listed Category 1 or 2 Candidate *Megalagrion* damselfly species were encountered within or in or adjacent to the stream. However, an introduced damselfly species, *Ischnura ramburi*, was observed in Station 2 (Table 7.2). This adult individual was observed perching on a large rock on the stream bank. No other aquatic insect species was observed during this assessment.

Crustaceans: Crayfish (*Procambarus clarki*) were abundant (up to 20 individuals/yd^2) at Stations 4a through 4c and 5b (Table 7.2). Despite intense sampling (hand nets and kick samples) in Station 2, no crayfish were found. No native crustaceans were found in any sampling station during this assessment.

Molluscs: Two introduced mollusc species, the asiatic clam (*Corbicula fluminea)* and an introduced snail species (*Thiaria* spp.), were encountered in Station 2 (Table 7.2). No native mollusc species were found in Kapunahala or Kaneohe Streams, and no exotic species were observed outside of Station 2.

4.4 STREAM-CHANNEL AND HABITAT CHARACTERISTICS

Riparian Vegetation: The composition of the riparian vegetation varied substantially among sampling stations. Vegetation at Station 1 was composed primarily of Job's tears (*Coix lachryma-jobi*), California grass (*Brachiaria mutica*), and banana (Musaceae). At Station 2 Job's tears was again dominant near the stream bank, and common tree species included mango (*Mangifera indica*) and some kukui (*Aleurites moluccana*). Station 3 was located by the Kapunahala School footbridge. The east bank was composed of a large garden containing a wide variety of agricultural and horticultural plants, and the west bank was occupied by a subdivision (lawns and ornamental species). Riparian vegetation in Stations 4a through 4c consisted primarily of Job's tears, banana, and a number of introduced species that we were unable to identify. Station 5a, the area adjacent the project location, was dominated by Job's tears. The historical channel was dry in this area during this assessment; this portion of the study area consists of a large wet meadow in which no perceptible flow occurs. Water in this portion of the study area appears to flow underground (see Section 2.0). Banana, ginger (Zingiberaceae), hau (*Hibiscus tiliaceus*), Java plum (*Syzygium cumini*), and umbrella tree (*Schefflera actinophylla*) were also present. Station 5b was dominated by hau, kukui and fern species. Hau, Java plum, and banana were prevalent at Station 6a, and Station 6b was dominated by mango and Chinese banyan (*Ficus microcarpa*). The steep slopes of the headwater region (Station 6c) were dominated by a'wa puhi kuahiwi (*Zingiber zerumbet*), ti (*Cordyline fruticosa*), and fern species.

Substrate and Habitat: Substrate composition varied considerably among stations. At Station 1 the streambed was probably composed of mostly fine material (sand and silt) and the banks were lined with boulders (> 10 in). At Station 2 the concrete-lined channel was interspersed with areas of more natural substrate dominated by gravel (<1 in). Cobble (3 to 6 in) and small

boulders were also present. More complex substrate was present in small pools and deeper runs that represented better fish habitat than that associated with more channelized area. Station 3 consisted entirely of a concrete channel, with very little fish habitat.

Station 4a was also a concrete channel, whereas Station 4c consisted of a mixture of natural substrate (sand and small boulders) that appeared to have been washed onto the concrete-lined channel. Station 4c was an incised clay channel that contained a few relatively deep (2 ft) pools (sand/silt substrate) an some riffle habitat (gravel substrate). Overall, fish habitat appeared best in the upper portion of Reach 4. Substrate in the dry channel at Station 5a and 5b was dominated by sand and silt, with patches of gravel. Station 5a, near the project area, was overgrown with vegetation in places, and had no clear incised channel. In Station 5b the channel was very shallow and fish habitat was limited.

As expected, substrate was composed of larger particles in the high-gradient areas of Stations 6a through 6c. Stations 6a and 6b had a substrate of larger boulders (2-3 ft) intermixed with sand and gravel. In Station 6c, substrate was comprised almost completely of large cobble (6 to 10 in) and boulders, with patches of exposed bedrock.

Temperature and pH: Predictably, water temperature was inversely related to altitude. Water temperature varied from 21 to 22 °C at Reaches 5 and 4, respectively, to 26 °C in Reach 2. We measured pH at Station 5b (down-gradient of the Hawaii State Hospital Well) only; pH, measured at 7.9, was slightly basic.

5.0 DISCUSSION

5.1.1 FISH

Kapunahala Stream and Kaneohe Stream was inhabited by high numbers of six introduced fish and one crustacean species. This was probably because the system has been almost entirely channelized from an elevation of about 380 ft downstream to Kaneohe Bay. Two poeciliid species and green swordtails accounted for nearly all the fish, numbers and biomass, in the Kapunahala Stream. Only one native stream ‘o‘opu (*A. stamineus*) was observed within the Kapunahala Stream.

The degree to which this system has been impacted by channelization and urbanization is reflected in the apparent lack of recruitment by native stream fish. No hinana (returning post-larval ‘o‘opu) were observed, suggesting that little recruitment occurs. A major ecological requirement for ‘o‘opu is the need to pass through a stream mouth at two times during the life of the individual (Kinzie 1990). Channelization of this system may interfere with fish migration. Other reasons why native fish do not appear to recruit to the upper Kapunahala Stream may include introduced biota (especially predators), stream diversion (such as the Hawaii State Hospital Well), or degraded water quality. For example, ascending post-larval *A. stamineus* encounter high densities of the introduced predator, *C. nigrofasciatum*, which is suspected to be

a major predator of native fish (Devick 1991). The negative effects of introduced piscivores (fish predators) have been documented on fish populations in many areas, for example North Carolina (Lemly 1985) and the Colorado River basin (Minckley 1983).

However, a lack of baseline population data, makes it difficult to evaluate the historical (prior to anthropogenic disturbances) status of endemic fish in the Kapunahala system. Qualitative sampling conducted in 1976 (Timbol and Maciolek 1978) and 1989 (HDAR Database 1993) on the lower Kaneohe Stream and Kapunahala Stream indicates that fish species composition has consisted mainly of introduced species for about the past twenty years (Table 7.3).

None of the native endemic 'o'opu found within the Kapunahala Stream are currently listed as threatened or endangered by the Federal Government. *L. concolor* is the 'o'opu species that is currently under consideration for listing as an endangered species by the U.S. Fish & Wildlife Service, but was not found during this survey. *L. concolor* is listed as threatened by the American Fisheries Society (Deacon et al. 1979), and is currently a Category One Candidate Endangered Species (Dodd et al. 1985). The probability of *L. concolor* being found in this stream is extremely low due to its preference for unchannelized streams with unsilted channels, and low water temperatures (Englund 1993).

5.1.2 POTENTIAL IMPACTS TO NATIVE FISH

The proposed Hope Chapel Kaneohe Driveway project should have no significant impact on native Hawaiian stream fish within Kapunahala/Kaneohe Stream or on the island of Oahu. Based on this assessment and previous studies, the Kapunahala/Kaneohe Stream system contains a very low number of native fish. Furthermore, the Hope Chapel Kaneohe Driveway project is limited in magnitude and duration. Effects of the proposed driveway would be immeasurable relative to existing perturbations (eg., introduced fauna and channelization). However, erosion control best management practices such as sediment barriers should be implemented to minimize sediment input into both Kapunahala and Kaneohe Stream and, ultimately, Kaneohe Bay. In addition, areas disrupted by construction should be quickly revegetated to reduce impacts of erosion and sedimentation on the Kapunahala Stream system.

5.2.1 NATIVE AQUATIC INVERTEBRATES

As mentioned above, Kapunahala Stream retains little of its original stream channel or vegetative character, even in the uppermost reaches. Abundance and diversity of native and introduced aquatic insect species were low in the Kapunahala/Kaneohe Stream system. The only aquatic insect species visually observed during this survey was an introduced species of damselfly, *I. ramburi*, which is commonly found in disturbed streams in the Hawaiian Islands. Undoubtedly more intensive surveys would reveal a limited number of introduced aquatic insect species. However, it is unlikely that native aquatic insect species persist in this system. No native *Megalagrion* damselflies were observed during this biological assessment.

5.2.2 POTENTIAL IMPACTS TO NATIVE AQUATIC INVERTEBRATES

Because native invertebrates are uncommon in the system, and the scope of the proposed Hope Chapel Kaneohe Driveway project is limited, no significant impacts to native invertebrates are expected.

6.0 REFERENCES CITED

Baker, J.A. and S.A. Foster. 1992. Estimating density and abundance of endemic fishes in Hawaiian Streams. Hawaii Division of Aquatic Resources, 50 pp.

Deacon, J.E., G. Kobetich, J.D. Williams, and S. Contreras. 1979. Fishes of North America endangered, threatened or of special concern. Fisheries 4: 29-44.

Devick, W.S. 1991. Patterns of introduction of aquatic organisms to Hawaiian freshwater habitats. *In:* Proceedings of the 1990 Symposium on Freshwater Stream Biology and Fisheries Management. 318 pp.

Devick, W.S., J.M. Fitzsimons, and R.T. Nishimoto. 1992. Conservation of Hawaiian Freshwater Fishes. Hawaii Division of Aquatic Resources. 26 pp.

Dodd, C.K., Jr., G.E. Drewry, R.M. Nowak, J.M. Sheppard, and J.D. Williams. 1985. Endangered and threatened wildlife and plants; review of vertebrate wildlife. Federal Register 50: 37957-37967.

Englund, R.A. 1993. The effects of stream channelization on *Lentipes concolor* and *Sicyopterus stimpsoni* distribution and abundance on Oahu. International Symposium on Hawaiian Stream Ecology, Preservation, and Management. Hilo, Hawaii.

Kinzie, Robert A., III. 1990. Species profiles: life histories and environmental requirements of coastal vertebrates and invertebrates, Pacific Ocean Region; Report 3 Amphidromous Macrofauna of Island Streams. Technical Report EL-89-10, U.S. Army Engineer Waterways Experiment Station, Vicksburg, MS.

Lemly, A.D. 1985. Suppression of native fish populations by green sunfish in first-order streams of piedmont North Carolina. Transactions of the American Fisheries Society 114: 705-712.

Minckley, W.L. 1983. Status of the razorback sucker, *Xyrauchen texanus* (Abbott) in the lower Colorado River basin. Southwestern Naturalist 28(2): 165-187.

Timbol, A.S. and J.A. Maciolek. 1978. Stream channel modification in Hawaii part a: statewide inventory of streams, habitat factors and associated biota. U.S. Fish and Wildlife Service Contract No. 14-16-0008-1199.

Watson, R.E. 1991. A provisional review of this genus *Stenogobius* with descriptions of a new subgenus and thirteen new species. Records of the Western Australian Museum. 15(3):571-654.

7.0 TABLES

Table 7.1. Description of sampling stations used for the assessment of Kapunahala Stream, 21-23 July, 1994.

Sampling station	Location	Date sampled	Reach	Elevation (ft)
1	Kaneohe Stream estuary adjacent to sewage treatment facility	7-23-94	1	0
2	Kaneohe Stream from confluence of Kapunahala and Kamooalii Stream to the Kaneohe Civic Center Playground	7-23-94	2	0-40
3	Kapunahala Stream at the Kapunahala School footbridge	7-23-94	3	60
4a	Kapunahala Stream adjacent to Koolau Baptist Church	7-23-94	4	150
4b	Kapunahala Stream immediately upstream of Kahekili Highway	7-23-94	4	160
4c	Kapunahala Stream approximately 100 yd downstream of Pookela Street	7-23-94	4	200
5a[1]	Kapunahala Stream approximately 200 yd down-gradient of Hawaii State Hospital Well (historical channel)	7-22-94	5	220
5b	Kapunahala Stream immediately downstream of confluence with Hawaii State Hospital Well inflow channel	7-22-94	5	240
6a[1]	Kapunahala Stream adjacent to Hawaii State Hospital	7-21-94	6	380
6b[1]	Kapunahala Stream directly under H-3 overpass	7-21-94	6	500
6c[1]	Kapunahala Stream at channel origin	7-22-94	6	820-880

[1] **Kapunahala Stream was dry at these sampling stations during the 21-24 August stream assessment**

Table 7.2. Aquatic biota observed and collected in Kaneohe/Kapunahala Stream from 21-23 July, 1994.

Scientific name	Common name	Elevation (ft)[1]					Biogeographical status[2]
		0 (Reach 1)	0 to 40 (Reach 2)	40 to 80 (Reach 3)	80 to 200 (Reach 4)	200 to 240 (Reach 5)	
Fish							
Awaous stamineus	'o'opu nakea				X		endemic
Poecilia sphenops	liberty molly		X				introduced
Poecilia reticulata	guppy				X	X	introduced
Poecilia spp.	poeciliid			X			introduced
Xiphophorus helleri	green swordtail		X		X		introduced
Cichlasoma nigrofasciatum	convict cichlid	X	X				introduced
Tilapia spp.	tilapia	X	X				introduced
Reptiles							
Trionyx sinensis sinensis	softshell turtle				X		introduced
Amphibians							
Bufo marinus	giant marine toad		X				introduced
Crustaceans							
Procambarus clarki	crayfish				X	X	introduced
Aquatic Insects							
Ischnura ramburi (Odonata)	damselfly		X				introduced
Molluscs							
Corbicula fluminea	asiatic clam		X				introduced
Thiaria spp.	snail		X				introduced

[1] Kapunahala Stream was dry above 240 ft elevation

[2] From Devick et al. (1992); Devick (1991)

Table 7.3. Temporal comparison of fish species composition in the Kaneohe/Kapunahala Stream system.

Scientific name	Common name	1975/1976[1]	1989[2]	1994[3]
Gobiidae				
Awaous stamineus (guamensis)	'o'opu nakea	X	X	X
Stenogobius hawaiiensis	'o'opu naniha		X	
Eleotridae				
Eleotris sandwicensis	'o'opu 'akupa	X	X	
Ictaluridae				
Ictalurus punctatus	channel catfish		X	
Clariidae				
Clarias fuscus	Chinese catfish	X	X	
Poecilidae				
Gambusia affinis	western mosquitofish	X	X	
Poecilia reticulata	guppy	X		X
Poecilia sphenops (mexicana)	liberty molly	X		X
Poecilia spp.	-		X	X
Xiphophorus helleri	green swordtail	X		X
Xiphophorus maculatus	southern platyfish	X		
Xiphophorus spp.	-		X	
Cichlidae				
Cichlasoma nigrofasciatum	convict cichlid			X
Cichlasoma spp.	-	X		
Tilapia mossambica	tilapia	X		
Tilapia spp.	tilapia		X	X
TOTAL TAXA	-	10	9	7

[1] From Timbol and Maciolek (1978)
[2] From HDAR records (1989)
[3] From Pacific Aquatic Environmental Assessment (1994)

8.0 PHOTOGRAPHIC RECORD

Photo 1: Station 1 - Kaneohe Stream Estuary

Photo 2: Station 2 - Kaneohe Stream at confluence of Kapunahala and Kamooalii Streams

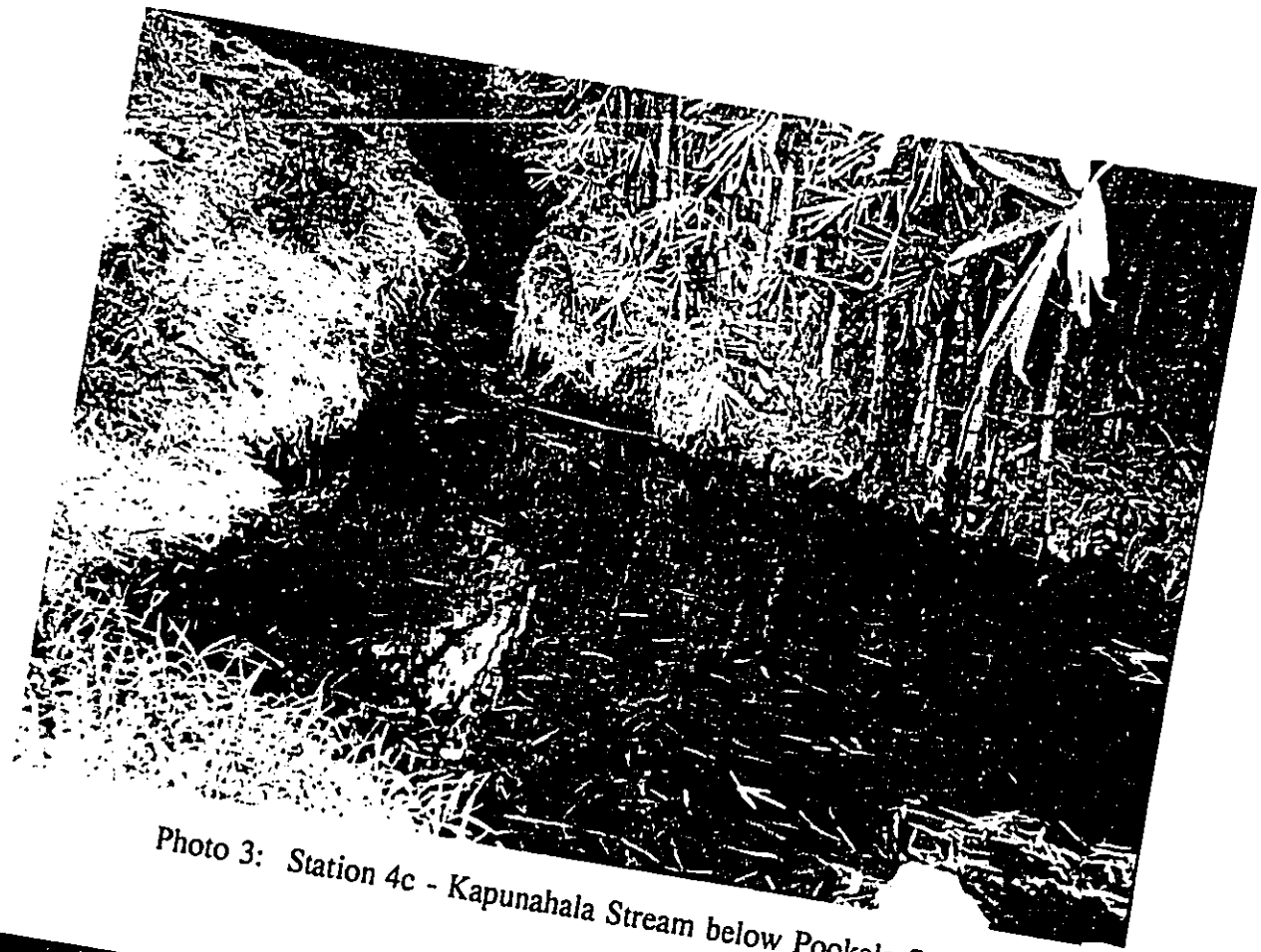

Photo 3: Station 4c - Kapunahala Stream below Pookela Street

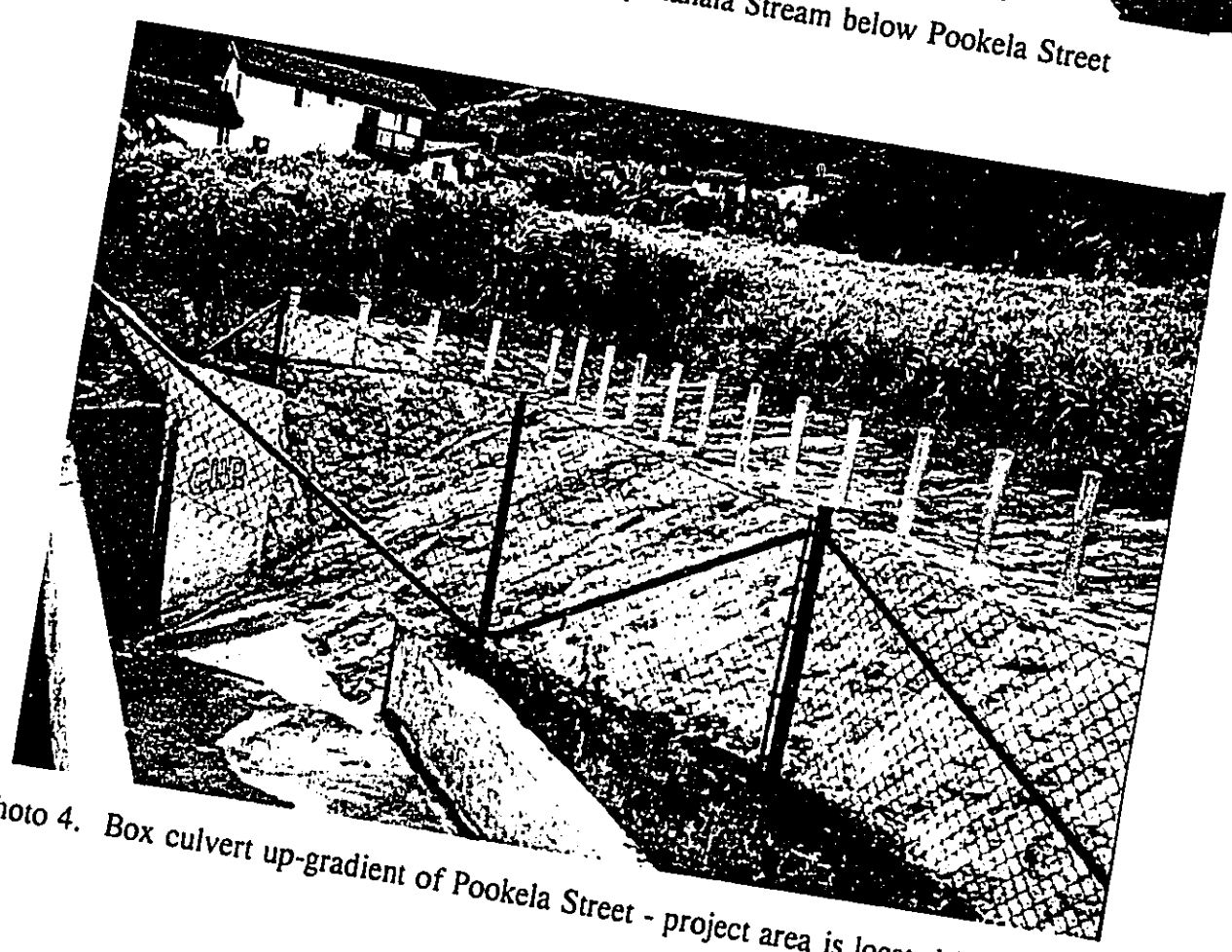

Photo 4. Box culvert up-gradient of Pookela Street - project area is located in background

CORRECTION

THE PRECEDING DOCUMENT(S) HAS
BEEN REPHOTOGRAPHED TO ASSURE
LEGIBILITY
SEE FRAME(S)
IMMEDIATELY FOLLOWING

Photo 3: Station 4c - Kapunahala Stream below Pookela Street

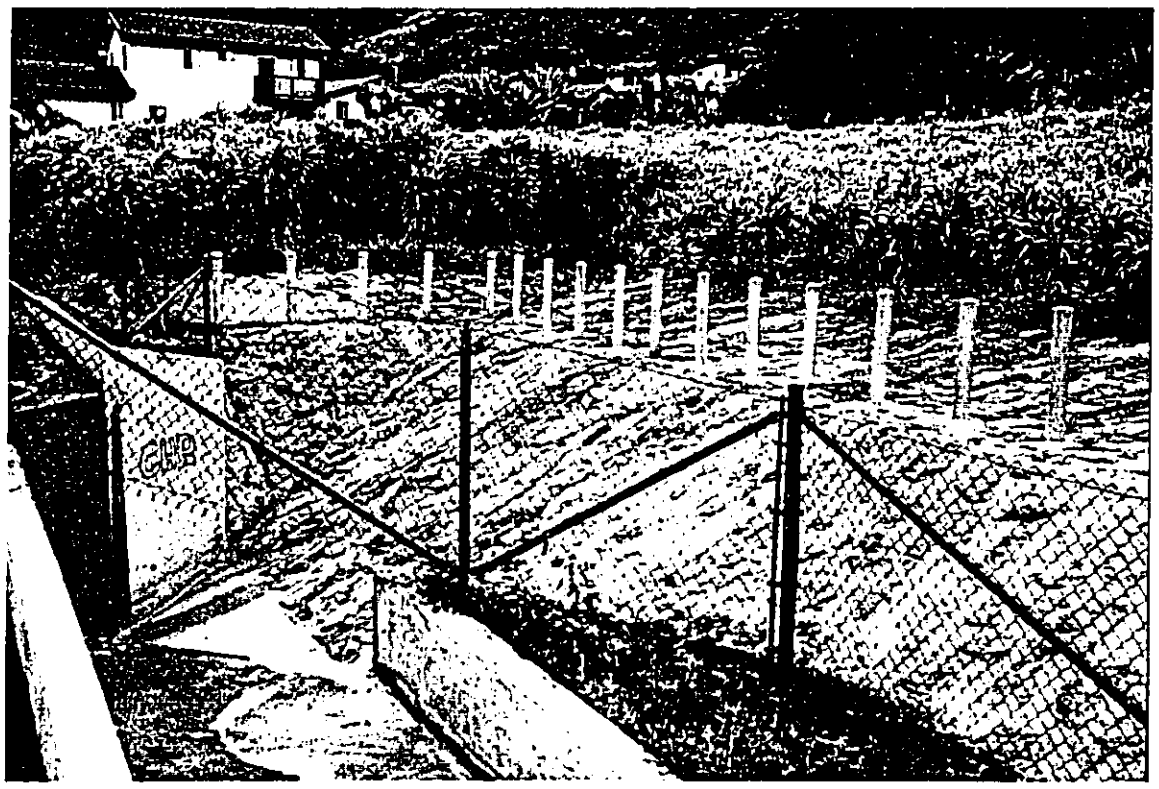

Photo 4. Box culvert up-gradient of Pookela Street - project area is located in background

Photo 5: Station 5a - Dry (historical) channel adjacent to project area

Photo 6: Station 5b - Kapunahala Stream below Hawaii State Hospital Well

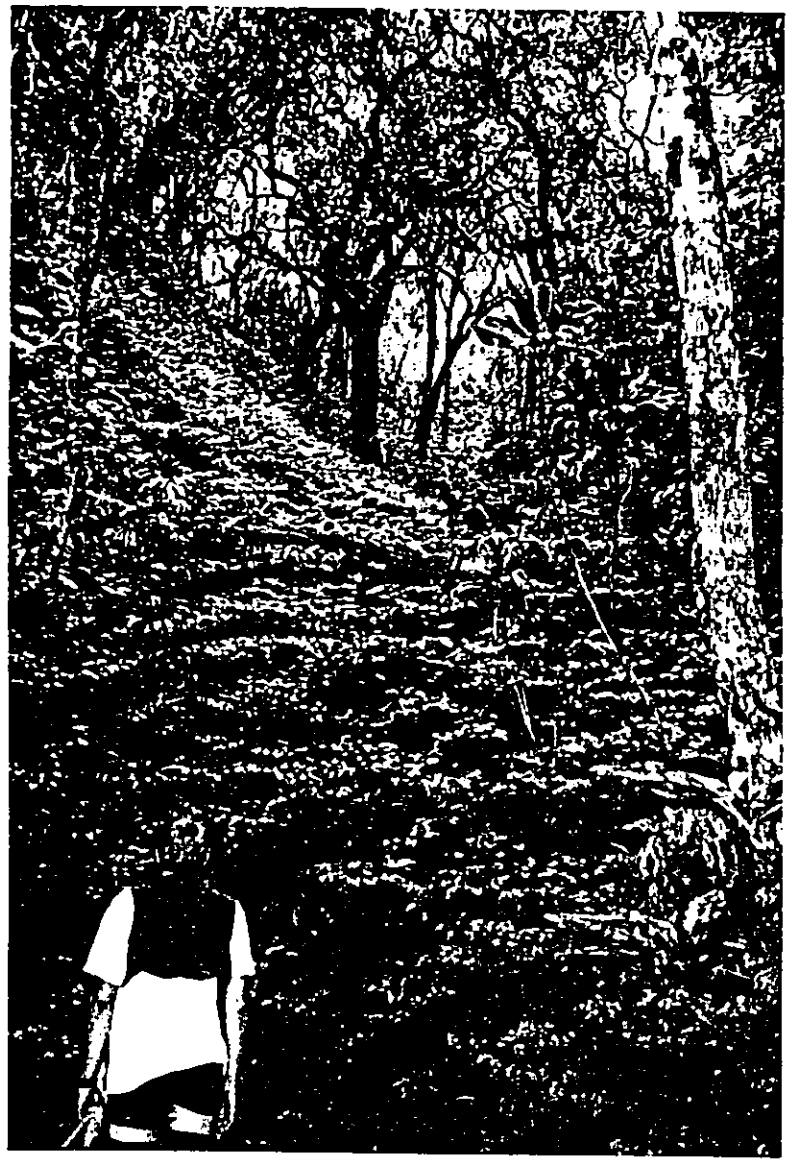

Photo 7: Station 6c - Kapunahala Stream headwater (about 900 ft)

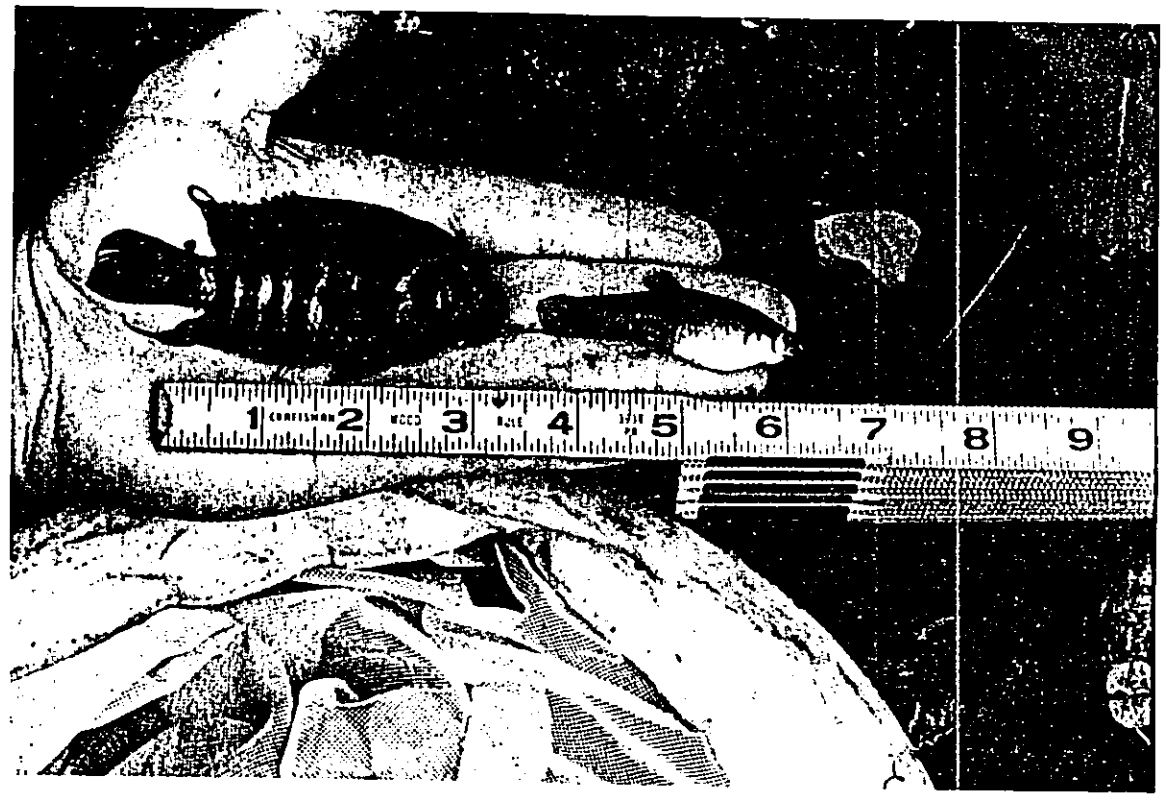

Photo 8: Introduced fish species captured at Station 2
Left (*Cichlasoma nigrofasciatum*)
Right (*Poecilia sphenops*)

Photo 9: Station 4b - Location where ‘o‘opu nakea was observed (*Awaous stamineus*)

ENGLUND-FILBERT PARTNERSHIP - STREAM ASSESSMENT

STREAM:	Kaneohe St. Estuary	REACH:	Reach #1
ELEVATION:	sea level -0-	DATE:	7-23-94
TEMPERATURE:	—	TIME:	1630
SUBSTRATE:	1) Sand 2) Silt 3) boulder banks	RIPARIAN VEGETATION:	1) banana 2) Job's tears 3) other exotics
PERSONNEL:	Filbert - Englund	Photograph #:	16,17 (Roll #3)

TAXA	PRESENT	HABITAT	ESTIMATED DENSITY (#/ft²)	COMMENTS
Crustacea				T
Atyoida bisulcata				
Macrobrachium grandimanus				
M. lar				* @ Sewage Disposal Plant
Procambarus. clarki				
Mollusca				
Neritina granosa				
Theodoxus verpertinus				
Melania sp.				* Turbidity precluded snorkeling
Corbicula fluminea				
Insecta				
Odonata				
Magalagrion spp.				* Too deep to sample w/out boat
Ischnura ramburi				
Trichoptera				
Diptera				
Fish				
Awaous stamineus (guamensis)				
Sicyopterus stimpsoni				
Lentipes concolor				
Stenogobius genivittatus				
Eleotris sandwicensis				
Mugil cephalus				
Kuhulia sandvicensis				
Cichlasoma nigrofasciatum	✓			
Tilapia spp.	✓			
Gambusia affinis				
Poecilia sphenops				
P. reticulata				
Xiphophorus helleri				
Micropterus dolomeui				
Amphibia				
Bufo marinus				
Rana spp.				

ENGLUND-FILBERT PARTNERSHIP - STREAM ASSESSMENT

STREAM:	Kaneohe	REACH:	Reach #2
ELEVATION:	6-40	DATE:	7-23-94
TEMPERATURE:	26°C	TIME:	1340
SUBSTRATE:	1) gravel 2) cobble 3) boulder	RIPARIAN VEGETATION:	1) kukui 2) Job's tears 3) mango } all order of exotic tree sp.
PERSONNEL:	Filbert - Englund	Photograph #:	10, 11, 12, 13 - 15 Roll #3

TAXA	PRESENT	HABITAT	ESTIMATED DENSITY (#/m²)	COMMENTS
Crustacea				
Atyoida bisulcata				
Macrobrachium grandimanus				
M. lar		saw no crustaceans in more than 20 (10 kicks)		Riffle habitat w/ slack water at margins
P. clarki				
Mollusca				
Neritina granosa				
Theodoxus vespertinus				Just below confluence
Corbicula fluminea	✓	T		of two-channel
Thiaridae	✓			stream - See topo.
Insecta				
Odonata - Ischnura ramburi	✓			
Megalagrion spp.				
Trichoptera				Mollusc were
Diptera				actively engaged
				in spawning -
Fish				many very convicts
Awaous stamineus (guamensis)				-
Sicyopterus stimpsoni				
Lentipes concolor				High densities
Stenogobius genivittatus				of fish > 50/m²
Eleotris sandwicensis				in some locations
Mugil cephalus				
~~*Kuhlia sandvicensis*~~ Cichlasoma nigrofasciatum	✓			
Tilapia spp.	✓			Sampled a
Gambusia affinis		Poecilia sphenops ✓		250 m segment
Xiphophorus spp.	✓			
Micropterus dolomieui				
Poecilia reticulata	✓			
Amphibia				
Bufo marinus	✓			
Rana spp.				

ENGLUND-FILBERT PARTNERSHIP - STREAM ASSESSMENT

STREAM:	Kapunahala	REACH:	Reach #3
ELEVATION:		DATE:	7-23-94
TEMPERATURE:	—	TIME:	1230
SUBSTRATE:	1) CONCRETE 2) 3)	RIPARIAN VEGETATION:	1) Student horticulture 2) Variable - fruit producing 3) Species
PERSONNEL:	Filbert England	Photograph #:	8-9 RM #3

TAXA	PRESENT	HABITAT	ESTIMATED DENSITY (m²)	COMMENTS
Crustacea				T
Atyoida bisulcata				
Macrobrachium grandimanus				
M. lar				
Procambarus. clarki				* @ Kapunahala School footbridge
Mollusca				
Neritina granosa				
Theodoxus verpertinus				
Melania sp.				Channel composed
Corbicula fluminea				completely of
Insecta				concrete flume
Odonata				
Megalagrion spp.				
Ischnura ramburi				
Trichoptera				
Diptera				
Fish				
Awaous stamineus (guamensis)				
Sicyopterus stimpsoni				
Lentipes concolor				
Stenogobius genivittatus				
Eleotris sandwicensis				
Mugil cephalus				
Kuhulia sandvicensis				
Cichlasoma nigrofasciatum				
Tilapia spp.				
Gambusia affinis				
Poecilia sphenops	Poecilia spp. observed.			
P. reticulata				
Xiphophorus helleri				
Micropterus dolomeui				
Amphibia				
Bufo marinus				
Rana spp.				

ENGLUND-FILBERT PARTNERSHIP - STREAM ASSESSMENT

STREAM:	Kapunahala	REACH:	Reach #4a
ELEVATION:	150	DATE:	7-23-94
TEMPERATURE:	22° C	TIME:	1140
SUBSTRATE:	1) Concrete channel 2) 3)	RIPARIAN VEGETATION:	1) Job's tears 2) herbaceous spp. 3)
PERSONNEL:	Filbert - England	Photograph #:	—

TAXA	PRESENT	HABITAT	ESTIMATED DENSITY (#/ft²)		COMMENTS
Crustacea					
Atyoida bisulcata					
Macrobrachium grandimanus					
M. lar					
P. clarki	✓		>10	*	Section adjacent to Koolau Baptist Church - St ?
Mollusca					
Neritina granosa					
Theodoxus verpertinus					
Corbicula fluminea					
Insecta					below this section Kapunahala Stream joins another Concrete flume - unnamed tribe
Odonata					
Megalagrion spp.					
Trichoptera					
Diptera					
Fish					
Awaous stamineus (guamensis)				*	Dead soft-shell turtle
Sicyopterus stimpsoni					
Lentipes concolor					
Stenogobius genivittatus					
Eleotris sandwicensis					long "riffle" lg. pool x 2.5' max depth
Mugil cephalus					
Kuhulia sandvicensis					
Tilapia spp.					
Gambusia affinis					200 ft sampled
Xiphophorus spp.	✓				
Micropterus dolomeui					
Poecilia reticulata	✓	>50			
Amphibia					
Bufo marinus					
Rana spp.					

ENGLUND-FILBERT PARTNERSHIP - STREAM ASSESSMENT

STREAM:	Kapunahala	REACH:	Reach # 4 b
ELEVATION:	160 ft	DATE:	7-23-94
TEMPERATURE:		TIME:	1121
SUBSTRATE:	1) Concrete 2) Sand 3) washed-in? boulders	RIPARIAN VEGETATION:	1) Banana 2) Job's tears 3) introd. herbaceous sp.
PERSONNEL:	England / Filbert	Photograph #:	#7 Roll #3

TAXA	PRESENT	HABITAT	ESTIMATED DENSITY (m²)	COMMENTS
Crustacea				
Atyoida bisulcata				
Macrobrachium grandimanus			X	Concrete channel
M. lar				terminates where
P. clarki	✓		high density (5-10)	triple culvert
				runs under Kahekili
Mollusca				
Neritina granosa				
Theodoxus varpertinus				
Corbicula fluminea				
Insecta				
Odonata				sweep nets
Megalagrion spp.				taken over a
Trichoptera				180 ft length of
Diptera				stream
Fish				
Awaous stamineus (guamensis)	✓ (1) 3.5"			
Sicyopterus stimpsoni				
Lentipes concolor				
Stenogobius genivittatus				
Eleotris sandwicensis				
Mugil cephalus				
Kuhulia sandvicensis				
Tilapia spp.				
Gambusia affinis				
Xiphophorus spp.				
Micropterus dolomeui				
Poecilia reticulata	✓		>5	
Amphibia				
Bufo marinus				
Rana spp.				

ENGLUND-FILBERT PARTNERSHIP - STREAM ASSESSMENT

STREAM:	Kapunahala	REACH:	Reach #4c
ELEVATION:	≈ 200	DATE:	7-23-94
TEMPERATURE:	22°C	TIME:	1030
SUBSTRATE:	1) Pool = silt, sand, gravel/clay 2) Riffle gravel, cobble 3)	RIPARIAN VEGETATION:	1) bamboo 2) banana 3) exotic herbs
PERSONNEL:		Photograph #:	Roll # 3, 4-5

TAXA	PRESENT	HABITAT	ESTIMATED DENSITY (m²)	COMMENTS
Crustacea				
Atyoida bisulcata				
Macrobrachium grandimanus				
M. lar				
P. clarki	✓/✓	pool/riffle	high (5-10)	Total = 4 kick-net
				samples in riffle
Mollusca				
Neritina granosa				Sweep-net ≈
Theodoxus vespertinus				50% of pool
Corbicula fluminea				
Insecta		*	Below Pookela St.	
Odonata				
Megalagrion spp.				
Trichoptera				
Diptera				
Fish		*	Also captured in this reach	
Awaous stamineus (guamensis)			Xiphophorus helleri	
Sicyopterus stimpsoni			↓ spawning?	
Lentipes concolor				
Stenogobius genivittatus				
Eleotris sandwicensis				
Mugil cephalus				
Kuhulia sandvicensis				
Tilapia spp.				
Gambusia affinis				
Xiphophorus spp.				
Micropterus dolomeui				
Poecilia reticulata	✓/✓			
Amphibia				
Bufo marinus				
Rana spp.				

ENGLUND-FILBERT PARTNERSHIP - STREAM ASSESSMENT

STREAM:	Kapunahala	REACH:	Reach 5a
ELEVATION:	220 ft	DATE:	7-22-94
TEMPERATURE:	-	TIME:	1400
SUBSTRATE:	1) Sand - silt 2) gravel 3)	RIPARIAN VEGETATION:	1) Job's tears, hau 2) ginger - Schefflera 3) banana Java plum
PERSONNEL:	Filbert - England	Photograph #:	Rolls 2 . 7-9

TAXA	PRESENT	HABITAT	ESTIMATED DENSITY (m²)	COMMENTS
Crustacea				T
Atyoida bisulcata				
Macrobrachium grandimanus				
M. lar				Channel was dry. - appeared to be location of historical flow - channel was apparent i.e. incised - however no Q was present - upstream flow appears to go subterranean just below well inflow - flows under Calif. grass meadow - flow on left side of meadow may be a spring or the resurfacing of water that began to flow underground ≈ 200 yd - upstream.
Procambarus. clarki				
Mollusca				
Neritina granosa				
Theodoxus verpertinus				
Melania sp.				
Corbicula fluminea				
Insecta				
Odonata				
Megalagrion spp.				
Ischnura ramburi				
Trichoptera				
Diptera				
Fish				
Awaous stamineus (guamensis)				
Sicyopterus stimpsoni				
Lentipes concolor				
Stenogobius genivittatus				
Eleotris sandwicensis				
Mugil cephalus				
Kuhulia sandvicensis				
Cichlasoma nigrofasciatum				
Tilapia spp.				
Gambusia affinis				
Poecilia sphenops				
P. reticulata				
Xiphophorus helleri				
Micropterus dolomieui				
Amphibia				
Bufo marinus				
Rana spp.				

ENGLUND-FILBERT PARTNERSHIP - STREAM ASSESSMENT

STREAM:	Kapunahala	REACH:	Reach 5b
ELEVATION:	240 ft	DATE:	7-22-94
TEMPERATURE:	21°C	TIME:	1320
SUBSTRATE:	1) Sand occasional cobble 6-8" 2) silt 3) gravel	RIPARIAN VEGETATION:	1) hau 2) ferns. 3) kukui
PERSONNEL:	Filbert - Englund	Photograph #:	Rll #2 5-6

TAXA	PRESENT	HABITAT	ESTIMATED DENSITY (m²)	COMMENTS
				T
Crustacea				
Atyoida bisulcata				
Macrobrachium grandimanus				
M. lar				
Procambarus. clarki	✓		5-10	
Mollusca			pH = 7.9	
Neritina granosa				
Theodoxus verpertinus				
Melanie sp.				
Corbicula fluminea				just below
Insecta				confluence of
Odonata				Kapunahala wall
Megalagrion spp.				inflow & dry
Ischnura ramburi				Kapunahala stream
Trichoptera				channel
Diptera				
Fish				
Awaous stamineus (guamensis)				
Sicyopterus stimpsoni				
Lentipes concolor				
Stenogobius genivittatus				
Eleotris sandwicensis				
Mugil cephalus				
Kuhulia sandvicensis				
Cichlasoma nigrofasciatum				
Tilapia spp.				
Gambusia affinis				
Poecilia sphenops				
P. reticulata	✓		5-10	
Xiphophorus helleri				
Micropterus dolomoui				
Amphibia				
Bufo marinus				
Rana spp.				

ENGLUND-FILBERT PARTNERSHIP - STREAM ASSESSMENT

STREAM:	Kapuna hale Stream	REACH:	Reach #6a
ELEVATION:	320'	DATE:	7/21/94
TEMPERATURE:	(Air) 29°C	TIME:	1730
SUBSTRATE:	1) Gravel 2) Sand 3) Boulders	RIPARIAN VEGETATION:	1) Hau 2) Java Plum 3) Banana
PERSONNEL:	RE/RF	Photograph #:	19 Roll #1

TAXA	PRESENT	HABITAT	ESTIMATED DENSITY (m²)	COMMENTS
Crustacea	Stream is dry here and appears to flow			
Atyoida bisulcata	only during storms. No aquatic habitat observed			
Macrobrachium grandimanus	-High gradient area of stream, stream channel			
M. lar	completely enclosed with impenetrable stands			
P. clarki	of hau.			
Mollusca		* adjacent to Hawaii State		
Neritina granosa		Hospital		
Theodoxus vespertinus				
Corbicula fluminea				
Insecta				
Odonata				
Megalagrion spp.				
Trichoptera				
Diptera				
Fish				
Awaous stamineus (guamensis)				
Sicyopterus stimpsoni				
Lentipes concolor				
Stenogobius genivittatus				
Eleotris sandwicensis				
Mugil cephalus				
Kuhulia sandvicensis				
Tilapia spp.				
Gambusia affinis				
Xiphophorus spp.				
Micropterus dolomeui				
Amphibia				
Bufo marinus				
Rana spp.				

ENGLUND-FILBERT PARTNERSHIP - STREAM ASSESSMENT

STREAM:	Kapunahala	REACH:	Reach #6 b
ELEVATION:	500 ft	DATE:	7-21-94
TEMPERATURE:	Air 29 °C	TIME:	1815
SUBSTRATE:	1) sand 2) boulder (2-3') 3) gravel	RIPARIAN VEGETATION:	1) mango 2) Banyan 3)
PERSONNEL:	Filbert England	Photograph #:	20-23 Roll #1

TAXA	PRESENT	HABITAT	ESTIMATED DENSITY (m²)	COMMENTS
Crustacea				
Atyoida bisulcata		Stream channel was dry, although		
Macrobrachium grandimanus		(as expected) evidence of flash-floods		
M. lar		was apparent - gradient 8%		
P. clarki		narrow, incised channel - Banyans growing		
		through bed.		
Mollusca				
Neritina granosa				
Theodoxus vespertinus		* Directly under H2 overpass		
Corbicula fluminea				
Insecta				
Odonata				
Megalagrion spp.				
Trichoptera				
Diptera				
Fish				
Awaous stamineus (guamensis)				
Sicyopterus stimpsoni				
Lentipes concolor				
Stenogobius genivittatus				
Eleotris sandwicensis				
Mugil cephalus				
Kuhulia sandvicensis				
Tilapia spp.				
Gambusia affinis				
Xiphophorus spp.				
Micropterus dolomaui				
Amphibia				
Bufo marinus				
Rana spp.				

ENGLUND-FILBERT PARTNERSHIP - STREAM ASSESSMENT

STREAM:	Kapiwai [illegible]	REACH:	Reach #6 c
ELEVATION:	820 - 880 ft	DATE:	7-22-94
TEMPERATURE:	NA	TIME:	1530
SUBSTRATE:	1) Boulder 2) Cobble 3)	RIPARIAN VEGETATION:	1) ginger 2) ferns 3) eucalyptus - ti
PERSONNEL:	Filbert - England	Photograph #:	10,11 (Roll # 2)

TAXA	PRESENT	HABITAT	ESTIMATED DENSITY (m²)	COMMENTS
Crustacea		*	Headwaters — Origin	T
Atyoida bisulcata				
Macrobrachium grandimanus				
M. lar				High gradient
P. clarki				intermittent channel
				- largely filled
Mollusca				w/ vegetation
Neritina granosa				indicating that
Theodoxus vespertinus				flow is infrequent
Corbicula fluminea				and low in volume
Insecta				
Odonata				ieie - present
Megalagrion spp.				
Trichoptera				
Diptera				@ 820 ft
				channel comprised
Fish				of eroded bedrock
Awaous stamineus (guamensis)				
Sicyopterus stimpsoni				
Lentipes concolor				Pig wallow/sign
Stenogobius genivittatus				
Eleotris sandwicensis				
Mugil cephalus				max elevation
Kuhulia sandvicensis				attained 880 ft -
Tilapia spp.				above this point
Gambusia affinis				channel is nearly
Xiphophorus spp.				undefined & cliffs
Micropterus dolomeui				rise shortly beyond
Amphibia				
Bufo marinus				
Rana spp.				

APPENDIX H

An Archaeological Inventory Survey of the Proposed Hope Chapel Driveway Corridor, District of Ko'olaupoko Kane'ohe Ahupua'a, Island of O'ahu

TMK: 4-5-23: Por. 2, Por. 3

ASC94-9

AN ARCHAEOLOGICAL INVENTORY SURVEY OF THE PROPOSED HOPE CHAPEL DRIVEWAY CORRIDOR DISTRICT OF KO`OLAUPOKO KANE`OHE *AHUPUA`A* ISLAND OF O`AHU [TMK 4-5-23: POR.2, POR.3]

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INTRODUCTION

At the request of PBR-Hawaii, an Archaeological Inventory Survey was conducted by Aki Sinoto Consulting in association with Scientific Consultant Services, Inc. (SCS) for the proposed Hope Chapel Access Driveway. This c. 1070 ft. by 32 ft. project corridor is located in Kane`ohe *ahupua`a*, Ko`olaupoko District, Island of O`ahu (TMK 4-5-23:por. 2 and por. 3) (Fig. 1). The purpose of the survey was to determine the presence or absence of significant cultural remains within the project area. Surface survey was carried out on June 16, 1994 under the overall direction of Robert L. Spear, Ph.D. Subsurface coring of the wetland area was conducted by International Archaeological Research Institute, Inc. (I.A.R.I.I.) under the direction of Dr. Stephen J. Athens on June 16, 1994.

SETTING

The project area consists of a driveway easement that measures c. 1070 ft. by 32 ft. The corridor is bounded on the north by wetlands and open fast lands, on the east by Po`okela Street, on the south by Castle Hills Subdivision, and the Interstate H-3 Highway corridor is situated to the west and *mauka* of the project area (Fig. 2). The 9.2 acre church parcel (TMK 4-5-24:20) is situated at the western end of the driveway corridor between Castle Hills subdivision and the H-3 freeway.

The first 400 ft. segment of the driveway is located in wetlands which, in the project area, is situated at an elevation of 190 to 220 ft. above mean sea level (Fig. 3). The remaining 670 ft. of driveway traverses through fast lands extending up and along the top of a finger ridge that reaches a maximum elevation of c. 330 ft. above mean sea level (Fig. 4). Rainfall in the project area averages 75 inches per year. The temperature fluctuates from an average minimum of 70 degrees Fahrenheit to an average high temperature of 80 degrees Fahrenheit annually (Armstrong 1973:62, 64).

Two classifications of soil are present in the project area; Hanalei silty clay and Alaeloa silty clay. Hanalei silty clay is found on 2 to 6 percent slopes. Runoff is slow and the erosion hazard is slight. The soil is used for sugarcane, taro, and pasture (Foote, et al. 1973: 38, 60).

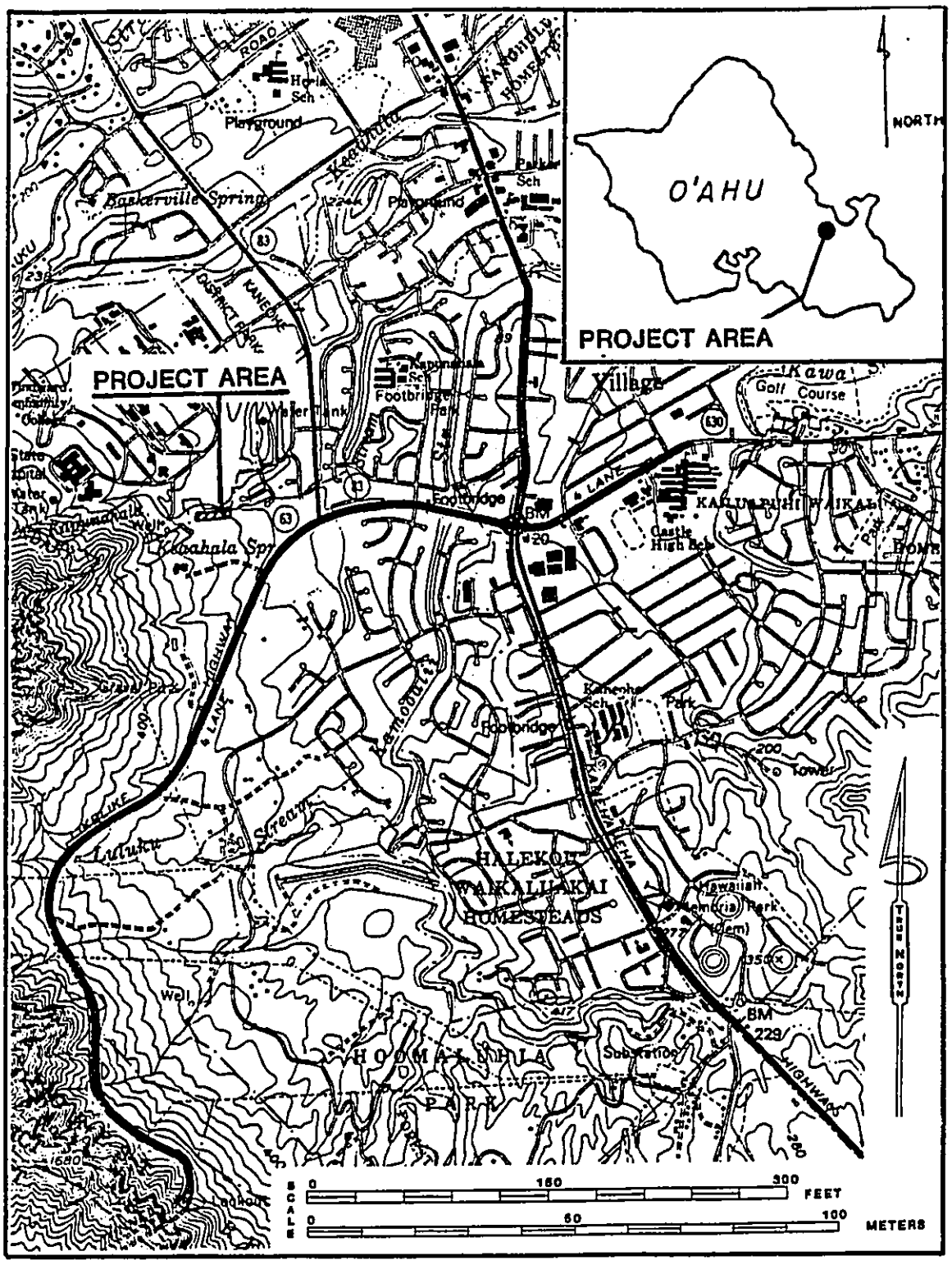

FIGURE 1: USGS KANEOHE QUADRANGLE SHOWING PROJECT AREA (SHADED).

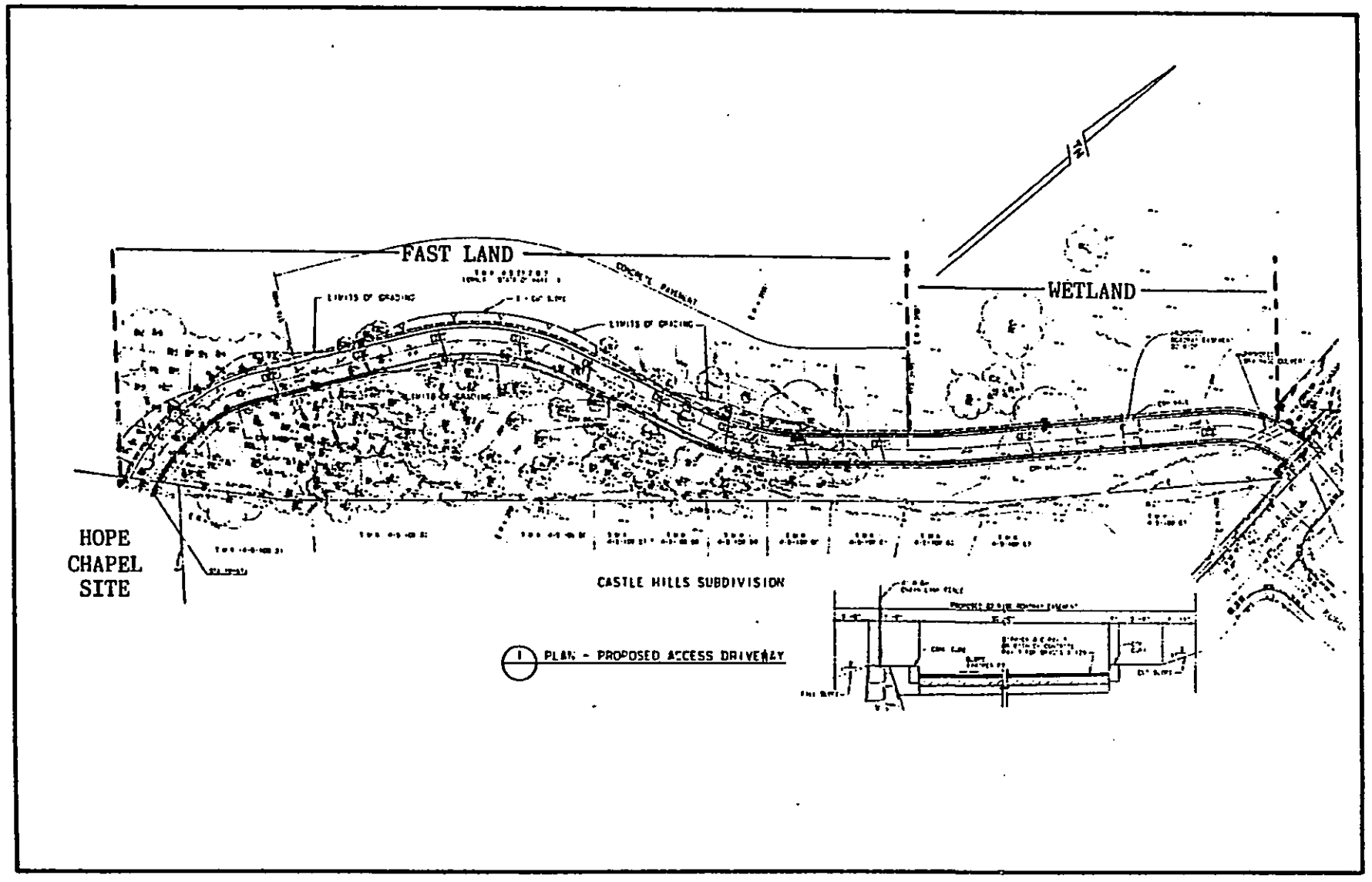

FIGURE 2: PROPOSED ACCESS DRIVEWAY FROM PO'OKELA STREET TO HOPE CHAPEL SITE.
(REDUCED FROM MAP BY CALVIN KIM & ASSOCIATES, INC.)

FIGURE 3: VIEW OF WETLANDS ARE AND LOCATION OF TEST BORING

FIGURE 4: VIEW OF PROJECT AREA ON FINGER RIDGE.
VIEW TO SOUTH.

Alaeloa silty clay is found on 40 to 70 percent slopes. Runoff is rapid to very rapid and the erosion hazard is severe. The soil is used for pasture and wildlife habitat (Foote, et al. 1973: 26, 60).

Adjacent to, but outside of the project area, is Kapunahala Stream. This stream originates on the slopes of the mountains and drains through the wetland area.

HISTORICAL BACKGROUND

Kāne`ohe *ahupua`a* extends from the windward base of the Ko`olau Mountains, *makai* to the ocean including much of the Mokapu Peninsula. Traditionally this *ahupua`a* was viewed as valuable because of its productive agriculture and marine resources (Kamakau 1961:303). In 1789 Portlock described Kāne`ohe as being; "...in a high state of cultivation, and crowded with plantations of taro, sweet potatoes, sugarcane, etc..." (Handy and Handy 1972: 455). When Kamehameha I divided up the island of O`ahu, he retained the Kāne`ohe *ahupua`a* as his personal property.

Upon Kamehameha's death, much of Kāne`ohe passed on to his sons, Liholiho and Kauikeaouli. In 1848 Kamehameha III (Kauikeaouli) initiated the land division known as the Great Mahele. He retained most of the *ahupua`a* during this time and the land eventually went to his wife, Queen Kalama after his death. The Land Commission Award (LCA) No. 4452, to Queen Kalama, consisted of 9,500 acres and two fish ponds.

A total of 150 LCAs were awarded within the *ahupua`a* of Kāne`ohe. The project area is contained in LCA 4173-B:1 awarded to Kaheleua as an adjunct to Moloka`i land claims by Kahuaina. LCA number 4236:2, in close proximity to the project area, was claimed by Kamauna but not awarded. In his claim application Kamauna described; "12 *lo`i*, a *kula*, and a parcel for a house." Also near the project, area LCA number 5081:3 is recorded as being a *kō`ele* in cultivation by Kuiaia.

In the 1860s commercial sugar cane and rice cultivation started in Kāne`ohe. By the 1880's much of the floodplain of Kāne`ohe was in rice cultivation and remained so until early in the 20th century. Ranching and pineapple also became major business endeavors during the mid-19th to early 20th centuries. Much of up-land Kāne`ohe was under pineapple cultivation by the second decade of the 20th century.

PREVIOUS ARCHAEOLOGY

Two archaeological projects have been conducted within the immediate area of the project. In 1990 the Bishop Museum conducted a reconnaissance survey for the proposed Hope Chapel Four-square Church Project (Lutfy and Williams 1990). The Museum's project area was situated at the *mauka* end of the driveway corridor being described in this present report. Five archaeological features were encountered during the survey including an *`ili* boundary wall, a wooden outhouse, a small rock concentration, a small earthen and rock mound and alignment, and a loose alignment of stones.

In 1992 work was conducted on the Po`okela Street extension which was built to provide access to the Castle Hills Subdivision (Hammatt et al. 1991, 1992). Po`okela Street is where the *makai* end of the project driveway corridor connects. A single site, consisting of an historic trash pit and a cement box dated to around 1900 A.D., was identified (Hammatt et al. 1992).
Hammatt states in the same report; "Clearly, the drainage pattern for the area has been severely altered by the development of residential subdivision *makai* of the project area...This modern modification of terrain may have backed up the drainage behind subdivisions to create the present marsh area. Judging from the local geomorphic features and the pre-development topography. This wet area appears to be a recent phenomenon." (Hammatt et al. 1992: 5,6)

Other archaeological work done in the general area of the project includes that done by McAllister (1933), Rosendahl (1976), and Allen (1987). McAllister recorded four sites in the vicinity of the project area including Kukuiokane *heiau* and Kumukumu Spring.

Rosendahl conducted a reconnaissance survey for the Kailua-Kāne`ohe Flood Control Project along the banks of Kāne`ohe Stream (1976). No sites were recorded in this reconnaissance survey.

Allen conducted an inventory survey of five upland *`ili* located in the Kāne`ohe Interchange of the Interstate H-3 Highway (1987). The focus of this work was an upland agricultural system located in Luluku *`ili*.

Based on the results of previous archaeological work in the area and the review of historical documentation, the pre-Contact use of the project area most likely consisted of agricultural activities, especially the wetland and dry land cultivation of taro. However, due to the wide spread impact of post-Contact ranching and agricultural activities, little, if any, pre-Contact surface features were expected to still exist. Post-Contact features would probably be associated with

ranching or rice and pineapple cultivation.

METHODOLOGY

The purpose of this inventory survey was to determine the presence or absence of significant cultural remains through surface survey and subsurface testing as warranted. The surface survey was conducted by walking the proposed driveway easement area which had been flagged in the field prior to the archaeological fieldwork.

The subsurface testing consisted of a single core obtained from the wetland segment of the driveway alignment. Manual coring employing a Livingston stainless steel core tool was completed by a subcontract with I.A.R.I.I.

Records for the project included fieldnotes and a black-and-white photograph record. The coring location was determined by tape and compass. All project materials will be stored at the office of Scientific Consultant Services, Inc. in Kāne`ohe, Hawai`i. The subsurface core sample will be curated by I.A.R.I.I.

RESULTS OF FIELDWORK

The surface survey focused on the segment of the driveway corridor that extends *mauka* of the wetlands. Three features were identified during the surface survey.

The first feature encountered during the survey was a narrow dirt road cut approximately 3 m wide into the slope. It roughly follows the 240 ft contour of the finger ridge that extends into the wetlands. Associated with the road cut were columns formed by stacked and mortared hollow-tile blocks. Some of the columns were topped by decorative architectural elements of undetermined function (Fig. 5).

The second feature observed was a concentration of debris that may have been the remains of a house. The remains were judged to be modern because of the associated cultural items such as plastic bottles and drain pipes that emerged from the ground.

The third feature identified was an outhouse (Fig. 6). This outhouse appears to be the one de

FIGURE 5: UNIDENTIFIED CONCRETE BLOCK FEATURE
VIEW TO NORTH.

FIGURE 6: OUTHOUSE FEATURE.
BPBM SITE NO. 50-OA-G5-92, FE.2
VIEW TO EAST.

scribed as Site 50-Oa-G5-92, Feature 2 by Lutfy and Williams (1990:3). Williams has confirmed this identification in a recent conversation. The original evaluation of this outhouse was that it was relatively recent (Lutfy and Williams 1990:3). Based on the type of lumber and condition of the wood, the evaluation of the feature during the current survey is that the outhouse is less than 50 years old.

In addition, a single core was obtained from the wetlands segment of the driveway corridor. A detailed analysis and discussion of the core is presented in Appendix A.

Approximately 8 m of sediments were encountered during the coring process and four core samples were submitted for pollen analysis. Three radiocarbon dating samples were also analyzed from the wetlands core.

The stratigraphically most recent radiocarbon sample, Beta No. 73648, produced a radiocarbon age of 1370 +/- 70 B.P., or a range of A.D. 560-768, at two sigma. The middle sample, Beta No. 73649, produced a radiocarbon age of 2600 +/- 60 B.P., or a range of 689-539 B.C. The deepest core sample, Beta no. 73650, provided a radiocarbon age of 4180 +/- 60 B.P., or a range of 2908-2576 B.C. These three dates indicate that the wetlands area may be of some antiquity.

Analysis of the core samples discovered charcoal particles in the two uppermost core samples indicating that fire was present in the area during the prehistoric Polynesian period and during historic times but not during pre-human times. Identified Polynesian plant introductions included *kukui* (*Aleurites moluccana*) and taro (*Colocasia esculenta*).

SUMMARY AND DISCUSSION

The surface survey located three features; a narrow dirt road, a concentration of historic debris, and a modern outhouse. The outhouse and the historic refuse were determined to be modern and no further work was deemed necessary. The driveway, which possibly originated during the early 20th century agricultural development is depicted on existing topographic maps. Along with the descriptive information included in this report, the significance of this feature has been realized.

Analysis of the marsh core found excellent pollen preservation. The pollen and charcoal particle records suggest prehistoric activities within the Kapunahala watershed by about 692 years B.P.

(about A.D. 1250). How much earlier the record of human activity might extend in the marsh is unclear since the next dated core sample was from a period prior to human occupation of Hawai`i. The presence of the taro pollen grains and the absence of anything which might be termed a pond-field soil suggests that taro cultivation might have been undertaken in another part of the marsh.

CONCLUSION AND RECOMMENDATIONS

None of the extant surface features are considered to be archaeologically significant. It was expected that the principal, surface, cultural remains that might be found in the project area would consist of agricultural features from the growing of taro, rice, or pineapple. No such remains were identified during the surface survey. The results from the core analysis indicate pre-historic activity in the general area of the marsh, but no direct evidence of pondfields in the driveway corridor.

Based on the results of this survey it is recommended that no further archaeological work be required in the driveway corridor prior to construction. Any additional development within the larger wetland area should be preceded by additional coring and analysis. Because of the discovery of subsurface features, such as *imu*, along the windward H-3 Highway corridor, it is recommended that an archaeological monitor be present whenever ground disturbing activities occur within the driveway corridor above the wetlands.

Although not expected, should human burials be discovered, all work in the immediate area of the burial must be halted and Dr. Tom Dye, Staff Archaeologist for O`ahu Island, State Historic Preservation Division, DLNR be immediately informed (587-0014).

REFERENCES CITED

Allen, J., (ed)
1987 *Five Upland `ili: Archaeological Investigations in the Kaneohe Interchange, Interstate Highway H-3, Island of O`ahu.* Departmental Report Series 87-1, Bishop Museum Press, Honolulu.

Armstrong, W. A.
1973 *Atlas of Hawaii*, Bishop Museum Press, Honolulu.

Award Books
n.d. *Indices of Awards* Hawaii State Archives Honolulu.

Foote, D. E., E Hill, S. Nakamura, F. Stephans
1972 *Soil Survey of the Islands of Kaua`i, O`ahu, Maui, Molokai, and Lanai, State of Hawaii*, US Dept. of Agriculture.

Hammatt, H. H. et al.
1991 *Archaeological Inventory Survey of Castle Hills Access Road, Kane`ohe, Ko`olaupoko, O`ahu*, Cultural Surveys Hawaii, Kailua, Hawai`i.

1992 *Archaeological Monitoring Results for Castle Hills Access Road, Kane`ohe, Ko`olaupoko, O`ahu.*, Cultural Surveys Hawaii, Kailua, Hawai`i.

Handy, C.E.S., and E. G. Handy
1972 *Native Planters of Hawaii*, Bishop Museum Press. Honolulu.

Kamakau, S. M.
1961 *Ruling Chiefs of Hawai`i*, Kamehameha Schools Press, Honolulu.

Lutfy M. and S. W. Williams
1990 *A Reconnaissance Survey of the Proposed Hope Chapel Foursquare Church Project Kane`ohe, O`ahu.* Public Archaeology Section, Bishop Museum, Honolulu.

McAllister, J. G.
1933 *Archaeology of O`ahu.* Bishop Museum, Bulletin 104, Honolulu.

Rosendahl, P. H. (ed.)
1976 *Archaeological Investigations in Upland Kane`ohe: Survey and Salvage Excavations in the Upper Kamo`ali'i Stream Drainage Area Kane`ohe, Ko`olaupoko, O`ahu, Hawai`i.* Departmental Report, Series 76-1, Bishop Museum, Honolulu.

APPENDIX A

A SEDIMENT CORING RECORD AT KAPUNAHALA MARSH KANE`OHE, O`AHU, HAWAI`I

by

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November 1994

A SEDIMENT CORING RECORD AT KAPUNAHALA MARSH, KANE`OHE, O`AHU, HAWAI`I

Fieldwork

A single sediment core--designated Core 1--was recovered on June 16, 1994 within the approximate alignment of a proposed road within Kapunahala Marsh. The alignment is located parallel to the southern boundary of the marsh next to the Castle Hills housing development, which is inland of Kane`ohe on the windward side of O`ahu. The marsh name is not an official or traditional name as far as is known; it is taken from the stream that passes through the marsh. Core 1 is situated 24.4 m west of the edge of Po`okela St. where it intersects with Kupohu St. and 14 m north of the edge with the Castle Hills development (Figs. 1 and 2).

Fieldwork was conducted on June 16, 1994 under the direction of J. Stephen Athens, Ph.D., with the assistance of Conrad Erkelens, M.A., both of International Archaeological Research Institute, Inc. (IARII), and David Chaffee, B.A., of Scientific Consultant Services, Inc. A full description of the marsh and other relevant details may be found in the archaeology survey report by Scientific Consultant Services, Inc.

Photos 1 and 2 provide views of the marsh. As may be seen, the marsh is covered by a virtually solid stand of *Coix lachryma-jobi* (Job's tears), which is an historically introduced plant of the grass family. At the time of coring the marsh ground surface was wet and the substrate soft and mucky.

The coring apparatus utilized was that of a modified Livingstone piston corer, which is a hand driven instrument designed to recover intact and undisturbed wetland and lake sediment samples (Wright *et al.* 1965, 1984, Wright 1967). The core barrel is 5 cm in diameter and 1 meter long. This type of coring device does not perform well in stiff sediments, or those composed mainly of sand or having gravel, pebbles, or larger clastics. Under ideal conditions the corer can penetrate to depths of 15 to 20 m or more.

A plywood board with a center hole for the bore hole was used as a platform on which to stand to drive and raise the core. This provided a relatively solid base for working in the marsh's soft sediments, besides keeping the ground surface around the bore hole solid and free of mud and debris.

After each drive, following collection of a core segment, the sediment was extruded onto a nearby plywood board that had been covered by a fresh piece of plastic wrap. Preliminary observations of the extracted sediment were recorded, and the core segment was measured. The entire segment was then wrapped in the plastic wrap, and this was followed by again wrapping it in heavy duty aluminum foil for rigidity. The foil-wrapped segment was then labeled with an indelible marker, noting top and bottom depths at each end. Field notes were maintained throughout the coring operation.

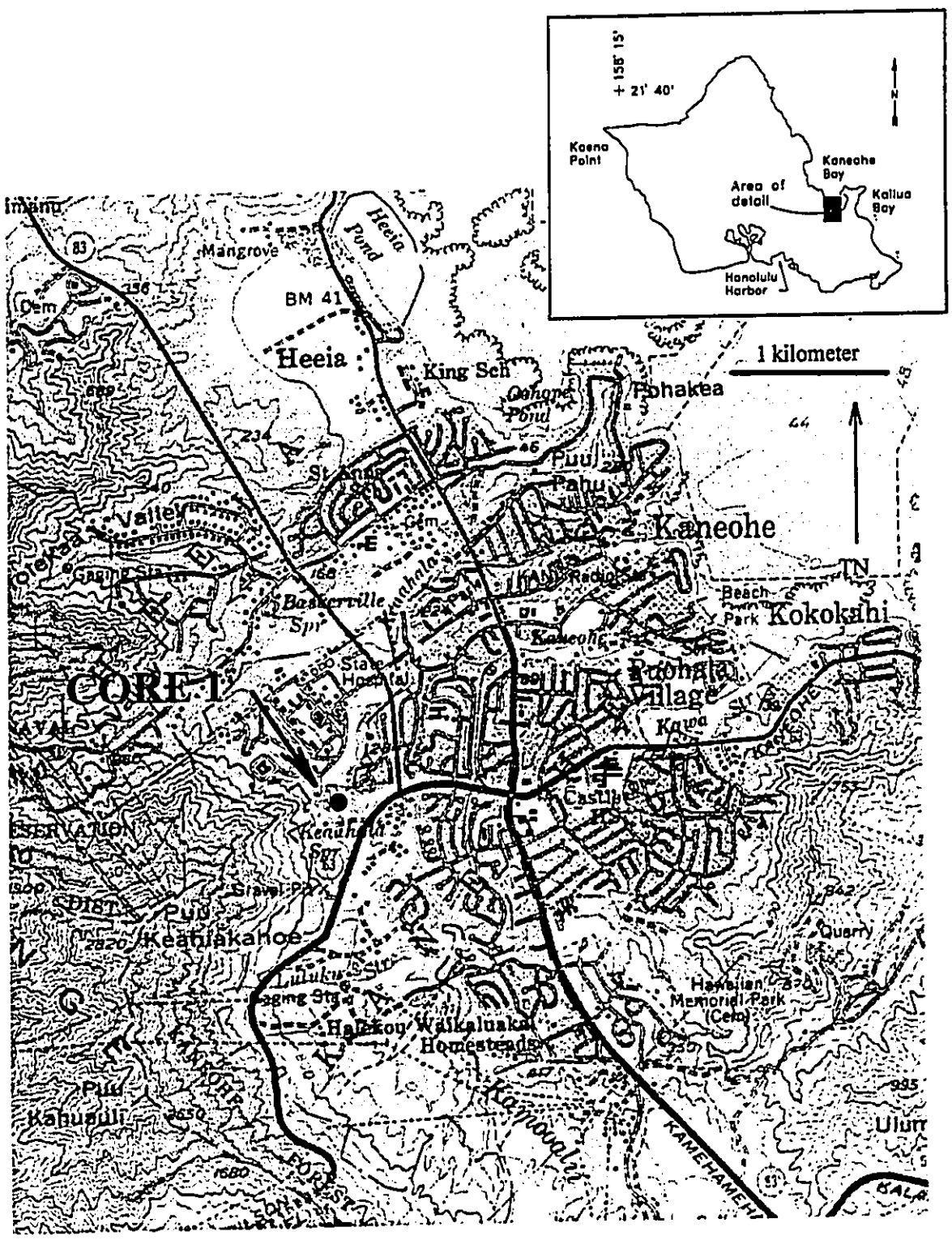

Figure 1. Portion of USGS topographic map of O`ahu (1954, revised 1970) showing location of Core 1 at Kapunahala Marsh.

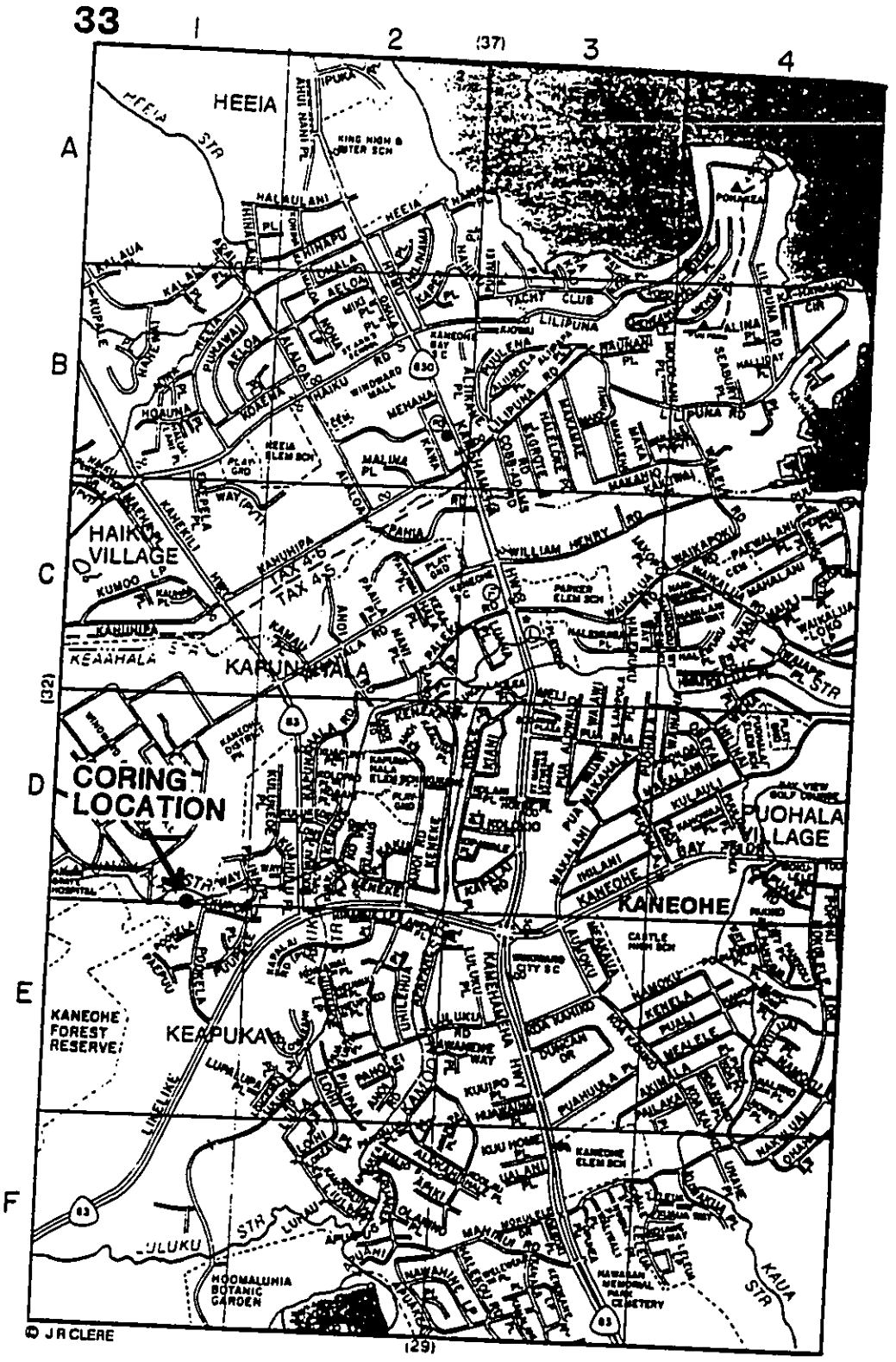

Figure 2. Location of Core 1, Kapunahala Marsh (Bryan 1992:33).

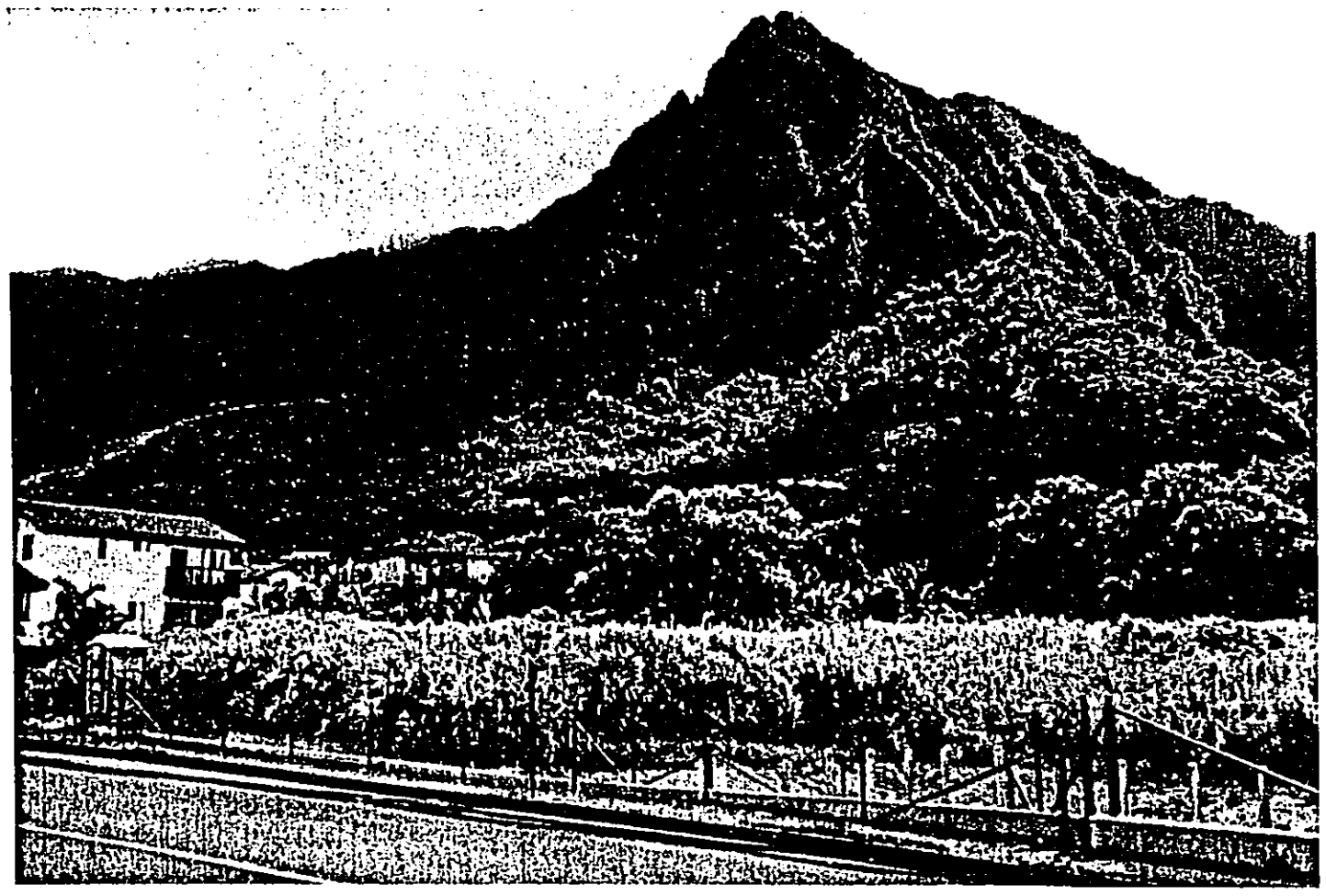

Photo 1. Kapunahala Marsh (foreground) and Castle Hills housing development to left. Surface water from marsh drains into culvert that runs below street. View to southwest toward Puu Keahiakahoe (860 m) and the Koolau Mountains.

Photo 2. View to north of Kapunahala Marsh and Core 1 location from yard of Castle Hills house that borders marsh. Note nearly solid stand of *Coix lachryma-jobi* (Job's tears).

Coring proceeded very smoothly once underway. The big surprise was the depth of the wetland sediments: the core reached a maximum of 7.81 m below the surface before being halted by rocky sediments at the base. After failing to extend the depth with a second drive, the coring operation was terminated. The surface topography of the marsh gave no indication that such a deep wetland basin would be present and it remains unclear how and why it formed. Perhaps with additional coring in other areas of the marsh, this question might be answered.

Because the depth of the wetland is so great next to the marsh's edge on the south side (where the Castle Hills development is located), it seems likely that the wetland must have formerly extended to the south before it was encroached upon by the housing development. It would be of interest to document the original boundaries of the marsh using historical documents (i.e., early aerial photographs and land survey records).

As a result of the presence of pebbles and gravel in the sediment, the core was interrupted at two intervals. These were at 253-283 cm and 696-725 cm in which no sediment was retrieved. Both obstructions were successfully penetrated using both screw-type and bucket augers. For the deeper part of the core, friction and stiffness of the sediments had become so great that a 3.5 inch bucket auger was used to widen the bore hole so as to facilitate the deeper drives.

During the coring operation, a surface sediment sample from just below the dry vegetation mat of solid *Coix lachryma-jobi* (Job's tears) was retrieved next to the bore hole. This was to provide a reference sample of the modern pollen rain to facilitate interpretation of the palynology record. Though funds were not available for the analysis of this sample, it is available for future reference.

Research Orientation of Coring Project

The primary goal of the coring operation was to determine the presence or absence of significant cultural remains within the Kapunahala Marsh and particularly within the proposed road alignment. Because of the wetland nature of the area, it was expected that such remains would primarily be in the form of evidence for pondfield taro agriculture. Such evidence could be determined from both soil data indicative of pondfield agriculture (e.g., see Kirch 1992) and/or the presence of taro pollen at particular sample intervals in the core. Thus, recovered sediments would need to be subjected to both sedimentological analyses and pollen analyses. To determine the chronology of the core sediment, radiocarbon dating of selected intervals also would be undertaken.

The value of wetlands for obtaining information relating to a number of issues of interest to archaeologists, biologists, botanists, paleoecologists, and paleoclimatologists has been discussed in several recent publications and reports (see especially Athens *et al.* 1992; Athens and Ward 1993, 1994a, 1994b). These include the timing of initial Polynesian settlement, the inland expansion of prehistoric Polynesian settlement and agriculture, the types and timing of Polynesian-introduced plants, the effect of prehistoric Polynesian settlement and agriculture on erosion and subsequent coastal infilling and progradation, Polynesian use of fire for agriculture and the natural occurrence of fire, climatic changes during the Holocene, the composition of pristine pre-human vegetation communities, the

nature and timing of changes to natural vegetation communities as a result of the Polynesian settlement of Hawai`i, and other questions. As a wetland, Kapunahala Marsh has the potential to significantly contribute to such research. Its inland location within the lowlands of O`ahu, in fact, makes the location of Kapunahala Marsh of particular interest with respect to the question of the timing of the inland expansion of Polynesian settlement (see Athens and Ward 1994a). Although it was not possible to anticipate in advance the suitability of Kapunahala Marsh for such research and therefore to budget for it, the present investigations nevertheless document its potential.

Sediment Record and Chronology

A profile of Core 1 showing the various soil strata and the location of the pollen and radiocarbon samples is shown in Figure 3. A description of the sediments is given in Table 1. In general the wetland sediments were remarkable for the amount of organic matter they contained; virtually the entire column consisted of peaty sediments with macrobotanical remains. The latter appeared to consist chiefly of the roots of palm trees (almost certainly *Pritchardia* sp. , G. Murakami, IARII, pers. comm.), which in places consisted of intact and intertwined root mats with the individual roots having a vertical orientation. This was especially notable in the sample from the 206-217 cm interval. Such a configuration suggests that the roots are *in situ* and that a *Pritchardia* forest once grew in the marsh. Ms. Murakami also identified several *Pritchardia* fruits in the sediment (604-607, 612, and 760-780 cm). Other identified organic remains included the seeds of Job's tears in Layers I and II (observed but not collected in Layer I; found in intervals at 58, 71, 81, and 88 cm in Layer II). Wood fragments were also common in the core.

Interspersed at four locations within the core were layers and lenses of basaltic sand, gravel, and pebbles. These were rounded and had been stream-rolled. Their presence is definitely due to fluvial action, probably indicating that Kapunahala Stream (or perhaps an ephemeral tributary) was not stable in its course through time. The base of the core (below which further penetration was not possible) could represent coarse stream deposits, though since sediments were not extracted this is uncertain; the basal sediments could also be old colluvium deposited prior to the formation of the marsh. Occassional rounded pebbles were widely scattered throughout the core, suggesting occasional transport of coarse sediment throughout most or all of the marsh's history.

None of the sediment layers had anything approaching what might be called a pondfield soil as would be generally indicated by a gleyed clay horizon. Given the chronology of the sediment column (see below), anthropogenic formations or indicators only would be a realistic possibility in approximately the top two meters of the profile, which corresponds to the period of Polynesian settlement in Hawai`i. However, the sediments of this part of the profile do not indicate former pondfield cultivation.

With respect to chronology, three radiocarbon samples were processed from intervals at 169-175, 435-440, and 774-780 cm. Information regarding the samples and the results are provided in Table 2. The dates are also depicted on the profile (Fig. 3). Processing was normal for all samples and there is no reason to suspect any errors. Indeed, the three samples show a regular progression of age with depth as would be

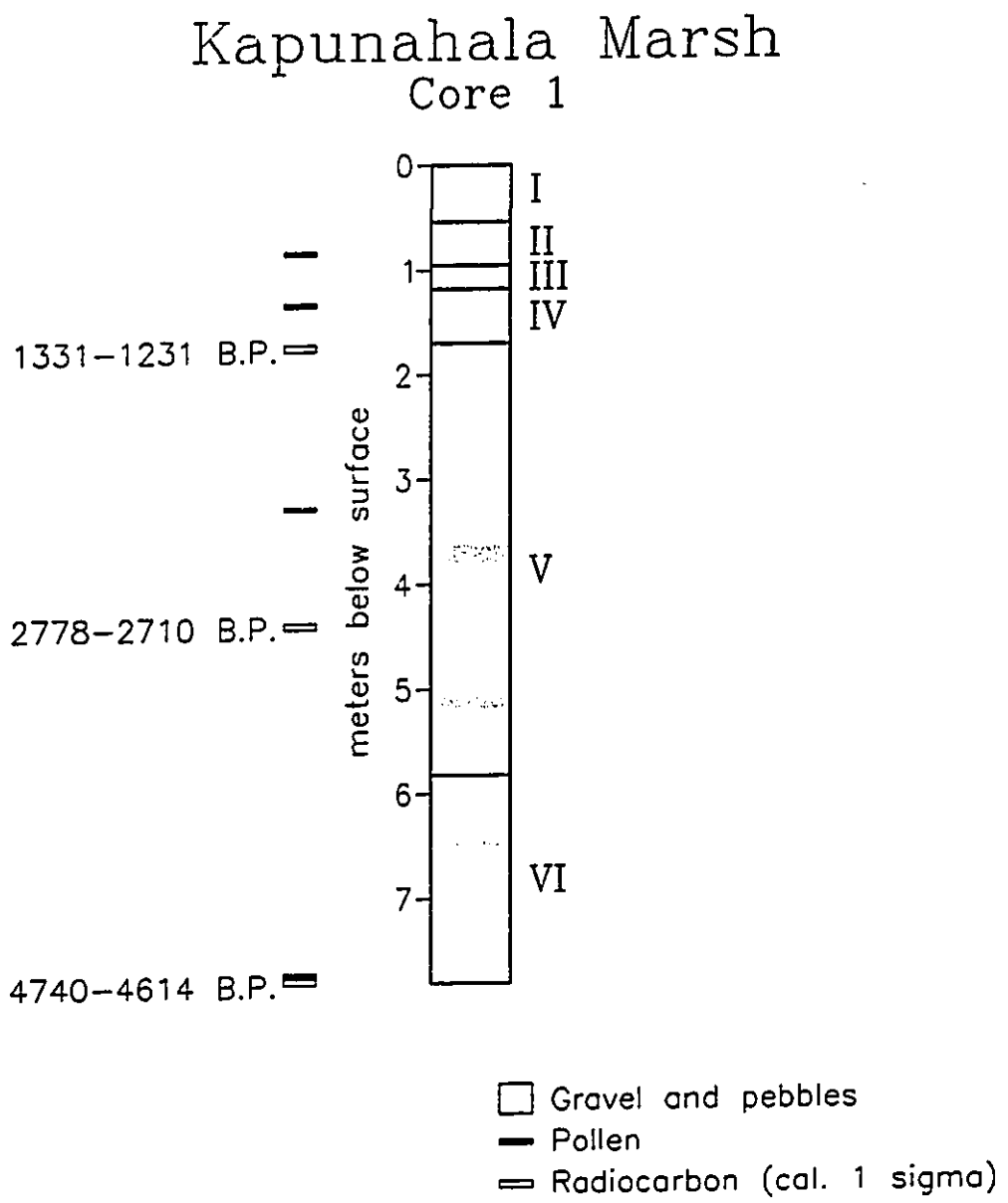

Figure 3. **Profile of Core 1, Kapunahala Marsh. Note calibrated radiocarbon dates (most probable cal. 1 sigma range) and location of pollen samples.**

Table 1. Soil description, Core 1, Kapunahala Marsh.

Layer	Depth cm	Munsell Color (dry)	Sediment Description
I	0-53	7.5YR 3/0	Very dark gray; fibrous root mat; spongy (not compacted), water-saturated; almost no humic sediment; roots mostly very fine; lower boundary slightly diffuse.
II	53-95	10YR 4/1	Dark gray; loam with no sand or clastics; very humic with large organic pieces and fine rootlets; sticky and plastic; core is relatively soft but firm enought to hold shape; seeds of historically introduced *Coix lachryma-jobi* (Job's tears) throughout layer suggest that it is entirely historic; lower boundary abrupt.
III	95-117	10YR 4/1, 4/2	Dark gray to dark grayish brown; sand, gravel, and pebbles, all basalt and rounded; pebbles mostly in top 5 cm of layer; small amount of loamy sediment in lower part of layer, but basically massive; abrupt lower boundary.
IV	117-169	10YR 4/1	Dark gray; silt loam, very humic, no sand but widely scattered and isolated basalt pebbles present throughout layer; slightly sticky and plastic; virtually no macrobotanical remains and only a small amount of fine fibrous material; lower boundary diffuse.
V	169-580	10YR 4/1, 4/2	Dark gray to dark grayish brown; peat and macrobotanical remains; firm sediment, very fibrous and almost completely organic; fragments of palm roots appear to be common; non-organic sediment virtually absent though lens of sand, gravel, and pebbles between 362-379 cm with small amount extending to 390 cm and at 506-516 cm; massive; non-sticky and non-plastic; abrupt lower boundary.

Table 1 (cont.).

Layer	Depth cm	Munsell Color (dry)	Sediment Description
VI	580-781	10YR 4/1	Dark gray; peat and macrobotanical remains with sand; lens of sand, gravel, and pebbles between 662-670 cm; scattered isolated basalt pebbles, rounded; density of sand and gravel appears to increase with depth except for bottom 15 cm, which is more organic.

* * * * *

expected. The entire sequence covers roughly the last 4600 to 4,700 years of the Holocene.

Using the Maher (1992) computer program, a depth vs. age plot was constructed for Core 1 based on the radiocarbon dates and one estimated pollen date. This program allows ages to be interpolated for any point along the plot (see Fig. 4). The particular mathematical model selected was that of linear interpolation. Table 3 provides the interpolated dating results for the Kapunahala Marsh sediment layers, and Table 4 provides the same information for the four pollen samples that were analyzed.

While a depth vs. age plot is normally based entirely on radiocarbon dates, the base of Layer II was assigned a semi-arbitrary age of 125 years because pollen results and macrobotanical identifications indicate this layer to be entirely historic (i.e., postdating 1778). The assigned age of 125 years corresponds to a calendar age of A.D. 1869. By this time introduced plants were fairly widespread in most lowland areas of Hawai'i. The botanical date is therefore reflected in the depth-age interpolations and depicted on the depth-age graph (Fig. 4).

Sediment accumulation was very rapid during the historic period, slow during the prehistoric period (probably after about 1350 years B.P.--see Spriggs and Anderson 1993 and Athens *et al.* 1994b), and moderately slow during the pre-human period (before about 1350 years B.P.). This rate sequence once again supports the argument by Athens and Ward (1993) that Hawaiian agricultural practices had little influence on erosion, sedimentation, and coastal infilling processes. In general there has been a mostly continuous and

Table 2. Radiocarbon dating results, Core 1, Kapunahala Marsh.

Core	Cat. #	Beta #	Provenience	Weight/ Material g	Age B.P.	C13/C12	Adjusted Age B.P.	Calibrated Age*	Proba-bility
1	kapu,169-175	73648	Core 1, V, 169-175 cm b.s.	90.5 peat/organics	1380 ± 70	-25.5	1370 ± 70	1331-1231 B.P. 1210-1185 B.P.	84% 16%
1	kapu,435-440	73649	Core 1, V, 435-440 cm b.s.	84.7 peat/organics	2610 ± 60	-25.5	2600 ± 60	2778-2710 B.P. 2584-2541 B.P. 2538-2508 B.P. 2623-2613 B.P.	64% 20% 12% 4%
1	kapu,774-780	73650	Core 1, VI, 774-780 cm b.s.	131.2 peat/organics	4230 ± 60	-28.4	4180 ± 60	4740-4614 B.P. 4769-4740 B.P. 4827-4806 B.P. 4583-4578 B.P.	70% 16% 12% 2%

* Calibration from Calib 3.0.3 computer program of Stuiver and Reimer (1993); all dates have 1 sigma probability age range.

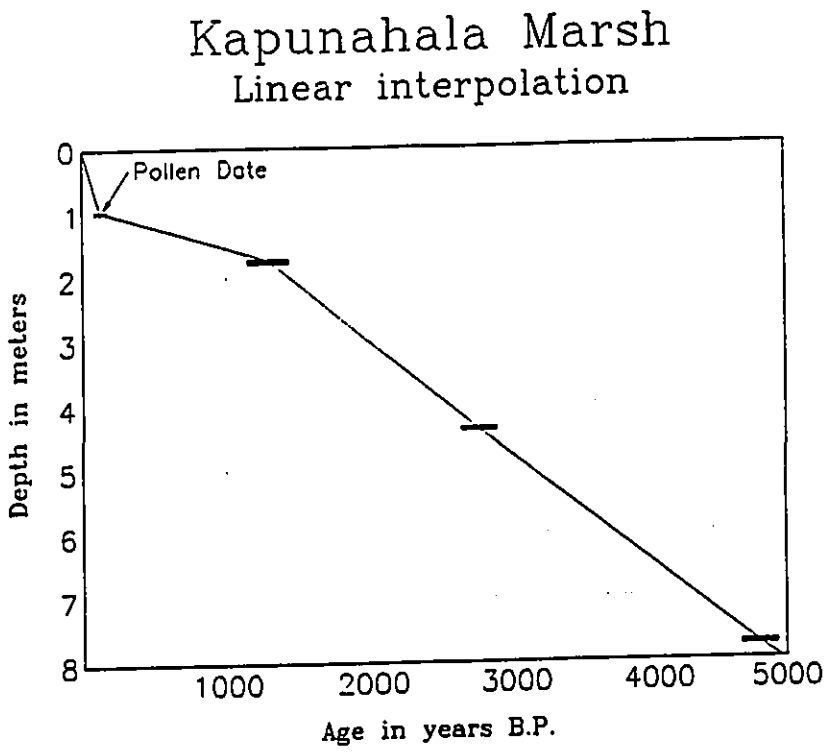

Figure 4. Sediment accumulation graph for Core 1 using linear interpolation function (after Maher 1992). Radiocarbon dates are calibrated at a one sigma confidence interval. Note pollen date, estimated at 125 years, at 95 cm depth (see text for discussion).

* * * * *

Table 3. Interpolated dates for sediment layers, Core 1, Kapunahala Marsh

Soil Layer	Depth cm b.s.	Age* yrs B.P.	Sediment Accumulation Rate at Base, cm/year
I	0 - 53	0 - 70	0.7400
II	53 - 95	70 - 140	0.0671
III	95 - 117	140 - 468	0.0671
IV	117 - 169	468 - 1243	0.0671
V	169 - 580	1243 - 3564	0.1730
VI	580 - 781 +	3564 - 4725	0.1730

* Dates are from linear interpolation function (Maher 1992) based on calibrated radiocarbon age ranges at one sigma.

Table 4. Interpolated dates for pollen samples, Core 1, Kapunahala Marsh

Sample Interval	Soil Layer	Age* yrs B.P.	Sediment Accumulation Rate at Base, cm/year
81 - 85	II	110	0.7400
130 - 134	IV	692	0.0671
325 - 328	V	2133	0.1828
770 - 774	VI	4673	0.1730

* Dates are from linear interpolation function (Maher 1992) based on calibrated radiocarbon age ranges at 1 sigma.

* * * * *

regular accumulation of sediments over much of the history of the marsh except for the rapid rate of the historic period.

Pollen Analysis

Four samples were analyzed for pollen at widely-spaced intervals from Core 1, Kapunahala Marsh. The samples were initially treated with HCL to dissolve carbonates, followed by KOH to solubilize organics, and HF to dissolve the silica fraction (Moore *et al.* 1991). Acetolysis solution, advocated by Herngreen (n.d.), was used to break down the abundant cellulose, and dilute HNO_3 was used to oxidize the remaining microscopic plant debris, including lignin. After final rinsing the pollen residue was mounted in glycerine jelly following Erdtman's (1960) technique.

Palynomorphs, which include pollen, pteridophyte spores, and other organic-walled microfossils are usually less than the 200 μm size fraction (Tschudy and Scott 1969). These were identified using published pollen floras that include Pacific types, chiefly Selling (1946, 1947) for Hawai'i, Cranwell (1953) for New Zealand, Huang (1972) for Taiwan, and Roubik and Moreno (1991) for types of Neotropical origin. A personal reference collection (Ward) of about 500 specimens of pollen and spores from the Pacific was also used. The palynomorphs were well-concentrated so that a single slide was counted per sample, each with a 22 x 40 mm cover glass area. An attempt was made to obtain a count of at least 200 dryland pollen grains. However, this was difficult especially in the upper portion of the core, which was dominated by locally-produced sedge pollen. Usually a sum of at least 200 pollen grains is preferred for Hawaiian work in order to adequately record shifts in plant types. A high pollen sum is also needed to detect the presence of ethnobotanically important species which are generally shy pollen producers.

Charcoal particles were counted using an eyepiece graticle, with a 10 x 10 grid square pattern (Patterson *et al.* 1987), and exotic marker *Lycopodium* spores counted along with them provided the necessary control for calculating the concentration. Charcoal was counted in grid square size classes and the total area in mm^2 was determined. The charcoal values were converted into concentration values using the formula from Birks and Bergen (1992):

Charcoal concentration = initial *Lycopodium* concentration (#/cc) x total charcoal area (mm^2/cc) ÷ *Lycopodium* spores counted (#)

The pollen concentration was calculated in a similar fashion:

Pollen concentration = initial *Lycopodium* concentration (#/cc) x total number of palynomorphs (#) ÷ *Lycopodium* spores counted (#)

The count data are presented in Table 5. Frequencies of the principal pollen types are graphed for Core 1 in a pollen diagram (Fig. 5). The pollen is separated into ecological groups: Dry-Mesic Forest, Mesic-Wet Forest, and Herbs, while the Pteridophytes are divided on the basis of morphology, whether monolete or trilete.

The samples contained amorphous organic debris, leaf cuticle, and abundant fungal palynomorphs. Pollen and spores were well-preserved and in moderate to high concentrations. Palynomorph concentrations in samples from intervals at 325-328 and 770-774 cm were lower than in the upper two samples at 81-85 and 130-134 cm. The lower two samples are pre-Polynesian and contain large proportions of *Pritchardia* pollen. The 81-85 and 130-134 cm samples, contain very high abundances of locally-produced sedge pollen and monolete, psilate fern spores. The high concentration from these levels is probably due to the local dominance of the sedge community (especially in the 130-134 cm sample).

Paleoecology

The basal sample at the 770-774 cm interval, dating to about 4,673 years B.P., is dominated by *Pritchardia* pollen at 51 percent, followed by *Acacia koa* and *Antidesma* at 7 and 8 percent, respectively. Mesic-wet forest types in this sample include *Cheirodendron*, *Hedyotis*, and *Tetraplasandra*. In general the pteridophytes are in low proportions, but monolete, psilate types are dominant at 10 percent while *Cibotium* is present at 2 percent. With no indication of Polynesian introductions and the high abundance of *Pritchardia* pollen, this sample is suggestive of a mid-Holocene *Pritchardia* palm forest with associated co-dominant types and a fern understory.

The 325-328 cm sample, dating to 2,133 years B.P., is also dominated by *Pritchardia* pollen at 43 percent, with *Acacia* and *Antidesma* at 3 percent each. The continued presence of mesic-wet forest elements such as *Cheirodendron*, *Hedyotis*, and *Myrsine* suggests a similar environment to that recorded in the basal sample. A possible difference seen in the Pteridophyte record is that of the increased abundance of monolete psilate fern spores at 28 percent. This possible shift, which may be no more than sample bias given the few samples analyzed, may reflect a change to open conditions at the site

Table 5. Palynomorphs from Core 1, Kapunahala Marsh.

Species or type	Sample number as depth in cm. 81-85	130-134	325-328	770-774
HERBS:				
Colocasia esculenta		2		
Commelina	8			
Cuscuta	2			
Cyperaceae (sedge)	482	2213	8	
Ludwigia octovalvis	15	6		
Poaceae (grass)	174	155		
Poaceae, lg. type, ca 80 μm	74			
Potamogeton	3	25		
Rumex	1			
Total Herbs:	759	2401	8	0
DRY-MESIC FOREST:				
Acacia koa	2	12	30	65
Aleurites moluccana		9		
Antidesma		5	30	74
Asteraceae (high-spined)	10	15		
Canthium odoratum			2	2
Casuarina	1			
Cheno-am	6	21		
Chamaesyce	3	1	2	2
Claoxylon sandwicense			1	
Colubrina		4	13	23
Cuphea	1			
Diospyros			1	
Dodonaea viscosa		2	1	4
Elaeocarpus bifidus-type	2	1	4	2
Gouania				2
Kanaloa kahoolawensis		3	2	1
Myrtaceae		2	3	3
Myrtaceae, granular (Melaleuca?)	5			
Nesoluma polynesicum				1
Nestegis sandwicensis			4	10
Pandanus	9	8	2	
Pisonia	2		2	4
Pritchardia		46	402	479
Prosopis pallida	4			

Table 5 continued. Palynomorphs from Core 1, Kapunahala Marsh.

Species or type	Sample number as depth in cm. 81-85	130-134	325-328	770-774
Sida cordifolia	1			
Sida sp.	1			
Wikstroemia				1
Total Dry-Mesic:	47	129	499	673
MESIC-WET FOREST:				
Bobea				1
Cheirodendron dominii				1
C. trigynum		1	7	3
C. sp. (loose sexine)			22	14
Coprosma			1	2
Cyrtandra				1
Freycinetia arborea			4	4
Hedyotis centranthoides-type				1
H. sp.			12	3
Ilex anomala			2	
Melicope barbigera-type		3	1	
Myrsine			6	2
Psychotria sp.		1		
Rubiaceae undiff.		1		3
Stenogyne		1	1	
Tetraplasandra gymnocarpa		8	5	8
T. oahuensis-type			4	3
Utricaceae:				
Diporate		5	3	
Triporate		1	1	
Polyporate				2
Zanthoxylum				
Total Mesic-Wet:	0	21	69	48
UNKNOWN POLLEN:				
Tricolporate:				12
Thin-walled, reticulate				5
Reticulate				2
Microreticulate, small, lobate				
Reticulate, thick-walled, w/ large pits		1		
Tetracolporate, psilate, small		1	3	1
Triporate, reticulate, annulate portes, Rubiaceae?			1	1
Triporate, granulate				1
Diporate, reticulate, Rubiaceae?				

Table 5 continued. Palynomorphs from Core 1, Kapunahala Marsh.

Species or type	Sample number as depth in cm. 81-85	130-134	325-328	770-774
Monosulcate:				
Tectate, large			1	
Granulate, small, palm-like		1	1	
Reticulate, small, palm-like	1			
Total Unknown:	1	4	6	22
TOTAL POLLEN:	807	2254	582	743
PTERIDOPHYTES:				
MONOLETE SPORES:				
Marattia		1	2	6
Polypodium pellicudum type		11	5	14
Psilate	510	548	266	95
Foveolate/granulate	1	6		
Granulate		2	6	2
Echinate				
Reticulate, fine			8	3
Verrucate			1	
Foveo-reticulate, large				
Perinate	1			
Total Monolete:	512	568	288	120
TRILETE SPORES:				
Ceratopteris thalictroides	20			
Cibotium	1	11	17	10
Gleichenia linearis			1	
Lycopodium cernuum	2	1		2
L. phyllanthum			1	5
Pteridium aquilinum-type			41	13
Pteris	1	5	7	14
Psilate	6		2	13
Psilate, undulating laesurae		2		7
Echinate, zonate	37	29	3	5
Punctate			3	2
Reticulate, fine				1
Total Trilete:	67	48	75	72
TOTAL SPORES:	579	616	363	192
TOTAL POLLEN AND SPORES:	1386	3170	945	935

Table 5 continued. Palynomorphs from Core 1, Kapunahala Marsh.

Species or type	Sample number as depth in cm. 81-85	130-134	325-328	770-774
Markers	158	424	264	626
Starting volume (ml)	6	4	5	6
Markers/cc	3767	5650	4520	3767
Polynomorph concentration	33021	42255	16180	5626
OTHER POLYNOMORPHS:				
Zygnema, crenulated	2			
Zygnema, foveolate	6	2		
Acritarch, escinate	3			
Acritarch, reticulate-tuberculate	3	3	2	
Acritarch, psilate w/ operculum	37			
Macrobiotus egg (tardigrade)	1			
Insect egg?	1	13		
CHARCOAL:				
Markers	143	206		
Starting volume	6	4		
Markers/cc	3767	5650		
Charcoal particles	588	559		
No. grid squares	1484	1157		
Total area (mm^2)	0.88	0.69		
Charcoal concentration (mm^2/cc)	23.3	18.9		

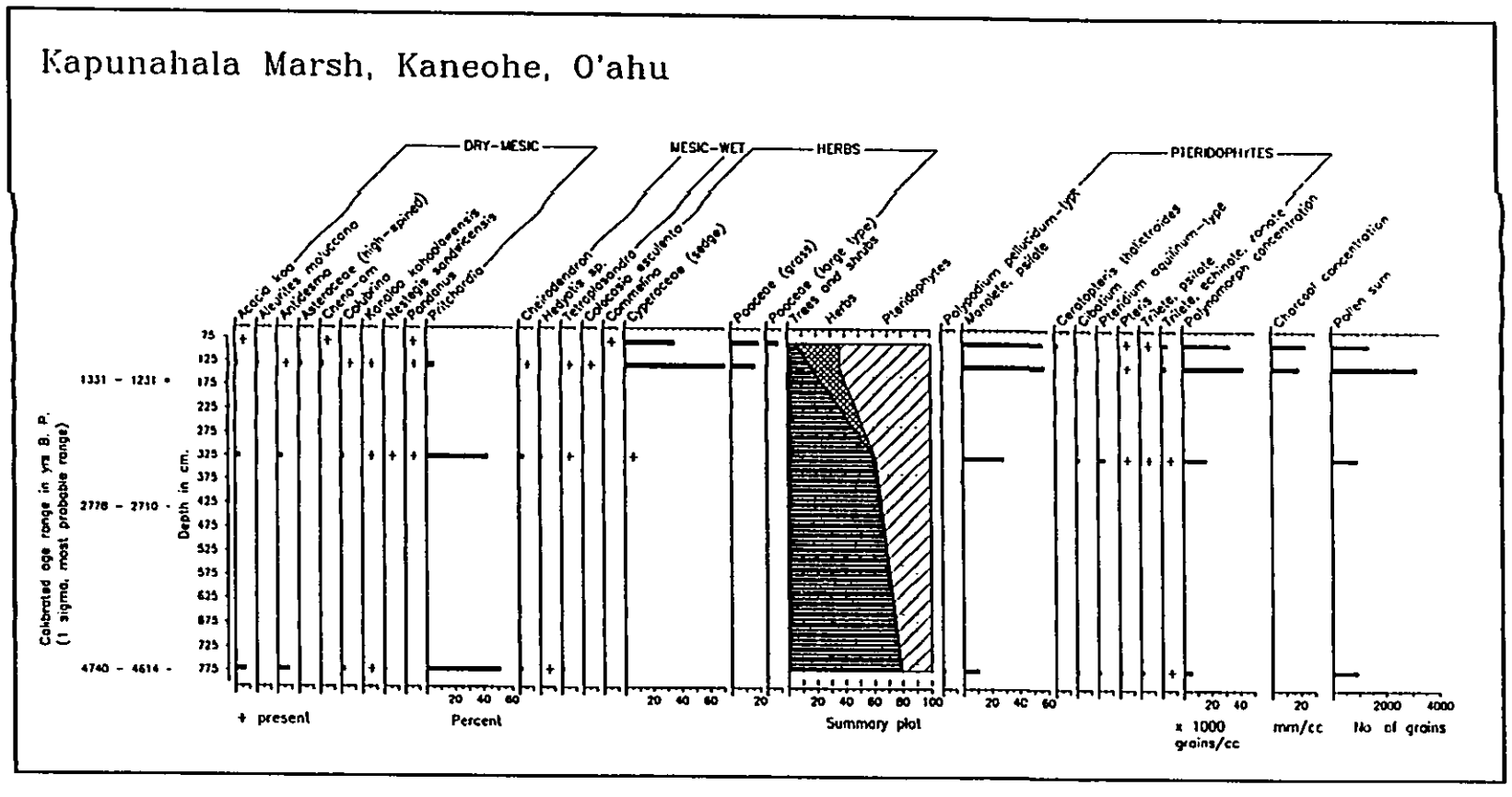

Figure 5. Pollen diagram of Core 1, Kapunahala Marsh, plotted histogram style.

which would favor growth of fern scrub. The unknown pollen types cluster in the lower two samples which attests to the higher diversity found in the pre-Polynesian forest community.

The 130-134 cm sample clearly pertains to the prehistoric Polynesian period, dating to about 692 years B.P. (Table 4). As the presence of both *Aleurites moluccana* and *Kanaloa kahoolawensis* suggest that the date should fall between 850 and 550 years B.P. according to a preliminary pollen chronology (see Athens *et al.* 1994b:32-33), the interpolated date appears to be supported.

The interval also contained 2 grains of *Colocasia esculenta*, suggesting use of the marsh for taro farming by prehistoric Polynesians. Other pollen types include sedge and grass, which make up 70 and 16 percent of the assemblage, respectively. Along with *Colocasia*, both are indicative of a freshwater marsh or pond environment. Monolete psilate spores are again dominant in the fern group at 57 percent reflecting open conditions. Of the dry-mesic types, *Pritchardia* is dominant at only 5 percent while cheno-ams hold to low levels of abundance. The mesic-wet forest types are greatly diminished in this sample and have fallen in both numbers and diversity. *Cheirodendron*, for example, is practically absent with only a single grain recovered.

The uppermost sample at 81-85 cm, dating to 110 years B.P., has historic period pollen evidence. This includes such known 19th to 20th century introductions as *Commelina, Casuarina, Cuphea*, possible *Melaleuca*, and *Prosopis* (Wagner *et al.* 1990). The very large grass pollen type, ca. 80 μm in size, most likely represents a recently introduced taxon, probably *Coix lachryma-jobi* (Job's tears). Pteridophyte spores of *Ceratopteris thalictroides*, widely naturalized in disturbed areas, occurred freely. While the sedge values fall from the previous sample, they are still high enough at 35 percent to suggest the presence of marsh conditions at the site. The dry-mesic forest group is dominated by high-spined *Asteraceae* and *Pandanus*. The absence of *Pritchardia* and any mesic-wet forest elements in this sample suggests a drastic vegetation shift from that observed in the mid-Holocene intervals, or even from the next lower interval dating to the prehistoric Polynesian period.

A number of freshwater indicators occur in the 130-134 cm sample interval, but were more common in the historic sample at 81-85 cm. Spores of the freshwater alga Zygnema and a Macrobiotus egg (tardigrade) were recovered. In addition, a number of acritarchs were found. These may represent algal reproductive structures or resting cysts.

Polynesian Plant Introductions

Pollen of *Aleurites moluccana*, or *kukui*, a species introduced by Polynesians, occurred freely in the prehistoric 130-134 cm interval sample. Since *kukui* pollen is relatively large and is insect-pollinated, its presence at this level suggests that it was locally produced.

Two pollen grains of *Colocasia esculenta*, or taro, a dietary staple of prehistoric Hawaiians, were also seen in the 130-134 cm sample. The marsh environment suggested

by the abundance of sedge pollen presumably would have favored its use for taro cultivation. The soil data for Core 1 (Table 1), however, provides no indication for the presence of pondfield soils, suggesting that taro cultivation may have been undertaken in another part of the marsh.

Pollen of *Ludwigia octovalvis* was found in the upper two samples at 130-134 and 81-85 cm. This species is given in Wagner *et al.* (1990) as questionably of Polynesian origin. It may be premature to declare the origin of this species without a more thorough study of related Hawaiian Onagraceae and especially a scan of additional intervals preceeding the prehistoric Polynesian period to verify that it was not present in pre-human times. Since *Ludwigia* pollen was fairly common in the 130-134 cm sample, a determination as to the origin of this species could be made at this site by studying additional pre-Polynesian samples at finer intervals.

Both coconut (*Cocos nucifera*) and *hau* (*Hibiscus tiliaceus*) pollen were expected but not found in the prehistoric 130-134 cm sample. Both species produce large pollen grains (ca. 70-150 μm) that do not disperse well from the parent plant. Further sampling is needed to securely determine the indigenous or introduced status of these plants (see further discussion in Athens and Ward 1994b:92).

Charcoal Particles

Charcoal particles were present in the two uppermost samples suggesting that fire was present in the area during the prehistoric Polynesian period and during historic times but not during pre-human times. The values recorded here, 23.3 mm^2/cc at 81-85 cm and 18.9 mm^2/cc at 130-134 cm are relatively high for sites on O'ahu (e.g., see Athens *et al.* 1994b). It would be of great interest to determine the date of the onset of fire use in the Kapunahala area as this would likely reflect the time of the inland expansion of Hawaiian settlement and agriculture (see Athens and Ward 1994a). However, to do so will require the processing of additional pollen samples.

Conclusions

The Kapunahala Marsh deposit offers an excellent opportunity to examine the changes in vegetation in Hawai`i from a mid-Holocene pristine lowland forest to the Polynesian period, and finally to the historic period. While a number of sites on O`ahu have been examined in detail and have revealed broad ecological patterns concerning the lowland forest (e.g., Athens and Ward 1993), each new site offers additional details on the variation and distribution of plant communities through time. The depth of sediment and excellent pollen preservation throughout the Kapunahala core mark this location as especially important for obtaining data concerning a number of paleoecological and archaeological questions.

Of special significance is the fact that palm roots were identified from several levels in the core, strongly suggesting the presence of an *in situ* Holocene *Pritchardia* palm forest. Kapunahala Marsh, therefore, offers a virtually unique chance to compare palm pollen percentages with the site of an ancient *Pritchardia* palm forest. Until now,

the fossil *Pritchardia* pollen percentages seen in other cores in Hawai'i could not easily be related to actual density of the Holocene forest since the native lowland forests were essentially destroyed prior to contact. Thus, it could be argued--incorrectly it is believed--that the high abundances of *Pritchardia* pollen in lowland cores spanning the Holocene were derived from upland forests or that only a few individual trees produced copious amounts of pollen. The Kapunahala Marsh site should help lay to rest such interpretive doubts based on pollen percentages and place paleoecological interpretations on firmer ground.

The pollen and charcoal particle records indicates prehistoric land use within the Kapunahala watershed by about 692 years B.P. (the 130-134 cm interval; about A.D. 1250). How much earlier the record might go is unclear since the next lowest sampling interval at 325-328 cm dates from the time before initial Polynesian settlement in Hawai`i. By way of comparison, pollen coring investigations in upper Maunawili Valley above Kawai Nui Marsh do not document human activity prior to about 736 years B.P. (A.D. 1214; Athens and Ward 1994a). A similar pattern at Kapunahala Marsh, if it can be documented by the analysis of additional samples, would be most important in the evaluation of the proposition that inland expansion of prehistoric Hawaiian settlement and agriculture did not occur until after A.D. 1200 (Athens and Ward 1994a).

Clearly, additional pollen and radiocarbon samples at intervening intervals should be processed for better dating control and more robust palynological interpretations. Also, additional cores should be recovered from the marsh to determine the lateral variation of the *Prithardia* root mat and to check for variation of *Pritchardia* pollen in the sediment matrix surrounding the *in situ* roots. It would also be of great archaeological interest to precisely determine through the charcoal particle counts the timing of the onset of prehistoric Hawaiian fire use, settlement, and agriculture in the watershed, and also the probable locations and dates for the use of the marsh for taro cultivation.

REFERENCES

Athens, J. Stephen and Jerome V. Ward
1993 "Environmental change and prehistoric Polynesian settlement in Hawai'i." *Asian Perspectives* 32(2):205-223.

1994a Prehistoric inland expansion of settlement and agriculture, O`ahu, Hawai'i. Paper presented at the 7th Annual Hawaiian Archaeology Conference, Hilo, Hawai'i, April 1-3, 1994.

1994b *Paleoenvironmental investigations at `Uko`a Pond, Kawailoa* Ahupua`a *O`ahu, Hawai`i.* Draft report prepared for Engineers Surveyors Hawaii, Inc., Honolulu. International Archaeological Research Institute, Inc., Honolulu.

Athens, J. Stephen, Jerome V. Ward, and Stephen Wickler
1992 "Late Holocene lowland vegetation, O`ahu, Hawai`i." *New Zealand Journal of Archaeology* 14:9-34.

Birks, H. J. and Bergen, H. H.
1992. Quaternary palaeoecology. Edward Arnold, London, 289 pp.

Cranwell, Lucy M.
1953 *New Zealand pollen studies: the monocotyledons: a comparative account.* Bull. Auckland Inst. Mus. No. 3: 91 pp.

Erdtman, G.
1960 "The acetolysis method, a revised description." *Svensk Botanisk Tidskrift.* 54(4): 561-564.

Herngreen, G. F. W.
n.d. Palynological preparation techniques. Unpublished typescript sent with letter, 1991, 21 pp.

Huang, T. C.
1972 *Pollen flora of Taiwan.* Nat. Taiwan Univ., Botany Dep. Press, Taipei: 297 pp.

Kirch, Patrick V.
1992 *The archaeology of history*, vol. 2 of *Anahulu: the anthropology of history in the Kingdom of Hawaii*, by Patrick V. Kirch and Marshall Sahlins. The University of Chicago Press, Chicago.

Moore, P. D., J. A. Webb, and M. E. Collinson
1991 *Pollen analysis.* Blackwell, London, 216 pp.

Patterson, W. A., K. J. Edwards, and D. J. Maguire
1987 "Microscopic charcoal as a fossil indicator of fire." *Quat. Sci. Rev.* 6: 3-23.

Roubik, D. W. and J. E. Moreno
1991 *Pollen and spores of Barro Colorado Island*. Mono. Sys. Bot. Vol. 36, Missouri Bot. Gard., 270 pp.

Selling, O.
1946 *Studies in Hawaiian pollen statistics: part I, the spores of the Hawaiian pteridophytes*. B. P. Bishop Mus. Spec. Publ. 37: 87 pp.

Selling, O.
1947 *Studies in Hawaiian pollen statistics: part II, the pollens of the Hawaiian phanerogams*. B. P. Bishop Mus. Spec. Publ. 38: 430 pp.

Tschudy, R. H. and R. A. Scott
1969 *Aspects of palynology*. John Wiley & Sons, New York, 510 pp.

Wagner, W. C., D. R. Herbst, and S. H. Sohmer
1990 *Manual of the flowering plants of Hawai'i, Vols. 1 and 2*. B. P. Bishop Mus. Spec. Publ. 83. Univ. Hawaii Press and Bishop Mus. Press, Honolulu.

Wright, H. E. Jr.
1967 "A square-rod piston sampler for lake sediments." *Journal of Sedimentary Petrology* 37:975-976.

Wright, H. E., E. J. Cushing, and D. A. Livingstone
1965 "Coring devices for lake sediments." In *Handbook of paleontological techniques*, ed. by Bernhard Kummel and David Raup, pp. 494-520. San Francisco: W. H. Freeman and Co.

Wright, H. E. Jr., D. H. Mann, and P. H. Glaser
1984 "Piston corers for peat and lake sediments." *Ecology* 65(2):657-659.

APPENDIX I

Traffic Impact Assessment Report for Hope Chapel

TRAFFIC IMPACT ASSESSMENT REPORT

FOR

HOPE CHAPEL KANEOHE

February 14, 1995

Kaneohe, Oahu, Hawaii
TMK: 4-5-25:20
4-5-23: 2 & 3

Prepared for:

Hope Chapel Foursquare Church

Prepared By:

Pacific Planning & Engineering, Inc.
1221 Kapiolani Boulevard, Suite 6D
Honolulu, Hawaii 96814

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FOREWORD

The traffic forecasts shown within this report's figures and tables are the direct result of Pacific Planning & Engineering, Inc.'s proprietary analytical tools. For report editing and review purposes, some or all of the forecast values have been rounded to the nearest five vehicles from our mathematical results, although we do not imply this level of accuracy can exist in any forecast method. The rounded values, however, reasonably quantify the forecasted traffic volumes for the purposes of this study.

This report is an update to our Traffic Report dated February 1993 for the Hope Chapel project. Since then, the project's access has been relocated to connect to Pookela Street just north of the Castle Hills subdivision. The original access was planned for Puupele Street. This Report describes the probable traffic impact for these changed conditions.

EXECUTIVE SUMMARY

Pacific Planning & Engineering, Inc. (PPE) was engaged to undertake a study to identify and assess the probable traffic impacts of the proposed Hope Chapel Kaneohe project. This report presents the findings and recommendations of the traffic study.

Project Description

Hope Chapel Kaneohe is proposing to build a church facility and staff offices in Kaneohe, Oahu, Hawaii on a 9.2 acre property mauka of the existing Castle Hills subdivision. The project will consist of a 17,600 square foot auditorium building, a 8,900 square foot daycare/classroom building, and a 7,900 square foot building for administration offices. On-site parking of 261 stalls including 10 handicap stalls will be provided. The project is expected to be completed by the end of 1997.

Methodology

Intersection analysis was conducted at the following intersections for the weekday morning and afternoon peak hours and Sunday mid-day peak:

- Kahekili Highway with Keaahala Road,
- Keaahala Road with Pookela Street, and
- Pookela Street with Project Driveway Access.

Future traffic was forecasted at the study intersections for the year 1997 by adding the following:

- Existing 1995 traffic volumes,

- Increasing through traffic on Kahekili Highway by a historical growth trend.
- Traffic generated by other developments in the area such as the Windward Community College Expansion.
- Traffic generated by the proposed Hope Chapel Kaneohe project.

The Report assesses the impact on the study intersections by determining *level-of-service*[1] (LOS) for existing, 1997 forecast without project, and 1997 forecast with project traffic conditions.

Conclusions and Recommendations

The Hope Chapel Kaneohe development, when completed in 1997, will have little impact on traffic operations at the intersections of Kahekili Highway with Keaahala Road and Keaahala Road with Pookela Street.

Kahekili Highway with Keaahala Road

With the planned widening of Kahekili Highway in 1995-1996, traffic conditions are expected to improve over the present LOS F operations. The addition of the Hope Chapel project will not significantly alter these conditions.

Keaahala Road with Pookela Street

Conditions at this intersection may worsen due to increased through traffic heading towards the Windward Community College[2]. Motorists making left-turns from the Windward Health Center may experience LOS C operations

[1]See Appendix A for Definition of Level of Service

[2]The College is required by a Plan Review Use Permit Condition to improve Keaahala Road. Funding is being sought through the State Legislature to improve Keaahala Road to City Department of Transportation standards.

during the morning peak hour, however, this volume is relatively small. Trips due to the construction of Hope Chapel facilities will not significantly affect this condition.

Pookela Street with Project Driveway

This driveway is expected to operate at LOS A when the project is completed.

When the Hope Chapel Project is completed in 1997, the levels-of-service will essentially remain the same as the without project scenario. The largest impact will be on Sundays because of church services, however, light traffic on adjacent roadways will not significantly reduce level-of-service. With the widening of Kahekili to a six-lane divided highway, no mitigating improvements are necessary.

PROJECT DESCRIPTION

Hope Chapel Kaneohe proposes to construct a church facility. An administrative building with office space and a small book store will also be constructed The project site is located in Kaneohe, Oahu, just mauka of the existing Castle Hills subdivision. The project location is shown on Figure 1.

The project consists of three buildings; an auditorium, classroom, and administration office. The 17,400 square foot auditorium building includes an 8,800 square foot auditorium for worship services, a small bookstore and 2,700 square feet of classroom space. The 7,900 square foot administration office is a planned two-level building with 6,000 square feet of office space. The 8,900 square foot classroom building will house 4,700 square feet of classroom space and include a small nursery. The site will include 261 parking stalls with 10 handicap stalls. The project site plan is shown on Figure 2. The project is expected to be operational by 1997.

The planned use of the auditorium is primarily for Sunday worship services. The administration office building would be used during the weekday by administrative staff of approximately 25 employees, and the classroom building would be used for preschool and day care[3] during the weekday and for Sunday school activities.

Access to the project site will be provided by a driveway along Pookela Street just north of the Castle Hills Subdivision.

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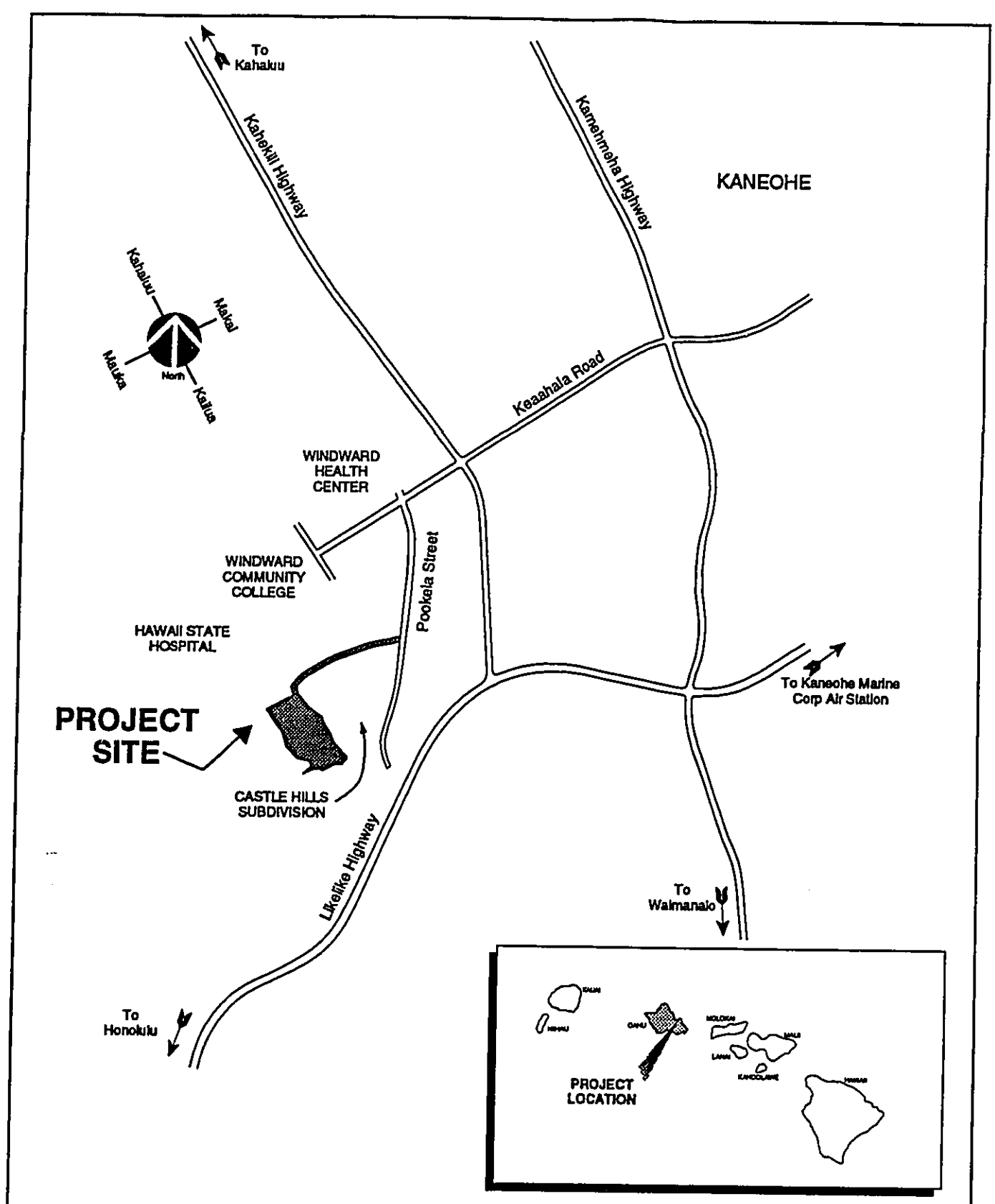
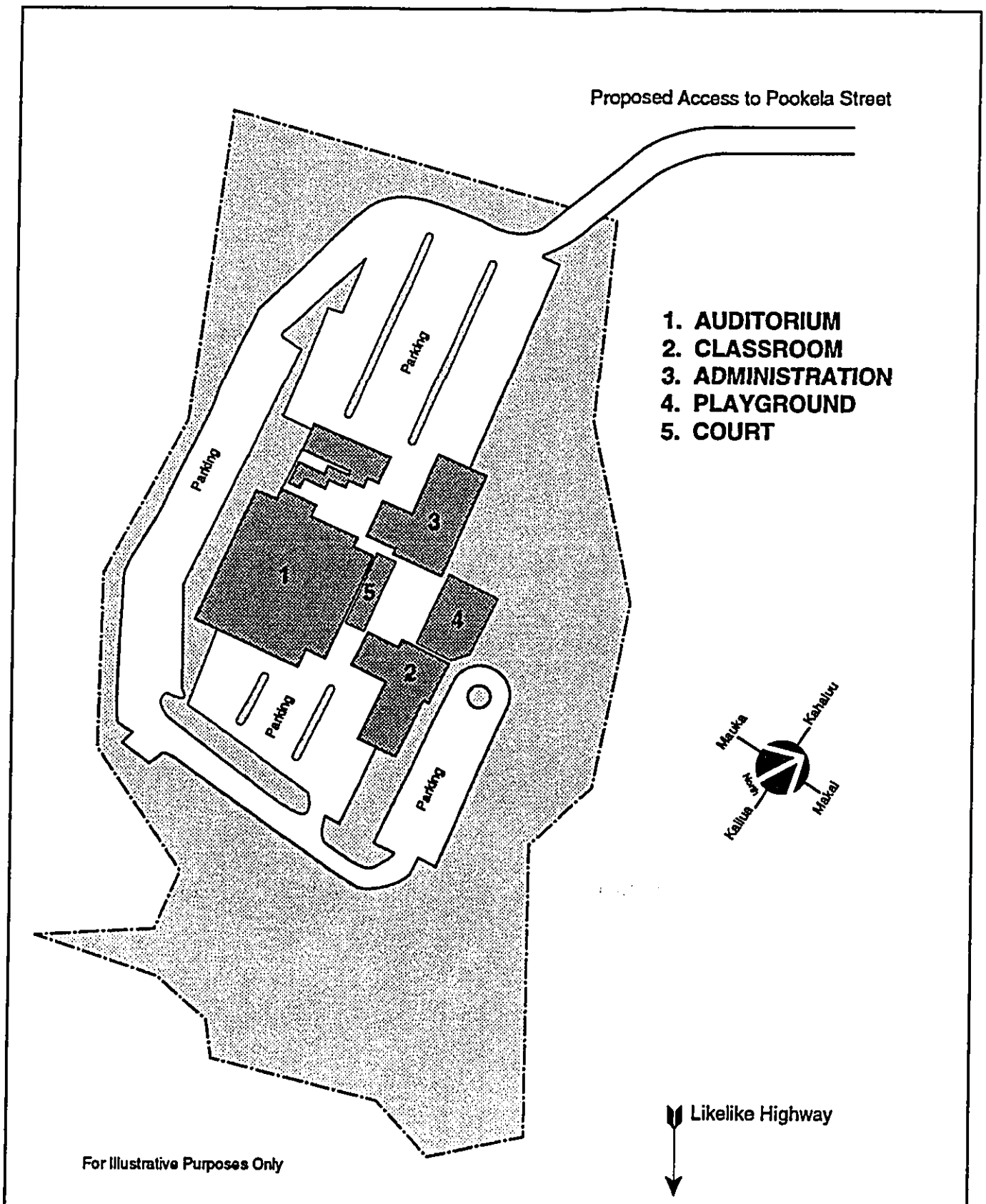
[3]Daycare is not planned for immediate future. It will be implemented when need there is a need. For conservative purposes, however, it was included in the report.



PACIFIC PLANNING & ENGINEERING, INC	Project Location Map	Figure 1



PACIFIC PLANNING & ENGINEERING, INC	**Project Site Plan**	**Figure 2**

EXISTING CONDITIONS

A survey of existing conditions was conducted to ascertain the current traffic conditions and the traffic impact of the proposed project. The review included the land uses in the area, roadway facilities, and existing traffic conditions.

Land Uses

Land uses in the vicinity of the proposed Hope Chapel Kaneohe development include the Castle Hills residential subdivision and institutional facilities. The institutional facilities include: Fathers of the Sacred Hearts Seminary, Hawaii State Hospital, Windward Community College, Windward Health Center, and the Kaneohe District Park.

Roadway Facilities

The main roadway serving the area is Kahekili Highway which stretches from Likelike Highway to Kamehameha Highway in Kahaluu.

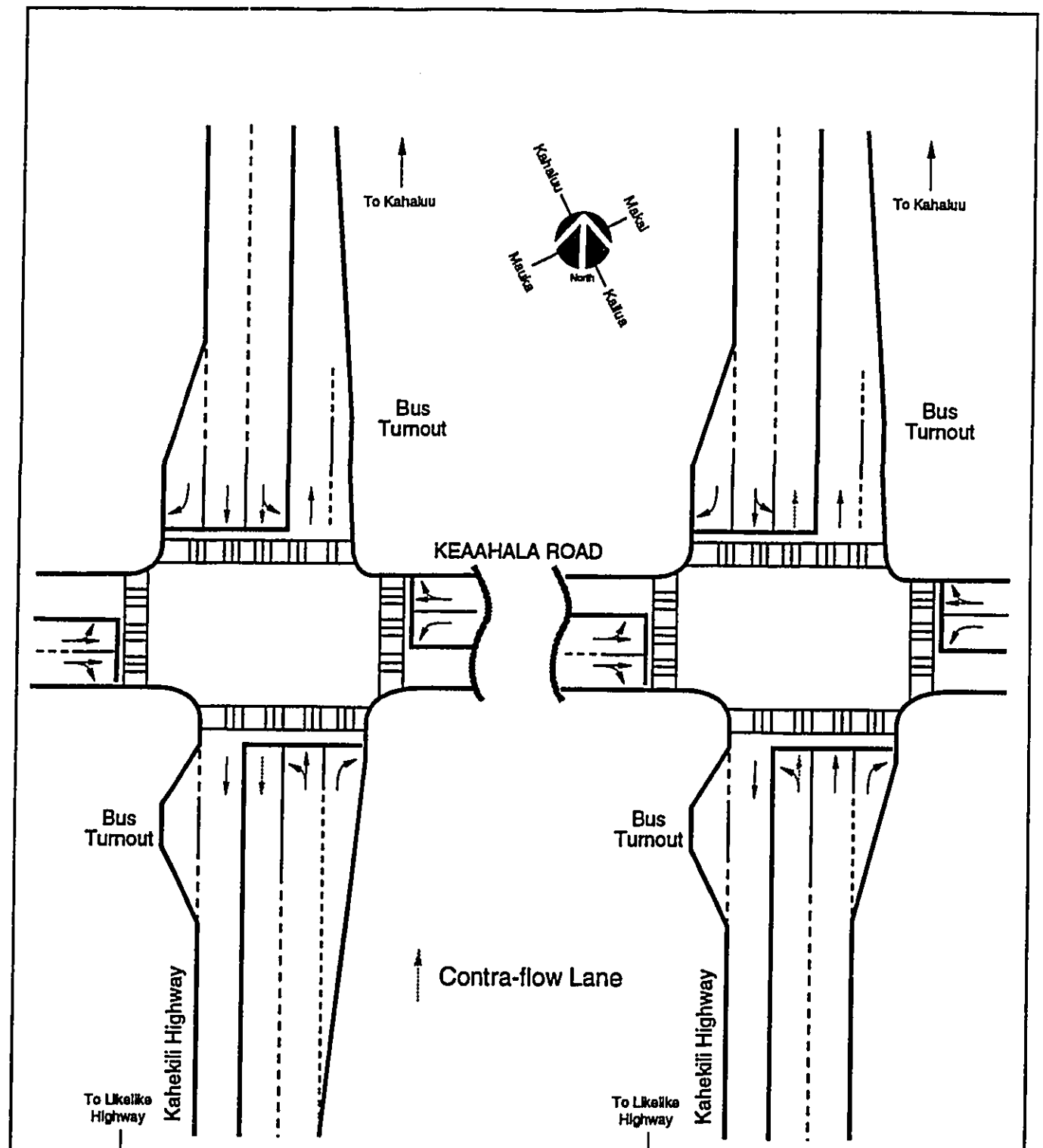
Kahekili Highway is a three-lane arterial. The center lane on Kahekili Highway between Likelike Highway and Haiku Road accommodates left turning movements in both directions during non-peak periods. Currently, the State Department of Transportation implements a contra-flow system on Kahekili Highway during the morning and afternoon weekday peak periods. During the morning peak period, Kahekili Highway is coned to allow two through lanes for the Honolulu bound traffic. During the afternoon peak period, Kahekili Highway is coned to allow two through lanes for Kahaluu bound traffic. Kahekili Highway has a posted speed limit of 35 mph at the Keaahala Road intersection.

Keaahala Road is a three-lane roadway which is the only access to Kahekili Highway for the Hawaii State Hospital, Windward Community College, Castle Hills, Windward Health Center and Kaneohe District Park. The posted speed limit is 25 mph. A schematic drawing of the existing laneage at the Kahekili Highway/Keaahala Road intersection is shown on Figure 3.

Pookela Street is a two-lane residential street with a 25 mph speed limit. Vehicles are permitted to park along the 40' wide roadway.

Study Intersections

The intersection of Kahekili Highway with Keaahala Road is controlled by traffic signal. Figure 4 shows the intersection layout. The intersection of Keaahala Road and Pookela Street is controlled by stop signs with Keaahala having the right of way. The intersection has single lane approaches in all four directions.



PACIFIC PLANNING & ENGINEERING, INC	Existing 1995 Intersection Layout Kahekili Hwy. & Keaahala Road	Figure 3

Traffic Conditions

Traffic counts along Kahekili Highway taken over a 24 hour period were obtained from the State Department of Transportation, Highways Division (DOT). The State counts indicated that the weekday morning and afternoon peak hour generally occur from 6:00 to 8:00 AM and 4:00 to 6:00 PM respectively.

Manual traffic counts were conducted during the weekday morning and afternoon peak periods on January 17, 1995 and during the Sunday morning peak period on January 22, 1995 when services are planned. The counts were taken at the intersections of Kahekili Highway with Keaahala Road, Keaahala Road with Pookela Street and near the proposed project access on Pookela Street. During the morning count the weather was dry, but the pavement was wet, the afternoon count was partly sunny with dry conditions. Sunday's count was during fair weather. The traffic volumes of the 1995 morning and afternoon peak hours and Sunday morning peak hour are shown in Figures 4, 5 and 6, respectively. The following are some of the observations made during the count.

During the weekday morning peak period:

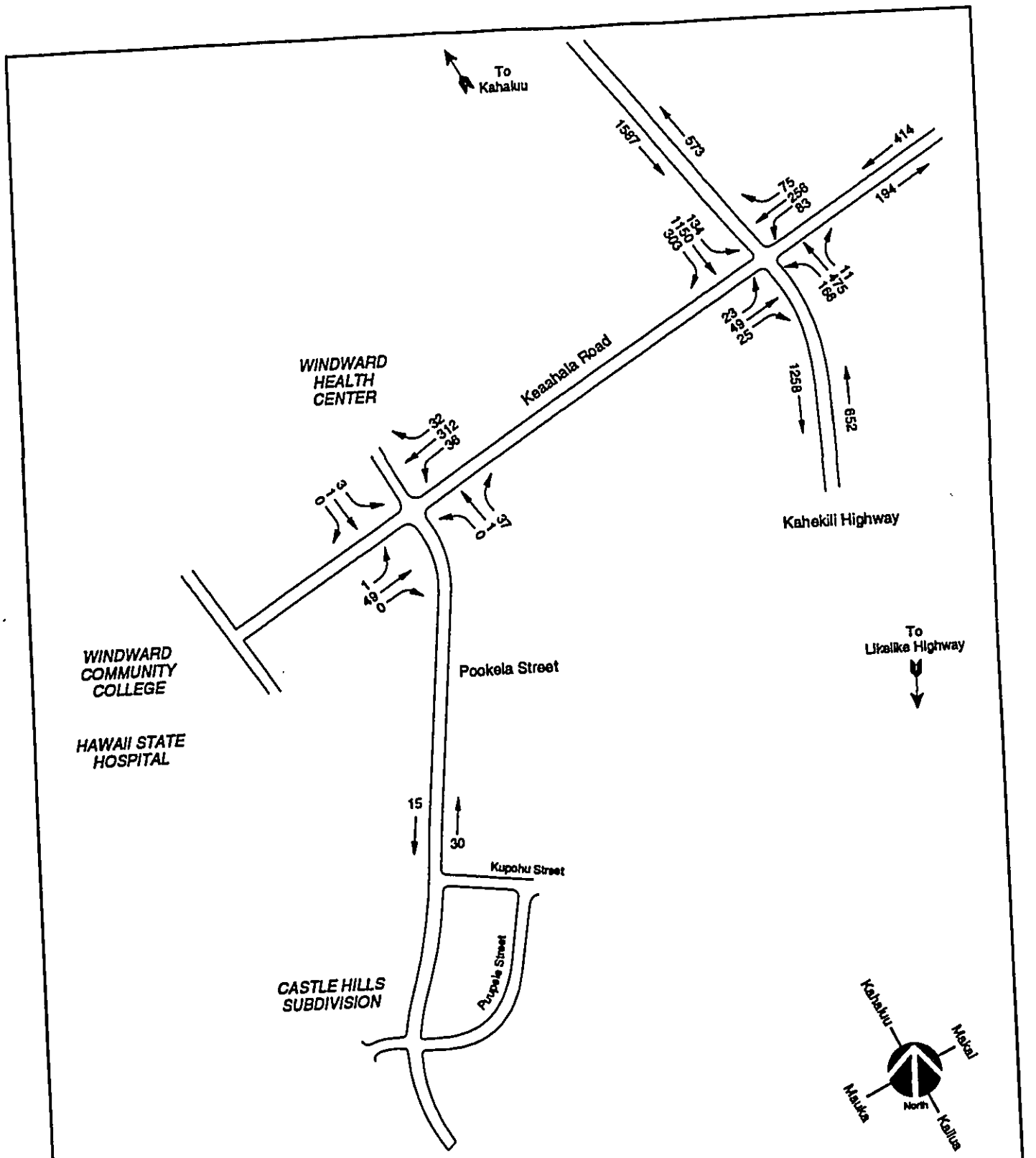
- Vehicles on Keaahala Road had long delays because most of the green time is given to movements on Kahekili Highway. Also, cycle lengths were measured to be approximately 180 seconds (3 minutes).
- Motorists travelling Honolulu-bound on Kahekili Highway backed up through the intersection on several occasions.

During the weekday afternoon peak period:

- Motorists travelling from Honolulu on Kahekili Highway backed up considerably at certain times.

During the Sunday mid-day peak period:

- Traffic on Kahekili Highway was relatively free-flowing.
- Even though traffic was light, motorists on Keaahala Road had long delays due to long cycle lengths.



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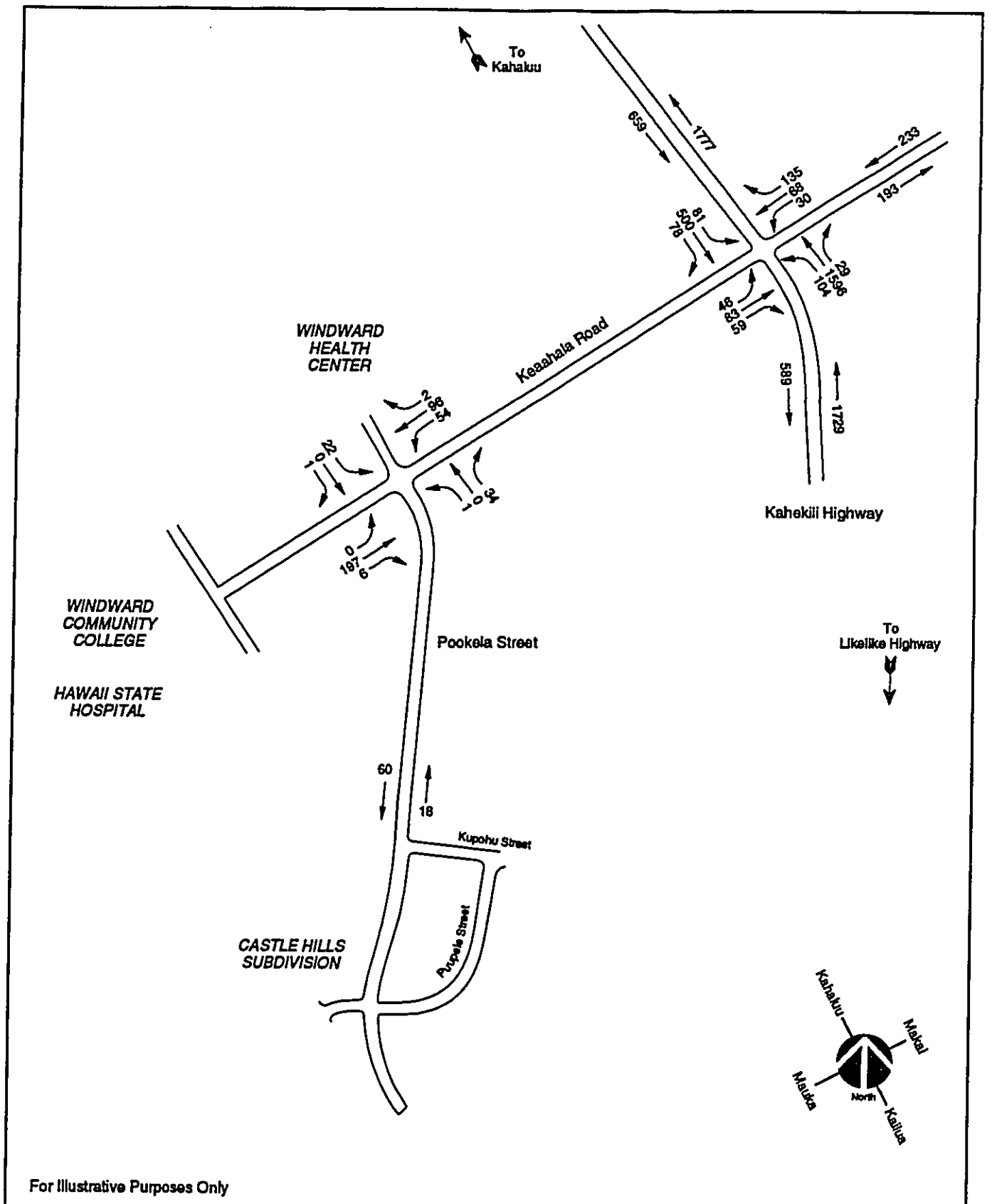
PACIFIC PLANNING & ENGINEERING, INC	Existing Morning Peak Hour Traffic Volumes	Figure 4



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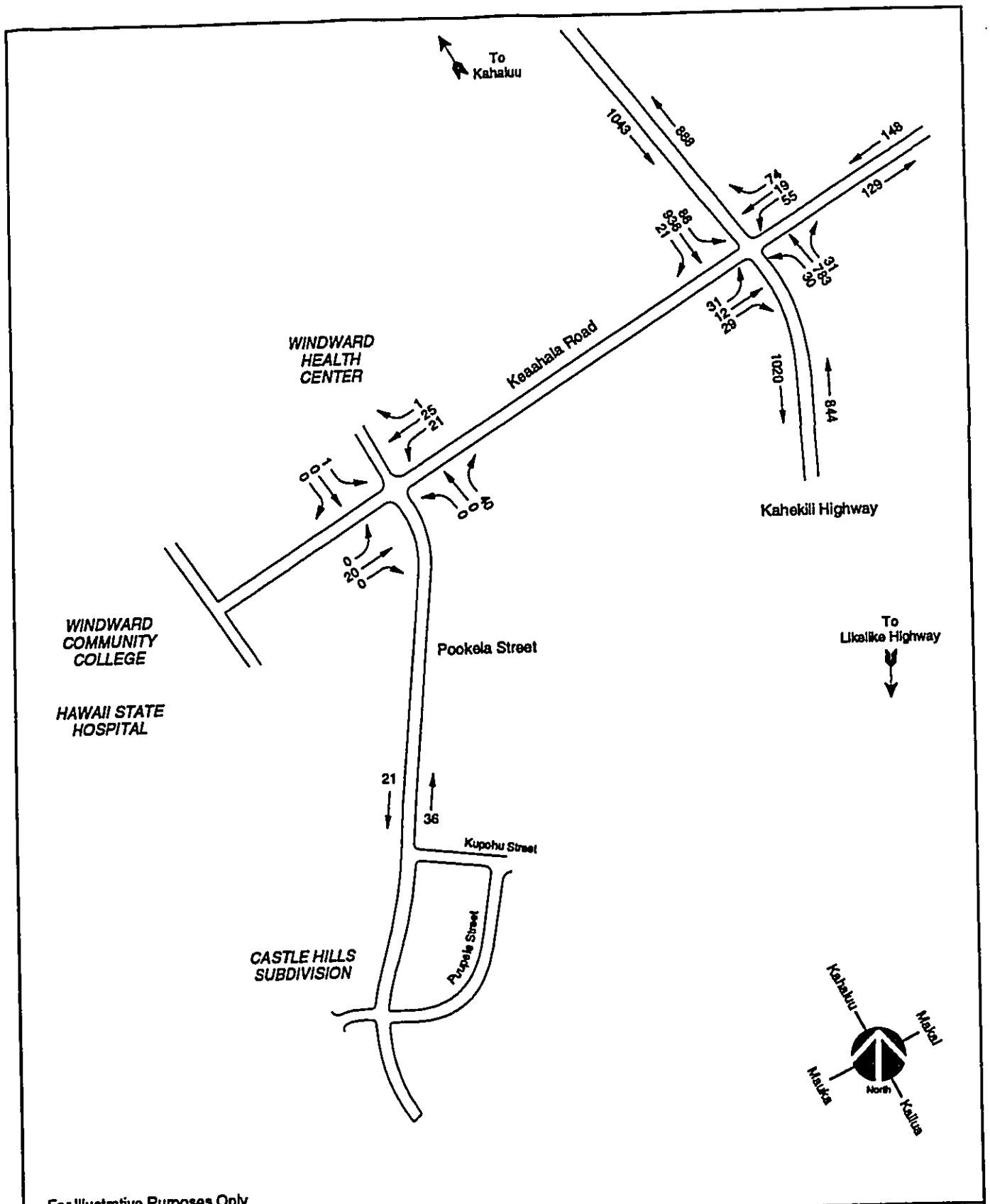
PACIFIC PLANNING & ENGINEERING, INC	**Existing Afternoon Peak Hour Traffic Volumes**	**Figure 5**



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PACIFIC PLANNING & ENGINEERING, INC	**Existing Sunday Morning Peak Hour Traffic Volumes**	**Figure 6**

FUTURE CONDITIONS

A survey of approved planned developments and improvements to transportation facilities was conducted to estimate future traffic conditions at the study intersections.

Land Uses

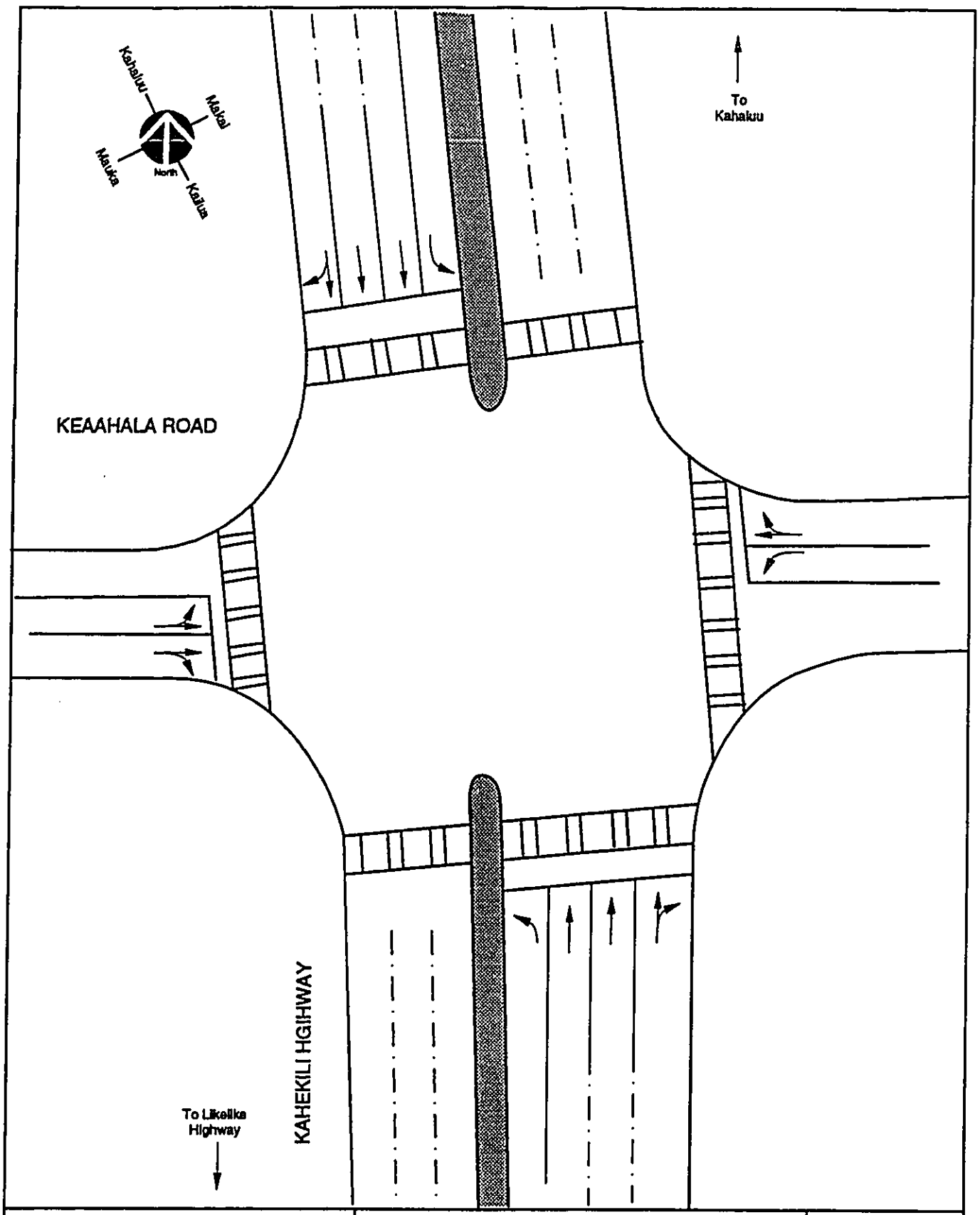
Traffic generated by the following development within the immediate area will impact the study intersection by the year 1997:

- The Windward Community College is planning to expand its facilities. Enrollment is expected to increase by approximately 600 students by year 1997.
- A substance abuse center (Hina Mauka) is being constructed along Pookela Street. Completion is scheduled for this year.
- The Hawaii State Hospital is expected to expand its staff this year. However, growth is minimal.

Roadway Facilities

Kahekili Highway is planned to be widened to a six-lane divided highway. Construction is expected to be completed by 1996. The proposed layout of the intersection of Kahekili Highway with Keaahala Road is shown in Figure 7.

Keaahala Road is expected to undergo various improvements including addition of left-turn bays by 1997 if funding is available.



PACIFIC PLANNING & ENGINEERING, INC

Proposed Intersection
Kahekili Hwy. and Keaahala Road

Figure 7

PROJECTED TRAFFIC CONDITIONS

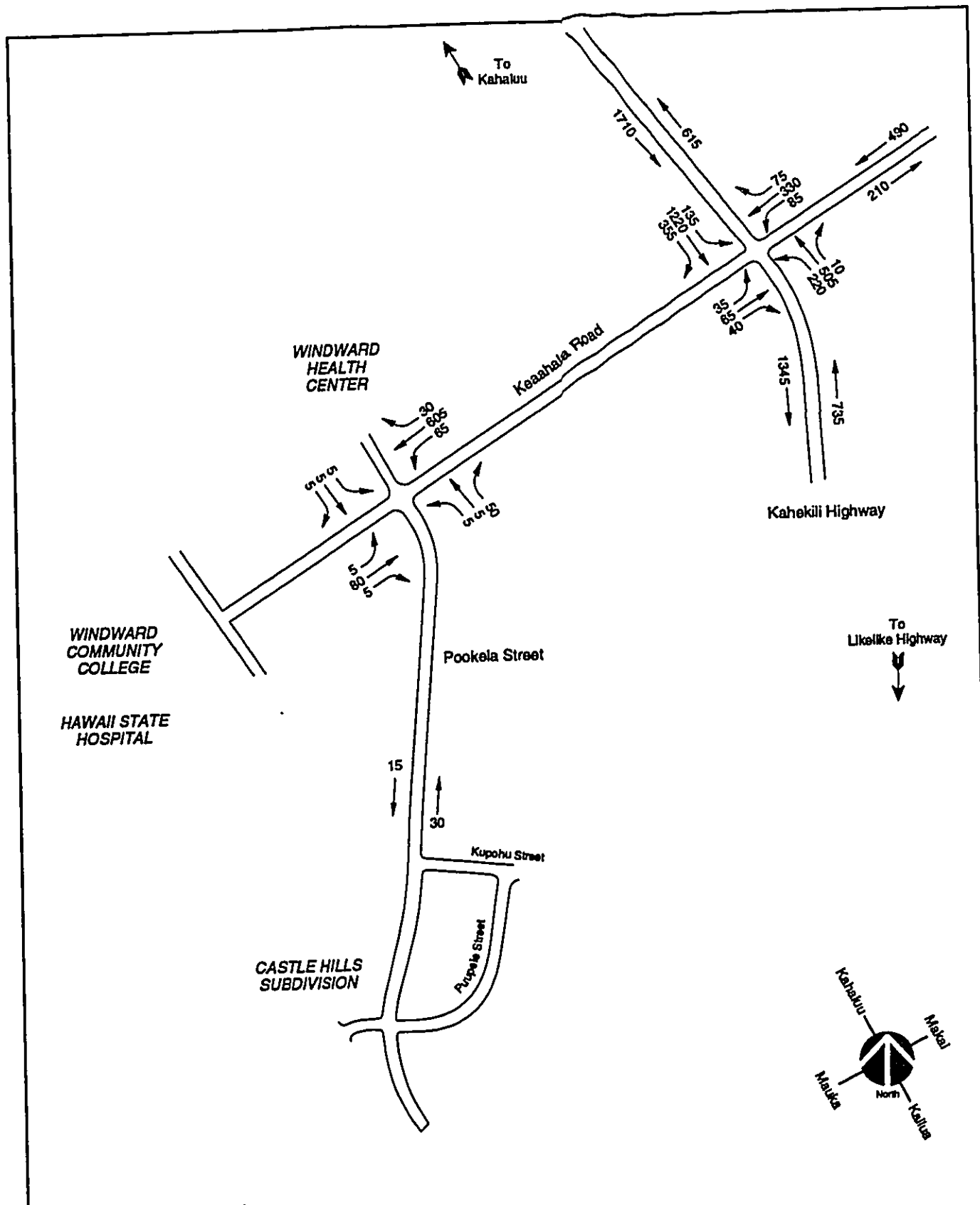
Future traffic forecasts without and with the project were estimated for the year 1997.

Future Traffic Without Project

Future traffic without the Hope Chapel project was forecasted by adding the following: (1) existing peak hour traffic volumes; (2) the increase in through-traffic; and (3) traffic generated by nearby proposed developments. The resultant forecast traffic without the project are shown in Figures 8, 9 and 10, for the morning, afternoon and Sunday peak hours, respectively.

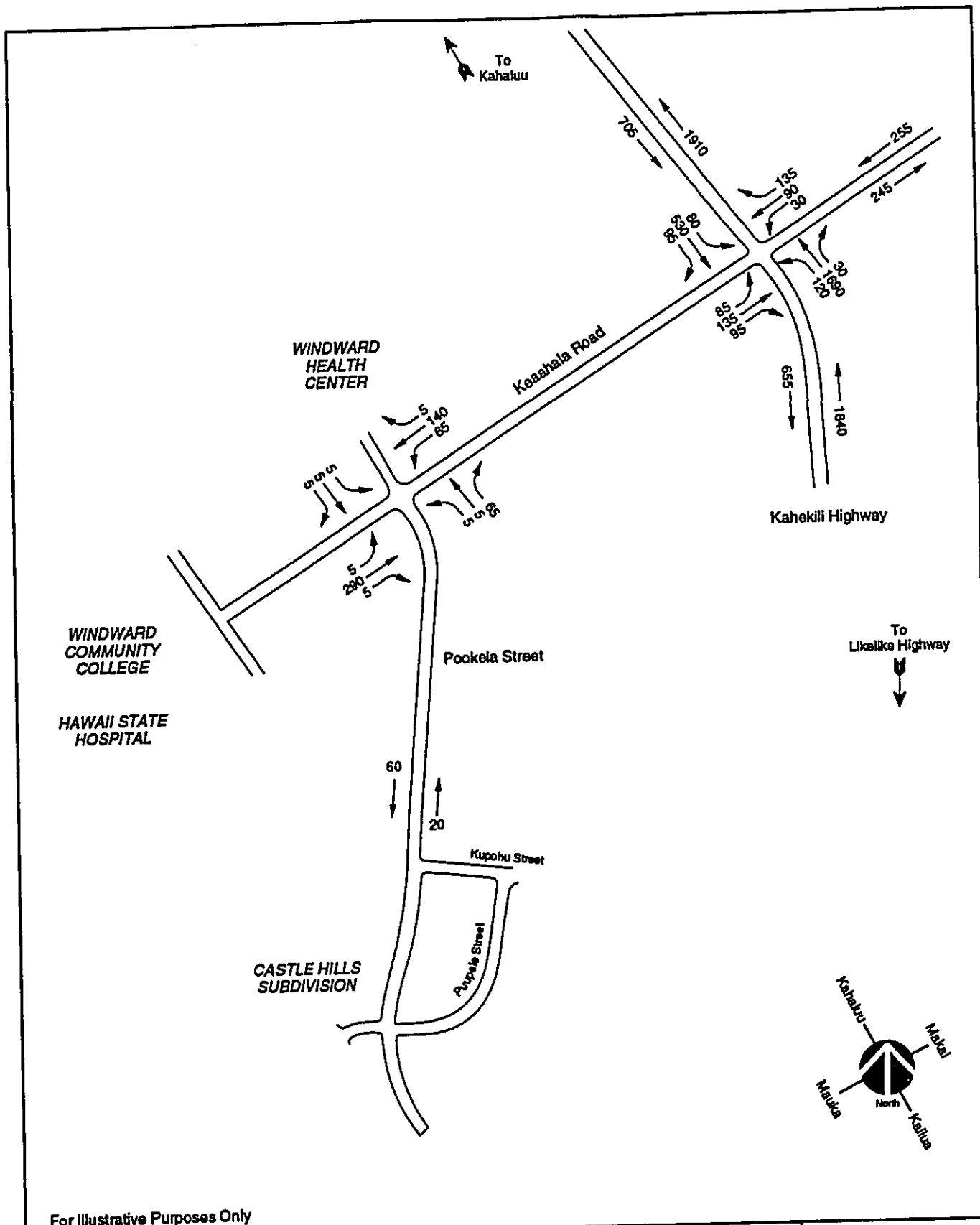
Through-Traffic Growth along Kahekili Highway

Through-traffic passes through the area without specific origin or destination near the project site. This generally reflects traffic increases from developments beyond the immediate study area. The growth in through-traffic was estimated using historical data obtained from nearby DOT traffic count stations and linear regression analysis. 1993 data indicated a reduction in growth, however, that could be due to motorists altering drive times because Kahekili is currently operating at capacity. When Kahekili is widened, traffic growth may increase accordingly. Future through traffic increase on Kahekili Highway is the existing traffic plus a 6% growth over two years to 1997.



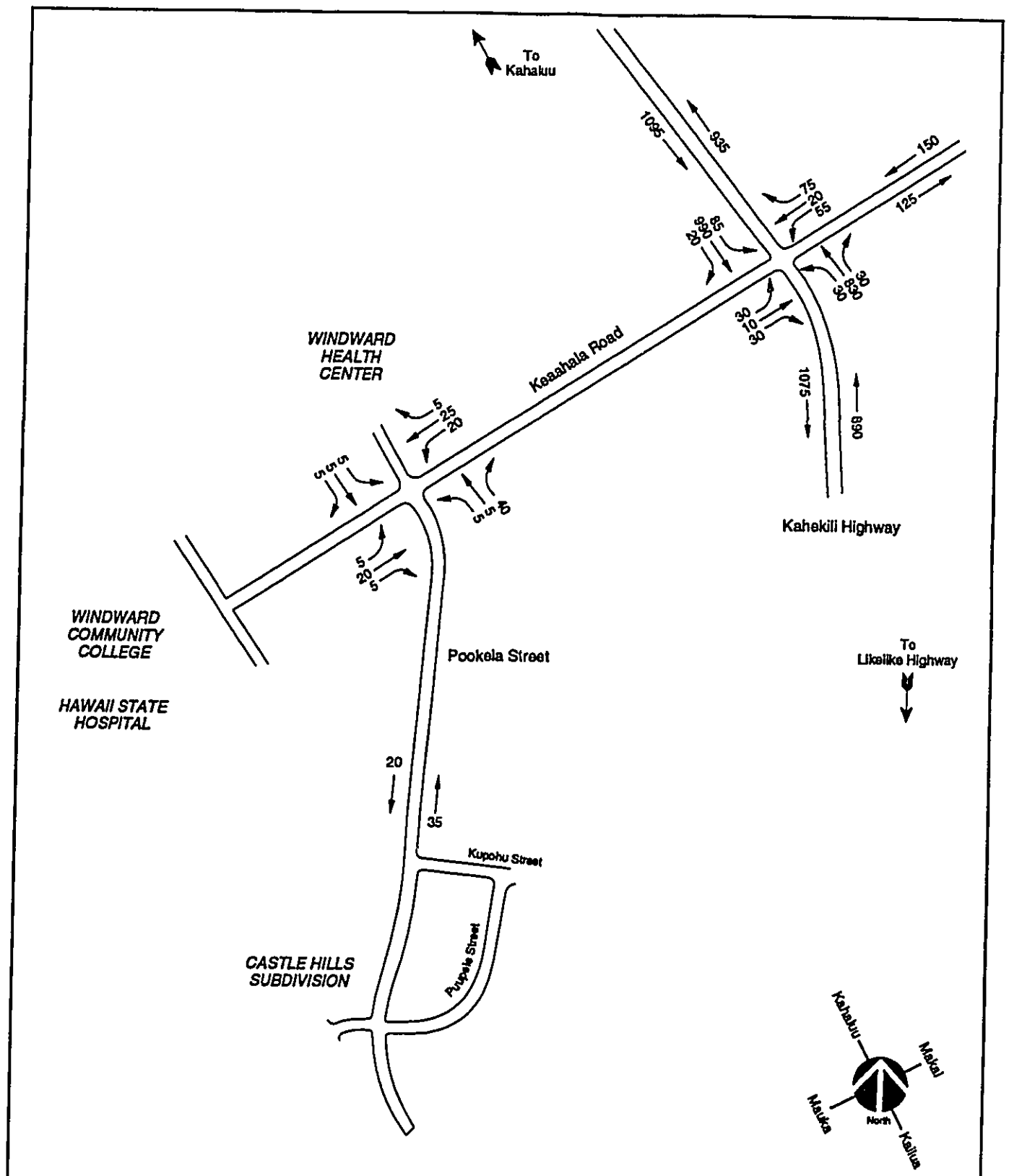
For Illustrative Purposes Only

PACIFIC PLANNING & ENGINEERING, INC	1997 Morning Peak Hour Traffic Volumes Without Project	Figure 8



For Illustrative Purposes Only

PACIFIC PLANNING & ENGINEERING, INC	**1997 Afternoon Peak Hour Traffic Volumes Without Project**	**Figure 9**



For Illustrative Purposes Only

PACIFIC PLANNING & ENGINEERING, INC	**1997 Sunday Morning Peak Hour Traffic Volumes Without Project**	**Figure 10**

Traffic from Other Proposed Developments

The three step procedure of trip generation, trip distribution, and traffic assignment was used to forecast future peak hour traffic for other developments.

The trip generation step estimates the number of trips which would be generated during the weekday morning and afternoon, and Sunday peak hours by the developments. Table 1 shows the number of trips generated by the other developments.

Trips due to the Windward Community College expansion was estimated based on the change in land uses and data from the Windward Community College Transportation Study Report (WCCTS)[4]. The difference in current enrollment numbers, and projected enrollment is estimated to be approximately 640 FTE students.

Table 1. Trip Generation for Other Developments

		Morning		Afternoon		Sunday	
Land Use	Parameter	Enter	Exit	Enter	Exit	Enter	Exit
WCC Expansion	640 students	104	21	37	75	0	0
Hina Mauka	40 employees	31	13	13	31	0	0
State Hospital	100 employees	23	10	9	20	0	0

The Hina Mauka facility is currently located elsewhere, but will be moving to their site along Pookela Street this year. The facility will employ 40 employees over three shifts. It utilizes a live-in residential program for special treatment programs. Trips were estimated based on the WCCTSR report.

The State Hospital plans to hire 100 more employees over three shifts, but, it

[4]Windward Community College Transportation Study Report, by Wilbur Smith Associates, May 1992.

may be offset by plans to move more patients out of the facility. However, these trips were added for conservatism.

The trip distribution step determines the expected trip origins and destinations. The trips were distributed based on distributions developed by WCCTSR for the college, and population and employment for the others.

The traffic assignment step identifies the specific route on the roadway network that will take the driver from origin to destination. Traffic was assigned based on the estimated shortest path or travel time from origins to destinations.

Comparison of Forecasts To WCCTSR

The forecasts for the without project scenario was compared to the forecasts developed in the WCCTSR. In general, the numbers are similar with a few exceptions. Traffic generated by the college in this report are greater than shown in the WCCTSR due to a later morning peak hour used in this report.

Future Traffic With Project

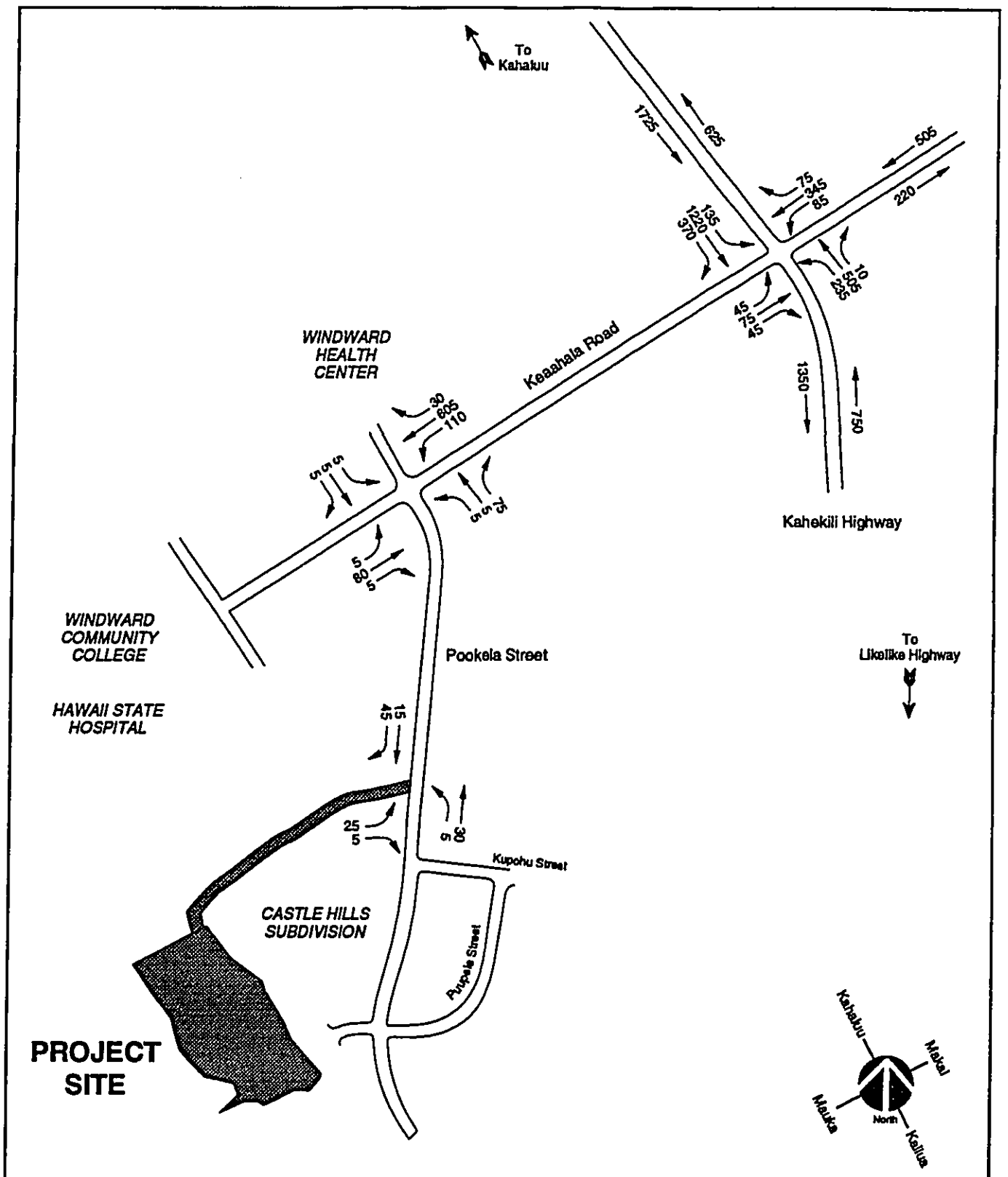
Future traffic with project was forecasted by adding traffic generated by the proposed project to the without project traffic volumes. The resultant forecast traffic with project are shown in Figures 11, 12 and 13 for the morning, afternoon and Sunday peak hours respectively.

The three step procedure of trip generation, trip distribution, and traffic assignment was used to estimate peak hour traffic from the proposed project.

The number of weekday morning and afternoon peak hour trips from the proposed Hope Chapel Kaneohe development are based on the project land uses and data from the Trip Generation Report. Trip generation for the Sunday peak

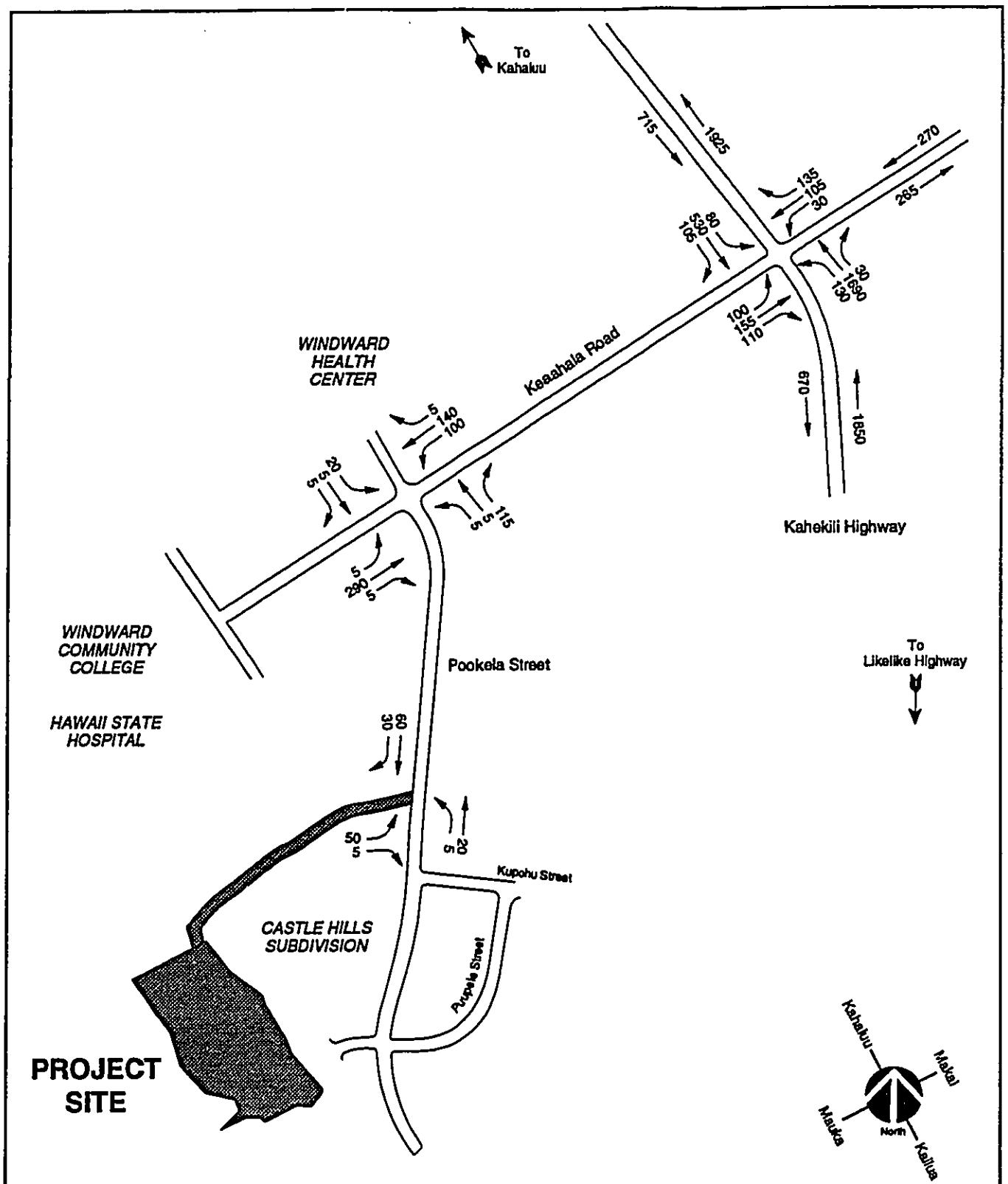
hour was based on the capacity of the project parking lot. Table 2 shows the number of trips generated by the proposed project.

Weekday project generated trips were distributed to different areas based on the distribution of population and employment on Oahu and on existing traffic patterns. On Sunday, project trips were distributed based on the residential distribution of the congregation members on Oahu since the members would be attending Sunday services.



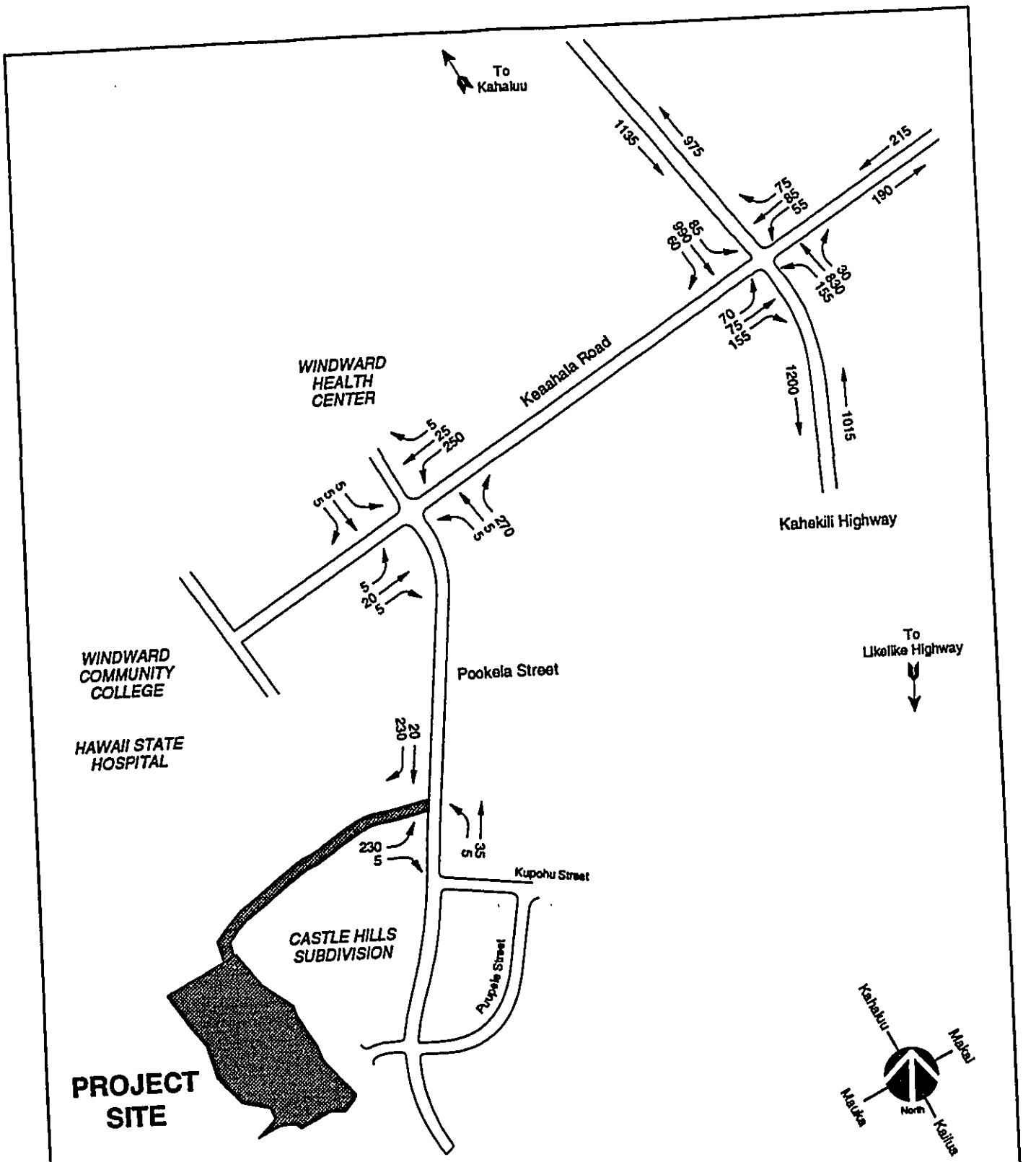
For Illustrative Purposes Only

PACIFIC PLANNING & ENGINEERING, INC	1997 Morning Peak Hour Traffic Volumes With Project	Figure 11



For Illustrative Purposes Only

PACIFIC PLANNING & ENGINEERING, INC	1997 Afternoon Peak Hour Traffic Volumes With Project	Figure 12



For Illustrative Purposes Only

PACIFIC PLANNING & ENGINEERING, INC	1997 Sunday Morning Peak Hour Traffic Volumes With Project	Figure 13

Table 2. Trip Generation for Hope Chapel Kaneohe Project				
	Land Use	**Parameter**	**Enter**	**Exit**
Morning Peak Hour	Auditorium (Church)	8800 sf	1	1
	Day Care	75 children	30	25
	Business Office	25 employees	17	2
		total	**48**	**28**
Afternoon Peak Hour	Auditorium (Church)	8800 sf	1	1
	Day Care	75 children	27	32
	Business Office	25 employees	4	19
		total	**32**	**52**
Sunday Peak Hour	Auditorium (Church)	261 stalls	261	261
	Day Care*	0 children	0	0
	Business Office*	0 employees	0	0
		total	**261**	**261**

*Day Care and Business Office are closed on Sunday.

As noted previously in the Project Description, the daycare program will not be implemented when the project is completed since there is no known demand currently. However, for conservative purposes, it was included in the traffic forecasts.

It was assumed that most of the children in the day care program would be from residents/families who lived in the Kaneohe area. The distribution for the weekday and Sunday is shown in Table 3 below.

Table 3. Trip Distribution for Hope Chapel Kaneohe Development		
	Sunday	Weekday
Kailua	21%	3%
Windward Coast	6%	3%
Kaneohe	56%	90%
Central Oahu	2%	2%
Town	13%	2%
Ewa	2%	0%

Traffic was assigned based on the estimated shortest path or travel time from origins to destinations. It was estimated that 30% would travel on Kahekili Highway heading south, 30% would travel on Kahekili Highway heading north, and 40% would cross Kahekili Highway.

TRAFFIC IMPACTS

Intersection analysis was conducted at the intersection of Keaahala Road and Kahekili Highway and at the intersection of Pookela Street and Puupele Street to determine the relative impact of the proposed project on the local roadway system. Analyses were done for existing, 1997 forecast without project, and 1997 forecast with project traffic conditions.

Analysis Methods

The study intersections were analyzed using methodologies from the Transportation Research Board Highway Capacity Manual, Special Report 209 (1985). Operational analysis was used to analyze the existing signalized intersection of Kahekili Highway and Keaahala Road. Unsignalized intersection analysis was used to analyze the Keaahala Road/Pookela Street and Pookela Street/Project Access intersections.

The methodology describes traffic flow conditions in terms of *level-of-service* (LOS) ranging from A to F, where LOS A is the best and LOS F is the worst. Appendix A gives the LOS definitions for each analysis method. The LOS for each methodology is not directly comparable due to different methods of determining LOS.

Analysis Results

The results and discussion of the analysis for the morning, afternoon and Sunday peak hours are summarized in Table 4 and Table 5.

Table 4 - Signalized Intersection Analysis - Kahekili Highway with Keaahala Road

	1995			1997 Without Project			1997 With Project		
	AM	PM	Sun	AM	PM	Sun	AM	PM	Sun
Northbound (from Likelike)	F	E	A	B	B	A	B	B	B
Avg. Vehicle Delay (sec)	>60	55.0	4.7	13.3	11.3	4.7	14.5	12.0	7.1
Southbound (to Likelike)	B*	F	B	B	B	B	B	B	B
Avg. Vehicle Delay (sec)	8.0*	>60	6.1	14.9	7.8	6.5	15.0	8.0	7.8
Eastbound (from WCC)	D	D	D	B	B	B	B	B	B
Avg. Vehicle Delay (sec)	38.4	39.5	36.0	10.2	14.7	13.7	10.4	15.0	14.8
Westbound (to WCC)	F	E	D	C	C	C	C	C	C
Avg. Vehicle Delay (sec)	>60	44.1	40.0	21.7	18.4	15.2	24.3	18.0	15.1
OVERALL INTERSECTION	F	F	B	C	B	B	C	B	B
Avg. Vehicle Delay (sec)	>60	>60	8.6	15.4	11.3	6.5	16.1	11.9	8.8
Capacity (v/c)	0.73	0.98	0.68	0.86	0.67	0.34	0.88	0.68	0.49

* Observed at LOS F
Note: WCC - Windward Community College

Kahekili Highway with Keaahala Road

- Presently, during the weekday morning, motorists heading to Honolulu on Kahekili Highway experience very long delays (LOS F). In the afternoon, traffic flow heading to Kahaluu on Kahekili Highway experiences LOS F. During the Sunday peak hour, drivers experience LOS B or better on the Kahekili Highway approaches and LOS D on Keaahala Road approaches.

- By 1997 without the project, due to the widening of Kahekili Highway, traffic conditions will improve (LOS C or better) during the weekday peak hours and Sunday.

- By 1997 with the project, the LOS remains the same as the without project case.

Table 5 - Unsignalized Intersection Analysis

	1995			1997 Without Project			1997 With Project		
	AM	PM	Sun	AM	PM	Sun	AM	PM	Sun
Keaahala/Pookela									
Northbound (from Pookela)	A	A	A	A	A	A	A	A	A
Southbound (to Pookela)	A	A	A	C	B	A	C	B	A
Eastbound (from WCC)	A	A	A	A	A	A	A	A	A
Westbound (to WCC)	A	A	A	A	A	A	A	A	A
Pookela/Project Driveway									
Northbound (from CHS)	n/a	n/a	n/a	n/a	n/a	n/a	A	A	A
Eastbound (from Project)	n/a	n/a	n/a	n/a	n/a	n/a	A	A	A

Notes: WCC - Windward Community College
CHS - Castle Hills Subdivision
n/a - not applicable

Keaahala Road with Pookela Street

- Without the project, motorists making left-turns out of the Windward Health Center (southbound) may experience LOS C in the morning peak hour and LOS B in the afternoon peak hour. However, these volumes are small.

- With the project, the LOS will remain the same as the without project case.

Pookela Street and Project Driveway

- With the project, the intersection will operate at LOS A during weekday peak hours and Sunday.

CONCLUSIONS AND RECOMMENDATIONS

The Hope Chapel Kaneohe development, when completed in 1997, will have little impact on traffic operations at the intersections of Kahekili Highway with Keaahala Road and Keaahala Road with Pookela Street.

Kahekili Highway with Keaahala Road

With the planned widening of Kahekili Highway in 1995-1996, traffic conditions are expected to improve over the present LOS F operations. The addition of the Hope Chapel project will not significantly alter these conditions.

Keaahala Road with Pookela Street

Conditions at this intersection may worsen due to increased through traffic heading towards the Windward Community College. Motorists making left-turns from the Windward Health Center may experience LOS C operations during the morning peak hour, however, this volume is relatively small. Trips due to the construction of Hope Chapel facilities will not significantly affect this condition.

Pookela Street with Project Driveway

This driveway is expected to operate at LOS A when the project is completed.

When the Hope Chapel Project is completed in 1997, the levels-of-service will essentially remain the same as the without project scenario. The largest impact will be on Sundays because of church services, however, light traffic on adjacent roadways will not significantly reduce level-of-service. With the widening of Kahekili to a six-lane divided highway, no mitigating improvements are necessary.

APPENDIX A

LEVEL-OF-SERVICE DEFINITIONS
FOR
SIGNALIZED AND UNSIGNALIZED
INTERSECTIONS

REFERENCE: Highway Capacity Manual (Special Report 209, 1985)

LEVEL-OF-SERVICE FOR SIGNALIZED INTERSECTIONS

Level-of-service for signalized intersections is defined in terms of *delay*. Delay is a measure of driver discomfort, frustration, fuel consumption, and lost travel time. Specifically, level-of-service criteria are stated in terms of the average stopped delay per vehicle for a 15-minute analysis period.

Level-of-service A describes operations with very low delay, i.e., less than 5.0 seconds per vehicle. This occurs when progression is extremely favorable, and most vehicles arrive during the green phase. Most vehicles do not stop at all. Short cycle lengths may also contribute to low delay.

Level-of-service B describes operations with delay in the range of 5.1 to 15.0 seconds per vehicle. This generally occurs with good progression and/or short cycle lengths. More vehicles stop than for LOS A, causing higher levels of average delay.

Level-of-service C describes operations with delay in the range of 15.1 to 25.0 seconds per vehicle. These higher delays may result from fair progression and/or longer cycle lengths. Individual cycle failures may begin to appear in this level. The number of vehicles stopping is significant at this level, although many still pass through the intersection without stopping.

Level-of-service D describes operations with delay in the range of 25.1 to 40.0 seconds per vehicle. At level D, the influence of congestion becomes more noticeable. Longer delays may result from some combination of unfavorable progression, long cycle lengths, or a high v/c ratios (volume of cars to capacity of intersection). Many vehicles stop, and the proportion of vehicles not stopping declines. Individual cycle failures are noticeable.

Level-of-service E describes operations with delay in the range of 40.1 to 60.0 seconds per vehicle. This is considered to be the limit of acceptable delay. These high delay values generally indicate poor progression, long

cycle length, and high v/c ratios. Individual cycle failures are frequent occurrences.

Level-of-service F describes operations with delay in excess of 60.0 seconds per vehicle. This is considered to be unacceptable to most drivers. This condition often occurs with oversaturation, i.e., when arrival flow rates exceed the capacity of the intersection. It may also occur at high v/c ratios below 1.00 with many individual cycle failures. Poor progression and long cycle lengths may also be major contributing causes to such delay levels.

LEVEL-OF-SERVICE FOR UNSIGNALIZED INTERSECTIONS

The concept of levels of service is defined as a qualitative measure describing operational conditions within a traffic stream, and their perception by motorists and/or passengers. A level-of-service definition generally describes these conditions in terms of such factors as speed and travel time, freedom to maneuver, traffic interruptions, comfort and convenience, and safety.

Six levels of service are defined for each type of facility for which analysis procedures are available. They are given letter designations, from A to F, with Level-of-Service A representing the best operating conditions and Level-of-Service F the worst.

Level-of-Service definitions--In general, the various levels of service are defined as follows for uninterrupted flow facilities:

Level-of-Service A represents free flow. Individual users are virtually unaffected by the presence of others in the traffic stream. Freedom to select desired speeds and to maneuver within the traffic stream is extremely high. The general level of comfort and convenience provided to the motorist, passenger, or pedestrian is excellent.

Level-of-Service B is in the range of stable flow, but the presence of other users in the traffic stream begins to be noticeable. Freedom to select desired speeds is relatively unaffected, but there is slight decline in the freedom to maneuver within the traffic stream from LOS A. The level of comfort and convenience provided is somewhat less than at LOS A, because the presence of others in the traffic stream begins to affect individual behavior.

Level-of-Service C is in the range of stable flow, but marks the beginning of the range of flow in which the operation of individual users becomes significantly affected by interactions with others in the traffic stream. The selection of speed is now affected by the presence of others, and maneuvering within the traffic stream requires substantial vigilance on the part of the user. The general level of comfort and convenience declines noticeably at this level.

Level-of-Service D represents high-density, but stable, flow. Speed and freedom to maneuver are severely restricted, and the driver or pedestrian experiences a generally poor level of comfort and convenience. Small increases in traffic flow will generally cause operational problems at this level.

Level-of-Service E represents operating conditions at or near the capacity level. All speeds are reduced to a low, but relatively uniform value. Freedom to maneuver within the traffic stream is extremely difficult, and it is generally accomplished by forcing a vehicle or pedestrian to "give way" to accommodate such a maneuver. Comfort and convenience levels are extremely poor, and driver or pedestrian frustration is generally high. Operations at this level are usually unstable, because small increases in flow or minor perturbations within the traffic stream will cause breakdowns.

Level-of-Service F is used to define forced or breakdown flow. This condition exists wherever the amount of traffic approaching a point exceeds the amount which can traverse the point. Queues form behind such locations. Operations within the queue are characterized by stop-and-go wave, and they are extremely unstable. Vehicles may progress at reasonable speeds for several hundred feet or more, then be required to stop in a cyclic fashion. Level-of-Service F is used to describe the operating conditions within the queue, as well as the point of the breakdown. It should be noted, however, that in many cases operating conditions of the vehicles or pedestrians discharged from the queue may be quite good. Nevertheless, it is the point at which arrival flow exceeds discharge flow which causes the queue to form, and Level-of-Service F is an appropriate designation for such points.

These definitions are general and conceptual in nature, and they apply primarily to uninterrupted flow. Levels of service for interrupted flow facilities vary widely in terms of both the user's perception of service quality and the operational variables used to describe them.

APPENDIX B

MANUAL TRAFFIC COUNT DATA

MANUAL TRAFFIC COUNT DATA

Intersection: Kahekili Hwy with Keaahala Rd. **Date: January 17, 1995**

	Kahekili Hwy						Keaahala Rd.					
	Northbound			Southbound			Eastbound			Westbound		
Time (a.m.)	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
6:30 - 6:45	12	69	1	9	350	21	4	4	15	7	34	12
6:45 - 7:00	14	72	0	7	338	35	5	5	19	13	25	12
7:00 - 7:15	8	43	1	12	312	47	12	22	15	13	22	14
7:15 - 7:30	10	68	0	4	348	105	4	14	8	17	32	7
7:30 - 7:45	22	103	2	21	294	133	3	17	7	21	37	11
7:45 -8:00	34	133	3	39	276	79	5	8	8	27	65	11
8:00 - 8:15	51	88	3	46	309	55	8	11	7	19	83	31
8:15 - 8:30	59	151	3	28	271	36	7	13	3	16	71	22
Peak Hour 7:30 - 8:30 Totals	166	475	11	134	1150	303	23	49	25	83	256	75

	Kahekili Hwy						Keaahala Rd.					
	Northbound			Southbound			Eastbound			Westbound		
Time (p.m.)	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
4:15 - 4:30	18	368	17	10	124	18	14	32	19	6	17	42
4:30 - 4:45	20	366	10	15	125	19	22	47	15	7	16	40
4:45 - 5:00	15	399	11	22	132	21	10	23	15	10	15	31
5:00 - 5:15	12	415	9	14	116	18	19	21	17	10	9	26
5:15 - 5:30	26	394	9	9	133	18	6	18	11	4	10	44
5:30 - 5:45	26	415	5	22	127	22	8	22	9	5	22	28
5:45 - 6:00	40	372	6	36	124	20	13	22	22	11	27	37
6:00 - 6:15	13	369	17	10	114	19	6	20	14	7	14	30
Peak Hour 5:00 - 6:00 Totals	104	1596	29	81	500	78	46	83	59	30	68	135

Intersection: Kahekili Hwy with Keaahala Rd. **Date: January 22, 1995**

	Kahekili Hwy						Keaahala Rd.					
	Northbound			Southbound			Eastbound			Westbound		
Time (a.m.)	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
9:30 - 9:45	4	134	3	21	202	7	3	4	8	9	1	17
9:45 - 10:00	26	160	11	17	211	6	7	1	10	11	3	16
10:00 - 10:15	3	146	7	26	204	8	4	5	10	14	3	18
10:15 - 10:30	7	181	10	20	237	4	4	3	6	15	1	15
10:30 - 10:45	**4**	**193**	**12**	**20**	**222**	**3**	**5**	**4**	**7**	**17**	**3**	**10**
10:45 - 11:00	**8**	**197**	**7**	**26**	**252**	**8**	**7**	**2**	**5**	**16**	**5**	**27**
11:00 - 11:15	**6**	**194**	**5**	**21**	**216**	**5**	**5**	**4**	**10**	**5**	**4**	**27**
11:15 - 11:30	**12**	**199**	**7**	**19**	**246**	**5**	**14**	**2**	**7**	**17**	**7**	**10**
Peak Hour 10:30 - 11:30 Totals	**30**	**783**	**31**	**86**	**936**	**21**	**31**	**12**	**29**	**55**	**19**	**74**

Intersection: Keaahala St. with Pookela St. **Date: January 17, 1995**

	Pookela St.						Keaahala Rd.					
	Northbound			Southbound			Eastbound			Westbound		
Time (a.m.)	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
6:30 - 6:45	0	0	14	1	0	0	0	7	0	4	45	2
6:45 - 7:00	0	0	21	0	0	0	0	20	0	10	34	2
7:00 - 7:15	0	0	18	0	0	0	1	34	0	11	32	4
7:15 - 7:30	0	0	11	0	0	0	0	17	0	8	39	4
7:30 - 7:45	0	1	16	1	0	0	0	9	0	8	59	9
7:45 -8:00	0	0	9	1	0	0	0	10	0	13	103	9
8:00 - 8:15	0	0	6	0	0	0	0	14	0	4	167	6
8:15 - 8:30	0	0	6	1	1	0	1	16	0	7	126	12
Peak Hour												
7:30 - 8:30												
Totals	.0	1	37	3	1	0	1	49	25	32	455	36

	Pookela St.						Keaahala Rd.					
	Northbound			Southbound			Eastbound			Westbound		
Time (p.m.)	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
4:15 - 4:30	0	0	9	3	0	1	0	65	5	19	26	1
4:30 - 4:45	0	0	13	11	0	0	0	53	0	13	24	1
4:45 - 5:00	1	0	5	6	0	0	0	22	0	10	26	0
5:00 - 5:15	0	0	8	1	1	0	2	28	0	16	13	0
5:15 - 5:30	1	0	8	2	0	0	0	21	0	15	19	2
5:30 - 5:45	0	0	7	2	0	0	0	21	0	15	36	3
5:45 - 6:00	0	0	8	0	0	0	0	39	0	17	79	2
6:00 - 6:15	0	0	5	4	0	0	0	10	0	14	20	1
Peak Hour												
5:00 - 6:00												
Totals	1	0	31	4	1	0	2	109	5	63	147	7

Intersection: Kahekili Hwy with Keaahala Rd. Date: January 22, 1995, SUNDAY

	Pookela St.						Keaahala Rd.					
	Northbound			Southbound			Eastbound			Westbound		
Time (a.m.)	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
9:30 - 9:45	0	0	4	0	0	2	0	4	0	5	2	2
9:45 - 10:00	0	0	13	0	0	0	0	5	0	7	8	0
10:00 - 10:15	0	0	11	0	0	0	0	7	0	8	8	0
10:15 - 10:30	0	0	10	0	0	2	0	6	0	15	9	2
10:30 - 10:45	**0**	**0**	**12**	**0**	**0**	**0**	**0**	**3**	**0**	**4**	**6**	**0**
10:45 - 11:00	**0**	**0**	**7**	**0**	**0**	**0**	**0**	**7**	**0**	**6**	**3**	**0**
11:00 - 11:15	**0**	**0**	**13**	**0**	**0**	**0**	**0**	**3**	**0**	**6**	**7**	**1**
11:15 - 11:30	**0**	**0**	**8**	**0**	**0**	**0**	**0**	**7**	**0**	**5**	**9**	**0**
Peak Hour												
10:30 - 11:30												
Totals	**0**	**0**	**40**	**0**	**0**	**1**	**0**	**20**	**0**	**21**	**25**	**1**

Intersection: Pookela St. with Kupohu St.

Date: January 17, 1995

	Pookela St.		Kupohu St.	
	Northbound	Southbound	Westbound	
Time (a.m.)	TH	TH	LT	RT
6:30 - 6:45	19	2		
6:45 - 7:00	24	1	Data	
7:00 - 7:15	18	4	Unavailable	
7:15 - 7:30	9	2		
7:30 - 7:45	13	3		
7:45 - 8:00	8	6		
8:00 - 8:15	5	3		
8:15 - 8:30	4	3		
Peak Hour				
7:30 - 8:30				
Totals	30	18	0	0

	Pookela St.		Kupohu St.	
	Northbound	Southbound	Westbound	
Time (p.m.)	TH	TH	LT	RT
4:15 - 4:30	7	18	0	0
4:30 - 4:45	10	13	1	1
4:45 - 5:00	3	6	0	1
5:00 - 5:15	3	15	0	1
5:15 - 5:30	5	13	0	0
5:30 - 5:45	5	15	0	1
5:45 - 6:00	5	17	0	3
6:00 - 6:15	2	14	1	0
Peak Hour				
5:00 - 6:00				
Totals	18	60	0	5

Intersection: Pookela St.

Date: January 22, 1995 , SUNDAY

	Pookela St.		Kupohu St.	
	Northbound	Southbound	Westbound	
Time (a.m.)	TH	TH	LT	RT
9:30 - 9:45	6	3	0	0
9:45 - 10:00	11	5	0	5
10:00 - 10:15	13	4	0	4
10:15 - 10:30	8	3	0	1
10:30 - 10:45	**11**	**2**	**0**	**4**
10:45 - 11:00	**10**	**4**	**0**	**4**
11:00 - 11:15	**10**	**6**	**1**	**4**
11:15 - 11:30	**5**	**5**	**0**	**0**
Peak Hour				
10:30 - 11:30				
Totals	**36**	**17**	**1**	**16**

APPENDIX C

TECHNICAL MEMORANDUM

DRIVEWAY LOCATION - Hope Chapel Kaneohe
February 3, 1995

TECHNICAL MEMORANDUM

DRIVEWAY LOCATION
FOR
HOPE CHAPEL KANEOHE

3 February 1995

Kaneohe, Oahu, Hawaii
TMK: 4-5-25:20, 4-5-23:2,3

Prepared for:

Hope Chapel Foursquare Church

Prepared By:

Pacific Planning & Engineering, Inc.
1221 Kapiolani Boulevard, Suite 6D
Honolulu, Hawaii 96814

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FOREWORD

This technical memorandum identifies solely the major roadway and traffic conditions pertinent to the question of driveway location and capacity. No interpretation of traffic safety presented by these conditions is made, and no statement of driver safety or lack of potential hazard of the situation in question is expressed herein, nor implied. Traffic safety depends on variables of the driver, environment and vehicle. Thus, the technical memorandum does not express nor imply that all conditions that might be pertinent to traffic safety are contained herein.

INTRODUCTION

Pacific Planning & Engineering, Inc. (PPE) was engaged to undertake a study to identify and assess the probable traffic operational impacts of the proposed Hope Chapel Kaneohe project. This technical memorandum addresses the comment by Hawaii DOT that the new project driveway should intersect Pookela Street opposite Kupohu Street or 250' north of Kupohu.

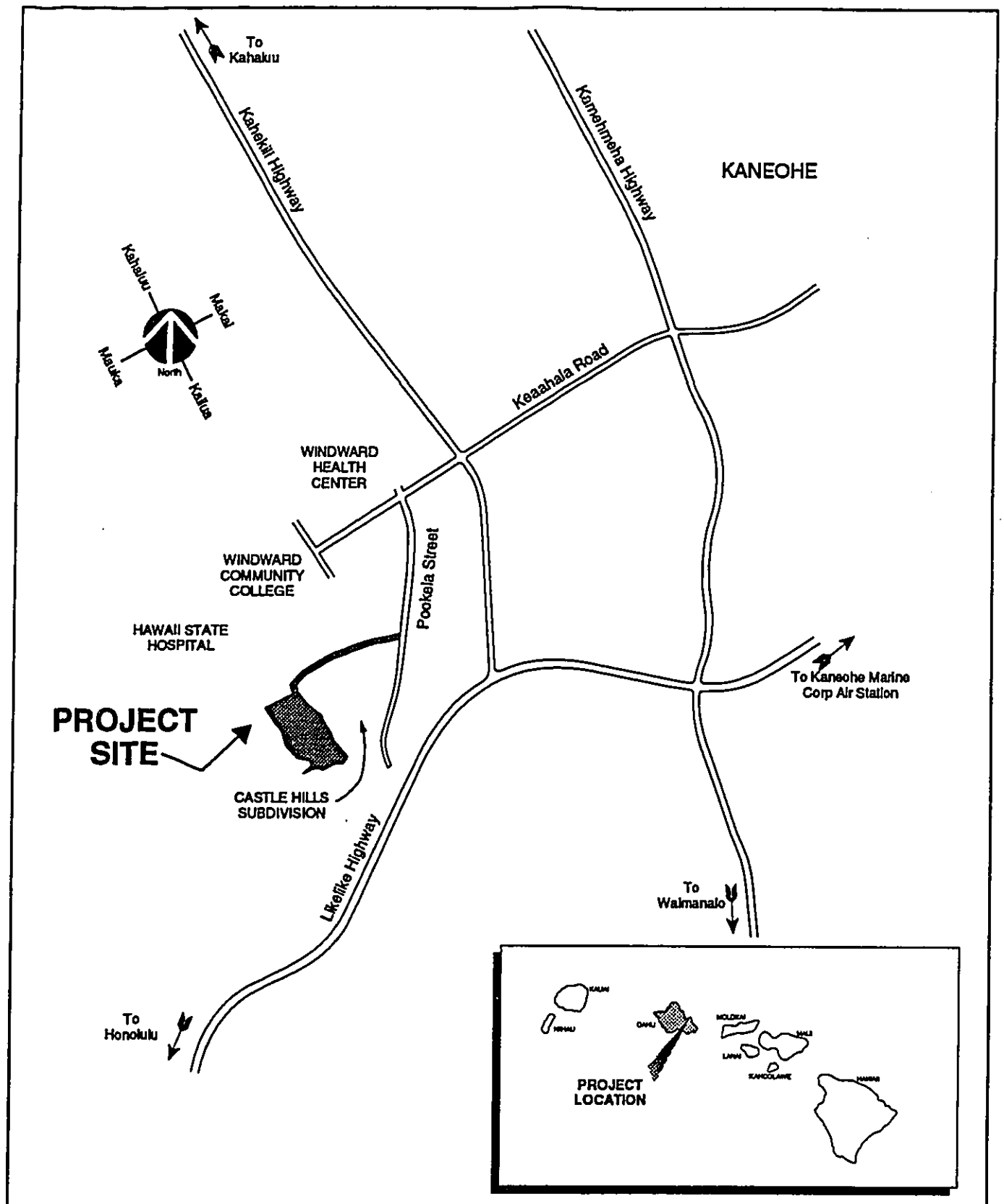
Project Description

Hope Chapel Kaneohe proposes to construct a church facility. The project site is located in Kaneohe, Oahu, just mauka of the existing Castle Hills subdivision. The project location is shown on Figure 1.

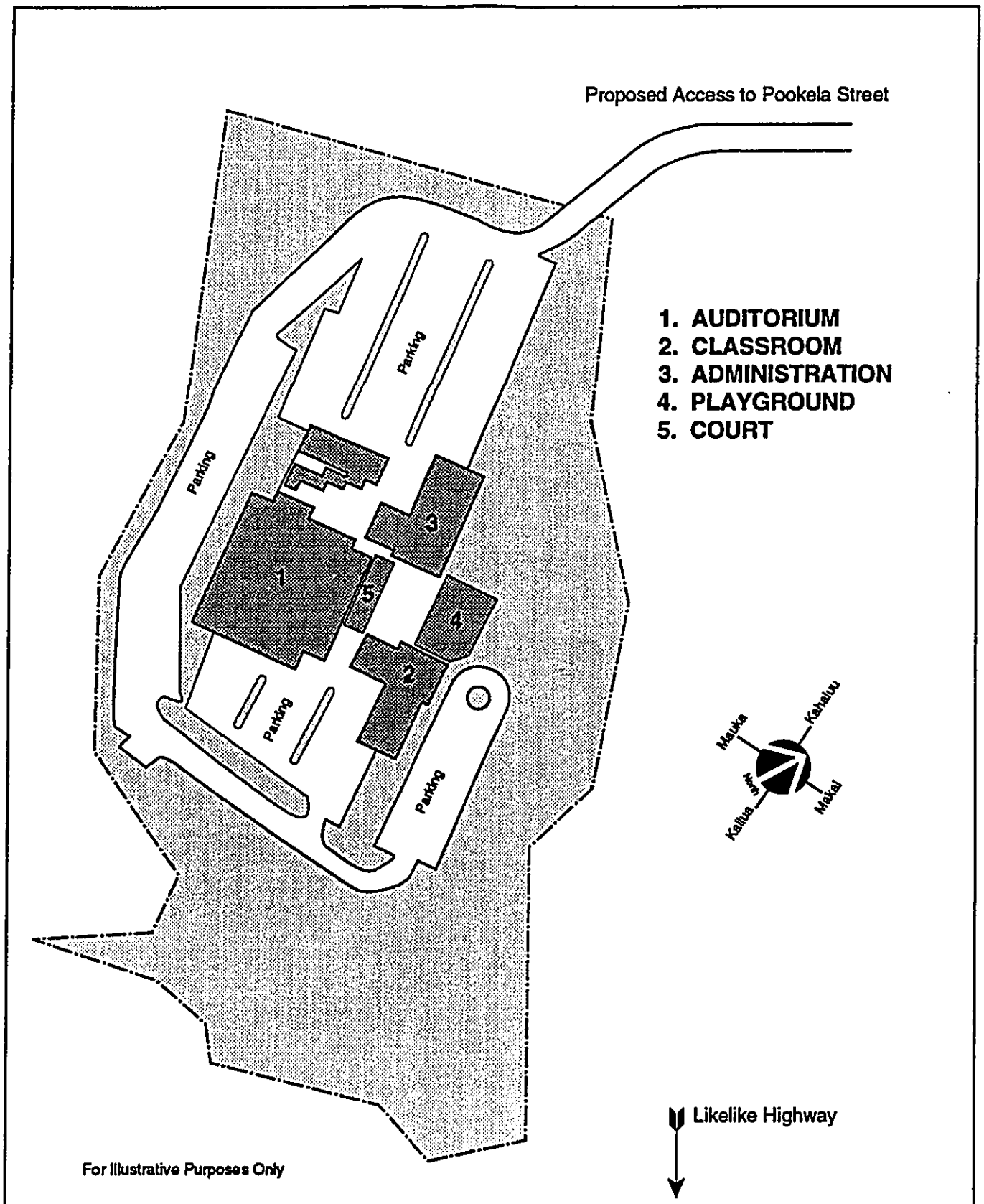
The project consists of three buildings; an auditorium, classroom, and administration office. The 17,400 square foot auditorium building includes an assembly area for worship services, a small bookstore and classroom space. The 7,900 square foot administration building is a planned two-level building for the church and program offices. The 8,900 square foot classroom building will house classes and a small nursery. A day care program will be implemented in the future when there is a need for this service in the Kaneohe community. This will be accommodated in the classroom building. This study examines the maximum buildout scenario. The project site plan is shown on Figure 2. It is projected that the project will be operational by 1997.

The planned use of the auditorium is primarily for Sunday worship services. The administration office building would be used during the weekday by administrative staff, and the classroom building would be used for preschool and day care during the weekday and for Sunday school activities.

The site will include 261 parking stalls with 10 handicap stalls. All parking for the chapel will occur on site. No off-site parking, for example on Pookela Street will occur.



PACIFIC PLANNING & ENGINEERING, INC	Project Location Map	Figure 1



PACIFIC PLANNING & ENGINEERING, INC	**Project Site Plan**	**Figure 2**

PROJECT DRIVEWAY AND POOKELA STREET

Description of Pookela

Pookela Street is owned and maintained by the City Department of Transportation Services. The State Department of Transportation owns and maintains that portion of Pookela just north of Kupohu Street to Keaahala Road. The proposed Hope Chapel driveway lies within the State right-of-way. An agreement to transfer Pookela Street to the City is pending improvements to Keaahala Road.

Pookela Street is about 40 feet in width, curb to curb. The street has posted 25 mile per hour signs, and parking is permitted. No parking was observed in the area of the driveway.

As shown on Figure 3, the driveway's location on Pookela Street is on a tangent section and at the bottom of a long vertical curve. There is no immediately adjacent driveway on this section of Pookela Street.

As shown on Figure 4, houses and property located opposite Kupohu Street preclude the driveway location at that point even if that were desirable.

As shown on Figure 5, a major drainage basin precludes aligning the driveway further north towards Keaahala Road.

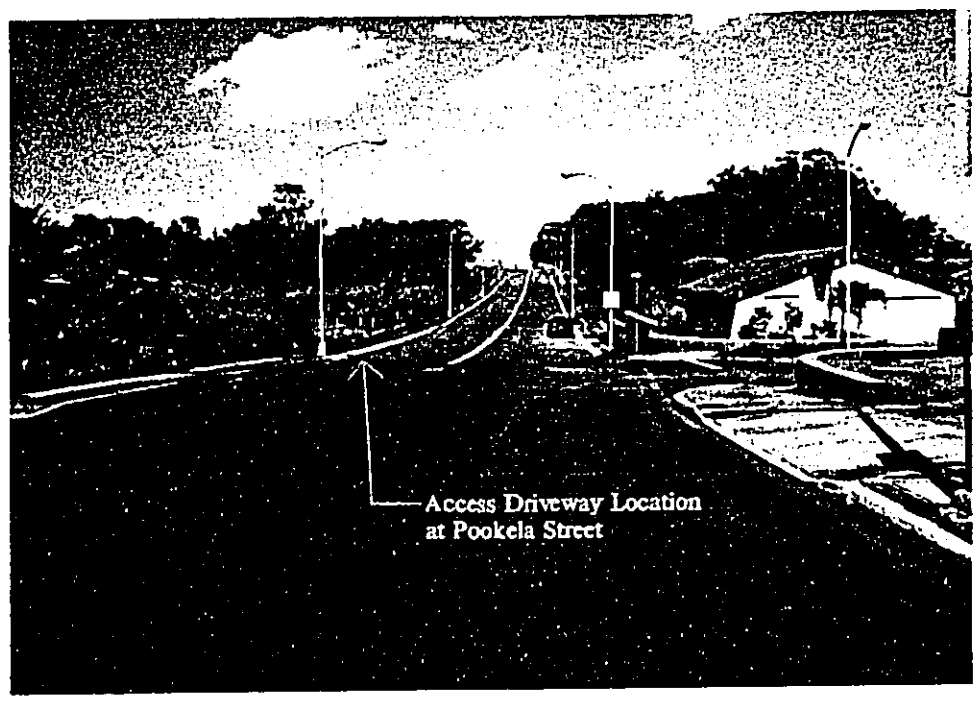


Figure 3. Pookela Street Looking North

(Driveway location on left or mauka side, just beyond first Light Pole)

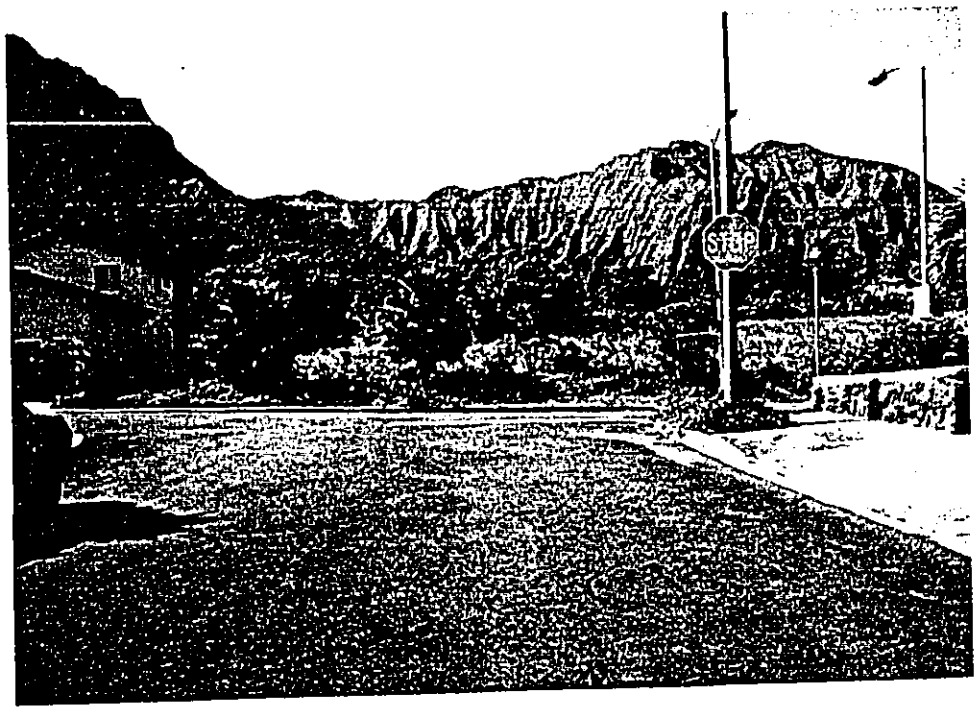


Figure 4. Kupohu Street Looking West or Mauka

(Private Property across Pookela Street)

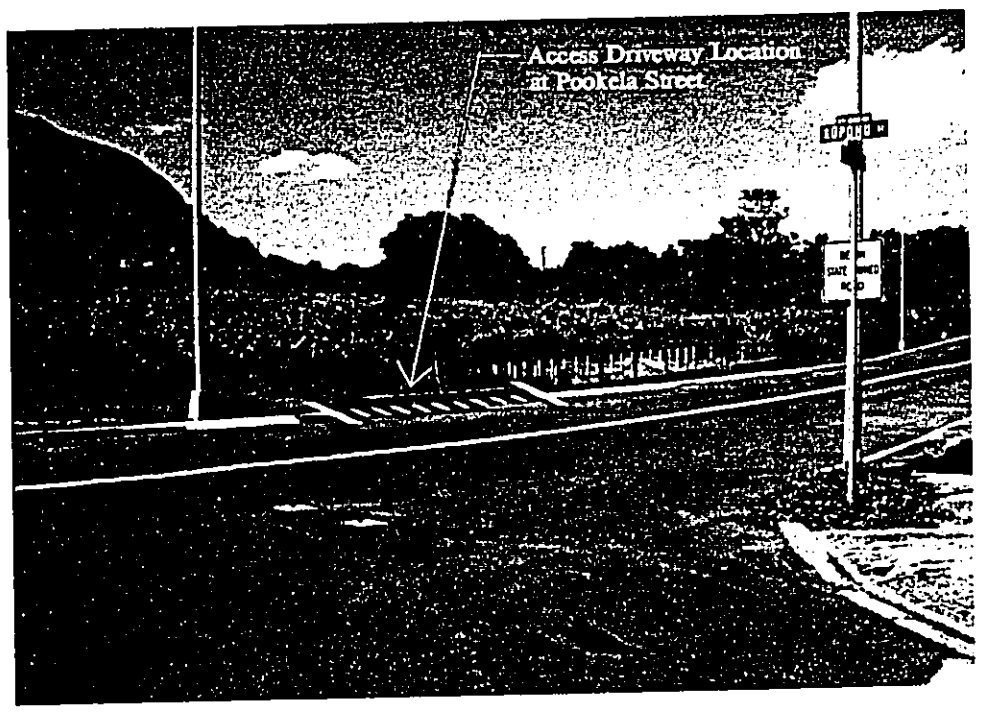


Figure 5. Proposed Driveway Location and Drainage Basin

(Driver's View from Kupohu Street)

Hope Chapel Driveway

The driveway design will conform to all City DTS standards. Preliminary civil engineering work has been accomplished by the firm of Calvin Kim & Associates. A preliminary plan view of the driveway is reproduced in Figure 6.

Observations and measurements were taken at the site during a sunny day with dry pavement. The distance from the centerline of Kupohu Street to the centerline of the proposed driveway is about 85 feet along Pookela, and about 94 feet point to point. There is an unrestricted view from the proposed driveway to the Kupohu Street approach, and from the Kupohu Street approach to the driveway. This view is shown in Figure 5 above.

The closest driveway is 98 feet to the south on the same side of Pookela Street. There are no driveways to the north within several hundred feet, and there are no driveways on the opposite or makai side of Pookela Street.

Service Area

Pookela Street serves the Castle Hills residential subdivision and institutional facilities. The institutional facilities include: Windward Community College, Windward Health Center, and the Kaneohe District Park. A baseyard for State Highways is expected to be completed sometime in 1995. Hina Mauka, a drug rehabilitation program is expected to be in operation by late 1995. The proposed Hope Chapel driveway will be to the south of the access points onto Pookela Street for these institutions.

Since the Likelike Highway access from Pookela Street was closed, only traffic from the Castle Hills residential subdivision and Fathers of the Sacred Hearts Seminary will pass by the Hope Chapel Driveway.

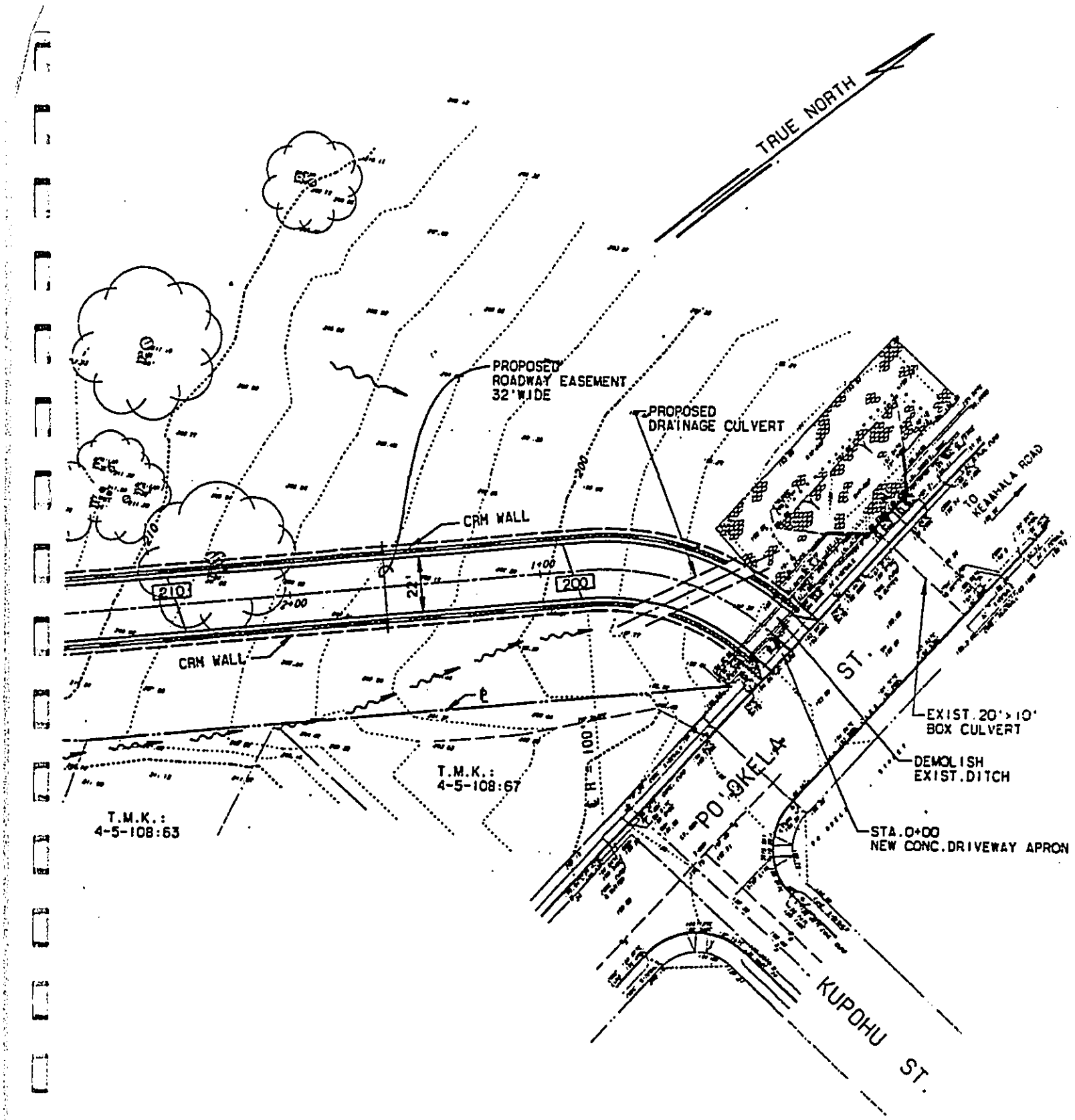


Figure 6. Plan View of Proposed Hope Chapel Driveway

Traffic Counts

Manual traffic counts (See Appendix B) were conducted at Pookela Street during the weekday morning and afternoon peak periods on January 17, 1995 and during the Sunday peak period on January 20, 1995. The weather was clear, and no abnormal events were observed during the data collection. The traffic levels were very low relative to street capacity. The volumes are consistent with the amount of residential units generating the existing traffic.

Observed Traffic Conditions

The traffic flow was smooth and there were no delays of any type. Headways were typically large for the low volumes. There were no unusual patterns observed.

Pedestrian traffic was practically non-existent.

Future Considerations

No increase in ambient traffic on Pookela is expected as there are no major land use projects or additional residential units to be developed in the Castle Hills area.

PROJECTED TRAFFIC CONDITIONS

Future Traffic With Project

Weekday project generated trips were distributed to different areas based on the distribution of population and employment on Oahu and on existing traffic patterns. On Sunday, project trips were distributed based on the residential distribution of the congregation members on Oahu.

Table 1. Trip Generation for Hope Chapel Kaneohe Project

Land Use	Quantity	unit	Enter	Exit
Morning Peak Hour				
Auditorium (Church)	8.8	1000 sf	1	1
Day Care	75	children	30	25
Business Office	25	employees	17	2
Total			**48**	**28**
Afternoon Peak Hour				
Auditorium (Church)	8.8	1000 sf	1	1
Day Care	75	children	27	32
Business Office	25	employees	4	19
	Total		**32**	**52**
Sunday Peak Hour				
Auditorium (Church)	261	stalls	261	261
Day Care*	0	children	0	0
Business Office*	0	employees	0	0
	Total		**261**	**261**

*Day Care and Business Office are closed on Sunday.

The trip distribution is based on the fact that the majority of the traffic generated during the weekday would be related to day care activities whereas on Sunday it would be related to church activities.

It was assumed that most of the children in the day care program would be from residents/families who lived in the Kaneohe area. The distribution for the weekday and Sunday is shown in Table 2 below.

Table 2. Trip Distribution for Hope Chapel

	Sunday	Weekday
Kailua	21%	3%
Windward Coast	6%	3%
Kaneohe	56%	90%
Central Oahu	2%	2%
Town	13%	2%
Ewa	2%	0%

Level of Service Results

The study intersections were analyzed using methodologies from the Transportation Research Board Highway Capacity Manual. Special Report 209 (1985). Unsignalized intersection analysis was used to analyze Pookela Street and the new driveway as a T-intersection.

The methodology describes traffic flow conditions in terms of *level-of-service* (LOS) ranging from A to F, where LOS A is the best and LOS F is the worst. Appendix A gives the LOS definitions for each analysis method. The LOS for each methodology is not directly comparable due to different methods of calculating LOS.

The results of the analysis for the morning, afternoon and Sunday peak hours are Levels of service "A" for all time periods.

FINDINGS

The Hope Chapel Kaneohe development, when completed in 1997, would have negligible impact on traffic operations at the project's driveway location on Pookela Street.

The following aspects should be considered in permitting the driveway location:

- The project driveway cannot be located opposite Kupohu Street due to existing homes. (Figure 4)

- The driveway cannot be located further north towards Keaahala Road due to the major drainage basin and drainage ways. (Figure 5)

- The project access is a private driveway, not a through or residential street that carries large volumes of non-local traffic.

- The project's peak traffic times do not coincide with the minimal existing peak traffic. The number of vehicle trips generated by the Hope Chapel project will be minimal during weekday peak hours, and highest during normal off-peak hours resulting in lower combinations of traffic movements.

- The Sunday peak hour would have about 260 vehicles exiting the site.

- Kupohu Street traffic is and will be negligible during the project's peak hour.

- Locating the driveway elsewhere does not eliminate traffic conflicts. The same number of vehicles will be using Pookela Street and the driveway.

- Sight distance to and from the Hope Chapel driveway and Kupohu Street is unrestricted, and vehicles turning right onto Pookela can easily be distinguished. (Figure 5)

- Kupohu Street is a minor residential street with extremely low volumes of traffic. It is not a through street.

- Kupohu Street is stop controlled at its t-intersection with Pookela Street. The approach to the stop line is on a slight positive grade. (Figure 4)

- To require Hope Chapel to relocate the driveway would create an intolerable financial burden, especially for an eleemosynary/religious program.

- The project driveway will be stop-controlled. All users will be instructed about traffic safety on Pookela, and in general, through the regular Hope Chapel communications and staff. Specifically, they will be asked to use extra care before exiting and allow Kupohu Street vehicles to turn right without interference.

- Hope Chapel is willing to install a sign warning drivers to yield to Pookela vehicles. A possible message might be: "Yield to Drivers Turning Right from Kupohu Street." The message would be as approved by DTS. The message sign would be installed below the "STOP" sign.

APPENDIX A

DEFINITION OF LEVEL-OF-SERVICE
FOR
UNSIGNALIZED INTERSECTIONS

DEFINITION OF LEVEL-OF-SERVICE
FOR
UNSIGNALIZED INTERSECTIONS

The concept of levels of service is defined as a qualitative measure describing operational conditions within a traffic stream, and their perception by motorists and/or passengers. A level-of-service definition generally describes these conditions in terms of such factors as speed and travel time, freedom to maneuver, traffic interruptions, comfort and convenience, and safety.

Six levels of service are defined for each type of facility for which analysis procedures are available. They are given letter designations, from A to F, with Level-of-Service A representing the best operating conditions and Level-of-Service F the worst.

Level-of-Service definitions--In general, the various levels of service are defined as follows for uninterrupted flow facilities:

Level-of-Service A represents free flow. Individual users are virtually unaffected by the presence of others in the traffic stream. Freedom to select desired speeds and to maneuver within the traffic stream is extremely high. The general level of comfort and convenience provided to the motorist, passenger, or pedestrian is excellent.

Level-of-Service B is in the range of stable flow, but the presence of other users in the traffic stream begins to be noticeable. Freedom to select

desired speeds is relatively unaffected, but there is slight decline in the freedom to maneuver within the traffic stream from LOS A. The level of comfort and convenience provided is somewhat less than at LOS A, because the presence of others in the traffic stream begins to affect individual behavior.

Level-of-Service C is in the range of stable flow, but marks the beginning of the range of flow in which the operation of individual users becomes significantly affected by interactions with others in the traffic stream. The selection of speed is now affected by the presence of others, and maneuvering within the traffic stream requires substantial vigilance on the part of the user. The general level of comfort and convenience declines noticeably at this level.

Level-of-Service D represents high-density, but stable, flow. Speed and freedom to maneuver are severely restricted, and the driver or pedestrian experiences a generally poor level of comfort and convenience. Small increases in traffic flow will generally cause operational problems at this level.

Level-of-Service E represents operating conditions at or near the capacity level. All speeds are reduced to a low, but relatively uniform value. Freedom to maneuver within the traffic stream is extremely difficult, and it is generally accomplished by forcing a vehicle or pedestrian to "give way" to accommodate such a maneuver. Comfort and convenience levels are extremely poor, and driver or pedestrian frustration is generally high. Operations at this level are usually unstable, because small increases in flow or minor perturbations within the traffic stream will cause breakdowns.

Level-of-Service F is used to define forced or breakdown flow. This condition exists wherever the amount of traffic approaching a point exceeds the amount which can traverse the point. Queues form behind such locations. Operations within the queue are characterized by stop-and-go wave, and they are extremely unstable. Vehicles may progress at reasonable speeds for several hundred feet or more, then be required to stop in a cyclic fashion. Level-of-Service F is used to describe the operating conditions within the queue, as well as the point of the breakdown. It should be noted, however, that in many cases operating conditions of the vehicles or pedestrians discharged from the queue may be quite good. Nevertheless, it is the point at which arrival flow exceeds discharge flow which causes the queue to form, and Level-of-Service F is an appropriate designation for such points.

These definitions are general and conceptual in nature, and they apply primarily to uninterrupted flow. Levels of service for interrupted flow facilities vary widely in terms of both the user's perception of service quality and the operational variables used to describe them.

REFERENCE: Highway Capacity Manual (Special Report 209, 1985)

APPENDIX B

MANUAL TRAFFIC COUNT DATA

MANUAL TRAFFIC COUNT DATA

Intersection: Pookela St. with Kupohu St.

Date: January 17, 1995

	Pookela St.		Kupohu St.	
	Northbound	Southbound	Westbound	
Time (a.m.)	TH	TH	LT	RT
6:30 - 6:45	19	2		
6:45 - 7:00	24	1	Data	
7:00 - 7:15	18	4	Unavailable	
7:15 - 7:30	9	2		
7:30 - 7:45	13	3		
7:45 - 8:00	8	6		
8:00 - 8:15	5	3		
8:15 - 8:30	4	3		
Peak Hour 7:30 - 8:30				
Totals	30	18	0	0

	Pookela St.		Kupohu St.	
	Northbound	Southbound	Westbound	
Time (p.m.)	TH	TH	LT	RT
4:15 - 4:30	7	18	0	0
4:30 - 4:45	10	13	1	1
4:45 - 5:00	3	6	0	1
5:00 - 5:15	3	15	0	1
5:15 - 5:30	5	13	0	0
5:30 - 5:45	5	15	0	1
5:45 - 6:00	5	17	0	3
6:00 - 6:15	2	14	1	0
Peak Hour 5:00 - 6:00				
Totals	18	60	0	5

Intersection: Pookela St.

Date: January 22, 1995 , SUNDAY

	Pookela St.		Kupohu St.	
	Northbound	Southbound	Westbound	
Time (a.m.)	TH	TH	LT	RT
9:30 - 9:45	6	3	0	0
9:45 - 10:00	11	5	0	5
10:00 - 10:15	13	4	0	4
10:15 - 10:30	8	3	0	1
10:30 - 10:45	11	2	0	4
10:45 - 11:00	10	4	0	4
11:00 - 11:15	10	6	1	4
11:15 - 11:30	5	5	0	0
Peak Hour 10:30 - 11:30 Totals	36	17	1	16

APPENDIX J

Wetland Mitigation Plan for Hope Chapel Kaneohe

5. WETLAND MITIGATION PLAN

In developing a mitigation plan to address the loss of 0.3 acre of wetland, the functions and values of the wetland were identified.

1) Drainage Function. The present functions of the wetland is in its drainage capacity for a 5-acre drainage sub-basin which includes portions of the Castle Hills subdivision, the church property (TMK 4-5-25:20), the Conservation District land and approximately 0.6 acre of wetland (between the Castle Hills boundary and the driveway easement) as shown in Figure 3. A concrete channel attached to the box culvert currently intercepts and discharges the runoff in the sub-basin.

2) Agricultural Value. Historically, Kaneohe, with its abundant stream systems supported taro ("kalo") cultivation. It is possible that wetlands in this watershed may have been utilized as taro pondfields, or lo'i. Although at the present time, taro is not grown in this or nearby wetlands. It has not been determined if this wetland served as an historical taro pondfield; however, the archaeological study core sample will help to determine if taro pollen is present.

Subsequently, to mitigate functions and values lost as a result of the driveway, goals and objectives were identified by Hope Chapel and the landowner, Hawaii State Hospital. The mitigation plan described in this section addresses the identified functions and values and the means to achieve the goals and objectives.

5.1 DRAINAGE RELATED MITIGATION

An existing concrete channel drains the 5-acre sub-basin, as shown in Figure 5. The preliminary driveway plan proposes that the existing channel be replaced with a new culvert within the driveway, thus allowing the runoff to discharge into the Pookela Street box culvert.

The anticipated increase in runoff is expected to be minor, however the new culvert will prevent flooding over the driveway and along the Castle Hills boundary. Detailed engineering plans for the culvert design will be prepared for agency review and approval. In addition, BMP measures as described in the Draft EA, section 4.1.6 and Appendix D include erosion and sediment controls such as sedimentation basins and sediment traps and silt fences.

5.2 MITIGATION FOR AGRICULTURAL VALUES: DEVELOPMENT OF WETLAND TARO PONDFIELDS

Presently the Hawaii State Hospital operates a plant nursery and an agricultural program as part of a patient psycho-social rehabilitation program within TMK: 4-5-23:2. The rehabilitation activities involve dryland agriculture and, on a limited scale, aquaculture. Discussions with program administrators and the facilities engineer at the Hospital have resulted in the proposal to provide mitigation which will enhance the program and provide additional wetlands in the form of taro pondfields. The proposed taro pondfields would create wetlands and allow the expansion of the

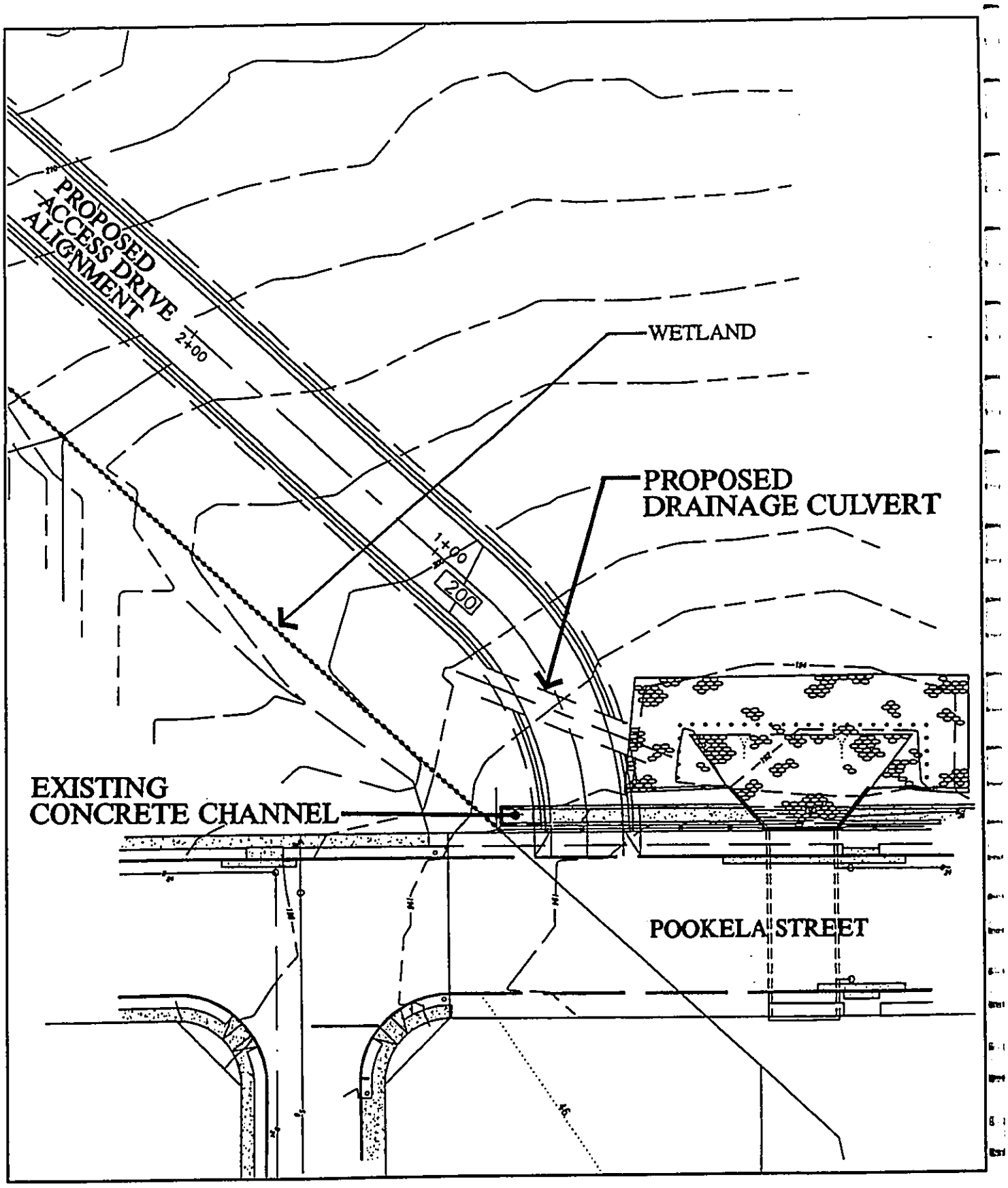


FIGURE 5
PRELIMINARY DRIVEWAY PLAN DETAIL
HOPE CHAPEL ACCESS DRIVEWAY

Source: Control Point; Calvin Kim & Assoc.

Hospital's rehabilitation program.

Hope Chapel will provide the overall planning, coordination, permitting, and initial construction for the development of the physical requirements for the pondfields. In addition, preliminary talks with Windward Community College staff have been pursued to see if there is interest by the College to participate in the program. A model for this proposal is the University of Hawaii at Manoa Hawaiian Studies Cultural Garden (which has since been abandoned due to construction of a new Hawaiian Studies building). The concept for this proposal has been discussed with staff of Windward Community College; with the expectation that detailed discussions will follow at the appropriate time in the planning process.

General Site Description. The mitigation parcel is approximately 0.75 acre and is accessed by a dirt road which connect to Banyan Drive on Hawaii State Hospital grounds. This road also provides access to the Hospital's water system infrastructure and the nursery. A bridge crosses over Kapunahala Stream.

Five small existing aquaculture ponds have been excavated and is irrigated through a simple system of PVC piping which connects to an old water system pumphouse. Tilapia is presently cultivated, with small patches of taro and ung choi, both water dependent plant species, along the edges. For the most part, the land is generally overgrown by weedy species such as California grass. Stands of banana trees have been planted along the perimeter and in a small patch within one section of the land.

Two Aukuu (Black-Crowned Night Heron) were observed at the edge of the ponds. No other waterbird species were seen.

Mitigation Concept. In concept, a Hawaiian cultural garden is planned for the 0.75 acre area. Approximately 0.6 acre are planned to be developed as taro pondfields (lo'i) of varying sizes. The remaining 0.15 acre will remain as dryland for a tool shed, a grass hale for meeting and resting, a traditional imu, and a garden for the cultivation of other native food crops such as sweet potatoes.

A detailed site plan and construction drawings will be prepared upon the Corps of Engineers' approval of this application. Hope Chapel will prepare a site plan and construct the pondfields and install the irrigation system in conjunction with the Hospital and the College (if the College elects to participate in the program).

Excavation and Construction of Berms. The initial phase involves the removal of soil in the mitigation area to create the lo'i for taro. Excavated soil will be used to create the berms or banks of the lo'i for water containment. Surplus soils will be removed and stockpiled within the nursery area for future use. The banks will be stabilized with turf grass and mowed to create walking and working surfaces. The existing aquaculture ponds will be worked into the plan or be converted to taro. An irrigation ditch system (auwai) will link the lo'i and allow fresh flowing water through each pond. The water level in each pond will be approximately 12 to 18 inches when flooded. Equipment for the initial excavation will be a backhoe.

Soil Erosion and Sediment Control. To avoid erosion and topsoil loss during construction activities, soil erosion and sediment control measures will be utilized. Erosion control measures will remain in effect until the banks are stabilized. These techniques will meet the Soil Erosion Standards and Guidelines of the City and County of Honolulu. Silt fencing will be placed around the perimeter of the mitigation site to prevent the washing of sediments into the adjoining makai wetlands.

Hydrology. The surface elevation of the ponds will be below the elevation of the pumphouse to allow gravity flow of water. The water which will be utilized is excess from the Hospital's well and from the Kapunahala Springs. Waterflow out of the lo'i will be controlled through several outlets and drained to the wetland.

Taro Planting. A program will be developed by the Hospital and the College (or another organization should the College elect not to participate in the program) for the initial taro planting.

Schedule of Completion. Once an agreement is reached concerning the proposed conceptual mitigation plan, Hope Chapel will proceed to coordinate the organizational details with the Hospital and the College (or other organization). This process is anticipated to take three to four weeks. Within an additional four to six weeks, a detailed site and construction plan will be finalized. Upon approval, for the driveway (i.e., CDUA) and the necessary permits, the mitigation construction will commence concurrently with the driveway construction and is expected to be substantially completed within four to six weeks.

Long-Term Maintenance and Operation. The taro fields will be integrated into the Hospital's patient rehabilitation program and will operate in that capacity. Discussions which will follow the approval of the mitigation concept will include the Windward Community College (or other organization) for joint partnership in the design and long-term maintenance and operation of the taro project. The ideal partnership arrangement will be with an entity, such as the Windward Community College, with expertise in taro cultivation who would benefit from the project for its educational and cultural potential. Direct economic benefits would be secondary due to the small area.

This proposed plan is consistent with the State's goals to identify and promote taro cultivation in new areas. It would greatly benefit Hospital patients, especially native Hawaiians who desire to work in a traditional agricultural setting and it could augment the College's Polynesian Garden program by providing an opportunity for actual wetland taro cultivation, and further supporting its annual Fourth of July Taro Festival.