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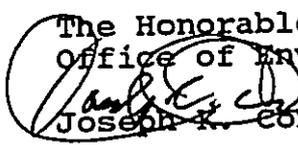
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March 2, 1992

TO: The Honorable Brian J.J. Choy, Director
Office of Environmental Quality Control

FROM:  Joseph K. Conant, Executive Director

SUBJECT: NEGATIVE DECLARATION FOR THE FACULTY HOUSING PROJECT
AT THE UNIVERSITY OF HAWAII AT MANOA (TMK 2-9-26: 1, 2
& PORTION OF 3 AND TMK 2-9-27: 54), HONOLULU, OAHU,
HAWAII

Submitted herewith are four (4) copies of the Environmental Assessment and one (1) copy of the Negative Declaration on the above project as required by the Office of Environmental Quality Control in compliance with EIS Regulations, Chapter 343, 1:31 c2, HRS.

Should you have any questions, please contact Al Ahana, Project Coordinator at 587-0541 or Dean Shigemura, Asst. Project Coordinator, at 587-0540.

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Faculty Housing

MAR - 8 1992

ENVIRONMENTAL ASSESSMENT FOR THE
FACULTY HOUSING PROJECT
AT THE UNIVERSITY OF HAWAII AT MANOA

Honolulu, Oahu, Hawaii

TMK 2-9-26: 1, 2 & portion of 3 and TMK 2-9-27: 54

prepared for

THE STATE HOUSING FINANCE AND DEVELOPMENT CORPORATION

and

THE UNIVERSITY OF HAWAII

by

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FEBRUARY 1992

Table of Contents

	<u>Page</u>
1. Introduction.....	1
2. Proposing Agency and Parties Consulted.....	1
3. Proposed Action and Statement of Objectives.....	2
4. Description of the Affected Environment.....	2
5. Project Characteristics.....	9
6. Major Impacts and Mitigation Measures.....	12
7. Compatibility with Public Policies.....	16
8. Alternative Actions.....	20
9. Summary of Major Impacts.....	21

Exhibits

1. Vicinity Map
2. Site Plan

Appendices

- A. Written Comments Received From Agencies
- B. Relationship to Planning and Zoning Standards
- C. Traffic Impact Assessment Report

ENVIRONMENTAL ASSESSMENT OF THE FACULTY HOUSING
PROJECT AT THE UNIVERSITY OF HAWAII AT MANOA

1. INTRODUCTION

The University of Hawaii's faculty housing project consists of 150 rental apartment units, a manager's unit and 30 residential condominium units on 11.5 acres of vacant land on the Mauka Campus of the University of Hawaii at Manoa next to the Manoa Marketplace. The project will expand the supply of rental apartments and townhouse condominiums in Honolulu and help the University recruit and retain top-flight faculty.

The project is being implemented as part of the University's Six Year Capital Improvements Program, whose environmental impact has already been assessed and for which a Notice of Determination was published in the OEQC Bulletin on June 8, 1988.

2. PROPOSING AGENCY & PARTIES CONSULTED

a. PROPOSING AGENCY

The State Housing Finance & Development Corporation, as the proposing agency, will coordinate the development, provide the construction and permanent financing and manage the project for the University of Hawaii.

b. AGENCIES CONSULTED

Written comments on the project were invited and received from the following eight agencies (see Appendix A for copies):

Fish & Wildlife Service, U.S. Dept. of the Interior

Dept. of Land & Natural Resources, State of Hawaii
Dept. of Health, State of Hawaii

Board of Water Supply, City & County of Honolulu
Dept. of Land Utilization, City & County of Honolulu
Dept. of Transportation Services, City & County of Honolulu
Dept. of Public Works, City & County of Honolulu
Dept. of Parks & Recreation, City & County of Honolulu

Oral comments on the project were offered by the following two agencies:

Dept. of Education, State of Hawaii (Principal, Noelani School)
U.S. Army Corps of Engineers (Pacific Ocean), Operations

c. OTHER PARTIES CONSULTED

Oral comments on the project were offered by the following parties:

University of Hawaii Professional Assembly
State Representative Brian Taniguchi
State Senator Ann Kobayashi

Parties from whom comments were invited but not received:

The Manoa Marketplace (Minami Development)
City Council Member Andrew Mirikitani

3. PROPOSED ACTION & STATEMENT OF OBJECTIVES

a. PROPOSED ACTION

Approximately 151 residential apartments would be developed for rent to faculty of the University of Hawaii, including a unit for the property manager, on the makai portion of the site. Approximately 30 townhouse condominium units would be developed on the mauka portion of the site. The University intends to sell the leasehold interest in these townhouses to faculty members.

Net proceeds from the sale of the condominium units would help defray the cost of developing the rental units. Buy-back restrictions would be established to insure that the condominiums are sold only to faculty members who are owner occupants. Construction is scheduled to begin in November 1992 and is expected to be completed in December 1993 or January 1994, weather permitting.

b. OBJECTIVES

The severe lack of affordable housing in Hawaii and projected decrease in Ph.D. graduates in relation to faculty retirements in the United States have made faculty recruitment and retention a critical concern for the University of Hawaii. The Report of the Regents' Committee on Physical Facilities and Planning dated January 19, 1990 concluded that "a faculty housing program for the purpose of recruiting and retaining top-flight faculty is of utmost importance if the University is to retain a competitive edge in developing a first-rate university."

4. DESCRIPTION OF THE AFFECTED ENVIRONMENT

a. PROJECT LOCATION & SITE CHARACTERISTICS

1. Location (see Exhibit 1)

The project site is located at the mauka end of the Mauka Campus of the University of Hawaii at Manoa. Situated on the eastern side of Manoa Valley in Honolulu, Hawaii, it straddles Lowrey Ave. The site is bounded by Woodlawn Drive to the northwest and Kalawao St. to the southeast. To the west is the Manoa Marketplace. To the northwest is the State of Hawaii's new Manoa Innovation Center.

Single-family houses and vacant residential lots abut the site to the north and occupy the hillside across Kalawao St. to the east. Manoa Stream runs along the makai (southwest) boundary of the site. Across the stream are research facilities of the U.S. Dept. of Agriculture and the University of Hawaii's College of Tropical Agriculture.

The project site is within walking/biking distance of the Central Campus. Hamilton Library is less than a mile, as the crow flies, from the intersection of Woodlawn Drive and Lowrey Ave. The site is across the street from a large retail shopping center and close to schools and other community facilities. It is well served by public roadways, utilities and mass transit.

ii. Size, ownership and control

The project site consists of two components. The mauka portion (TMK 2-9-27: 54) is approximately 2.3 acres (100,187 s.f.) in size. The makai portion of the site is approximately 9.242 acres (402,567 s.f.) and is composed of several contiguous parcels (TMK 2-9-26: 001, 002 and portions of 003), as follows.

TMK 2-9-26: 001	8.497 acres	370,129 s.f.
TMK 2-9-26: 002	.434 acres	18,905 s.f.
TMK 2-9-26: 003 (portion)	.282 acres	12,264 s.f.
TMK 2-9-26: 003 (portion)	.029 acres	1,269 s.f.
	-----	-----
subtotal (makai)	9.242 acres	402,567 s.f.
TMK 2-9-27: 054 (mauka)	2.300 acres	100,187 s.f.
	-----	-----
project site	11.542 acres	502,754 s.f.

The State of Hawaii owns all of these parcels. All except one (TMK 2-9-26: 002) are already under the control of the University of Hawaii. Parcel No. 2 is under the control of the Board of Land and Natural Resources and will need to be acquired by the University for this project. Transfer of the property is being negotiated. A tiny (70 s.f.) parcel (TMK 2-9-26: 008) along Woodlawn Drive is owned by the City & County and is not expected to affect the project.

The project site is encumbered by easements in favor of the City & County for drainage under Lowrey Avenue, fronting Kalawao St. The abutting Manoa Stream parcel (TMK 2-9-26: 043), makai of the project site, is owned by the State of Hawaii.

iii. Site characteristics

The 11.542 acre site is located in one of Honolulu's finest residential communities. Both portions of the project site are nearly rectangular in shape and are well configured for multi-family residential development.

The site is vacant and overgrown with heavy vegetation, including large trees and bushes. The property also functions as dump site, although dumping is prohibited by signs posted on premises.

The terrain is generally flat (approximately two percent slope).

The land fronting the stream is about 140 feet above mean sea level. The land mauka of Lowrey Ave. is about 160 feet above mean sea level. The property's frontage along Woodlawn Dr. is slightly lower than its frontage along Kalawao St.

The site, like much of the land near Manoa Stream, was probably cultivated at one time for taro or sugarcane or used for pasture.

iv. Adjacent lands

The land to the northeast between Woodlawn Drive and Kalawao St. is occupied by one and two story houses. The hillside east and upslope of the mauka portion of the project site is occupied by one and two story houses. The upslope area between Woolsey Place and Kalawao St. is known to have undergone downhill ground movements (Geotechnical Engineering Exploration for the site prepared by Geolabs-Hawaii, Jan. 23, 1992, p. 6).

To the southwest is Manoa Stream. The Manoa Hillside Estates project is under construction downstream. Across the stream are research facilities of the U.S. Dept. of Agriculture (fruit fly laboratory) and the University's College of Tropical Agriculture. Down the street along Woodlawn Drive is Noelani Elementary School.

Across Woodlawn Drive to the west is the Manoa Marketplace. The State's Manoa Innovation Center (currently under construction) and a few single-family houses are located across the street to the northwest. On the north side of the Manoa Marketplace along East Manoa Road are the existing Manoa East residential-commercial and the Manoa Village residential condominiums.

b. ENVIRONMENTAL CHARACTERISTICS

i. Climate and storm runoff

Rainfall at the University of Hawaii at Manoa ranged from 32 to 58 inches per year between 1979 and 1989 (State Dept. of Business, Economic Development & Tourism, State of Hawaii Data Book, 1990). Precipitation on the project site is heavier than it is on the rest of the campus.

Storm runoff from properties east of the site drains into a swale (as deep as 11 feet) fronting Kalawao St. Runoff from the mauka and western portions of the site empty into City & County storm drains along Lowrey Ave. and Woodlawn Drive. Runoff from the makai portion of the site empties into Manoa Stream.

ii. Manoa Stream

The upstream section of Manoa Stream between Manoa Valley Park and East Manoa Road is channelized. Portions of the stream between the Manoa Marketplace and the Manoa Innovation Center are lined with riprap. The stream flows through a concrete culvert under Woodlawn

Drive and winds along the makai edge of the project site, where the channel remains unimproved. Manoa Stream, which is fed by dike springs as well as by rainfall, flows along the eastern side of the valley, joins Palolo Stream and empties into the Ala Wai Canal.

iii. Floodway

Most of the project site is located in Zone X, which is outside the 500 year flood plain, according to the flood insurance rate map (FIRM) of the Federal Emergency Management Administration. A small portion of the site abutting the stream, however, is in the floodway and is thus susceptible to inundation by the 100 year flood, based upon FIRM designations.

Flood insurance, which is required for mortgages on properties in flood zones that are sold on the secondary market, is extremely expensive for properties in a floodway and might not even be available. Site improvements, such as bank stabilization, may be needed to reduce the potential for flooding.

iv. Water quality

The water quality of Manoa Stream is quite poor. Over a century of cultivation (taro, rice, sugar cane, coffee, e.g.) and residential expansion have altered the land and waters of Manoa Valley, including contamination by pesticides and other wastes. Much of the channel upstream from the project site is laden with trash and debris. Most of the channel downstream from the project site borders the Ewa side of Manoa Hillside Estates, where heavy construction is underway.

v. Soils

The site is covered mainly by Hanalei silt clays, according to soil survey maps by the U.S. Soil Conservation Service. This series generally consists of poorly drained clay soils on bottom lands that are underlain by peat, muck or marine clay. They are usually characterized by moderate permeability and very slow runoff.

Geotechnical investigations (Geotechnical Engineering Exploration for the site prepared by Geolabs-Hawaii, Jan. 23, 1992, pp. 7-8), based upon a sampling of 14 borings on the project site encountered "a thick deposit of highly compressible marshy subsoils below a surface crust of fill materials and alluvium in most areas of the project site...Further below is a layer of alluvial soils or colluvial cobbles and boulders, generally very stiff to hard."

The Geolabs-Hawaii report indicates that the surface/near surface fill materials and alluvium are known to exhibit high expansion potential, low strength and creep characteristics when saturated. Geolabs also found, based upon borings near Manoa Stream, that the stream had removed the soft marshy deposits and redeposited alluvium in their place.

vi. Landslides

The project site is located in a hillside area of Oahu that is subject to interim development controls (IDC) in City & County Ordinance 91-94. Most of upper Manoa Valley is included within this hillside area. According to the map in the original IDC Ordinance (89-150), no landslides have been documented on the project site. The map excludes the project site from lands characterized by 20 percent or greater slopes and unstable soils.

No building or grading permits may be issued in areas subject to the IDC unless the builder or developer submits, and the City & County Dept. of Public Works accepts, a geotechnical engineering study conducted by a licensed civil engineer with substantial experience in soils engineering and hydrology which concludes or demonstrates, to the satisfaction of the Chief Engineer of the City & County, that the proposed construction or grading will not pose a threat to nearby property or residents.

The original IDC ordinance (No. 89-150) was adopted to provide the City & County and the U.S. Geological Survey with additional time to conduct comprehensive studies of soil movement on Oahu hillsides as the bases for future development regulations. It was amended by Ordinance No. 91-09 on February 27, 1991. Scheduled to expire on December 28, 1991, the amended IDC Ordinance was extended by Ordinance No. 91-94 to remain in effect until December 28, 1992.

Geolabs-Hawaii (Geotechnical Engineering Exploration report dated Jan. 23, 1992, pp. 9-10) found that a toe of the easterly Manoa hillside known to have a history of ground movement may have developed along Kalawao St. (east of the project site), that the imaginary slip circle extending to the easterly portion of the project site has a long-term safety factor of about 1.3 and that the long-term safety factor is about 1.7 if the imaginary slip circle extends further into the site.

Geolabs-Hawaii observes that "this safety factor of 1.3 is smaller than the normally accepted safety factor of 1.5 for long term safety concerns, but it is higher than the safety factor of 1.0 considered to be incipient of slope failure." Geolabs-Hawaii concludes that "this intermediate safety factor may still be considered acceptable, especially considering the normally conservative nature of the subsoils and groundwater conditions that have to be assumed for slope stability analysis."

While the Geolabs report finds that the landslide movements may continue further downslope, it concludes that "in general, the likelihood of the existing landslide affecting the project site is remote."

vii. Flora and Fauna

The site is covered by dense vegetation, including large trees and bushes. It is occupied mainly by "volunteers" common to much of Manoa Valley. Java plum, hau and pothos vine are commonly found in this part of Manoa. Monkeypod, banyan, opiuma, Formosan koa, false kamani, African tulip and coconut trees also occupy the site.

No indigenous plant or animal species are known to be located on the site, which does not support any significant wildlife habitats. The gopy (o'opu), which is the only native aquatic specie in Manoa Stream, is quite common, according to the Aquatic Resources Division of the State Dept. of Land & Natural Resources.

The U.S. Fish & Wildlife Service is not aware of any listed or proposed species of threatened or endangered plants or animals that are located on the site or in the vicinity of the site or that would be affected by the proposed action (see Appendix A).

c. EXISTING PUBLIC FACILITIES

i. Water

An existing 12 inch main runs along Woodlawn Drive. It is part of the BWS high service system. Two fire hydrants front the property along Woodlawn Dr. Another fire hydrant is located near the intersection of Woodlawn Dr. and Lowrey Ave. The existing water system is adequate to provide the site with off-site fire protection.

Water will need to be allocated to the project by the State Dept. of Land and Natural Resources. Water services do not exist at this time and a meter will need to be installed. A water facilities development charge will be imposed upon the project.

ii. Sanitary sewer

Two City & County trunk sewer lines run along Woodlawn Ave. A 24 inch line runs down Lowrey Ave. to Woodlawn Dr. A 15 inch line runs along Woodlawn Dr., serving the area mauka of Lowrey Ave. Both lines run through campus to a 60 inch sewer tunnel located on Dole Street. An application to connect the project to the City & County's 24 inch line along Woodlawn Drive has been approved by the Dept. of Public Works.

An 8 inch City & County sewer line, for which there is no recorded easement, traverses the makai portion of the site. Running parallel to Lowrey Ave., it serves the hillside houses east of Kalawao St. and connects with the sewer main along Woodlawn Dr. The line will need to be realigned within the project site.

iii. Storm drainage

Existing drainage lines run along both sides of the site into Manoa Stream. A 48 to 54 inch drainage line runs along Woodlawn Dr. A 24 inch drainage line runs along Lowrey Ave. (to Woodlawn Drive). The swale along the Kalawao St. frontage of the site carries runoff from hillside properties located up the street through a culvert under Lowrey Ave. and into Manoa Stream.

iv. Electricity

A 12.47 kv underground electrical circuit runs along Woodland Dr. fronting the project site. Providing the project with electrical power is not expected to be a problem.

v. Telephone & cable television

Telephone service is expected to be available. Oceanic Cable will be able to extend cable to the intersection of Woodlawn Dr. and Lowrey Ave., from which service can be provided.

vi. Solid waste disposal

Solid waste disposal will be handled by a private refuse collection company.

vii. Fire and police protection

The Manoa fire station is located a block away along East Manoa Road across from the Manoa Marketplace. The Honolulu Police Department's headquarters on South Beretania St. is only a few minutes away. Campus security may also be available to assist, as needed.

viii. Streets, bikeways and pedestrian routes

None of the streets abutting the project site are designated for widening on the City & County Development Plan Public Facilities Map.

Traffic between the Manoa Marketplace and the Central Campus is often congested along East Manoa Road, Woodlawn Drive and Oahu Avenue during the peak morning and evening hours.

Faculty walking or biking between the project site and the Central Campus can use Woodlawn Drive, Pamoia Road, the University fire trail and East-West Road. The University of Hawaii's Long Range Development Plan calls for rights-of-way to be acquired and East-West Road to be extended to connect the Mauka and Central campuses.

ix. Mass transit service

City & County buses provide excellent service to the project site via East Manoa Road. Free shuttle service is already being provided by the Associated Students of the University of Hawaii between the site (stop at Lowrey Ave.) and other stops on the Manoa campus.

x. Other public facilities in the area

Noelani Elementary School and the Manoa Library are a block away from the project site along Woodlawn Drive. Manoa Valley Field and the Manoa Recreation Center are a few blocks away to the north. Saint Francis High School and Mid-Pacific Institute are located between the project site and the Central Campus of the University.

d. CULTURAL RESOURCES

i. Archaeological sites

The Historic Preservation Division of the State Dept. of Land & Natural Resources is not aware of any archaeological sites on or near the project site. It is possible, of course, that an abandoned agricultural terrace or other remains may be found along the stream.

ii. Historic sites

Manoa Valley was a favorite resort of King Kamehameha I. The Chinese Cemetery was once part of Queen Kaahumanu's residence. No significant historic sites are known, however, to be located on or adjacent to the project site.

5. PROJECT CHARACTERISTICS

a. SITE PLAN (see Exhibit 2)

i. Vehicular access

Entry to/exit from both the rental and condominium components of the project is provided via Lowrey Ave. in order to alleviate potential traffic congestion along Woodlawn Drive. and Kalawao St.

Traffic into the rental portion of the project is routed from the makai gate on Lowrey Ave. through a central driveway into one of five parking areas. Traffic into the condominium portion of the project is likewise channeled from the mauka gate on Lowrey Ave. through a central driveway into one of several parking areas.

ii. Building sites, foundations and configurations

No building sites, driveways or parking areas are located in the following areas: (a) the swale fronting Kalawao St., where a new box drain will be installed and covered; (b) the low lying areas

along the stream, which may be subject to flooding; and (c) the corner of Woodlawn Dr. and Lowrey Ave., where a large banyan tree is located and a small "tot lot" (playground) will be developed.

Although most of the project site is underlaid by highly compressible deposits, Geolabs-Hawaii believes that the site's surface crust, which is composed of generally competent subsoils at least eight feet deep, will be able to support the project's light loaded, two story wooden structures on spread and/or continuous footing foundations (Geolabs-Hawaii, "Geotechnical Engineering Exploration," Jan. 23, 1992, p. 15).

Of the project's 26 buildings, 22 are four units long. Three of the buildings are six units long. The shortest building in terms of length contains only one residential unit (for the manager), laundry facilities and mailboxes. The shorter the building, the less the risk of soil movement, expansion and settlement.

Winds passing across the site would not be obstructed by unusually tall or long buildings. All of the structures are oblique to the principal wind direction from north to south.

iii. At grade parking areas

At grade parking is provided in parking areas adjacent to each residential building. The condominium units have covered parking stalls. The rental units do not have covered parking.

Approximately 1.5 stalls will be provided for each of the 145 two bedroom units. Approximately 2.0 stalls will be provided for each of the 36 three bedroom units. Guest parking will be provided, equivalent to approximately ten percent of the dwelling units.

iv. Filling, grading and drainage

About two feet of non-expansive granular material will be needed under all building floor slabs as well as under all parking and driveway pavements. At least two feet of select bedding material will need to be provided below the bottom of the proposed box culvert fronting Kalawao St. From three to five feet of fill will be needed to raise the southwestern portion of the site adjacent to the stream, which may otherwise be subject to flooding.

Current plans call for the mauka side of a short section of the stream bank closest to Woodlawn Drive to be lined with riprap, which would minimize erosion and sedimentation. A low retaining wall would be built along the stream frontage. The wall would be located at the edge or mauka of the floodway, except for a short section near Woodlawn Drive. A drainage report will be prepared and submitted to the City & County Dept. of Public Works (Engineering Division, Drainage Section) for review and approval.

A large rectangular culvert (approximately eight feet high) will be installed in the existing swale fronting Kalawao St. It will be covered and landscaped.

v. Clearing, grubbing & landscaping

All of the existing trees fronting Lowrey Ave. will be retained. However, most of the trees on the site will need to be cleared, relocated elsewhere on the site or moved to other sites. Some of the trees are in poor condition, in which case relocation may not be feasible.

The buildings will be set back from Woodlawn Dr. and Lowrey Ave. to provide generous front yards. Both frontages will be landscaped and bordered by a low masonry wall. Even wider setbacks are provided along Kalawao St., where a landscaped buffer will be provided over the new box culvert.

All of the grounds, including the playground (tot lot), parking areas, driveways, picnic (barbeque) areas and stream frontage will be landscaped.

b. BUILDING PLANS

i. Townhouse condominiums

The two story townhouses on the mauka side of the project consist of seven buildings. Six of the buildings contain four two-level units. The building facing Kalawao St. contains six two-level units. Each of the townhouse units has three bedrooms, two and a half bathrooms and approximately 1,200 s.f. of net floor area.

ii. Rental apartments

The two story rental apartments on the makai side of the project consist of 19 buildings. Fifteen buildings contain four upstairs units and four downstairs units. Each of these units averages about 900 s.f. of net floor area and includes two bedrooms and two bathrooms.

Two buildings contain six upstairs units and six downstairs units. Each of these units also averages about 900 s.f. of net floor area and includes two bedrooms and two bathrooms. One building (located on the makai side of the playground at Lowrey Ave. and Woodlawn Dr.) contains two units upstairs and four units downstairs, each of which averages 1,000 s.f. of net floor area and features three bedrooms and two bathrooms.

The only one story building is located near the entrance to the property. It includes the manager's residence, laundry facilities, and mail boxes.

iii. Relationship to nearby buildings

The project will be lower in height than the two story Manoa Marketplace and the two story Manoa Innovation Center across the street. The project will be lower in height and much lower in density (15.7 units per acre) than the existing three level Manoa East condominiums on the Ewa side of East Manoa Road (40.0 units per acre @ 20 residential and 5 commercial units on 0.624 acre of land). Its density will also be lower than that of the Manoa Village condominiums on the Diamond Head side of East Manoa Road (22.5 units per acre @ 9 units on 0.4 acre of land).

Development of the mauka portion of the site for three bedroom residential condominiums would be compatible with the abutting dwellings, most of which are owner occupied. The makai portion of the site, which does not abut any owner occupied dwellings, is closer to the Central Campus and the Manoa Marketplace and is more appropriate for two bedroom faculty apartments.

iv. Relationship to planning and zoning standards (see Appendix B)

c. DEVELOPMENT CONCEPT

- i. The University of Hawaii (State of Hawaii) will retain the fee simple interest in the project. The University of Hawaii will contribute the land, pay for the planning and contribute the equity needed to secure the financing for the residential condominiums.
- ii. The State Housing Finance and Development Corporation will develop, finance and manage the project for the University of Hawaii.
- iii. Net proceeds from the sale of the 30 leasehold condominium units will be contributed as equity toward the construction loan for the rental units, whose cost is estimated at this time to be at least \$22.4 million. At least \$2.2 million in equity will need to be raised from the sale of the condominium units. The price of each leasehold unit is estimated at this time to be at least \$290,000. All of these estimates are preliminary and subject to change.
- iv. Net proceeds from the apartment rents, which are expected to be competitive with market rates, would be used to retire the mortgage loan for the project.

6. MAJOR IMPACTS & MITIGATION MEASURES

a. ENVIRONMENTAL IMPACTS

- i. The vacant project site is not known to be a source of hazardous, toxic or radioactive materials. If the project is developed as planned, however, the practice of illegal dumping will be curtailed.
- ii. The water quality of Manoa Stream will probably be degraded to some degree during the construction period. A short section of riprap

and a low retaining wall fronting the stream will be constructed prior to excavation, filling and grading in order to minimize erosion and sedimentation. Residential development of the site is not expected, however, to worsen the quality of Manoa Stream in the long-run.

- iii. Ambient air quality will probably worsen during the construction period. Particulate levels, which are already high because of construction activities at the Manoa Innovation Center and the Manoa Hillside Estates, will remain high during this period.

Although more vehicles will be operating on or near the project site, the increase in vehicular emissions in this area may be offset to some degree. Emissions should fall near Noelani School as the number of out-of-district exemptions drops. Emissions are also expected to lessen elsewhere on the campus, where they would otherwise be generated by faculty commuting by car from longer distances.

- iv. Ambient noise levels will rise during the construction period. The increase is not expected to be significant, however, since no piles will be driven. While long-term noise levels will rise, the difference is not expected to be significant in comparison to existing noise levels near the site, where two major construction projects (Manoa Hillside Estates and Manoa Innovation Center) are underway.
- v. Mitigation measures will be taken to reduce erosion, sedimentation and dust generated during construction, including the installation of temporary berms and sedimentation basins, the phasing of site work, planting right after final grading and periodic watering of the site.

b. AESTHETIC IMPACTS

- i. The project is not expected to affect any major view corridors or coastal vistas.
- ii. The two story buildings and landscaped grounds appear to blend well with adjacent buildings.

c. SOCIO-ECONOMIC IMPACTS

- i. The project will help to meet an urgent need for additional faculty housing, without which the University of Hawaii at Manoa will lose its competitive edge in faculty recruiting and retention and will no longer be a first-rate university.
- ii. No other housing alternatives have been designated for faculty families on the Manoa campus in the University's Long-Range Development Plan Six-Year Capital Improvements Program. The only other site on Oahu proposed for faculty housing is in Kakaako at the Pensacola campus of Kapiolani Community College.

The housing proposed for Kakaako, however, will consist mainly of one and two bedroom apartments. The Pensacola project is also beyond walking distance of the Manoa campus.

- iii. The project's 150 rental units will help to relieve the competition for rental housing in central Honolulu, for which demand far exceeds supply. The project will satisfy at least some of the demand for rental housing by University faculty who might otherwise be competing with other families in Honolulu for rental units.

The project's 30 townhouse condominium units will likewise help to soften the competition for condominium units in Honolulu, for which demand also exceeds supply.

- iv. Making more efficient use of vacant campus land will alleviate the need for the University of Hawaii to acquire additional land off campus and displace nearby businesses and residents for this purpose.

d. IMPACT ON COMMUNITY SERVICES

- i. About 170, or approximately 40 percent, of the students at Noelani Elementary School are enrolled under out-of-district exemptions. Noelani will need more classrooms and staff to accommodate the project's estimated 28-34 children of elementary school age. The University anticipates that its rental housing units will have about 65 children, but that only about 20-25 will be of elementary school age. About 20-25 children are expected to reside in the project's condominium units, of whom about 8-9 will probably be of elementary school age.

The influx could be a problem for the school, especially during the transition, if Noelani decides not to curtail its out-of-district exemptions, if it cannot acquire additional staff and facilities in a timely manner or if back-up assistance cannot be provided by Manoa Elementary School. The University of Hawaii is aware of the problem and will be coordinating efforts in anticipation of possible shortages.

- ii. The project will provide approximately 23,900 s.f. of playground space (private park) at the corner of Woodlawn Drive and Lowrey Ave., which will be dedicated as a private park. About 110 s.f. of park or playground space is needed per apartment unit, according to the City & County's park dedication standards. Only 19,910 s.f. of park space would, therefore, be needed to support all of the project's 181 multi-family dwelling units @ 110 s.f. per unit.

Small picnic/barbeque areas are also being provided at various locations on the project site to meet the recreational needs of the project's residents. The project's impact on nearby recreation facilities is not expected to be significant in view of these playground and picnic facilities.

e. IMPACT ON OFF-SITE PARKING

- i. The project will provide at least 2.0 stalls per three bedroom unit and 1.5 stalls per two bedroom unit. Although 2.0 stalls are usually required per dwelling unit larger than 800 s.f. by City & County standards, fewer parking stalls are appropriate in this particular case.
- ii. Nearly twice as much parking is being provided than is actually needed at the existing Waahila faculty apartments on Dole St. Only 0.8 stalls per unit (3.1 persons per apartment unit or 0.26 stalls/person) are needed at Waahila, based upon University findings.

The faculty housing units are, in effect, part of a "mixed use" community in which employee housing is provided within walking, biking and shuttle distance of nearby jobs. The Hawaii Community Development Authority's standard for off-street parking in mixed use projects in Kakaako is only 1.35 stalls per multi-family unit equal to or larger than 800 s.f.

The project's proximity to a large retail shopping center, an excellent elementary school, a community library and recreation facilities and its accessibility to shuttle and bus service make it an ideal site for faculty members who prefer not to drive to and from work.

Some of the residents would probably prefer to walk, bike or shuttle to work than to pay for stalls in the Lower Campus (quarry) garage. The availability of parking on the Central Campus, where most of the faculty teach or occupy offices, is diminishing as existing parking lots are being redeveloped. The price of campus parking stalls, moreover, will continue to rise.

- iii. Developing an excessive amount of parking on the site would reduce the amount of land that can be devoted to open space, encourage residents to drive to work and require additional campus parking.
- iv. The project is not expected, therefore, to increase the demand for street parking, except during construction. Spaces will continue to be available for University students, construction workers, people employed at the Manoa Marketplace and the University of Hawaii, neighborhood residents and their guests.

f. IMPACT ON VEHICULAR CIRCULATION (see Appendix C)

- i. Peak hour traffic is expected to increase along Oahu Ave., Woodlawn Dr. and East Manoa Road is expected to increase by 1994, even without the project. Although the project will contribute to future congestion, when the project would be fully occupied, its impact in comparison to levels of congestion anticipated without the project is not expected to be significant.

- ii. The project's impact on peak hour traffic should be comparable to that of the existing Waahila faculty housing facility along Dole Street. Waahila has fewer dwelling units (67) and is closer to the Central Campus, but is much farther from stores, shops and other community facilities.

Traffic counts taken at the existing faculty housing complex on Dole St. in 1987 showed that "literally no traffic was generated during the peak hours, indicating that either faculty members did not drive during the peak hours, or walked to campus." ("Traffic Impact Report for the Proposed University of Hawaii Long Range Development Plan for the Manoa Campus" prepared by Austin Tsutsumi & Associates, Inc., Oct. 30, 1987, pp. 27-28).

- iii. A recent traffic study by Pacific Planning and Engineering (see Appendix C) concludes that the project would have a small impact on the intersection of East Manoa Road with Kolowalu St. and the intersection of East Manoa Road with Oahu Ave. and would not have any significant impact on the intersection of East Manoa Road with Lowrey Ave. and the intersection of Woodlawn Drive and Lowrey Ave.

Little or no delays are currently experienced during the peak morning and afternoon hours at the unsignalized intersection of Woodlawn Drive and Lowrey Ave. Little or no peak hour delays are expected to be experienced with the project.

The average of delay per vehicle during the peak morning and afternoon hours is currently 6 seconds at the signalized intersection of East Manoa Road and Lowrey Ave. The average peak hour delay with the project will still be 6 seconds.

The average of delay per vehicle during the peak morning and afternoon hours is currently 18 to 22 seconds at the signalized intersection of East Manoa Road and Kolowalu St. and at the intersection of East Manoa Road and Oahu Ave. The average peak hour delay with the project will be slightly longer, 18 to 24 seconds. Although congestion and queues exist at these two intersections, the number of trips generated by the project would be relatively small.

7. COMPATIBILITY WITH PUBLIC POLICIES

a. RELATIONSHIP TO THE SHORELINE & STATE LAND USE DISTRICT BOUNDARIES

- i. The project site is not located on or near the shoreline.
- ii. The project site not located in the Special Management Area.
- iii. The project site is located in the State Land Use Urban District.

b. COMPATIBILITY WITH ADOPTED STATE PLANS AND POLICIES

- i. By helping the University maintain its competitive edge as a first-rate university, the project would carry out the following Hawaii State Plan (1991) objectives and policies (Chapter 226, HRS):

Sec. 226-10. Policies for the economy-potential growth activities. To achieve the potential growth activity objective, it shall be the policy of this State to:

- (3) Enhance and promote Hawaii's role as a center for international relations, trade, finance, services, technology, education, culture, and the arts.
- (4) Accelerate research and development of new energy-related industries based on wind, solar, ocean, and under ground resources and solid waste.
- (7) Increase research and the development of ocean-related economic activities such as mining, food production, and scientific research.

Sec. 226-10.5. Policies for the economy-information industry. To achieve the information industry objective, it shall be the policy of this State to:

- (7) Assist in the promotion of Hawaii as a broker, creator, and processor of information in the Pacific."

- ii. By developing rental and condominium housing on an appropriate site, the project would carry out the following Hawaii State Plan (1991) objectives and policies (Chapter 226, HRS):

Sec. 226-19. Policies for socio-cultural advancement-housing. To achieve the socio-cultural advancement-housing objective, it shall be the policy of this State to:

- (3) Increase homeownership and rental opportunities and choices in terms of quality, location, cost, densities, style, and size of housing.
- (6) Facilitate the use of available vacant, developable, and underutilized urban lands for housing.

- iii. By helping the University of Hawaii maintain its competitive edge as a first-rate university, the project would implement the following policies of the Hawaii State Higher Education Functional Plan (1984), which was adopted by House Concurrent Resolution No. 30, as amended, on April 19, 1984.

Policy B(1). Sustain the commitment to quality instruction and scholarship in the basic arts, letters, humanities and social and

natural sciences as a necessary prerequisite to overall institutional quality.

Policy B(3). Maintain and strengthen the position of the University of Hawaii at Manoa as a leading national and international research center.

- iv. The project was approved as Implementing Action B(1)(b) of the 1989 Hawaii State Housing Functional Plan by Governor Waihee on May 8, 1989. This implementing action calls for the University to build "approximately 150 transitional rental housing units in Manoa Valley" in order to "to develop rental housing units for students and faculty of the University of Hawaii system."
- v. The project was approved by the Board of Regents as part of the Six Year Capital Improvements Program (CIP) of the University of Hawaii at Manoa. The environmental impact of all projects in the Six Year CIP was assessed and a Notice of Determination was published in the OEQC Bulletin on June 8, 1988.

c. COMPATIBILITY WITH THE CITY & COUNTY GENERAL PLAN & DEVELOPMENT PLANS

- i. The project carries out the following Oahu General Plan (1988) housing objectives and policies, as amended by Honolulu City Council Resolution No. 87-211:

Housing Objective A, Policy 3. Encourage innovative residential development which will result in lower costs, added convenience and privacy, and the more efficient use of streets and utilities.

Housing Objective A, Policy 12. Encourage the production and maintenance of affordable rental housing.

Housing Objective C, Policy 3. Encourage residential development near employment centers.

Housing Objective C, Policy 4. Encourage residential development in areas where existing roads, utilities, and other community facilities are not being used to capacity.

- ii. The project carries out the following Oahu General Plan (1988) physical development and urban design objectives and policies, as amended by Honolulu City Council Resolution No. 87-211:

Physical Development and Urban Design Objective A, Policy 5. Provide for more compact development and intensive use of urban lands where compatible with the physical and social character of existing communities.

Physical Development and Urban Design Objective A, Policy 8. Locate community facilities on sites that will be convenient to the people they are intended to serve.

Physical Development and Urban Design Objective D, Policy 6. Provide special design standards and controls that will allow more compact development and intensive use of lands in the primary urban center.

- iii. The project implements the City & County of Honolulu's Development Plan for the Primary Urban Center (PUC).

The project site, like the existing Waahila faculty housing site and the rest of the Manoa Campus, is designated for use as a public/quasi-public facility on the PUC Development Plan Land Use Map. It is not needed for any other major public facilities, as indicated on the PUC Development Plan Public Facilities Map.

d. COMPATIBILITY WITH ADOPTED CITY & COUNTY PLANNING AND ZONING STANDARDS

- i. The project implements the Long-Range Development Plan (LRDP) of the University of Hawaii's Manoa Campus, which was adopted by its Board of Regents in December 1987. The project site is designated for faculty housing or for an instruction and research complex. The design criteria in the LRDP for the faculty housing project on page D-17 indicate that:
 - o it should be developed as low-rise, high density townhomes;
 - o the architectural character should be compatible with the neighborhood;
 - o the height of the housing should not exceed three stories in the interior and two stories along the perimeter of the site; and
 - o an adequate landscape buffer should be maintained along the perimeter of the site.

The project, like the other LRDP projects proposed in the University of Hawaii's Six-Year CIP, was approved under a Plan Review Use permit (88/PRU-3) adopted by City Council Resolution No. 89-411 on December 13, 1989.

- ii. In granting the PRU approval, the City Council asked the University to submit an updated Utility Master Plan (Five Year Master Plan for water, sewage disposal and drainage) for review by the Dept. of Public Works and Board of Water Supply and a phasing plan of campus transportation improvements, as proposed by Austin Tsutsumi & Associates in the LRDP, for review by the Dept. of Transportation Services.

The University will be submitting an updated Utility Master Plan for the Mauka Campus, where existing infrastructure is adequate to support the project, when it is completed. No transportation improvements were found by Austin Tsutsumi & Associates to be necessary to support any of the Mauka Campus projects in the LRDP.

- iii. The project, which has already been approved by the City Council, meets all of the City & County's planning and zoning standards applicable to multi-family housing projects in Honolulu's A-1 Low Density Apartment zoning district, except for off-street parking. See Appendix B.

It also meets most, but not all, of the standards applicable to detached and duplex units located in the underlying R-7.5 Residential zoning district, which would otherwise apply if project were not developed under an approved PRU permit.

- iv. The project may be certified by the Housing Finance and Development Corporation and exempted, if necessary, from planning, zoning and other development standards under Act 15.

8. ALTERNATIVE ACTIONS

a. INSTRUCTION AND RESEARCH COMPLEX

- i. Only one alternative use for the project site was designated in the University of Hawaii's Long Range Development Plan. The LRDP also identified the project site for possible use as an "instruction and research complex."
- ii. Located at the mauka end of the University's Mauka Campus, the site would not be as convenient for students and faculty as any of the other sites designated on the LRDP for instruction and research complexes. Such a complex would probably generate more peak hour traffic in the area and would probably be less compatible with surrounding uses than the proposed faculty housing project. It would intensify the competition for on-street parking by students with classes and employees doing research at the complex who do not have assigned parking stalls on the site.

b. HOMELESS VILLAGE

- i. The State Dept. of Human Services proposed in 1991 that nine acres of the project site be used to house the homeless. Each of the homeless villages is expected to accommodate 50 to 100 homeless families in wooden cabins. As one of the "Weinberg Villages," it would help to meet the pressing need by low income families for low cost housing in central Honolulu. The Dept. of Human Services asked the City Council to exempt the villages from numerous City & County ordinances, charter provisions and rules relating to planning, zoning and construction standards.
- ii. The Dept. of Human Services agreed on October 24, 1991 to suspend its efforts to develop a homeless village on the project site, pursuant to commitments made by the Housing Finance and Development Corporation and the University of Hawaii to develop the site for faculty housing and to the encumbrance of \$500,000.00 by the University to plan the project.

c. DO NOTHING

- i. Although the property could be left as it is, an open dump site, the University of Hawaii has decided that the site is too valuable to remain vacant.
- ii. If the site is not developed for faculty housing, as planned, then it will probably be made available to the Dept. of Human Services for a homeless village.

d. CONCLUSION

- i. The proposed faculty housing project appears to be more compatible with existing uses in the neighborhood than either the instruction and research complex alternative identified by the University of Hawaii in 1987 or the homeless village alternative proposed by the State Dept. of Human Services in 1991.
- ii. The project provides an ideal transition in uses between the detached residential dwellings to the north and east, on one hand, and the commercial office and retail activities to the west, the low density apartments to the northwest and the research facilities to the south and west, on the other.

9. SUMMARY OF MAJOR IMPACTS

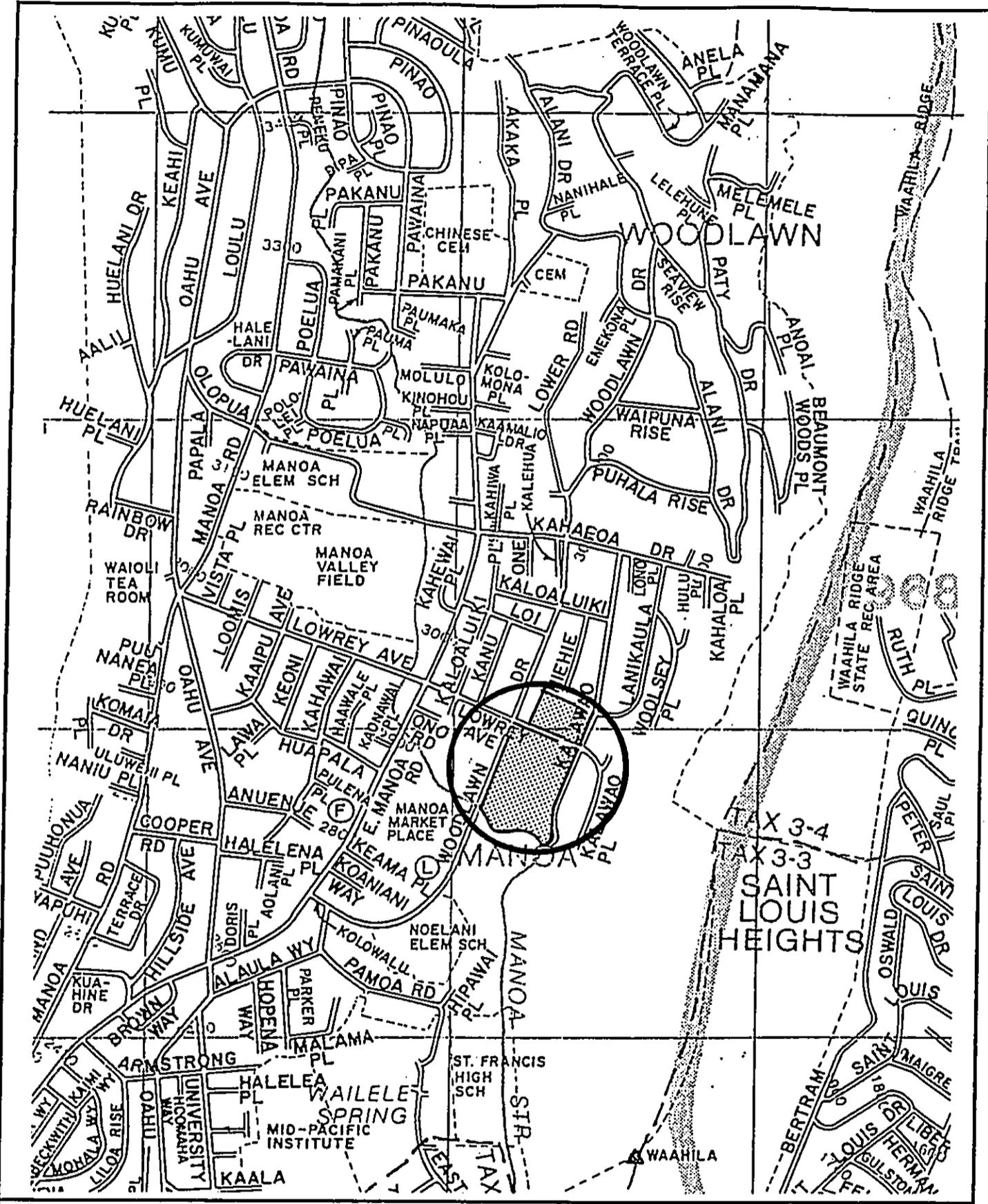
a. MAJOR SHORT-TERM IMPACTS ANTICIPATED DURING CONSTRUCTION

- i. Short-term increases in dust.
- ii. Short-term increases in ambient noise levels.
- iii. Short-term increases in downstream sedimentation.

b. MAJOR LONG-TERM IMPACTS ANTICIPATED

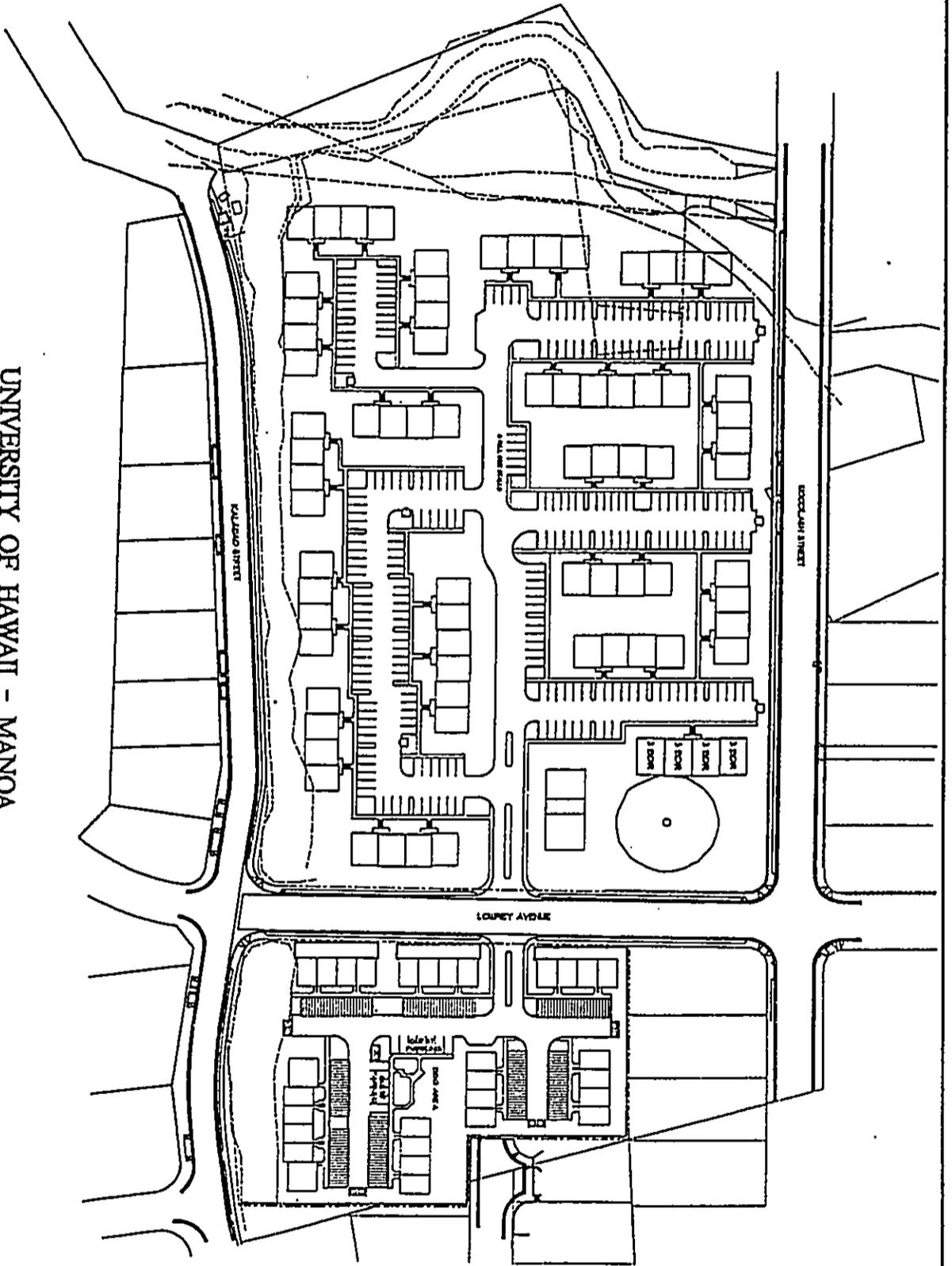
- i. An increase in the supply of rental housing in central Honolulu.
- ii. An increase in the capacity of the University to recruit and retain top-flight faculty.

EXHIBITS



 **MATSUSHITA SAITO & ASSOCIATES, INC**
ARCHITECTS

VICINITY MAP



UNIVERSITY OF HAWAII - MANOA
 FACULTY HOUSING
 TMK 2-9-26-PARCEL 1, 2 & PORTIONS OF 3
 TMK 2-9-27-PARCEL 54



MATSUSHITA SAITO & ASSOCIATES, INC
 ARCHITECTS

SITE PLAN

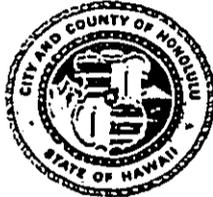
APPENDIX A

WRITTEN COMMENTS RECEIVED FROM AGENCIES

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

LU01/92-248 (ASK)

March 2, 1992

Mr. Tim Chow
1210 Auahi Street, Suite 212
Honolulu, Hawaii 96814

Dear Mr. Chow:

University of Hawaii, Manoa
Faculty Housing Project
Tax Map Keys 2-9-27: 54 and 2-9-26: 1 & 2

This responds to your January 10, 1992 letter relative to the environmental assessment for faculty and for-sale-housing to be developed on Lowrey Avenue in Manoa.

Resolution 89-411 CD-2, approved 88/PRU-3 and a five year master plan for the University of Hawaii subject, in part, to conformance with the standards and design criteria established in the Long Range Development Plan Report (LRDP). The proposal is generally consistent with the approved five year master plan which identifies the site for faculty housing and the LRDP which describes the project as low-rise high density townhomes.

The LRDP states that an adequate landscape buffer should be maintained along the perimeter of the site. Building designs, layouts, and the use of landscaping and open areas should be designed to enhance the surrounding residential neighborhood.

The environmental assessment should describe the impacts to the surrounding land uses including traffic, noise, and visual character.

Regarding the proposal to sell units on the mauka portion of the site, we offer the following:

1. The property is approved for university faculty housing. The sale of units to individuals other than U.H. faculty, will require an amendment to the existing PRU. Private residences do not qualify for waivers which may be granted to public uses and structures. A

Mr. Tim Chow
Page 2
March 2, 1992

private development will be required to meet the development standards of the underlying zoning district.

2. The property is designated Public Facility on the Development Plan Land Use Map. We recommend that you consult the Department of General Planning regarding consistency with the DP land use policy for the site.

As noted in your summary description, a portion of the project is within the flood hazard area and subject to Section 7.10, Flood Hazards Districts of the LUO. The environmental assessment should describe how these requirements will be met.

Impacts of the proposed stream alteration, including drainage, water quality, and stream ecology should be addressed as part of the environmental assessment.

The property is within an Interim Development Control Area for slide areas. We recommend that you contact the Department of Public Works regarding the requirements of this ordinance.

Should you have questions regarding the above, you may contact Ardis Shaw-Kim of our staff at 527-6274.

Very truly yours,



DONALD A. CLEGG
Director of Land Utilization

DAC:lg
A:chow.ask



United States Department of the Interior

FISH AND WILDLIFE SERVICE
Pacific Islands Office
P.O. Box 50167
Honolulu, Hawaii 96850



January 17, 1992

Mr. Tim Chow
1210 Auahi Street, Suite 212
Honolulu, Hawaii 96814

Dear Mr. Chow:

This responds to your January 10, 1992 letter regarding the proposed construction of faculty housing for the University of Hawaii in Manoa, Oahu, Hawaii. Specifically, you requested we review the project to determine if any listed or proposed species of endangered or threatened plants or animals may be found in the vicinity of the project.

To the best of our knowledge, there are no listed or proposed species of plants or animals which would be found in the vicinity of, or would be affected by, your proposed action.

The property to be developed is adjacent to Manoa Stream. We assume that the construction will not require filling any portion of the stream and that construction practices will not cause erosion or other types of pollution of the stream. If any action affecting the stream is required, please contact us again.

Thank you for your concern for listed species.

Sincerely,

William R. Kramer
Acting Field Supervisor
Pacific Islands Office

DEPARTMENT OF PARKS AND RECREATION
CITY AND COUNTY OF HONOLULU

650 SOUTH KING STREET
HONOLULU, HAWAII 96813



FRANK F. FASI
MAYOR

WALTER M. OZAWA
DIRECTOR

ALVIN K.C. AU
DEPUTY DIRECTOR

January 27, 1992

Mr. Tim Chow
1210 Auahi Street, Suite 212
Honolulu, Hawaii 96814

Dear Mr. Chow:

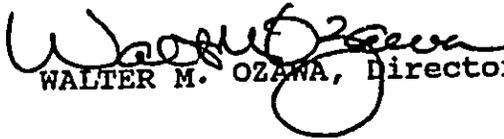
Subject: Recreation Assessment for Faculty Housing
Project in Manoa
Tax Map Key 2-9-27: 54 and 2-9-26: 1 & 2

We have made a recreation assessment of the proposal to establish the University of Hawaii's Faculty Housing project in Manoa and offer the following comments.

The project will have to comply with the City's Park Dedication Ordinance No. 4621. The outdoor recreation area proposed at the corners of Woodlawn Drive and Lowry Avenue is applicable for credit as a private park for the project to comply with the Ordinance. Such credit are specified under Rule 10, Standards and Requirements for Private Parks, in the City's Park Dedication Rules and Regulations.

Should you have any questions, please contact Jason Yuen of our Advance Planning Branch at 527-6315.

Sincerely,


WALTER M. OZAWA, Director

WMO:ei

DEPARTMENT OF PUBLIC WORKS
CITY AND COUNTY OF HONOLULU
650 SOUTH KING STREET
HONOLULU, HAWAII 96813

FRANK F. FASI
MAYOR



SAM CALLEJO
DIRECTOR AND CHIEF ENGINEER

C. MICHAEL STREET
DEPUTY DIRECTOR

ENV 92-22

January 28, 1992

Mr. Willard T. Chow
Planning Consultant
1210 Auahi Street, Suite 212
Honolulu, Hawaii 96814

Dear Mr. Chow:

Subject: Environmental Assessment (EA)
Faculty Housing Project, University of Hawaii at Manoa
TMK:2-9-26:1 and 2-9-27:54

We have reviewed the subject EA and have the following comments:

1. A drainage report for a portion of the project which is located in the flood zone should be submitted to the Drainage Section, Division of Engineering, for review and approval.
2. Since the proposed development is adjacent to the Manoa Hillside Sliding Area, a soils report should be prepared to address potential slide problems.
3. All improvements within the City's right-of-way should be in conformance to the City design standards.
4. As noted on the approved "Application for Sewer Connection" form dated July 25, 1991, sewer connection will only be allowed to the 24-inch sewer line on Woodlawn Drive.
5. Also, a Wastewater System Facilities charge is applicable for this project and must be paid before the sewer portion of the building permit can be approved.

Very truly yours,

C. Michael Street
SAM CALLEJO
Director and Chief Engineer

JOHN WAIHEE
GOVERNOR OF HAWAII



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

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

In reply, please refer to:

January 29, 1992

92-026/epo

Mr. Williard T. Chow, Ph.D.
Tim Chow Planning Consultant
1210 Auahi Street, Suite 212
Honolulu, Hawaii 96814

Dear Mr. Chow:

Subject: Environmental Assessment (EA) Preparation for the
Faculty Housing Project, University of Hawaii at
Manoa, Oahu

Thank you for allowing us a pre-assessment review of the subject project. We have the followings comments to offer:

- a. If the subject project involves land disturbance activities of five acres or more, an application for a stormwater runoff permit under the National Pollutant Discharge Elimination System (NPDES) is required. The deadline to submit an NPDES application is October 1, 1992 or 90 days prior to the commencement date of construction activity, whichever is later.
- b. As stated in the applicant's transmittal, the north bank of Manoa Stream will be lined (riprap) and a portion of the site will be filled and graded. Placement of fill or dredged material into waters of the United States may require a Clean Water Act Section 404 permit from the U.S. Army Corps of Engineers (COE). We recommend that the applicant consult the COE for Federal discharge permit requirements. Should a Section 404 permit be required by the COE, a Section 401 Water Quality Certification will also be required from the Department of Health.

In addition, stream alteration may require a permit issued by the State Department of Land and Natural Resources (DLNR). We also recommend that the applicant contact DLNR for details.

- c. We request that mitigative measures be discussed in the proposed EA to prevent pollutants, including soil, from being discharged into Manoa Stream.

Mr. Williard T. Chow
January 29, 1992
Page 2

92-026

If you should have any questions on this matter, please contact
Mr. Ed Chen of the Clean Air Branch at 586-4309.

We may have additional comments at a later date when more details
become known.

Very truly yours,



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

c: Clean Water Branch

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

TE-121
PL92.1.018

January 30, 1992

Mr. Willard T. Chow
Tim Chow Planning Consultant
1210 Auahi Street, Suite 212
Honolulu, Hawaii 96814

Dear Mr. Chow:

Subject: Faculty Housing Project - University of Hawaii
Preparation of Environmental Assessment
TMK: 2-9-26: 1; 2-9-27: 54

This is in response to your letter of January 10, 1992 requesting our comments on the proposed faculty housing project.

Based on our review, we have the following comments:

1. All vehicular access points should be constructed as standard City dropped driveways. The widths of the driveways should be specified and shown on the site plan.
2. The driveway grade should not exceed 5 percent for a minimum distance of 35 feet from the curb line, and adequate sight distance to pedestrians and other vehicles should be provided and maintained.
3. The property line radii should be adjusted to 30 feet at the Woodlawn Drive/Lowrey Avenue and Kalawao Street/Lowrey Avenue intersections.
4. Landscaping should be placed in locations where it does not obstruct vehicular sight lines.
5. As shown on the site plan, the driveways servicing each parcel should be aligned directly across each other and located at approximately mid-block.
6. We may have additional comments based on our review of the traffic impact report which we understand will be prepared as part of the Environmental Assessment.

Mr. Willard T. Chow
Page 2
January 30, 1992

Should you have any questions, please contact Lance Watanabe of
my staff at 523-4199.

Sincerely,


JOSEPH M. MAGALDI, JR.
Director

BOARD OF WATER SUPPLY

CITY AND COUNTY OF HONOLULU

630 SOUTH BERETANIA STREET

HONOLULU, HAWAII 96843



February 18, 1992

FRANK F. FASI, Mayor

WALTER O. WATSON, JR., Chairman
MAURICE H. YAMASATO, Vice Chairman
JOHN W. ANDERSON, JR.
SAM CALLEJO
REX D. JOHNSON
MELISSA Y.J. LUM

KAZU HAYASHIDA
Manager and Chief Engineer

Mr. Willard T. Chow
Tim Chow Planning Consultant
1210 Auahi Street, Suite 212
Honolulu, Hawaii 96814

Dear Mr. Chow:

Subject: Your Letter of January 10, 1992 Regarding the Preparation of an Environmental Assessment for the Proposed UH-Manoa Faculty Housing, TMK: 2-9-26: 1 and 2, 2-9-27: 54, Lowrey Avenue

Thank you for the opportunity to review and comment on the proposed 181-unit faculty housing project. We have the following comments to offer:

1. The existing water system is presently adequate to provide off-site fire protection to the proposed project. There are no existing water services to the site. The developer will be required to obtain a water allocation from the State Department of Land and Natural Resources.
2. The availability of water will be confirmed when the building permit is submitted for our review and approval. If water is made available, the developer will be required to pay the prevailing Water System Facilities Charges for transmission, daily storage and any meter installation charges.
3. 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.



Mr. Willard T. chow
Page 2
February 18, 1992

4. The proposed project will be subject to our cross-connection control requirements prior to the issuance of the building permit.

If you have any questions, please contact Bert Kuioka at 527-5235.

Very truly yours,

A handwritten signature in black ink, appearing to read "Kazu Hayashida". The signature is fluid and cursive.

KAZU HAYASHIDA
Manager and Chief Engineer

JOHN WAIHEE
GOVERNOR OF HAWAII



STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES

P. O. BOX 621
HONOLULU, HAWAII 96809

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

DEPUTIES

MANABU TAGOMORI
Dan T. Kochi

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

Ref: LM-DU

FEB 19 1992

OD-91-680

Mr. Tim Chow
Planning Consultant
1210 Auahi Street
Suite 212
Honolulu, HI 96814

Dear Mr. Chow:

Subject: Faculty Housing Project, University of Hawaii at
Manoa, TMK: 2-9-26:2

This is a follow-up to your letter of January 10, 1992
regarding the subject project.

We would like to clarify a mis-statement in your letter. The
Board of Land and Natural Resources has not assigned TMK: 2-9-
26:2 to the University of Hawaii.

In subsequent discussions with the Housing, Finance and
Development staff, we understand that you will be examining the
entire area for "planning purposes" in preparing the Environmental
Assessment. Transfer of the property to the University is pending
a determination from the University as to whether we will be
exchanging the parcel with University of Hawaii lands elsewhere,
or University of Hawaii will pay the 20% compensation to the
Office of Hawaiian Affairs.

We hope that this clarification will allow you to proceed
with your Environmental Assessment. Should you have any questions
regarding this matter, please feel free to contact Mr. Dean Uchida
at 587-0414.

Very truly yours,

A handwritten signature in dark ink, appearing to read "W. Paty".

WILLIAM W. PATY

cc: Ms. S. Himeno
Mr. T. C. Him
University of Hawaii
HFDC

APPENDIX B

RELATIONSHIP TO PLANNING AND ZONING STANDARDS

APPENDIX B

RELATIONSHIP TO PLANNING AND ZONING STANDARDS

This portion of the Manoa Campus of the University of Hawaii is situated in the City & County of Honolulu's R-7.5 residential zoning district. Other portions of the campus are zoned R-7.5 or R-5. Institutions like the University of Hawaii are allowed to develop under a long-range master plan, subject to a public hearing and approval of the plan by the City Council.

The City Council granted a Plan Review Use (PRU) permit for the University's Long Range Development Plan (LRDP) on December 13, 1989 by passing Resolution 89-411. The section of the approved LRDP pertaining to this particular site may be found on page D-17 of the plan, which specifies that "faculty housing should be developed as low-rise, high density townhomes."

Since detached dwellings and duplexes are clearly not "high-density townhomes," residential planning and zoning standards do not apply to this particular project. Of the standards in the the City & County's Land Use Ordinance pertaining to multi-family dwellings in apartments areas, those specified in Low Density Apartment zoning district appear to be most appropriate. Standards in the underlying R-7.5 residential zoning district are presented along with those in the applicable A-1 Low Density Apartment zoning district for comparative purposes.

Urban Design Principles and Controls, Special Provisions for the PUC

The project's overall density of 15.7 units per acre (181 units/11.542 acres) is well below the Primary Urban Center (PUC) Development Plan's density guideline of 30 units per net acre for "low density apartment" uses. The density guideline for "residential" uses is 12 units per net acre.

Principal Uses

Public uses and structures, such as faculty housing, are allowed as principal uses in both the applicable A-1 apartment district and the underlying R-7.5 residential district. Multi-family dwellings are allowable as a principal use in the applicable A-1 district but would not be allowable in the underlying R-7.5 district without an approved PRU permit.

Minimum Lot Size

Both components of the project site are larger than the minimum lot area standard in the applicable A-1 district of 7,500 s.f. The minimum lot area standard in the underlying R-7.5 residential district is also 7,500 s.f. (for uses other than one family detached, two family detached and duplex dwellings).

Minimum Lot Width & Depth

Both components of the project site are wider and deeper than the the minimum lot width and depth standards of 70 feet area in the applicable A-1 district and 65 feet in the underlying R-7.5 zoning district.

Minimum Front Yard Depth

The project provides at least 20 feet of front yard along Woodlawn Drive, where it faces the State's Manoa Innovation Center. At least 20 feet of front yard is also planned along the makai side of Lowrey Ave. More than 30 feet of front yard is planned along Kalawao St., where the project faces existing dwellings. The front yard along the mauka side of Lowrey Ave. will be at least 15 feet.

All four of these front yards exceed the minimum yard width standard of 10 feet in the applicable A-1 district. Only the front yard along Kalawao St., which serves as buffer, would exceed the standard front yard of 30 feet that would otherwise apply (to uses other than detached and duplex dwellings) in the underlying R-7.5 zoning district that are not developed under an approved PRU permit.

Minimum Side & Rear Yard Depth

At least 10 feet of rear/side yard is provided along the mauka boundaries of the site, where the townhouse condominiums abut vacant residential lots and existing detached houses. The minimum standard for side and rear yards is 10 feet in the applicable A-1 district and 15 feet (for uses other than off street parking and detached and duplex dwellings) in the underlying R-7.5 district.

Maximum Building Height

None of the project's buildings, the tallest of which is only two stories, would exceed the maximum height standard of 30 feet in the applicable A-1 district. Nor would they exceed the maximum height standard of 25 feet (30 feet above finish grade) that would otherwise apply in the underlying R-7.5 district.

Minimum Height Setbacks (Front)

No "stepback" standards are prescribed in the applicable A-1 zoning district. All of the project's two story buildings are set back from the project's front buildable area boundaries by at least a foot for every two feet of additional height over 20 feet in accordance with height setback standards in the underlying R-7.5 district.

Minimum Height Setbacks (Side & Rear)

No "stepback" standards are prescribed in the applicable A-1 zoning district. All of the project's two story buildings are set back from the project's side and rear buildable area boundaries by at least one foot for every two feet of additional height over 15 feet in accordance with height setback standards in the underlying R-7.5 district.

Maximum Building Area

Buildings cover about 22 percent of the project site, which is much less than the 40 percent maximum standard (for lots larger than 20,000 s.f.) in the applicable A-1 district. Coverage is much less than the 50 percent maximum standard in the underlying R-7.5 district.

15 eight-plex apartment buildings @ 3,900 s.f.	58,500	
2 twelve-plex apartment buildings @ 5,850 s.f.	11,700	
1 six-plex apartment building @ 4,300 s.f.	4,300	
1 mgr's. apt., laundry & mail @ 2,500 s.f.	2,500	

subtotal for makai portion of project		77,000
6 four-plex condominium buildings @ 2,650 s.f.	15,900	
6 carports @ 1,600 s.f.	9,600	
1 six-plex condominium building @ 5,100 s.f.	5,100	
1 carport @ 2,400 s.f.	2,400	

subtotal for mauka portion of project		33,000
s.f. of building coverage		110,000
total lot area in s.f.		502,574
building coverage (both parts)	0.22	
makai coverage (77,000 s.f./402,567 s.f.)	0.19	
mauka coverage (33,000 s.f./100,187 s.f.)	0.32	

Maximum Density

The project's floor area ratio (FAR) of approximately 0.38 is much less than the maximum FAR standard of 0.90 in the applicable A-1 district for lots larger than 40,000 s.f. No density standards are prescribed in the underlying R-7.5 zoning district.

	BOTH	MAKAI	MAUKA
	=====	=====	=====
144 two bedroom units for rent @ 900 s.f.	129,600		
6 three bedroom units for rent @ 1000 s.f.	6,000		
manager's unit, laundry & mail boxes	2,500		

subtotal for makai portion	138,100	138,100	
30 three bedroom units for sale @ 1,200 s.f.	36,000		36,000
	-----	-----	-----
s.f. of net floor area for both portions @ 90%	174,100	138,100	36,000
s.f. of gross floor area for both portions @ 100%	193,444	153,444	40,000
lot area in s.f.	502,754	402,567	100,187
floor area ratio	0.38	0.38	0.40

Minimum Off-Street Parking and Loading Spaces

At least 309 off-street parking stalls will be provided, which is more than adequate for such a project but less than the 379 stalls that would otherwise be applicable to multi-family dwellings projects in this district which are developed without an approved PRU permit.

	# Stalls Provided =====	# Stalls @ 2 Per Unit =====
145 two bedroom rental units @ 1.5 stalls per unit	218	
6 three bedroom rental units @ 2.0 stalls per unit	12	
30 three bedroom condo units @ 2.0 stalls per unit	60	

subtotal for 181 units	290	362
guest parking @ 10 percent of dwelling units	19	19
	---	---
total stalls	309	379

The project provides three loading spaces, exceeding the minimum standard of two spaces per 151-300 multi-family dwelling units.

APPENDIX C

TRAFFIC IMPACT ASSESSMENT REPORT
BY PACIFIC PLANNING AND ENGINEERING, INC.

RECEIVED
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TRAFFIC IMPACT ASSESSMENT REPORT

FOR

**UNIVERSITY OF HAWAII
FACULTY HOUSING**

February 25, 1992

Manoa, Oahu, Hawaii

TMK 2-9-26:1 and TMK 2-9-27:54

Prepared for:

Housing Finance and Development Corporation

Prepared By:

Pacific Planning & Engineering, Inc.

1221 Kapiolani Boulevard, Suite 740

Honolulu, Hawaii 96814

TABLE OF CONTENTS

I.	EXECUTIVE SUMMARY	1
	Project Description	1
	Methodology	1
	Conclusions and Recommendations	2
II.	PROJECT DESCRIPTION	5
III.	EXISTING CONDITIONS	8
	Land Uses	8
	Roadway Facilities	8
	Study Intersections	9
	Traffic Conditions	11
III.	FUTURE CONDITIONS	15
	Future Land Uses	15
	Future Roadway Improvements	15
IV.	PROJECTED TRAFFIC CONDITIONS	16
	Future Traffic Without Project	16
	Future Traffic With Project	20
V.	TRAFFIC IMPACT ANALYSIS	26
	Analysis Methods	26
	Analysis Results	27
VI.	CONCLUSIONS AND RECOMMENDATIONS	35

APPENDICES

- Appendix A Level-of-Service Definitions for Unsignalized Intersections
and Signalized Intersections
Appendix B Manual Traffic Count Data

LIST OF FIGURES

Figure 1.	Project Location Map	6
Figure 2.	Project Site Plan	7
Figure 3.	Study Intersections	10
Figure 4.	1992 Morning Peak Hour Traffic Volumes	12
Figure 5.	1992 Afternoon Peak Hour Traffic Volumes	13
Figure 6.	1994 Morning Peak Hour Traffic Volumes without the Project	17
Figure 7.	1994 Afternoon Peak Hour Traffic Volumes without the Project	18
Figure 8.	1994 Morning Peak Hour Traffic Volumes with the Project	21
Figure 9.	1994 Afternoon Peak Hour Traffic Volumes with the Project	22
Figure 10.	1994 Morning Peak Hour Project Traffic	24
Figure 11.	1994 Afternoon Peak Hour Project Traffic	25

LIST OF TABLES

Table 1.	Land Uses for Other Developments	15
Table 2.	Trip Generation for Other Developments	19
Table 3.	Trip Generation for Project	20
Table 4.	Weekday Morning LOS for Study Intersections	28
Table 5.	Weekday Afternoon LOS for Study Intersections	30

EXECUTIVE SUMMARY

Pacific Planning & Engineering, Inc. (PPE) was engaged to undertake a study to identify and assess future traffic impacts that would be caused by the proposed University of Hawaii Faculty Housing project. This traffic impact report identifies and evaluates the probable impact of traffic generated by the proposed development.

Project Description

Housing Finance and Development Corporation (HFDC) is proposing to build faculty housing for the University of Hawaii in Manoa, Oahu, Hawaii. The project is expected to be completed and fully occupied by 1994.

The project will include 151 rental two and three-bedroom units and 30 leasehold three-bedroom units. The project accesses will be located on Lowrey Avenue.

Methodology

Analysis was conducted at the following intersections to determine the relative impact of the proposed project on the local roadway system:

- Intersection of East Manoa Road and Oahu Avenue.
- Intersection of East Manoa Road and Kolowalu Street.
- Intersection of East Manoa Road and Lowrey Avenue.
- Intersection of Lowrey Avenue and Woodlawn Drive.
- Intersection of Lowrey Avenue and project access.

Future traffic was forecasted at the study intersections by adding the following:

- Existing traffic volumes at the study intersections.
- Traffic generated by other projects in the area.
- Traffic generated by the project.

This study assesses the impact on each intersection by determining the level-of-service (LOS) for existing, 1994 forecast without the project, and 1994 forecast with the project traffic conditions.

Conclusions and Recommendations

The University of Hawaii Faculty Housing project, when completed and fully occupied in the year 1994, would have a small impact on the study intersections of East Manoa Road with Kolowalu Street and East Manoa Road with Oahu Avenue. The project will not have a significant impact at the intersections of East Manoa with Lowrey Avenue and Woodlawn Drive with Lowrey Avenue.

Presently, the drivers experience an average of about 6 seconds of delay per vehicle (LOS B) at the signalized intersection of East Manoa Road and Lowrey Avenue during the morning and afternoon peak hours.

Drivers experience an average of about 18 to 22 seconds of delay per vehicle (LOS C) at the signalized intersections of East Manoa Road with Kolowalu Street and East Manoa Road with Oahu Avenue during the morning and afternoon peak hours. Traffic queuing does occur, however, along the Kolowalu Street to East Manoa Road to Oahu Avenue route, which is commonly used for traffic exiting Manoa valley. The queuing conditions occurred for a duration of 10 to 20 minutes during the peak hours. The vehicles in the queues were not able to clear the traffic signal in one cycle.

At the unsignalized intersection of Woodlawn Drive and Lowrey, drivers experience little or no delays during the morning and afternoon peak hours.

Without the project in the year 1994, average traffic delays at the study intersections will increase by 1 to 4 seconds delays per vehicle over existing delays. The intersection of Woodlawn Drive and Lowrey will continue to operate with little or no delays.

With the project, an average delay of 6 seconds per vehicle (LOS B) is expected at the intersection of East Manoa Road and Lowrey Avenue; and 18 to 24 seconds per vehicle (LOS C) at the intersections of East Manoa Road with Kolowalu Street and East Manoa Road with Oahu Avenue. This represents an increase of 1 to 3 seconds in average delays per vehicle. The intersection of Woodlawn Drive and Lowrey will continue to operate with little or no delays.

Although congestion and queues exist at two study intersections, the amount of trips generated by the project is relatively small. Therefore, the project traffic is not expected to significantly impact traffic operations at these intersections. Project traffic may, however, lengthen the congestion periods slightly during the peak hours. Since the congestion is expected to last for very short time periods in the day, no mitigating measures are recommended.

To provide for smooth traffic operating conditions the following measures are recommended:

- Provide adequate sight distance for drivers exiting Lowrey Avenue onto Woodlawn Drive by restricting parking along Woodlawn Drive.

- Adjust the signal timing at the intersections of East Manoa Road with Kolowalu Street and East Manoa Road with Oahu Avenue to minimize delays.
- To minimize traffic entering and exiting the project, encourage the Faculty Housing tenants to use the existing University of Hawaii shuttle service.
- Encourage alternate modes of transportation (ie. walking, bicycling, carpooling).

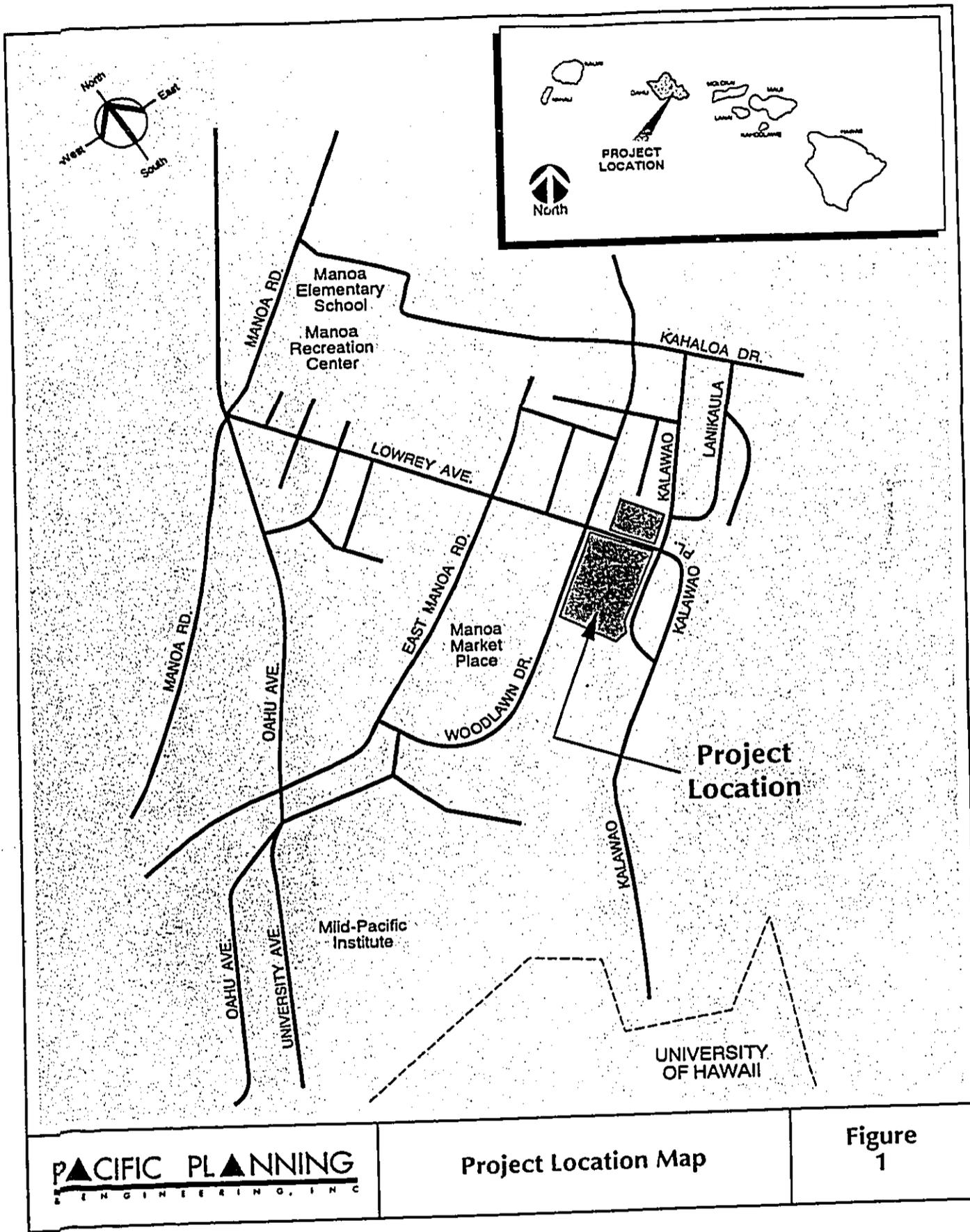
PROJECT DESCRIPTION

Housing Finance and Development Corporation (HFDC) is proposing to build faculty housing for the University of Hawaii in Manoa, Oahu, Hawaii. The project is expected to be completed and fully occupied by 1994. Figure 1 shows the general project location and roadway network.

The site plan of the proposed development is presented in Figure 2. The project site is located on vacant land bordered by Kalawao Street and Woodlawn Drive. The project will be divided into two parts, separated by Lowrey Avenue.

The parcel makai of Lowrey Avenue will include 151 rental units. The units will consist primarily of two-bedroom units and will be constructed as two story apartment buildings. Directly across Lowrey Avenue, the second parcel will accommodate 30 townhouse condominium units. These will be three-bedroom units and will be sold at market prices. The project accesses will be located on Lowrey Avenue.

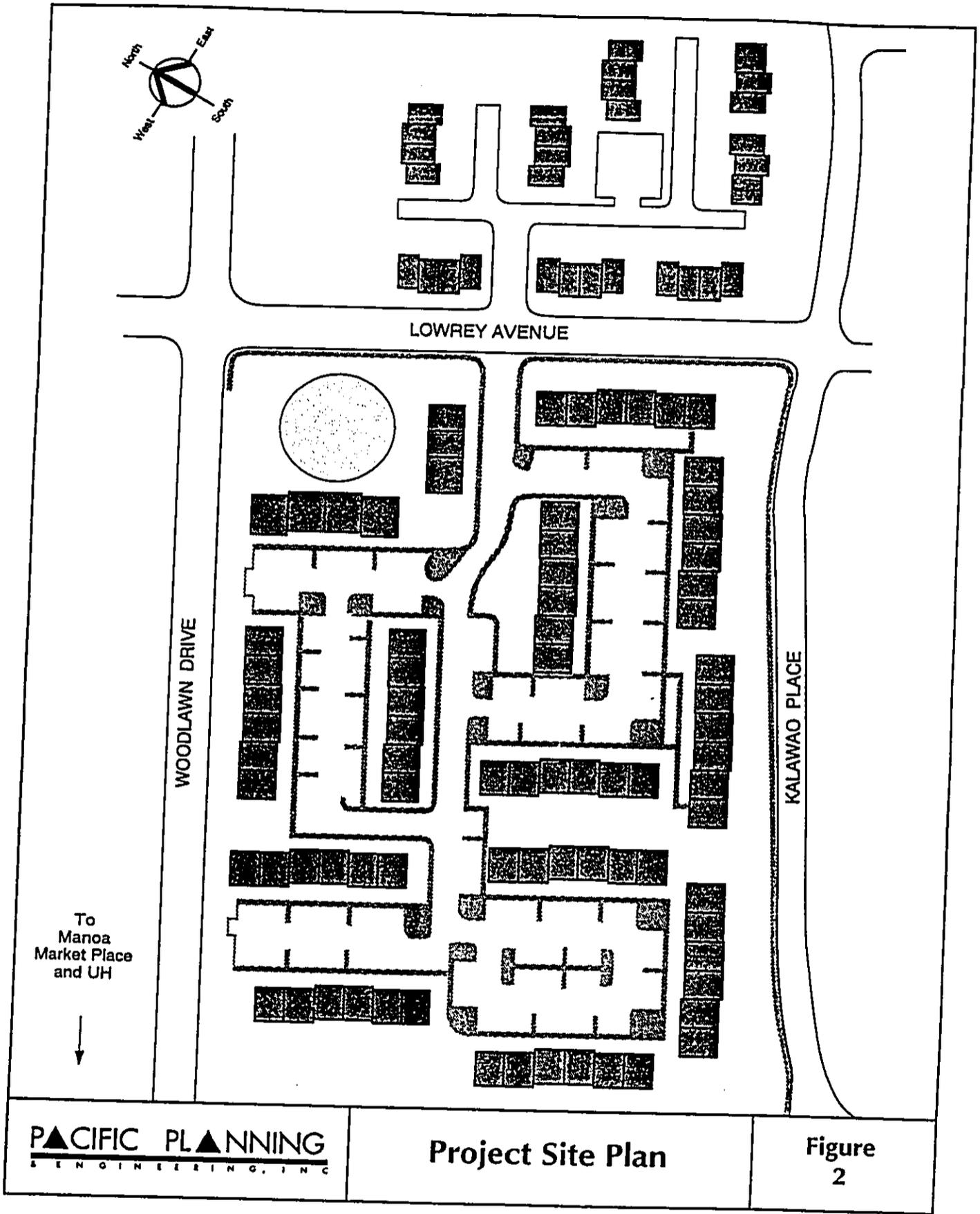
The primary service of the rental apartments would be to provide affordable housing for the University of Hawaii faculty. Revenues generated from the sales of the 30 townhouse condominium units would help to finance the development of the rental units.



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Project Location Map

Figure 1



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Project Site Plan

Figure 2

EXISTING CONDITIONS

An inventory of existing conditions was conducted to better ascertain the current traffic conditions in the area and to provide a basis for estimating the potential traffic impact of the proposed project. The review included the land uses in the area, roadway facilities, and existing traffic conditions.

Land Uses

The land uses immediately surrounding the project are primarily residential. Immediately surrounding the project are single family residential dwellings. Manoa Marketplace is located just west of the project. Manoa Stream borders the site to the south. Across the stream are research facilities for the U.S. Department of Agriculture and the University of Hawaii's College of Tropical Agriculture.

Roadway Facilities

East Manoa Road is a primary roadway serving the Manoa community; it connects to Punahou Street which is one of two accesses into and out of Manoa. East Manoa Road is a two lane roadway of varying widths ranging from 24 feet to 36 feet in the vicinity of the study intersections. The posted speed limit is 25 miles per hour (mph).

Oahu Avenue is also a primary roadway serving the Manoa community. It connects to University Avenue which is the second access into and out of Manoa. Oahu Avenue is a two-lane roadway with a posted speed limit of 25 mph. In the vicinity of the study intersection, the roadway is 34 feet wide.

Woodlawn Drive is a two lane roadway within the Manoa community. It is a 40 foot wide two-lane roadway with a posted speed limit of 25 mph. In the vicinity of Noelani Elementary School, the posted speed limit is 20 mph. Woodlawn Drive terminates and becomes Kolowalu Street before intersecting East Manoa Road.

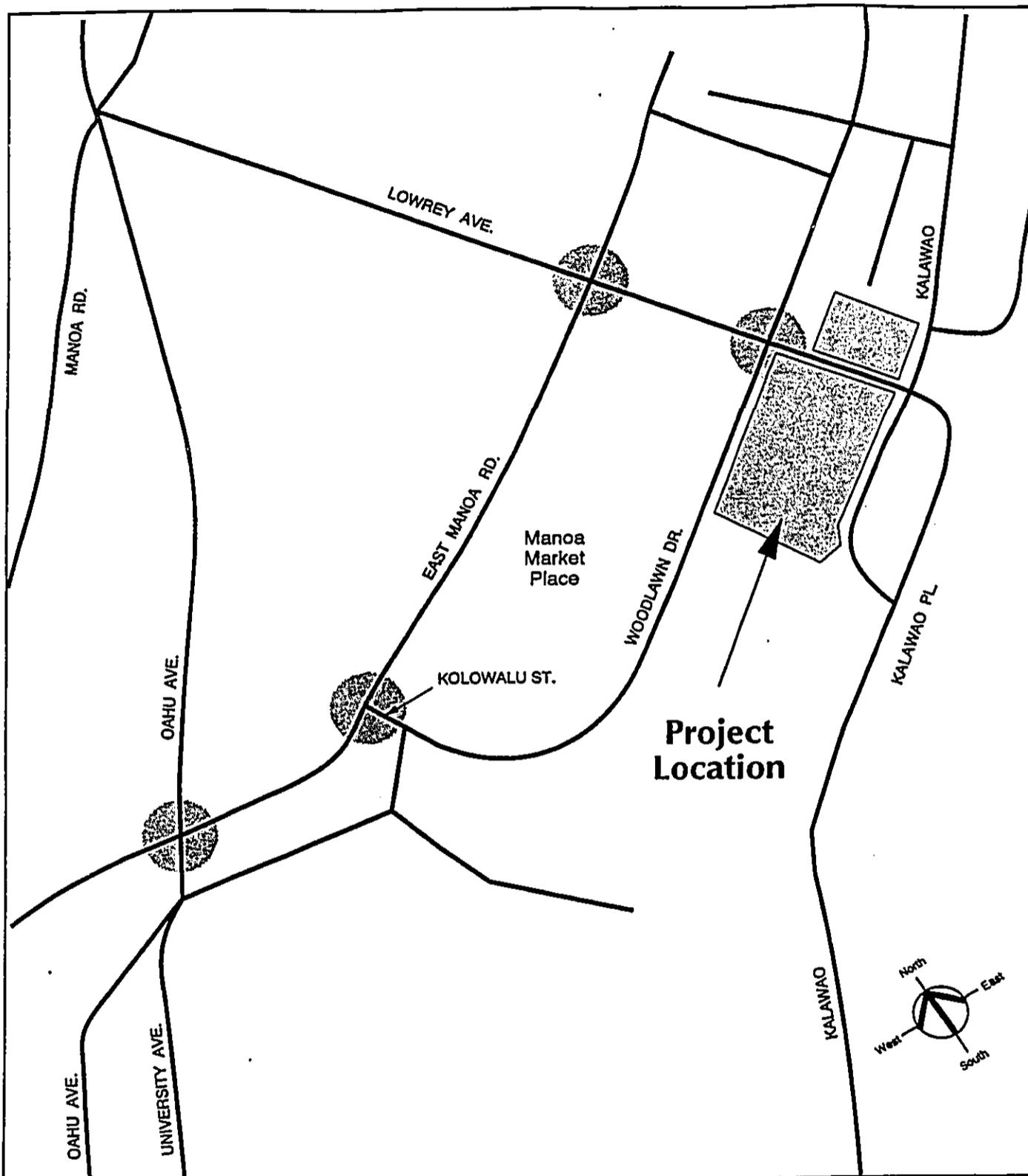
Lowrey Avenue is a two-lane local street that stretches from Kalawao Street to a five-way intersection with Oahu Avenue and Manoa Road. The posted speed limit is 25 mph.

Study Intersections

The intersections of East Manoa Road with Oahu Avenue, East Manoa Road with Kolowalu Street and East Manoa Road with Lowrey Avenue are signalized. The traffic signals are fully actuated and contain two phases. All approaches at the intersections are single lane approaches. Pedestrian buttons and crosswalks are provided at each of the intersections.

The intersection of Lowrey Avenue and Woodlawn Drive is a stop controlled intersection with Woodlawn Drive having the right-of-way.

The layout of the intersections is shown in Figure 3.



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Study Intersections

Figure 3

Traffic Conditions

Twenty-four hour traffic counts taken at the intersections of East Manoa Road and Kolowalu Street, East Manoa Road and Lowrey Avenue and Woodlawn Drive and Lowrey Avenue in years 1990 and 1991 were obtained from the City and County of Honolulu Department of Transportation Services (DTS). A review of the DTS traffic counts indicated that the peak traffic periods generally occur between 6:30 to 8:30 am in the morning and 4:30 to 6:30 pm in the afternoon. The peak period was used to determine traffic impacts, since the cumulative total of roadway and project traffic volumes on the surrounding roadways would be the highest during this time.

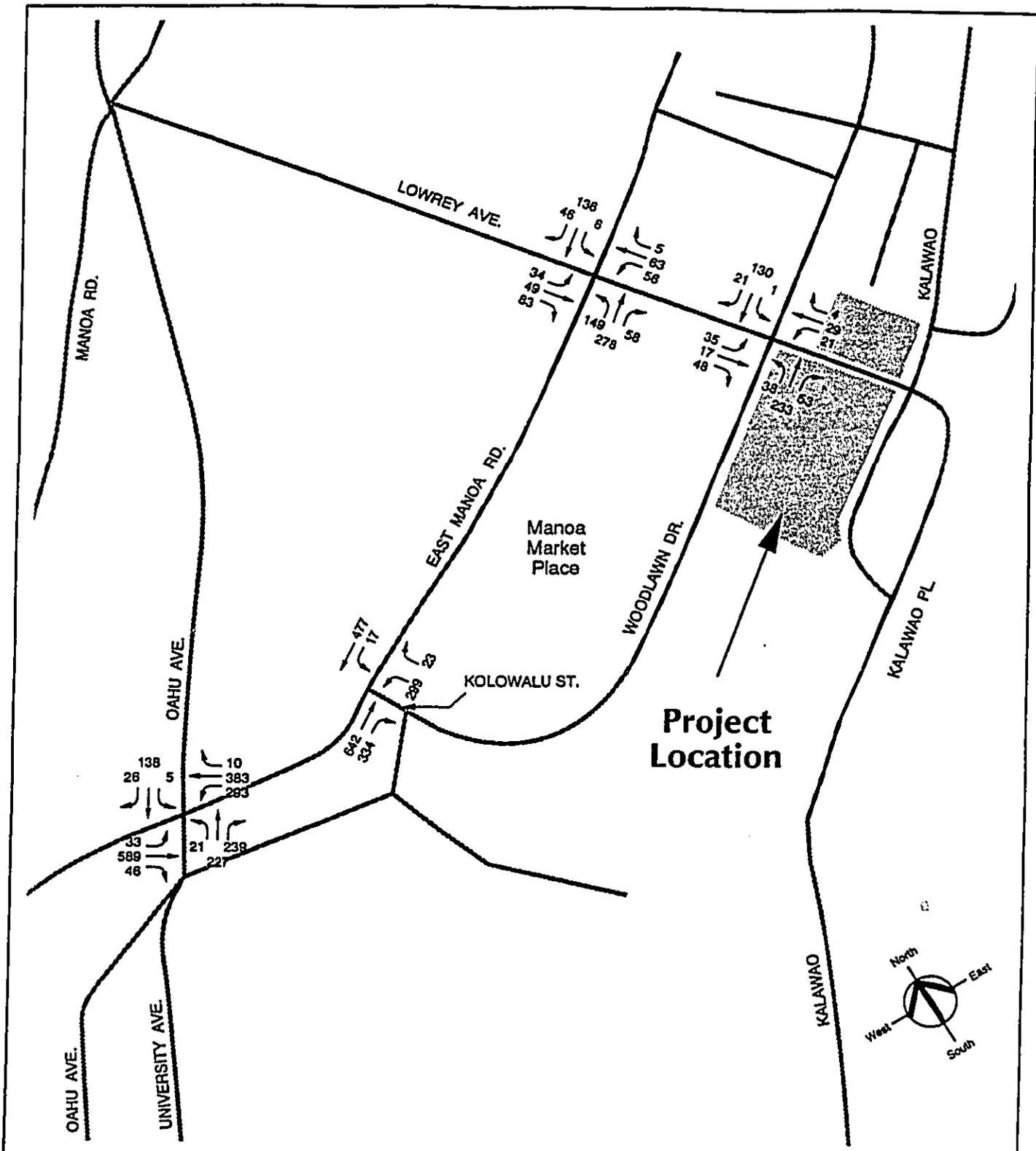
Manual traffic counts were taken at the intersections of East Manoa Road with Kolowalu Street, East Manoa Road with Oahu Avenue, East Manoa with Lowrey Avenue and Woodlawn Drive with Lowrey Avenue. The counts were taken on Tuesday, January 28, 1992, between 4:30 to 6:30 pm and on Wednesday, January 29, 1992, between 6:30 to 8:30 am.

The manual counts classified passenger cars, trucks and buses by turning movements and approaches. During the field counts, the weather was partly cloudy, and the roadway pavement was dry. A summary of the traffic volumes for the observed peak hours is shown on Figures 4 and 5. Manual traffic count data are summarized in Appendix B.

Observed Traffic Conditions

The following observations were made during the field survey:

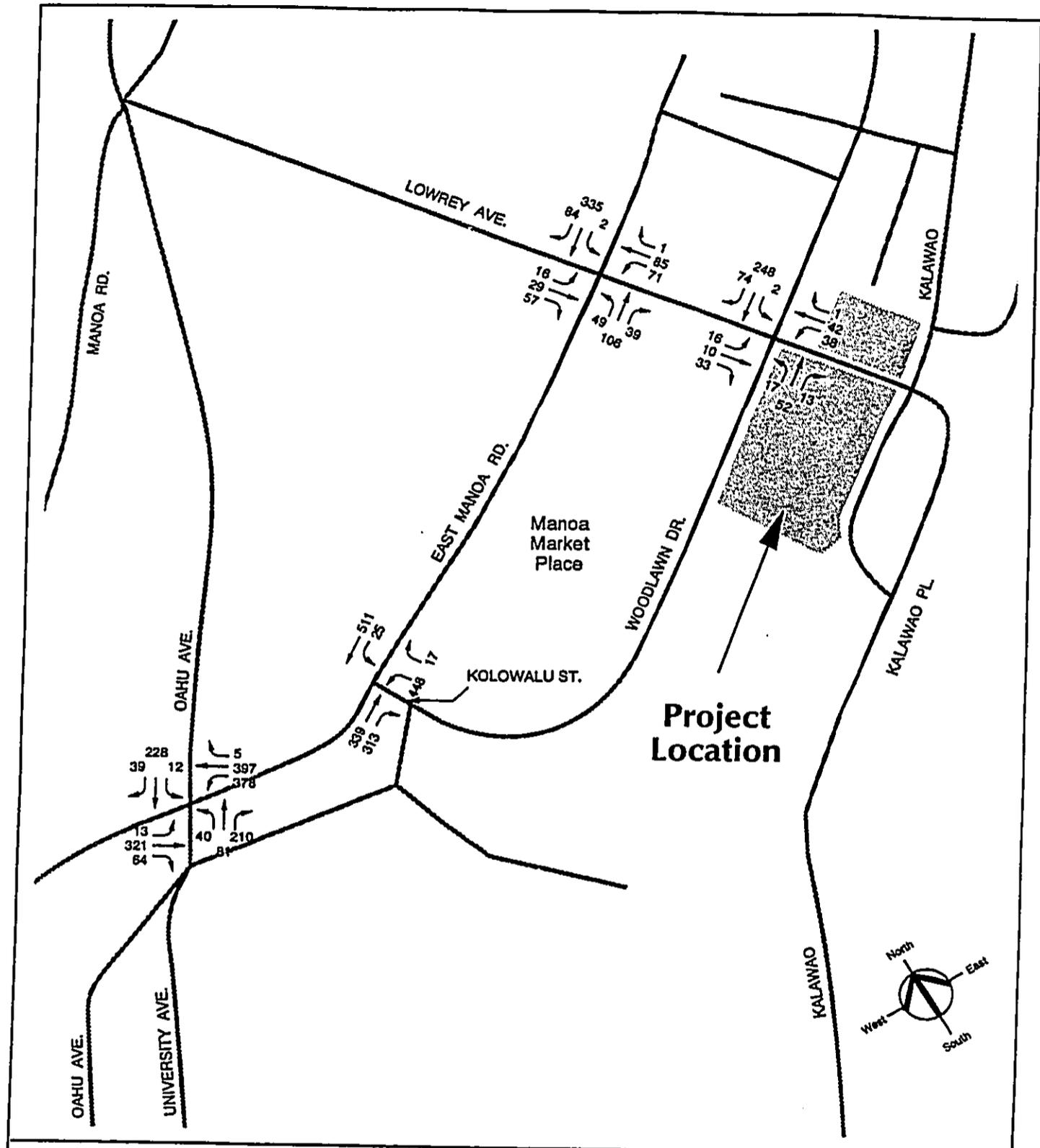
1. During the morning, students park on Oahu Avenue and walk or bicycle down to the university. Students also park along Lowrey Avenue between Woodlawn Drive and Kalawao Street and catch the University of Hawaii shuttle.
2. For the left turn movement from Kolowalu Street onto East Manoa Road, queues of 20 or more cars form during a 20 minute period in the morning and during a 10 minute period in the afternoon. Drivers waiting to turn left from Kolowalu Street onto East Manoa Road often do not clear the signal during these periods.
3. For the Honolulu bound approach of Oahu Avenue at East Manoa Road, queues of 20 or more cars form during a 10 minute period in the morning. Drivers waiting in the queue often do not clear the signal during this period.
4. At the intersection of East Manoa Road with Oahu Avenue, all approaches are single lane approaches, however the approaches are wide enough to accommodate two cars side by side at the intersection. Therefore, the East Manoa Road approaches operate as a separate left turn lane, and a shared through/right turn lane. The Oahu Avenue approaches operate as a separate shared left turn/through lane, and an exclusive right turn lane.
5. At the intersection of East Manoa Road with Kolowalu Street, all approaches are single lane approaches, however the East Manoa approaches are wide enough to accommodate two cars side by side at the intersection. Therefore, the eastbound approach operates as separate through and right turn lanes. The westbound approach similarly operates as separate left turn and through lanes.



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1992 Afternoon Peak Hour
Traffic Volumes

Figure
5



PACIFIC PLANNING
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1992 Morning Peak Hour
Traffic Volumes

Figure
4

FUTURE CONDITIONS

A survey of approved planned developments and improvements to transportation facilities in the immediate area was conducted to estimate future traffic conditions at the study intersections.

Future Land Uses

There are currently three projects in the area that would impact the study intersections by the year 1994. These developments are the Manoa Elderly Housing, the Manoa Innovation Center and the Manoa Hillside Estates. Construction has begun on all three developments. Table 1 below lists the land uses for each development.

Table 1. Land Uses for Other Developments

<u>Development</u>	<u>Land Use</u>	<u>Quantity</u>	<u>Unit</u>
Manoa Elderly	elderly housing	80	units
Manoa Innovation Center	research/office	52	1000 sf glfa ¹
Manoa Hillside Estates	single family residence	62	du ²

note: Manoa Innovation Center and Manoa Hillside Estates were estimated to be 75% occupied by the year 1994

¹ 1000 sf glfa - 1000 square feet of gross leasable floor area

² du - dwelling unit

Future Roadway Improvements

For the study intersections and roadways in the project vicinity, there are no known committed plans for improvements. The intersection laneage would remain the same as the existing conditions.

PROJECTED TRAFFIC CONDITIONS

Future traffic was forecast for traffic conditions without and with the proposed University of Hawaii Faculty Housing. Traffic forecasts were estimated for the year 1994 when the project is expected to be completed and fully occupied.

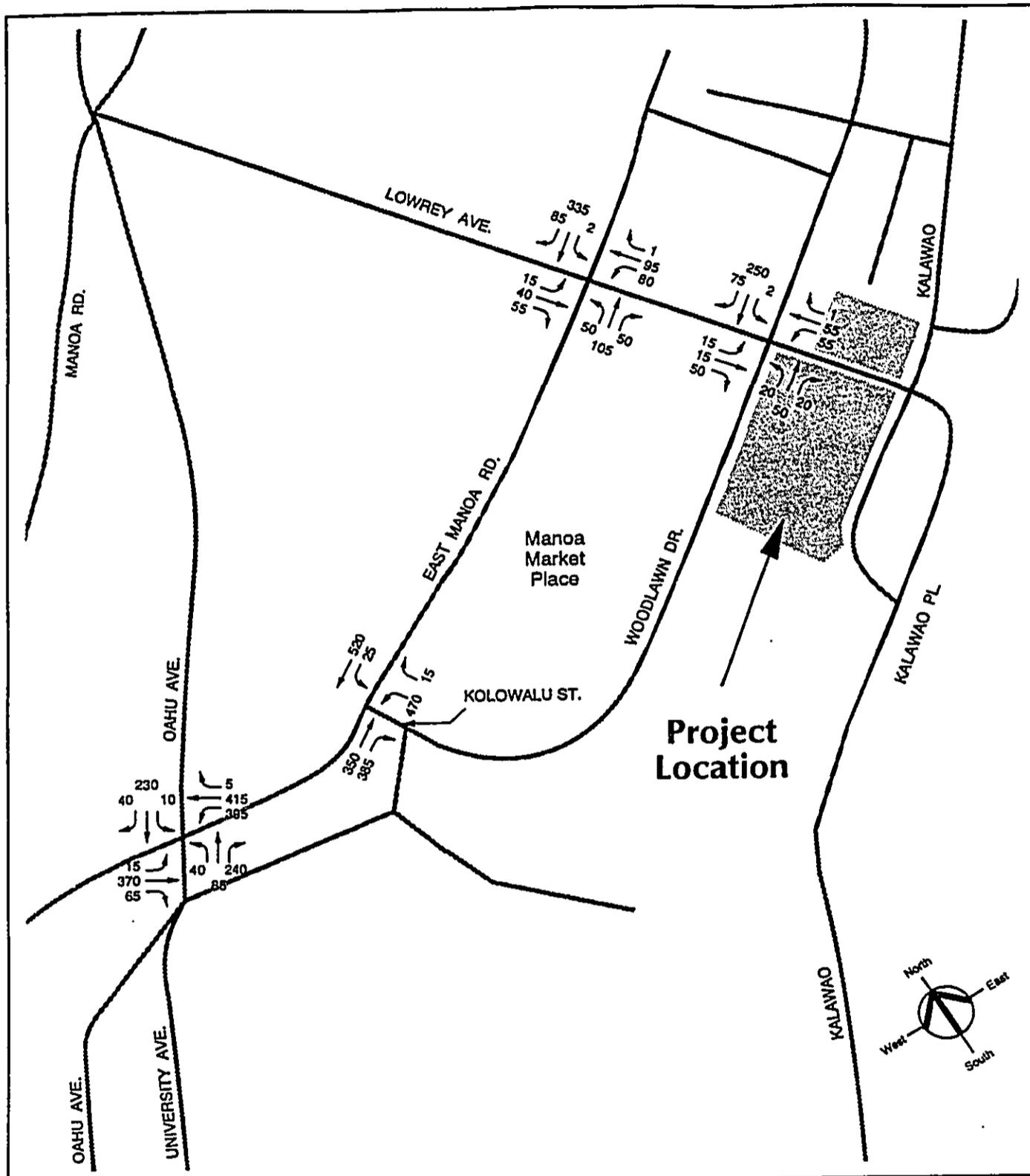
Future Traffic Without Project

Future traffic without the project was forecasted by adding the following: 1) existing traffic volumes, and 2) adding traffic generated by other developments in the area. The resulting morning and afternoon peak hour traffic volumes without the project are shown in Figures 6 and 7.

Traffic Generated by Other Developments

A three step procedure of trip generation, trip distribution, and traffic assignment was used to forecast future weekday morning and afternoon peak our traffic from future developments. The trip generation step estimates the number of vehicle trips that would be generated based upon the development's land use using data from the Trip Generation Report¹. Table 2 below shows trips generated by the other developments.

¹Trip Generation Report, by the Institute Transportation Engineers, Fifth Edition, 1991.



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1994 Morning Peak Hour Traffic Volumes Without the Project

Figure 6

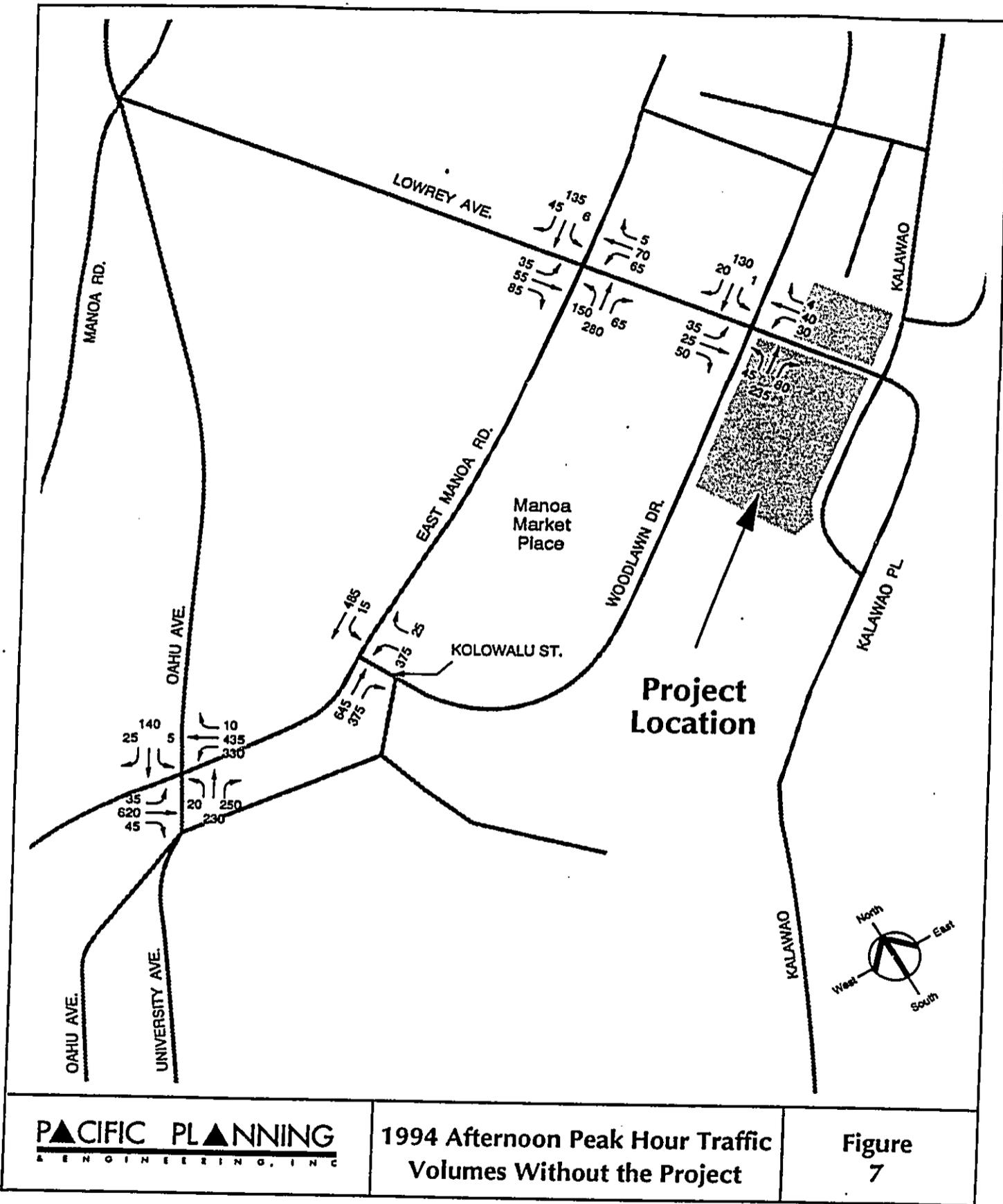


Table 2. Trip Generation for Other Developments

<u>Development</u>	<u>Morning Trips</u>		<u>Afternoon Trips</u>	
	<u>Enter</u>	<u>Exit</u>	<u>Enter</u>	<u>Exit</u>
Manoa Elderly	2	2	4	2
Manoa Innovation Center	82	10	16	77
Manoa Hillside Estates	10	30	34	19

The trip distribution step assigns vehicle trips from their predicted origins to destinations. The distribution of trips generated by other developments were based upon predicted origins and destinations considering estimates of employment, population, and existing travel patterns from collected traffic counts. The trips were generally distributed 95% outside of Manoa and 5% within Manoa.

The traffic assignment step assigns vehicle trips to specific routes on the roadway network that will take the driver from origins to destinations. Traffic was assigned based upon the shortest route or travel time between origins and destinations and existing travel patterns.

Future Traffic With Project

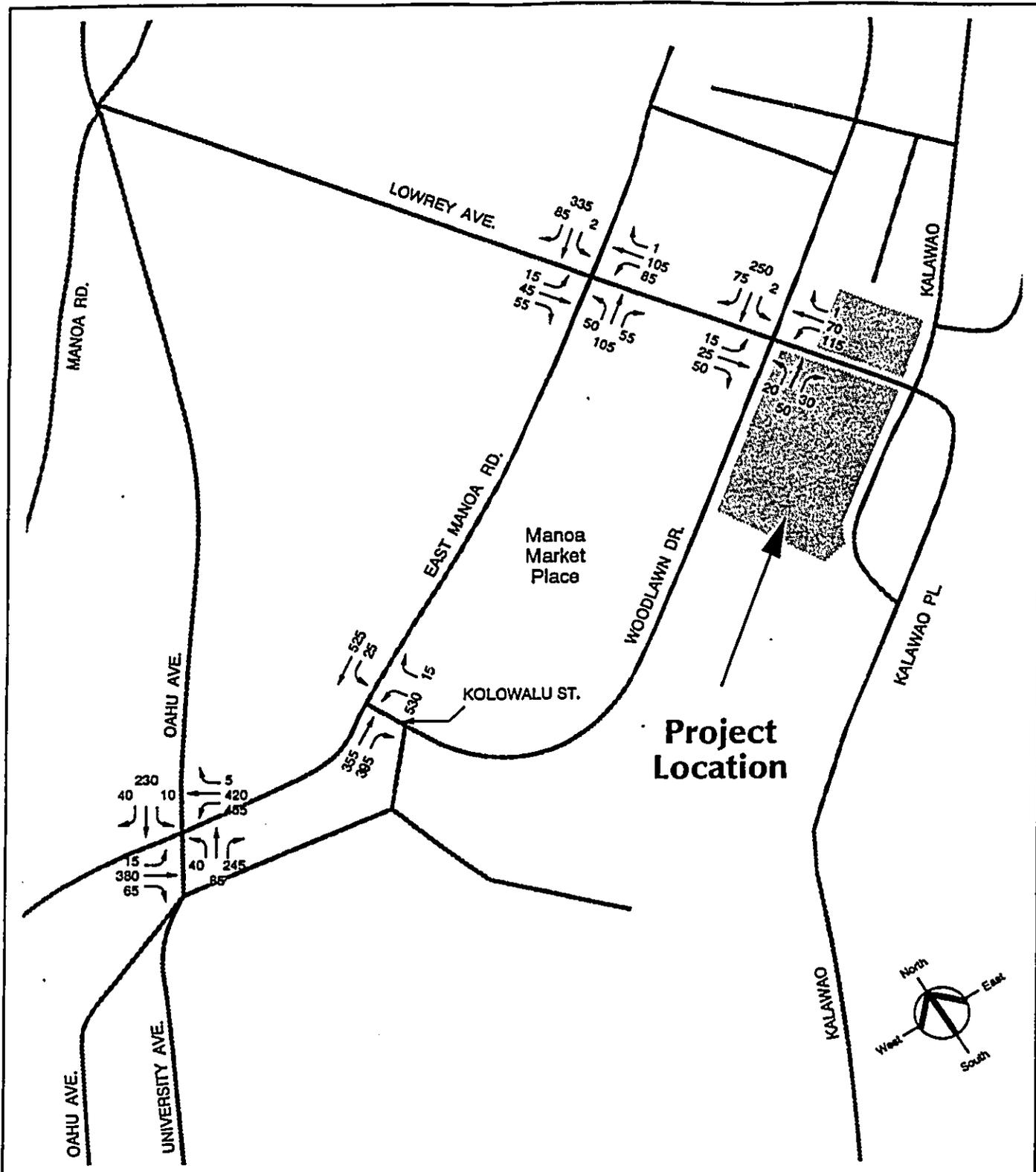
Future traffic with the project was forecasted by adding traffic generated by the proposed University of Hawaii Faculty Housing to the forecasted traffic without the project. The resulting morning and afternoon peak hour forecast traffic volumes with the project in the year 1994 are shown in Figures 8 and 9.

The standard three step procedure of trip generation, trip distribution, and traffic assignment was used to estimate peak hour traffic from the proposed project.

The trip generation step estimates the number of trips that would be generated by the project. The number of trips from the project was estimated based on apartment and townhouse condominium data from the Trip Generation Report. Table 3 shows the number of trips generated for the project.

Table 3. Trip Generation for Project

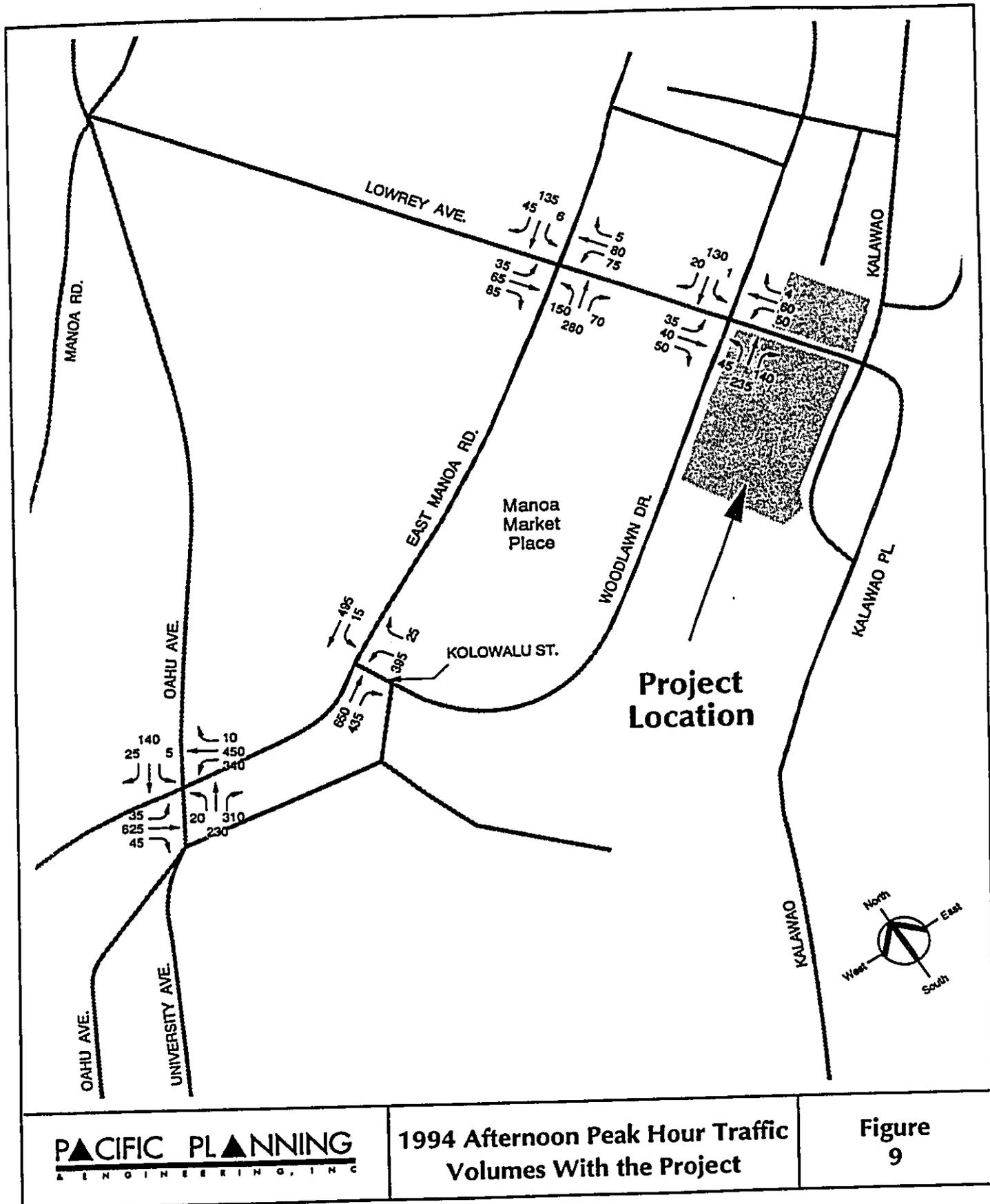
<u>Land Use</u>	<u>units</u>	<u>Morning Trips</u>		<u>Afternoon Trips</u>	
		<u>Enter</u>	<u>Exit</u>	<u>Enter</u>	<u>Exit</u>
Rental Apartments	151 units	15	62	63	33
Townhouse Condos	30 units	<u>2</u>	<u>12</u>	<u>11</u>	<u>6</u>
Total		17	74	74	39



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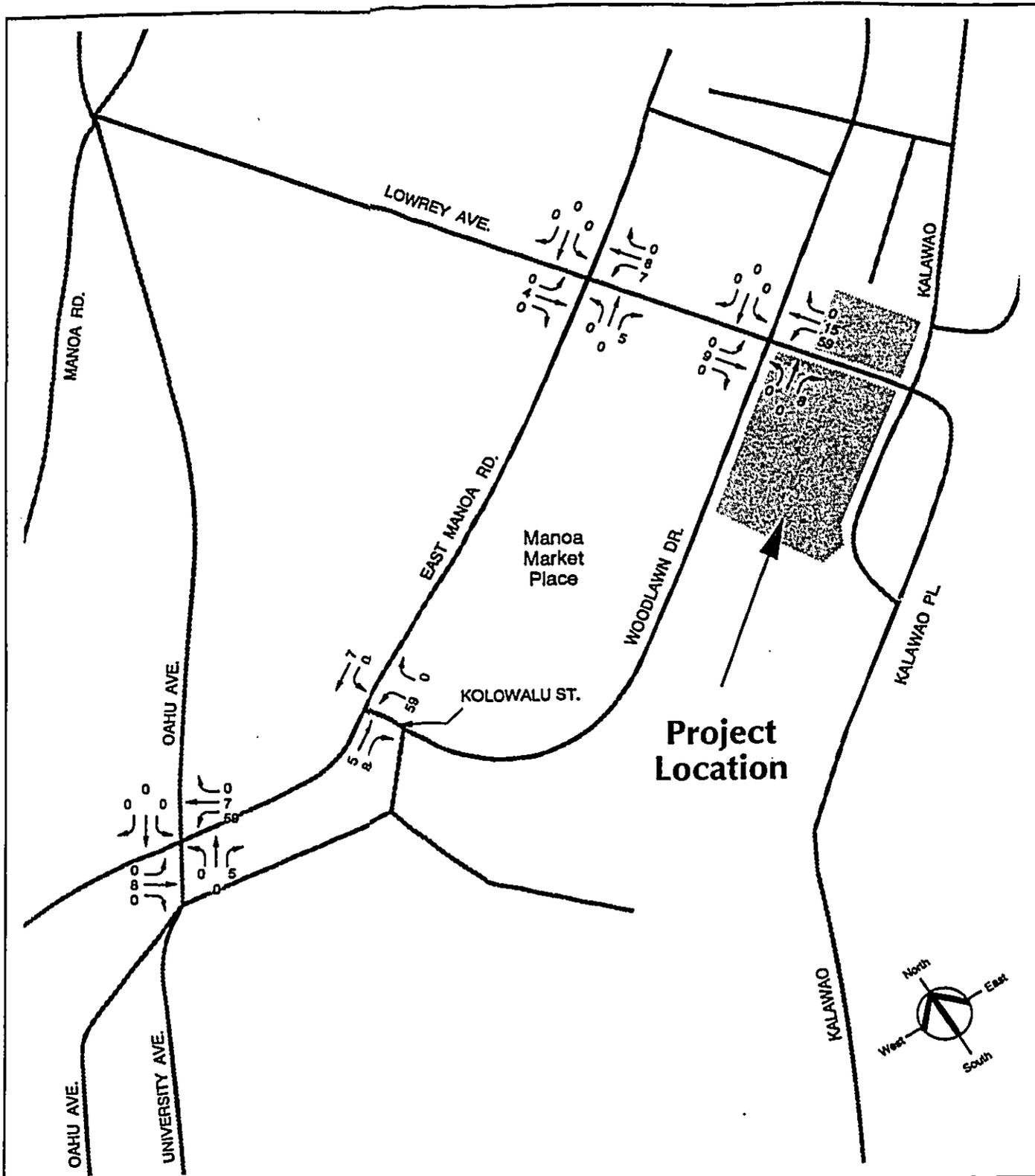
1994 Morning Peak Hour Traffic Volumes With the Project

Figure 8



The trip distribution step estimates the distribution of vehicle trips to their predicted destinations and origins. The distribution of the project generated trips was based on the expected tenants of the project. Since the project is being developed to house University of Hawaii faculty and their families, it was assumed that 100% of the trips would be exiting Manoa.

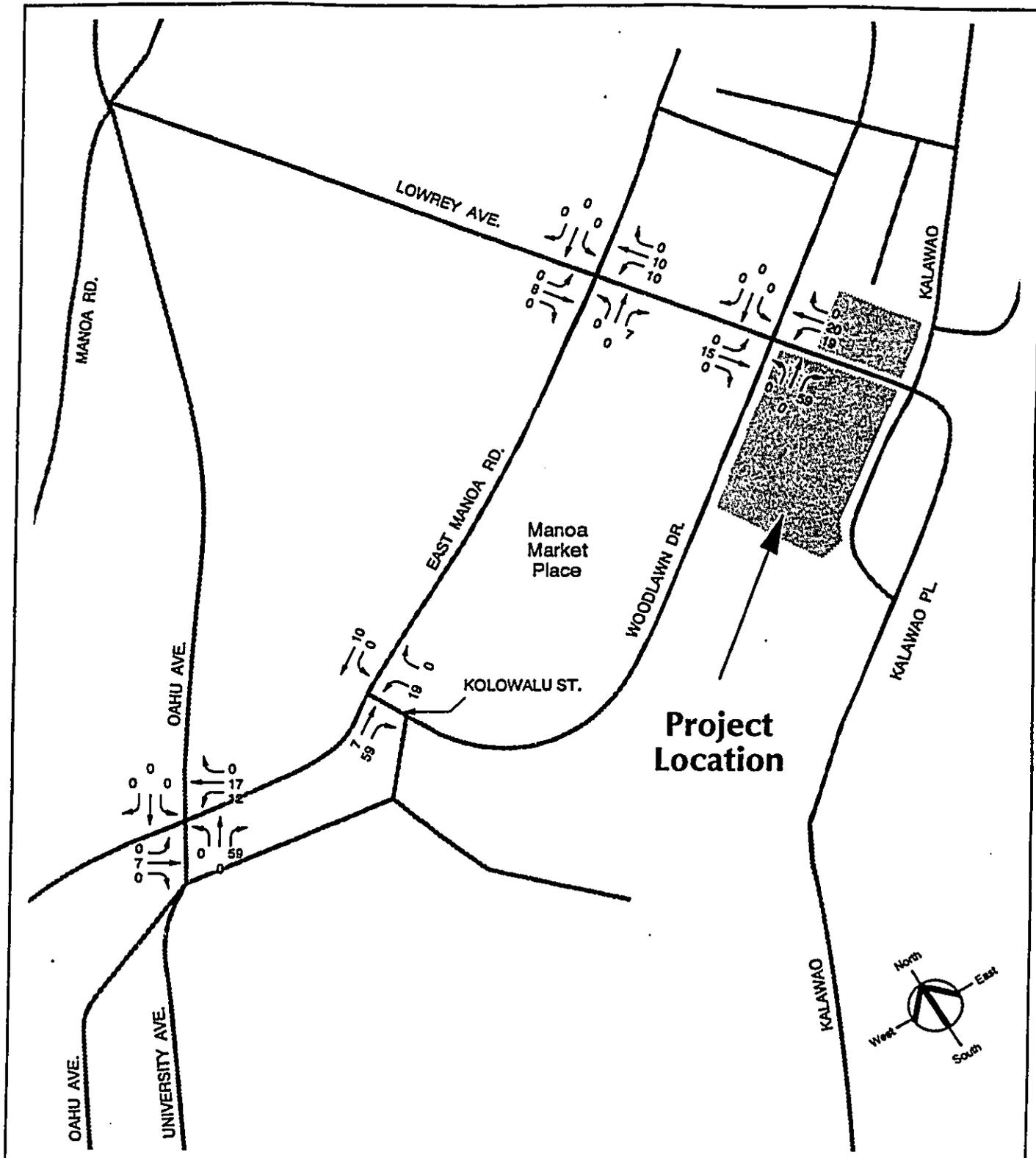
The traffic assignment step assigns vehicle trips to specific routes on the roadway network that will take the driver from origin to destination. Since the project is being developed to house University of Hawaii faculty and their families, traffic was assigned 80% to University Avenue via Oahu Avenue and 20% to Punahou Street via East Manoa Road and Manoa Road. Traffic was assigned as shown in Figures 10 and 11.



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1994 Morning Peak Hour
Project Traffic

Figure
10



<p>PACIFIC PLANNING ENGINEERING, INC</p>	<p>1994 Afternoon Peak Hour Project Traffic</p>	<p>Figure 11</p>
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TRAFFIC IMPACT ANALYSIS

Analyses were conducted for the study intersections to determine the relative impact of the proposed project on the local roadway system. The analyses were conducted for the existing, 1994 forecasts without project, and 1994 forecast with project traffic conditions. Analysis for projected traffic conditions were based on the existing roadway network.

Analysis Methods

The study intersections were analyzed using the appropriate methods for signalized and unsignalized intersections outlined in the 1985 Highway Capacity Manual².

The intersections of East Manoa Road with Oahu Avenue, East Manoa Road with Kolowalu Street and East Manoa Road with Lowrey Avenue were analyzed using operational analysis for signalized intersections and observed field measurements. The operational analysis uses the average delay per vehicle to measure traffic operating conditions.

The methodology for operational analysis measures traffic operations using the "level-of-service" (LOS) rating, which ranges from A to F. The LOS for the traffic movements at a signalized intersection, summarized in Appendix A, is classified into six categories ranging less than 5 seconds of average delay per vehicle (LOS A) to over 60 seconds of average delay per vehicle (LOS F).

² Highway Capacity Manual, Special Report 209, by the Transportation Research Board, National Research Council, 1985.

The intersection of Woodlawn Drive with Lowrey Avenue was analyzed using the unsignalized intersection analysis. This analysis method is based on the estimated number of vehicle turning movements which could proceed through a conflicting traffic stream. The LOS is determined by the amount of vehicle reserve capacity available for a particular turning movement. The lower the amount of reserve capacity, the lower the LOS. LOS for unsignalized intersections, summarized in Appendix A, is classified into six categories ranging from little or no delay (LOS A) to extreme delays (LOS F).

LOS for signalized and unsignalized intersections is not directly comparable, since the two analysis are based on different methodology and operating characteristics.

Analysis Results

The results of the analysis at the study intersections generally indicate:

- Presently, drivers turning left from Kolowalu Street onto East Manoa Road and from East Manoa Road onto Oahu Avenue, Honolulu bound, experience long to very long delays, LOS D to LOS F.
- Without or with the project, no significant change in level of service is expected at any of the study intersections

The results of the analysis are shown in Tables 4 and 5.

Table 4. Weekday Morning LOS for Study Intersections

		1992	1994	1994
		Existing	Without Project	With Project
Signalized Intersections				
East Manoa Road with Oahu Avenue				
East Manoa Road				
westbound	LT	F	F	F
	TH/RT	B	B	B
eastbound	LT	B	B	B
	TH/RT	B	B	B
Oahu Avenue				
northbound	LT/TH	B	B	B
	RT	B	B	B
southbound	LT/TH	B	B	B
	RT	B	B	B
Overall Intersection				
Delay (sec/veh)		21.8	22.1	22.9
LOS		C	C	C
East Manoa Road with Kolowalu Street				
East Manoa Road				
northbound	TH	B	B	B
	RT	B	B	B
southbound	LT	A	A	B
	TH	B	B	B
Kolowalu Street				
westbound	LT/ RT	F	F	F
Overall Intersection				
Delay (sec/veh)		20.9	21.2	23.9
LOS		C	C	C

Table 4. Weekday Morning LOS for Study Intersections

		1992	1994	1994
		<u>Existing</u>	<u>Without Project</u>	<u>With Project</u>
<u>Signalized Intersections</u>				
East Manoa Road with Lowrey Avenue				
East Manoa Road				
northbound	LT	A	A	A
	TH/RT	A	A	A
southbound	LT	A	A	A
	TH/RT	A	A	A
Lowrey Avenue				
westbound	LT	B	B	B
	TH/RT	B	B	B
eastbound	LT	B	B	B
	TH/RT	B	B	B
Overall Intersection				
Delay (sec/veh)		5.8	6.0	6.1
LOS		B	B	B
<u>Unsignalized Intersections</u>				
Woodlawn Drive with Lowrey Avenue				
Woodlawn Drive				
northbound	LT	A	A	A
southbound	LT	A	A	A
Lowrey Avenue				
westbound	LT/TH/RT	A	A	B
eastbound	LT/TH/RT	A	A	A

Abbreviations: LT - left turn, RT - right turn, TH - through movement

Table 5. Weekday Afternoon LOS for Study Intersections

		1992 <u>Existing</u>	1994 <u>Without Project</u>	1994 <u>With Project</u>
<u>Signalized Intersections</u>				
East Manoa Road with Oahu Avenue				
East Manoa Road				
westbound	LT	E	E	E
	TH/RT	B	B	B
eastbound	LT	A	A	A
	TH/RT	B	B	B
Oahu Avenue				
northbound	LT/TH	C	C	C
	RT	C	C	C
southbound	LT/TH	C	C	C
	RT	C	C	C
Overall Intersection				
	Delay (sec/veh)	17.7	18.0	18.4
	LOS	C	C	C
East Manoa Road with Kolowalu Street				
East Manoa Road				
northbound	TH	B	B	B
	RT	A	B	B
southbound	LT	A	A	A
	TH	B	B	B
Kolowalu Street				
westbound	LT/ RT	D	E	E
Overall Intersection				
	Delay (sec/veh)	12.2	17.0	18.6
	LOS	B	C	C

Table 5. Weekday Afternoon LOS for Study Intersections

		1992 Existing	1994 Without Project	1994 With Project
Signalized Intersections				
East Manoa Road with Lowrey Avenue				
East Manoa Road				
northbound	LT	A	A	A
	TH/RT	A	A	A
southbound	LT	A	A	A
	TH/RT	A	A	A
Lowrey Avenue				
westbound	LT	B	B	B
	TH/RT	B	B	B
eastbound	LT	B	B	B
	TH/RT	B	B	B
Overall Intersection				
Delay (sec/veh)		5.3	5.5	5.7
LOS		B	B	B
Unsignalized Intersections				
Woodlawn Drive with Lowrey Avenue				
Woodlawn Drive				
northbound	LT	A	A	A
southbound	LT	A	A	A
Lowrey Avenue				
westbound	LT/TH/RT	A	A	B
eastbound	LT/TH/RT	A	A	A

Abbreviations: LT - left turn, RT - right turn, TH - through movement

At the intersection of East Manoa Road and Kolowalu Street:

Presently at the intersection of East Manoa Road and Kolowalu Street, drivers turning left from Kolowalu Street onto East Manoa Road experience extreme delays, level of service (LOS) F during the morning peak hour and long delays, LOS D during the afternoon peak hour. All other movements at the intersection operate with little delays, LOS B or better.

Without the project, drivers turning left from Kolowalu Street onto East Manoa Road will continue to experience extreme delays, LOS F during the morning peak hour and very long delays, LOS E during the afternoon peak hour. All other movements at the intersection will operate at the same level of service as existing.

With the project, drivers turning left from Kolowalu Street onto East Manoa Road will continue to experience extreme delays, LOS F during the morning peak hour and very long delays, LOS E during the afternoon peak hour. All other movements at the intersection will operate at LOS B or better during the morning and afternoon.

The project will not change the level of service of the intersection, however the average delay per vehicle will increase by approximately 3 seconds during the morning peak hour and by approximately 1 second during the afternoon peak hour.

At the intersection of East Manoa Road and Oahu Avenue:

Presently at the intersection of East Manoa Road and Oahu Avenue, westbound drivers turning left from East Manoa Road onto Oahu Avenue experience extreme delays, level of service (LOS) F during the morning

peak hour and very long delays, LOS E during the afternoon peak hour. Other movements at the intersection operate with average delays, LOS C or better.

Without the project, all movements at the intersection will operate at the same level of service as existing.

With the project, all movements at the intersection will operate at the same level of service as without the project.

The project will not change the level of service of the intersection, however the average delay per vehicle will increase by approximately 1 second during the morning and afternoon peak hours.

At the intersection of East Manoa Road and Lowrey Avenue:

Presently, all movements operate with little delay, LOS B or better during the morning and afternoon peak hours.

All movements at the intersection will continue to operate at LOS B or better during the morning and afternoon peak hours without or with the project in year 1994.

The net impact of the project is an increase of approximately 1 second delay per vehicle during the morning and afternoon peak hours.

At the intersection of Woodlawn Drive and Lowrey Avenue:

Presently, all movements operate with little delay, LOS B or better during the morning and afternoon peak hours. There is a sight distance problem however, for drivers exiting Lowrey Avenue. Westbound drivers

exiting Lowrey Avenue have a sight distance problem looking south on Woodlawn Drive. Eastbound drivers exiting Lowrey Avenue have a sight distance problem looking both north and south on Woodlawn Drive.

All movements at the intersection will continue to operate at LOS B or better during the morning and afternoon peak hours without or with the project in year 1994.

CONCLUSIONS AND RECOMMENDATIONS

The University of Hawaii Faculty Housing project, when completed and fully occupied in the year 1994, would have a small impact on the study intersections of East Manoa Road with Kolowalu Street and East Manoa Road with Oahu Avenue. The project will not have a significant impact at the intersections of East Manoa with Lowrey Avenue and Woodlawn Drive with Lowrey Avenue.

Presently, the drivers experience an average of about 6 seconds of delay per vehicle (LOS B) at the signalized intersection of East Manoa Road and Lowrey Avenue during the morning and afternoon peak hours.

Drivers experience an average of about 18 to 22 seconds of delay per vehicle (LOS C) at the signalized intersections of East Manoa Road with Kolowalu Street and East Manoa Road with Oahu Avenue during the morning and afternoon peak hours. Traffic queuing does occur, however, along the Kolowalu Street to East Manoa Road to Oahu Avenue route, which is commonly used for traffic exiting Manoa valley. The queuing conditions occurred for a duration of 10 to 20 minutes during the peak hours. The vehicles in the queues were not able to clear the traffic signal in one cycle.

At the unsignalized intersection of Woodlawn Drive and Lowrey, drivers experience little or no delays during the morning and afternoon peak hours.

Without the project in the year 1994, average traffic delays at the study intersections will increase by 1 to 4 seconds delays per vehicle over existing delays. The intersection of Woodlawn Drive and Lowrey will continue to operate with little or no delays.

With the project, an average delay of 6 seconds per vehicle (LOS B) is expected at the intersection of East Manoa Road and Lowrey Avenue; and 18 to 24 seconds per vehicle (LOS C) at the intersections of East Manoa Road with Kolowalu Street and East Manoa Road with Oahu Avenue. This represents an increase of 1 to 3 seconds in average delays per vehicle. The intersection of Woodlawn Drive and Lowrey will continue to operate with little or no delays.

Although congestion and queues exist at two study intersections, the amount of trips generated by the project is relatively small. Therefore, the project traffic is not expected to significantly impact traffic operations at these intersections. Project traffic may, however, lengthen the congestion periods slightly during the peak hours. Since the congestion is expected to last for very short time periods in the day, no mitigating measures are recommended.

To provide for smooth traffic operating conditions the following measures are recommended:

- Provide adequate sight distance for drivers exiting Lowrey Avenue onto Woodlawn Drive by restricting parking along Woodlawn Drive.
- Adjust the signal timing at the intersections of East Manoa Road with Kolowalu Street and East Manoa Road with Oahu Avenue to minimize delays.
- To minimize traffic entering and exiting the project, encourage the Faculty Housing tenants to use the existing University of Hawaii shuttle service
- Encourage alternate modes of transportation (ie. walking, bicycling, carpooling)

APPENDIX A

LEVEL-OF-SERVICE DEFINITIONS
FOR
UNSIGNALIZED INTERSECTIONS
&
SIGNALIZED INTERSECTIONS

DEFINITION OF LEVEL-OF-SERVICE
FOR
UNSIGNALIZED INTERSECTIONS

For unsignalized intersections, the traffic most impacted will be the minor or cross-street with the stop or yield control. The major roadway will have the right-of-way. The level-of-service is the amount of delay expected for the average vehicle desiring to cross or enter the major road. The following gives a general description of the measure.

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 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.

DEFINITION OF 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 sec 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 sec 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 sec 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 sec 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 sec 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.

Level-of-service F describes operations with delay in excess of 60.0 sec 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.

REFERENCE: Highway Capacity Manual (Special Report 209, 1985)

APPENDIX B

MANUAL TRAFFIC COUNT DATA

APPENDIX B: MANUAL TRAFFIC COUNT DATA

Date: January 28, 1992
Tuesday

East Manoa Road and Oahu Avenue

<u>Time (pm)</u>	East Manoa Road						Oahu Avenue					
	Westbound			Eastbound			Northbound			Southbound		
	<u>LT</u>	<u>TH</u>	<u>RT</u>	<u>LT</u>	<u>TH</u>	<u>RT</u>	<u>LT</u>	<u>TH</u>	<u>RT</u>	<u>LT</u>	<u>TH</u>	<u>RT</u>
4:30-4:45	68	131	3	10	116	12	5	68	48	1	30	8
4:45-5:00	87	71	1	7	157	11	5	64	77	2	45	11
5:00-5:15	65	84	1	5	153	10	7	58	58	0	27	4
5:15-5:30	73	97	5	11	163	13	4	39	56	2	36	3
5:30-5:45	73	91	3	7	140	11	5	55	63	1	34	6
5:45-6:00	73	91	3	7	140	11	5	55	63	1	34	6
6:00-6:15	61	83	3	4	153	10	5	56	74	1	36	5
6:15-6:30	81	81	3	6	99	9	4	46	63	2	27	6
Peak Hour 4:30-5:30												
Totals	293	383	10	33	589	46	21	227	239	5	138	26

East Manoa Road and Kolowalu Street

<u>Time (pm)</u>	East Manoa Road				Kolowalu Street	
	Westbound		Eastbound		Northbound	
	<u>LT</u>	<u>TH</u>	<u>TH</u>	<u>RT</u>	<u>LT</u>	<u>RT</u>
4:30-4:45	6	110	148	82	81	3
4:45-5:00	2	107	177	92	60	5
5:00-5:15	3	124	172	86	94	6
5:15-5:30	8	121	160	77	62	5
5:30-5:45	3	111	142	78	75	6
5:45-6:00	3	121	168	93	68	6
6:00-6:15	5	120	161	71	75	3
6:15-6:30	3	115	126	56	84	5
Peak Hour 5:00-6:00						
Totals	17	477	642	334	299	23

APPENDIX B: MANUAL TRAFFIC COUNT DATA

Date: January 28, 1992
Tuesday

East Manoa Road and Lowrey Avenue

Time (pm)	East Manoa Road						Lowrey Avenue					
	Eastbound			Westbound			Northbound			Southbound		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
4:30-4:45	33	78	12	1	39	9	19	24	0	5	12	32
4:45-5:00	52	67	13	2	33	13	19	15	1	10	10	13
5:00-5:15	36	72	19	2	48	15	7	11	1	8	15	18
5:15-5:30	28	63	14	1	43	9	11	13	3	11	12	20
5:30-5:45	26	80	13	1	29	4	11	9	2	2	13	13
5:45-6:00	34	60	15	0	41	13	17	15	2	3	12	25
6:00-6:15	31	64	10	3	38	9	11	14	2	5	5	19
6:15-6:30												
Peak Hour 4:30-5:30												
Totals	149	278	58	6	163	48	58	63	5	34	49	83

Woodlawn Drive and Lowrey Avenue

Time (pm)	Woodlawn Drive						Lowrey Avenue					
	Eastbound			Westbound			Northbound			Southbound		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
4:30-4:45	12	48	17	1	26	4	6	7	0	9	2	15
4:45-5:00	12	64	10	0	24	6	7	9	0	11	4	10
5:00-5:15	11	52	17	0	33	3	6	5	2	9	5	17
5:15-5:30	7	60	10	1	29	3	2	7	1	9	5	13
5:30-5:45	10	61	10	0	31	9	8	6	1	11	3	9
5:45-6:00	10	60	16	0	37	6	5	11	0	6	4	9
6:00-6:15	11	57	10	1	40	7	2	6	0	4	4	6
6:15-6:30												
Peak Hour 5:00-6:00												
Totals	38	233	53	1	130	21	21	29	4	35	17	48

APPENDIX B: MANUAL TRAFFIC COUNT DATA

Date: January 29, 1992
Wednesday

East Manoa Road and Oahu Avenue

<u>Time (am)</u>	East Manoa Road						Oahu Avenue					
	Westbound			Northbound			Eastbound			Southbound		
	<u>LT</u>	<u>TH</u>	<u>RT</u>	<u>LT</u>	<u>TH</u>	<u>RT</u>	<u>LT</u>	<u>TH</u>	<u>RT</u>	<u>LT</u>	<u>TH</u>	<u>RT</u>
6:30-6:45	17	56	0	2	24	2	1	16	15	0	34	12
6:45-6:00	45	67	2	3	69	10	6	15	43	0	31	7
7:00-7:15	59	77	0	2	55	12	13	24	37	0	32	10
7:15-7:30	98	100	0	3	71	12	8	13	38	2	72	10
7:30-7:45	95	118	2	4	91	20	13	20	57	3	64	9
7:45-8:00	90	99	1	3	98	22	16	28	65	4	52	10
8:00-8:15	95	80	2	3	61	10	3	20	52	3	40	10
8:15-8:30	57	70	2	5	80	6	6	15	67	2	30	10
Peak Hour 7:15-8:15												
Totals	378	397	5	13	321	64	40	81	210	12	228	39

East Manoa Road and Kolowalu Street

<u>Time (am)</u>	East Manoa Road				Kolowalu Street	
	Westbound		Eastbound		Northbound	
	<u>LT</u>	<u>TH</u>	<u>TH</u>	<u>RT</u>	<u>LT</u>	<u>RT</u>
6:30-6:45	1	68	55	13	48	1
6:45-6:00	3	70	70	32	62	3
7:00-7:15	3	91	59	49	82	0
7:15-7:30	4	114	63	57	116	1
7:30-7:45	10	143	89	90	109	7
7:45-8:00	9	115	95	113	123	4
8:00-8:15	2	139	92	53	100	5
8:15-8:30	1	98	100	65	57	5
Peak Hour 7:15-8:15						
Totals	25	511	339	313	448	17

APPENDIX B: MANUAL TRAFFIC COUNT DATA

Date: January 29, 1992
Wednesday

East Manoa Road and Lowrey Avenue

Time (am)	East Manoa Road						Lowrey Avenue					
	Eastbound			Westbound			Northbound			Southbound		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
6:30-6:45	6	20	8	0	30	7	15	11	0	0	4	12
6:45-6:00	5	31	7	1	35	11	5	11	0	0	4	9
7:00-7:15	8	23	5	0	52	17	13	20	1	2	5	10
7:15-7:30	12	22	5	0	82	23	15	14	0	0	6	10
7:30-7:45	10	24	11	1	91	19	24	27	0	4	6	13
7:45-8:00	18	22	13	1	81	25	14	29	0	5	10	19
8:00-8:15	9	33	10	0	81	14	18	15	0	7	7	15
8:15-8:30												
Peak Hour 7:15-8:15												
Totals	49	106	39	2	335	84	71	85	0	16	29	57

Woodlawn Drive and Lowrey Avenue

Time (am)	Woodlawn Drive						Lowrey Avenue					
	Eastbound			Westbound			Northbound			Southbound		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
6:30-6:45	2	5	2	0	30	7	9	6	0	1	4	5
6:45-6:00	2	8	2	0	64	7	9	6	0	1	2	4
7:00-7:15	1	12	2	1	66	17	10	14	1	2	4	7
7:15-7:30	4	7	0	0	79	13	8	10	0	1	2	4
7:30-7:45	4	13	4	0	48	19	11	9	0	3	3	13
7:45-8:00	8	20	7	1	55	25	9	9	0	10	1	9
8:00-8:15	7	24	7	1	53	13	6	7	0	6	4	5
8:15-8:30												
Peak Hour 7:00-8:00												
Totals	17	52	13	2	248	74	38	42	1	16	10	33