JOHN WAIHEE
GOVERNOR OF HAWAII

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

JUL 28 1989

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

LIBERT K. LANDGRAF
DEPUTY

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

Mr. Marvin Miura
Director
Office of Environmental Quality Control
465 South King Street
Room 4
Honolulu, HI 96813

Ref: LM-DU

Dear Mr. Miura:

Subject: Negative Declaration for the Hale Mohalu Housing Project at Pearl City, Oahu (TMK: 9-7-19:Por. 35)

Attached are three (3) copies of the Environmental Assessment prepared for the Department of Land and Natural Resources for the development of the subject project by the Hawaii Council of Churches.

Based on the information provided and pursuant to Section 343, Hawaii Revised Statutes, we find the proposed action will have no significant effect on the subject State-owned lands. As such, a negative declaration has been determined for the proposed activity.

Should you have any questions regarding this matter, please feel free to contact Mr. Dean Uchida, our Oahu District Land Agent, at 548-3262.

Very truly yours,

WILLIAM W. PATY

Encs
cc: Mr. M. Kealoha
Mr. Bob Stauffer

ENVIRONMENTAL ASSESSMENT

HALE MOHALU HOUSING PROJECT

WAIMANO, OAHU, HAWAII

Prepared For

DEPARTMENT OF LAND AND NATURAL RESOURCES
STATE OF HAWAII

May, 1989

ENVIRONMENTAL ASSESSMENT

FOR ACTIONS THAT DO NOT REQUIRE AN EIS UNDER NEPA OR LOCAL LEGISLATION

I. HUD/STATE DATA

A. Name of Project: HALE MOHALU HOUSING PROJECT

I.D. No. (None assigned)

B. Type of Action: ____ Applicant _X_ Agency

Department of Land and Natural Resources
State of Hawaii
Honolulu, Hawaii 96813

C. Approving/Implementing Agency:

1. Department of Land and Natural Resources
State of Hawaii
Honolulu, Hawaii 96813

D. Head of Agency: Willaim W. Paty, Chairman
Board of Land and Natural Resources

E. Environmental Assessment Prepared By: Gerald Park, Urban Planner, October, 1988; Revised, May 1989

II. DESCRIPTION OF PROPOSED ACTION(S)

A. Proposed Activity

_____ Single Activity
_X_ Aggregation of Activities
_____ Multi-Year Activities

B. Proposed Action:

The Hawaii Council of Churches or its assigns proposes to improve a portion of the grounds of the former Hale Mohalu State Hospital for a multiple-residential housing project (See Appendix A). The goal of the Hale Mohalu project is to create affordable rental housing and a community where residents can be assured a secure, stable, and comfortable life style. The development offers a housing alternative to institutionalized living arrangements for elderly headed households and the developmentally disabled including persons afflicted with Hansen's disease. As presently planned, units will be available to persons at least 62 years of age, those who are physically disabled, can meet income qualifications, and who can maintain an independent, self-functioning household.

The project was originally planned to include 200 units in 2- and 3-story structures that would have included Community Development Block Grant funds through the City's Department of Housing and Community Development. Many of the responses gathered for this environmental assessment reflects this earlier, larger project.

The present proposal includes nineteen (19) detached two-story structures housing dwelling units, having a gross floor area of 87,000 square feet to be constructed as shown in Appendix A. The following unit mix is proposed:

Type of Unit	No. of Units	Approximate Area
1 BDR	142	470 SF
2 BDR	14	626 SF

(Area includes 50 SF Lanai)

The two-story buildings will not exceed 25-feet in height. The handicapped and more elderly residents will occupy ground floors and the more able-bodied will occupy the upper floors.

Residential dwellings will be erected on concrete foundations (slab-on-grade) and existing concrete slabs from the previous buildings may be used to reduce construction costs. All buildings would be wood framed and feature exterior redwood plywood siding, gypsum board interior walls, and hip roofs covered with asphalt shingles.

Water, storm drains, and sanitary sewers will be provided as well as underground electric, telephone, and street lighting systems. All utility systems will be constructed to standards of the City and County of Honolulu. Access will be taken off Kamehameha Highway and 3rd Street. The Kamehameha Highway entry also will service a sports complex planned on adjoining lands. A new roadway bridge over an unnamed channel will be constructed and an existing vehicle crossing upgraded for pedestrian use. 3rd Street will be widened and resurfaced from Hale Mohalu to Lehua Street, a distance of 1,000 feet. A single interior road (of varying width) loops through the development. Portions of the channel traversing the site will be improved to County drainage standards. Channel sections and dimensions will be determined in a drainage study requested by the Department of Public Works.

The elderly and developmentally disabled are not totally dependent on privately operated vehicles for their transportation needs. Because of this, off-street parking will be provided at a ratio of 1 stall per 2.7 units or 57 resident parking stalls. Guest parking (19 stalls) placed along the edge of the passive park will be shared with the sports complex

to accommodate the overflow from their activities. Pull outs for use by Handi-vans will be sited along the loop road. The new roadway bridge will be secured at dusk each evening and traffic to Hale Mohalu will be directed to/from the 3rd Street entry. Two (2) service parking stalls and nineteen (19) stalls along the improved 3rd Street portion of the project site will also be provided. The aggregate ratio is therefore one stall per 1.6 units with ninety-seven (97) parking stalls.

The project includes a 3,000 square foot community center where 100-250 residents can gather comfortably for indoor activities and social functions. Space for office use, assembly, kitchen, restrooms, and storage is allocated within the building. Land will be set aside for an all purpose sport court for basketball, volleyball, tennis, and badminton. In addition, a one-acre passive park is planned for the Ewa-mauka corner to be shared with the sports complex. Garden plots around the perimeter of the property will allow residents both to recreate and raise garden vegetables for consumption. Shaded areas with benches, chairs, and tables will foster passive activities and table games for residents.

The cost of the project is estimated at $10.3 million ($1989). The land is owned by the State of Hawaii and will be leased to the Hawaii Council of Churches or its assigns for the projects.

Rental rates have not been established but are planned to qualify for government-assisted low-income housing support (Section 8).

The project will be constructed in one phase with completion and occupancy projected at 2 years after start-up.

C. Basic Data:

Geographic Area:	Pearl City, Oahu, Hawaii
Tax Map Key:	9-7-19: por. 35
Land Area:	6.507 acres
Landowner:	State of Hawaii
State Land Use:	Urban
Development Plan:	Public Facility
Zoning Map:	Residential (R-5)
Special District:	No
Special Management Area:	No
Existing Land Use:	Vacant
Surrounding Land Use:	Residential, Commercial, Cemetary, Recreation
Census Tract:	80.01

D. Description of the Affected Environment:

Located makai of Kamehameha Highway, the Hale Mohalu site is bounded by a four-story commercial building (Pearl City Shopping Plaza) and a service station on the north, a cemetary (Sunset Memorial Park) and residential dwellings on the west, a railroad right-of-way and the H-1 Freeway on the south, and an unnamed drainage channel on the east.

Hale Mohalu was used as a treatment center for Hansen's disease patients from 1949 to its closing in 1978. Most patients were relocated to Leahi Hospital in Kaimuki and the buildings were razed in 1985 for safety reasons. The land is currently vacant and unmaintained but has been used for stockpiling soil and indiscriminate dumping.

Remnants of previous development---an asphaltic concrete roadway, concrete building pads, a concrete lined stream channel, and vehicle and pedestrian bridge crossings---are still very much in evidence. The lot is relatively flat with a west to east slope (1%) in the direction of the drainage channel.

The lot is composed almost entirely of Honouliuli, silty clay, a silty and plastic clay. Permeability is moderately slow, runoff is slow, the erosion hazard is slight, and the soil has a high shrink-swell potential. A cursory inspection of the concrete pads showed no sign of structural deformities.

The unnamed drainage channel which is a branch of the larger Waimano Stream Drainage Channel bisects the property forming its eastern boundary. Constructed in the early 1960s, storm-water is contained in a gunite lined trapezoidal section 8 feet deep and 20 feet wide (bottom) with .75:1 sloped sidewalls. Above the Hale Mohalu site, the channel can accommodate a design flow of 6,200 cfs and a lesser flow rate through the site to its outlet in Pearl Harbor's East Loch.

The site is not part of a wetland, marsh, or tidal land and is 1,200 lineal feet north of East Loch Pearl Harbor.

There are no recorded historical features on the property.

Although unmaintained and unused, the property supports trees of significant height and spread. Prominent banyans (Ficus spp) some of which stand 75 feet high with a spread of 100+ feet dominate the landscape. Fine specimen trees include monkeypod (Samanea saman), royal poinciana (Delonix regia), Java plum (Eugenia cumini), rubber (Brassaia actinophylla), opiuma (Pithecellobium dulce), and Christmas berry (Schinus terebinthifolius). Slender coconut palms (Cocos nucifera) rise above the tree tops giving the site a tropical image. Beneath spreading tree canopies, koa haole (Leucaena leucocephala),

guinea grass (Panicum maximum), California grass (Brachiara mutica), ipomea (Ipomea sp.), and wayside weeds spread unchecked. Of interest, a fine chaulmoogra tree (Hydnocarpus arithelmintica), the oil of whose fruit was used in leprosy treatment, grows as a reminder of the previous use of the site. In the drainage channel, the perennial sedge (Cyperus alternifolius) and honohono grass (Commelina diffusa) sprout from broken bottom sections and joints. None of the species are threatened or endangered or proposed for such status.

No wildlife was observed on-site. Singing birds were heard but not seen. Owing to man's presence nearby, feral dogs and cats probably roam the site and in all probability so do rats, mice, and mongoose. Schools of fish were seen in a shallow pool just above an existing vehicle bridge crossing the drainage channel. The ubiquitous guppy (Poecilia reticulata) is the most abundant fish and the native goby, o'opu nakea (Awaous stamineus) also was observed.

Ambient noise levels are high owing to high traffic volume and speeds on the adjacent elevated section of the freeway. Background noise levels range from 70 Ldn 100 feet from the freeway diminishing to 65 Ldn at 500 feet (see Appendix D).

The site is accessed from Kamehameha Highway and 3rd Street off Lehua Avenue. Kamehameha Highway, a State maintained six lane two-way divided highway, links Pearl City with all parts of Oahu. A paved driveway (40 foot right-of-way) connects Hale Mohalu with Kamehameha Highway but is used primarily by traffic to/from the Pearl City Business Plaza. Outbound traffic is stop controlled. Traffic counts taken recently along this section of Kamehameha Highway shows a weekday morning peak hour occurring between 6:15 and 7:15 a.m. and the afternoon peak hour between 3:30 and 4:30 p.m. Peak hour volume during the afternoon (3,100 vehicles) is slightly greater than the morning peak hour (2,800 vehicles).

3rd Street, a two-way, two lane roadway lies within a 40-foot right-of-way. Owned by the County and the State the road is partly paved (County owned section) and partly gravelled (State owned portion). The State owned portion (400 lineal feet) comprises part of the Hale Mohalu site.

Water, electrical, and communication systems on Kamehameha Highway, Lehua Avenue, or 3rd Street are available to service the project. A 10-foot wide sewer easement (Waiau Trunk Sewer) follows the west property line and wastewater generated by the development will be discharged into the municipal trunk sewer.

The Pearl City Fire Station at the intersection of 1st Street and Lehua Avenue is within one-half of the development. Response time to the site is under one minute. Similarly, the Pearl City Police Station on Waimano Home Road (mauka of Kamehameha Highway) is within one half mile from the project.

III. ENVIRONMENTAL ASSESSMENT PREPARED FOR COMPLIANCE WITH HUD REQUIREMENTS AND ENVIRONMENTAL REVIEW REQUIREMENTS OF OTHER LEVELS OF GOVERNMENT AS FOLLOWS:

A. X State of Hawaii, Supplemental Form EA-S-SOH
B. ___ Guam, Supplemental Form EA-S-Guam
C. ___ Northern Mariana Islands Supplemental Form EA-S-NMI
D. ___ Trust Territories of the Pacific Islands Form EA-S-TTPI
E. ___ American Samoa, Supplemental Form EA-S-ASG

IV. FINDINGS AND CONCLUSIONS RESULTING FROM THE ENVIRONMENTAL REVIEW

A. Environmental Finding

X Finding of No Significant Impact on the Environment (FONSI)
___ An Environmental Impact Statement is required.

B. Agencies/Interested Parties Consulted
(See Appendix B)

C. Alternatives Considered:

1. No Action

A no action alternative precludes all environmental impacts short and long term, beneficial and adverse described herein. The project site would remain vacant, undeveloped, and underused. The potential social and housing goals sought by the project to benefit the elderly and developmentally disabled would be foregone.

2. Change in Density

Development at a density higher than what is proposed would reduce monthly rental costs to the benefit of tenants but at the same time could place greater demands on public services and facilities. Physical impacts to the site and its occupants would be similar to that described in this Assessment.

A lower density development would have opposite effects. Demands on public services and facilities would be lessened but rental prices may increase beyond the limits imposed by the low-income housing support program (Section 8) and therefore beyond the ability of the elderly and disabled to pay. Physical impacts to the site and its occupants would be similar to that described in this Assessment.

D. Special Conditions Imposed or Action Taken to Achieve Compliance with HUD or Local Policies and Standards:

1. A soils investigation will precede construction to identify and recommend measures for mitigating potential settlement problems.

2. A drainage study will be prepared for compliance with construction and flood proofing measures in areas susceptible to flooding.

3. Noise attenuation measures will be incorporated into building design to achieve an interior noise level of 65 Ldn.

E. Finding of No Significant Impact on the Environment and Request Release of Funds (Combined Notice):

1. Date FONSI/RPOF published in local newspaper: _____
2. Last day for recipient to receive comments: _____
3. Last day for HUD to receive comments: _____
4. Date FONSI transmitted to Federal, State, or local governmental agencies or interested groups or individuals: _____.
5. Date HUD released grant conditions: _____

F. Negative Declaration (Hawaii Only):

1. Date Negative Declaration published in OEQC Bulletin: _____.
2. Date on which 60-day waiting period expires: _____
3. Documentation attached: ___ Yes ___ No.

V. IMPACT CATEGORIES

Rating of Environmental Factors:

Rating 1 - Potentially Beneficial Impact.
Rating 2 - No Impact Anticipated.
Rating 3 - Minor Adverse Impacts Anticipated.
  a. Short Term
  b. Long Term
Rating 4 - Adverse Impact Requires Mitigation.
Rating 5 - Adverse Impact Requires Modification to Project/Activity.

A. Land Development:

1. Conformance with Comprehensive Plans and Zoning:

The project is consistent with Oahu General Plan policies for maximizing use of Primary Urban Center lands and providing needed affordable housing for the elderly and handicapped. It is located in an older, established

community with available utilities, public facilities and services, and adjacent to existing major roadways which will foster mobility for project residents. The cluster housing arrangement intensifies the use of land and minimizes the cost of providing utility and infrastructure systems.

The project will be developed following the development standards of the A-1 low-density apartment district, although the density will be only approximately one-half of that allowable under A-1. The low-density apartment district allows for multi-family dwellings, meeting facilities, and complementary uses and activities including limited social services. Applicant also will request waivers pursuant to a Conditional Use Permit for on-site and off-street parking requirements of the Land Use Ordinance.

Rating: 2 - No Impact Anticipated.

References: State Land Use District Boundary Maps.
General Plan, City and County of Honolulu.
Development Plan, City and County of Honolulu.
Land Use Ordinance, City and County of Honolulu
Department of General Planning Letter dated 9/13/88.

2. Compatibility and Urban Impact:

The Hale Mohalu site is located in an urban setting supporting a range of activities and land uses. Lands to the north support strip commercial developments, low-density residential and cemetary uses are to the west, a proposed recreation complex lies to the east, and a section of the H-1 Interstate Freeway passes to the south. Beyond (south) the Freeway, watercress is freely grown and cultivated along East Loch of Pearl Harbor.

Given these diverse land uses in a highly developed urban setting, the project does not introduce a use totally different and incompatible with the neighborhood and community. As will be presented in latter sections of this Assessment, urban services and facilities are adequate to service the project without adverse impacts to existing levels of service.

Rating: 2 - No Impact Anticipated

References: Project Plans.
Land Use Ordinance, City and County of Honolulu

3. Slope:

The site is an improved parcel. In general, the land is graded from west to east with a slight slope (0-1%) in the direction of the drainage channel.

Rating: 2 - No Impact Anticipated.

References: Field observation by Gerald Park, 8/88.
Topography Map.

4. Erosion:

Honouliuli clay, the primary soil comprising the project site, poses only slight erosion problems.

Rating: 2 - No Impact Anticipated.

References: Soil Conservation Service, 1973.

5. Soil Suitability:

Honouliuli clay is a plastic and sticky clay with high-shrink swell potential. A soils investigation should precede construction and the recommendations contained in same followed to minimize building foundation and soil settlement problems.

Rating: 3a - Minor Short Term Impact Anticipated.

References: Soil Conservation Service, 1973.

6. Hazards and Nuisances, Including Site Safety:

There is no evidence of unusual topographic and geological features contributing to flash floods, landslides, or other natural hazards.

There is no evidence of hazardous waste materials present on-site. An underground storage tank of unknown size is buried on-site and will be removed. Oil transmission lines are buried within a 40-foot wide railroad right-of-way passing to the immediate south of the site.

The site is not subject to nuisances from odors, vibrations, or noxious activities. The project will neither be affected by air pollutants generated by vehicle traffic on the nearly H-1 Freeway nor adversely affect ambient air quality on adjacent surface streets and intersections (See Appendix C).

Traffic on the H-1 Freeway to the south of the project site will generate noise in excess of 65 Ldn an acceptable HUD standard. Most affected are the upper floors of the 2-story buildings fronting the Freeway which could experience noise in the range of 68-71 Ldn which will require sound attenuation treatment in order to meet HUD standards. Proposed mitigation measures include planting of tall trees between the Freeway and the 2-story structures, using double-paned windows or window type sound attenuators, and insulating all walls facing the freeway. Air conditioning may be considered but generally is not a practical item for elderly housing (See Appendix D).

A 25-foot wide electrical easement crosses the property in a northwest-southeast direction. No buildings will be placed within the easement but the land under the easement can and will be used for parking, paving, and landscaping.

Rating: 4 - Adverse Impact (Noise) Requires Mitigation

References: Traffic Noise Study by Y. Ebisu & Associates.

7. Energy Consumption:

Energy use is estimated at not more than 120,000 kilowatts per month. Power will be brought to the site from distribution lines on Kamehameha Highway or 3rd Street.

Rating: 2 - No Impact Anticipated.

References: Personal Communication.

B. Environmental Design and Historic Values:

1. Visual Quality - Coherence, Diversity, Compatible Use, and Scale:

The project would not adversely affect the existing urban environment, however, at 30/units per acre density is greater than that for the R-5 residential zoning district without a Conditional Use Permit. Such a waiver is necessary to economically justify the project.

The higher density is mitigated by the site development plan which provides adequate setbacks and separations between buildings, provides open space and recreation areas, and retains most of the abundant trees and palms for aesthetic and functional purposes. The two-story buildings are similar in height to two-story (residential) and three-story buildings (commercial) on nearby properties. A 10-20 foot grade differential separates the property from Kamehameha Highway which makes structures appear lower than they really

are. Similarly, building orientation, building roof lines, and construction material architecturally blend with the adjoining neighborhood uses rather than appearing as a visually harsh brick and concrete apartment complex.

The Hale Mohalu site is neither a registered historic site nor recommended for such status.

Rating: 2 - No Impact Anticipated.

References: Field Observation by Gerald Park, 8/88.
Historic Site Maps, Department of Land and Natural Resources

C. Socioeconomic:

1. Demographic/Character Changes:

The project would accommodate a population of between 250 to 300 persons which is less than a one percent increase in the population (1980) of the Pearl City community. The increase is consistent with County growth policies aimed at in-filling vacant or underdeveloped lands in the primary urban center (see also Section V. A. 1. Conformance with Comprehensive Plans and Zoning). Whether this influx of people results in substantial social change and impact to the community is difficult to ascertain early in any planning process. There will be change, however, as any development produces some change. The use of land and population increase are two outward signs of this change. These changes have been taking place in Pearl City for many years oftentimes on a scale larger than that proposed. The advantages of the area---temperate climate, suburban locale, a heterogenous population, good schools, proximity to commercial and public facilities, an efficient transportation system---certainly are valued by existing residents and will be valued by others who choose to reside in the community. Some of these advantages (and there are others) are probably more sought after by the elderly.

A majority of tenants are expected to be 62 years old or older with incomes of less than $20,000 annually. Tenant age and income are not anticipated to significantly affect the relatively youthful, middle-income community. The project does not introduce a totally new population segment with differing values into the community and of such magnitude to alter the community's social structure.

Rating: 1 - Potentially Beneficial Impact.
2 - No Impact Anticipated.

References: Senior Housing Program, HFDC.

2. Displacement:

The site is uninhabited and no persons will be displaced by the proposed action.

Rating: 2 - No Impact Anticipated.

References: Field Observation by Gerald Park, 8/88.

3. Employment and Income Patterns:

Impacts on employment and income patterns cannot be determined. Generally, it is expected that tenants income will be less than $20,000 annually and most will be retired or not part of the work force. Tenants who are now employed will probably remain with their present employer irrespective of a change in residence.

Rating: 2 - No Impact Anticipated.

D. Community Facilities and Services:

1. Educational Facilities:

Not applicable.

2. Commercial Facilities:

Neighborhood and regional shopping areas stand to benefit from the slight growth in population. It is anticipated that Hale Mohalu residents will purchase goods and services close to their place of residence. Supermarkets, drug and sundry stores, restaurants, financial institutions, and specialty stores can be found at shopping centers in Pearl City (.5 mile away), Waimalu (1.5 miles away), and Aiea (3 miles away). These neighborhood centers are dwarfed by Pearlridge Center, a regional shopping center, located about 2.5 miles from Hale Mohalu.

Rating: 1 - Potentially Beneficial Impact.

References: Field Observation by Gerald Park, 8/88.
Project Planning Report, 5/88.

3. Health Care:

Health care facilities---clinics, health centers, and private medical and dental offices---can be found in Pearl City and nearby communities of Waipahu, Waiau, and Aiea. All are accessible and adequate for the communities in which they are located. Major hospitals in Honolulu are located in the Primary Urban Center and within 1/2 hour driving time from Hale Mohalu.

Rating: 2 - No Impact Anticipated.

References: Field Observation by Gerald Park, 8/88.
Project Planning Report, 5/88.

4. Social Services:

Tenants will not require any special medical/health assistance and must be able to function independent of same.

See Item D.3. Health Care.

Rating: 2 - No Impact Anticipated.

5. Solid Waste:

Solid waste will be collected by municipal collection crews or a private collection company.

Rating: 2 - No Impact Anticipated.

6. Waste Water:

Aged and deteriorating on-site sewer lines will be replaced with a new wastewater system. The system will collect and convey wastewater to an existing 10-inch trunk sewer (Waiau Trunk Sewer) aligned mauka-makai on the western perimeter of the Hale Mohalu site.

Ultimately, wastewater from the project will receive secondary treatment at the Honouliuli Wastewater Treatment Plant and discharged into the ocean.

Rating: 2 - No Impact Anticipated.

References: Project Plans.

7. Storm Water:

Storm water will be collected and conveyed by underground drains and discharged into the adjoining drainage channel.

No flood insurance panel has been printed for the subject property. The parcel is in Zone D which are unstudied areas with possible flood hazard.

The Department of Public Works has requested that a drainage report be submitted for their review and approval.

Rating: 4 - Potential Adverse Impact Requires Technical Analysis to Establish Mitigative Measures

References: Project Plans.
Flood Insurance Rate Maps.
Department of Public Works Letter dated 9/9/88

8. Water Supply:

Water will be brought to the site via a 12-inch line from Lehua Avenue. The existing water system can accommodate the proposed development.

On-site fire protection will be coordinated with the Fire Prevention Bureau of the Honolulu Fire Department.

Rating: 2 - No Impact Anticipated.

References: Water Systems Plans.
Board of Water Supply Letter dated 9/12/88

9. Public Safety:

a. Police:

Police service is adequate to serve the proposed project. Environmental security measures, as suggested by the Police Department, will be considered in site and building design.

Rating: 2 - No Impact Anticipated.

References: Field Observation by Gerald Park, 8/88.
Police Department Letter dated 9/6/88.

b. Fire:

Present and planned fire protection and emergency services (medical co-response) are adequate to serve the development.

Rating: 2 - No Impact Anticipated.

References: Field Observation by Gerald Park, 8/88.
Fire Department Letter dated 9/9/88.

c. Emergency Medical:

See Item D.3. Health Care and Item D.9.b. Fire.

Rating: 2 - No Impact Anticipated.

10. Open Space and Recreation:

a. Open Space:

Vacant, undeveloped, and unused, the open space utility of the site is questionable. The site is obscured by a dense canopy of trees and weedy vegetative growth. Beneath the leafy canopy, the landscape is visually blighted by large, scattered rubbish piles, building debris, broken concrete, and earth mounds, the removal of which would enhance the appearance of the site.

Rating: 1 - Potentially Beneficial Impact.

References: Field Observation by Gerald Park, 8/88.

b. Recreation:

Planned active and passive, indoor and outdoor recreation facilities and areas should foster an interactive environment from which a range of recreational and social activities suitable for residents can take place.

Rating: 2 - No Impact Anticipated.

References: Field Observation by Gerald Park, 8/88.
Project Design.

c. Cultural Facilities:

With the exception of community libraries and religious institutions, major cultural facilities are located in Honolulu proper.

Rating: 2 - No Impact Anticipated.

References: Field Observation by Gerald Park, 8/88.

11. Transportation:

Public transportation is available on TheBus, Honolulu's municipal bus system. The bus route services Pearl City with connections to Honolulu and other parts of Oahu. Bus stops are located along Kamehameha Highway within walking distance of the project site.

Rating: 2 - No Impact Anticipated.

References: Field Observation by Gerald Park, 8/88.

E. Natural Features:

1. Water Resources:

No new water resources need be developed to serve the project. The project is proposed over caprock forming part of this southern edge of the vast Pearl Harbor aquifer.

Rating: 2 - No Impacts Anticipated.

References: Board of Water Supply Letter dated 9/12/88.

2. Surface Water:

The project site is well drained and should not be susceptible to flooding caused by on-site runoff.

The Department of Public Works has requested and applicant will prepare a drainage study to evaluate existing channel capacity and to propose cost effective alternative improvements necessary to convey the design runoff with minimal flooding to the adjacent areas.

Rating: 4 - Potential Adverse Impact (Drainage)
Requires Technical Analysis to Establish Mitigative Measures

References: Field Observation by Gerald Park, 8/88.
Field Observation by AECOS Inc., 9/88.
Preliminary Drainage Information.

F. Other Commentary/Discussion:

None of the observed terrestrial and aquatic flora and fauna are rare, threatened or endangered species.

Traffic generated by the project is estimated at 634 daily trips by residents, visitors, pickups/deliveries, and other vehicles entering and exiting the development. Traffic data reveals that afternoon traffic volume on Kamehameha Highway is heavier than morning hours thus the afternoon peak hour was selected for analysis. Using trip generation rates for elderly housing, the peak hour two way traffic is projected at 43 vehicles. The vehicles were distributed 60/40 to Kamehameha Highway (29 vehicles) and 3rd Street (19 vehicles) respectively. The 29 vehicles passing through the Kamehameha Highway entry is not a significant contribution to peak hour or daily volume. Most vehicles exiting the development are expected to turn right heading east to Honolulu. This turning movement will have minimal impact on the intersection turning movement. Although traffic is heavy on Kamehameha Highway in both

directions, vehicles turning left onto Kamehameha Highway should experience only slight delays. Through movement on Kamehameha Highway fronting the entry is partially controlled by two traffic signals about 300 feet on either side of the Hale Mohalu driveway. Left turn movements (in/out) can be executed during the "red cycle" for through traffic.

3rd Street will undergo a functional change as it no longer will serve as a dead end residential street. To accommodate daily traffic to/from the proposed development and that created by existing residences, it will be improved for vehicle and pedestrian traffic. Traffic generated by the project should be light during daylight hours (less than 10-12 vehicles/hour) and increase up to 18-20 vehicles per hour between 6:00 and 10:00 p.m.

Rating: 2 - No Adverse Impact Anticipated.

Reference: Traffic Study by Gerald Park, 9/88.

* Note: The analysis was based on a 192-unit project.

Part VI
STATUTORY CHECKLIST/HUD STANDARDS

Federal statutes, regulations or executive orders address specific resources that may be impacted by the proposed action. HUD policies and standards address conditions that may require mitigative measures or modifications to the proposed action to achieve compliance with HUD requirements.

Pages 5 and 6 of this form lists those authorities and the implementing regulations or guidelines that must be followed to achieve compliance with the applicable authority.

Complete analysis of the proposed action on pages 5 and 6 and enter the determination in column 2 or 3 below.

(1) Statutes, Executive Orders & HUD Regulation/Notices	(2) Not Applicable As Certified on Pgs. 5 & 6	(3) Compliance Required. Make Reference to and Attach Source Documentation and Analysis to Show Compliance with Applicable Authorities per Part 58.5
Historic Properties	X	
Floodplain Management	X	
Wetlands Protection	X	
Coastal Zones		
Endangered Species	X	
Farmlands Protection	X	
Air Quality	X	
Water Quality	X	
Noise		See Appendix D: Traffic Noise Study for the Proposed Hale Mohalu Residential Development.
Thermal/Explosives	X	
Airport Clear Zones	X	
Solid Waste Disposal	X	
Toxic Chemicals and Radioactive Wastes	X	
Coastal Barrier Resources Wild and Scenic Rivers	Federal legislation and implementing regulations concerning these resources do not apply to the State of Hawaii, Guam, Mtl, TTPI or American Samoa as of January 1, 1986.	

Other environmental concerns not addressed under Parts V or VI _____

HISTORIC PROPERTIES: The National Historic Preservation Act of 1966 (P.L. 89-665) (16 U.S.C. 470); Preservation of Historic and Archeological Data Act of 1974 (P.L. 93-291) (16 U.S.C. 469); Executive Order 11593. Implementing Regulations: Protection and Enhancement of the Cultural Environment, 36 CFR Part 800 or 801 F.R. 1/30/79.

X The site for the proposed action is not listed nor eligible for listing on the National Register of Historic Places based on: ___ consultation with the SHPO; ___ information checks with the Federal Register; X local authorities and interest groups; X field observation

___ Action is subject to compliance with Section 106 of the National Preservation Act of 1966. Compliance achieved on _____ (date), documentation attached.

FLOODPLAIN MANAGEMENT: Flood Disaster Protection Act of 1973 (P.L. 93-234) and implementing regulations; National Flood Insurance Program (44 CFR Parts 59-79); Executive Order 11988; Water Resources Council Guidelines on Implementing E.O. 11988; Section 404 of the Clean Water Act of 1977.

X The project/activity is located outside of the 100 year flood hazard area identified by the FIRM or FIA Flood Hazard Boundary map panel number No Printed Panel and not subject to compliance with E.O. 11988.

___ The proposed action is located within the 100 year floodplain and compliance with E.O. 11990 is required. Documentation for compliance with the E.O. was completed on _____ (date) and is attached.

___ Proposed action requires construction or fill in waters of the U.S. or adjacent wetlands, Department of Army permit required (Section 404 of the Clean Water Act). Its issuance is contingent upon a federal consistency determination with the local Coastal Zone Management Program.

___ Flood insurance required. Policy issued to:_____

WETLANDS PROTECTION: Executive Order 11990; Water Resources Council Guidelines for Implementing E.O. 11988.

X The proposed action is not within a wetland area nor will it have an adverse impact on an adjacent wetland area. This determination is made by: X Field obeservation; X consultation with the U.S. Corps of Engineers; ___ Other _____.

___ The proposed action is located within a wetland or will impact on one nearby. Documentation for compliance with the E.O. was completed on _____ (date) and is attached. If action requires fill, a Department of Army Permit is required (Section 404 of the Clean Water Act). Its issuance is contingent upon a consistency determination with the local Coastal Zone Management Program. Copy of permit is attached.

___ Flood insurance required. Policy issued to:_____

COASTAL ZONE MANAGEMENT: Coastal Zone Management Act of 1972 (P.L. 92-583) (16 U.S.C. 1451, et seq.): Executive Order 11990; 15 CFR Part 930.

___ Not applicable to_____. (TT only)

___ The proposed action is consistant with the approved Coastal Management Program for the area. Consistency determination is attached.

___ The proposed action will have an impact on the coastal area which required a permit from the _____agency/department. The permit was issued on _____ (date) and a copy is attached.

ENDANGERED SPECIES: The Endangered Species Act of 1973 (16 U.S.C. 1531-1543) Section 7; 50 CFR Part 402.

X The proposed action will not affect any endangered species of plants or animals, nor any critical habitat. This determination was made based on: ___ consultation with U.S. Fish and Wildlife Service (FWS); ___ consultation with local authority _____ (Dept./Agency); X Field Observation.

___ Formal Consultation required with the U.S. FWS under Section 7 (16 U.S.C. 1536). Compliance achieved on _____ (date) documentation attached.

FARMLANDS PROTECTION: Farmland Protection Policy Act of 1981 7 U.S.C. 4201, et seg.; 7 CFR Part 658 (Subtitle I of the Agriculture and Food Act of 1981).

X The proposed action will not adversely impact prime or unique farmland nor farmlands designated as important by State and Local Government that have been approved by the Secretary of Agriculture. This determination was made by: X review of local land use plans; ___ consultation with the District Conservationist, SCS, USDA; X Field Observation.

___ The proposed action impacts on agricultural lands however mitigative measures were identified in the attached analysis in accordance with 7 CFR Part 658. Compliance achieved on _____ (date). Documentation attached.

AIR QUALITY: Clean Air Act (P.L. 90-148) (42 U.S.C. 7401-7642) as amended; applicable EPA implementing regulations; Volume 1 Guide for Rapid Assessment of Air Quality at Housing Sites by R.H. Thuillier, May 1978 and HUD Format AP #1, Rapid Evaluation Procedure for Carbon Monoxide Concentrations.

X Project/activity is located within an attainment area in accordance with the State Implementation Plan; is not located near a power plant or sugar mill; and is not adjacent to a traffic throughfare that generates CO concentrations in excess of the 8 hour standard of 10 mg/m^3 at project site.

___ Project/activity is located within a non-attainment area and/or is exposed to air pollutants that threatens the federal air quality standard for _____ (pollutant). Analysis and recommendations for clearance is attached.

WATER QUALITY: Federal Water Pollution Control Act (P.L. 92-500) as amended (33 U.S.C. 1251-1376), the Safe Drinking Water Act of 1974 (P.L. 93-523) as amended (42 U.S.C. 300f-300j-10); particularly section 1424(e)(42 U.S.C. 300h-303(e)).

X Project/activity does not impact a sole source aquifer designated by EPA in accordance with Section 1424(e) of the Safe Drinking Water Act of 1974, as amended.

__ Project/activity is located within the Northern Groundwater Aquifer on Guam. Guam EPA has reviewed proposal in accordance with MOU between HUD, U.S. EPA, Guam EPA and GHURA. Their recommendation for clearance is attached. (Activities on Guam only)

NOISE: Noise Control Act 42 U.S.C. 4903; 24 CFR Part 51 Subpart B: Noise Abatement and Control; HUD Noise Assessment Guidelines March 1984.

__ Project/activity is not subject to current or projected noise levels that exceed 65 LDN as determined by: ___ a site inspection; ___ an evaluation using HUD Noise Assessment Guidelines; or ___ other acoustical data (_____)

X Project/activity requires mitigative action to comply with 24 CFR Part 51B Noise Abatement and Control. Report prepared by Y. Ebisu & Associates, consultant, outlines mitigative measures for compliance with HUD standards. Copy attached.

THERMAL/EXPLOSIVE HAZARDS: 24 CFR Part 51 Subpart C - Environmental Criteria and Standards; Siting of HUD-Assisted Projects Near Hazardous Operations Handling Petroleum Products or Chemicals of an Explosive or Flammable Nature.

X Project/activity is not subject to hazards from explosive or flammable fuels or other hazardous chemicals based on site inspection and information on file.

__ Project/activity is subject to hazards from explosive or flammable fuels or other hazardous chemicals. Evaluation of these hazards and recommended mitigative measures are: ___ included in attached study; ___ mitigative measures will be incorporated into project design.

CLEARZONES AT AIRPORTS: 24 CFR Part 51 Subpart D - Siting of HUD Assisted Projects in Runway Clear Zones at Civil Airports and Clear Zones and Accident Potential Zones at Military Airfields.

X Project/activity is not located in or near a Clear Zone at a civil or military airfield nor in or near an Accident Potential Zone at a military airfield.

__ Project/activity is located within an existing or future Clear Zone or Accident Potential Zone. Approval of proposed action is consistent with Part 51.302, 51.303 and 51.305(b). _____ Documentation attached.

SOLID WASTE DISPOSAL: Resources Conservation and Recovery Act (42 U.S.C. 6901-6987); 40 CFR Part 250.43-1.

X Project/activity does not involve the disposal of hazardous materials nor siting of sanitary landfills or closing of open dumps.

__ Project/activity is subject to provisions of EPA Guidelines; ___ Documentation of evaluation and coordination with EPA attached.

TOXIC CHEMICALS & RADIOACTIVE WASTES: HUD Notice 79-33, September 10, 1979 Policy Guidance to Address the Problems Posed by Toxic Chemicals an Radioactive Materials Chemicals and Radioactive Materials.

X Project/activity is not affected by toxic chemicals or radioactive material based on; ___ site inspection; X information check with local Health Dept.; ___ other source _____.

__ Project/activity's site was suspected of containing toxic chemicals or radioactive materials. HUD and local responsible agency contacted. ___ Evaluation of hazard was made in accordance with Notice 79-33 and found acceptable. Documentation attached, __Yes, __No.

Grantees are advised not to utilize CDBG funds on activities supporting new development for habitation at locations affected by toxic chemicals and radioactive materials.

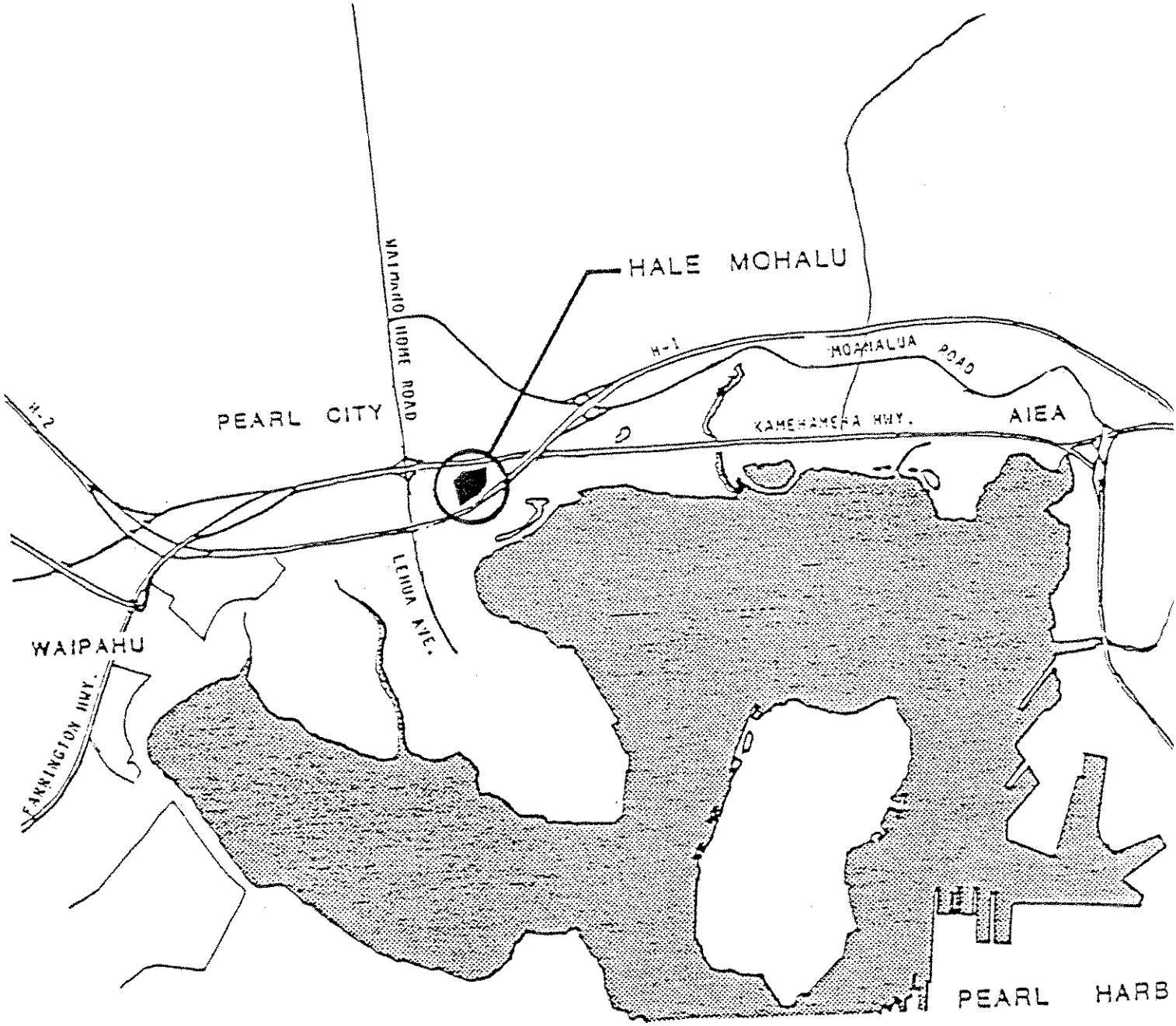
Other policies, standards or guidelines used in preparing the environmental analysis

Chapter 59, Ambient Air Quality Standards, Title 11, Administrative Rules of the State Department of Health

Cumulative Impacts: _____

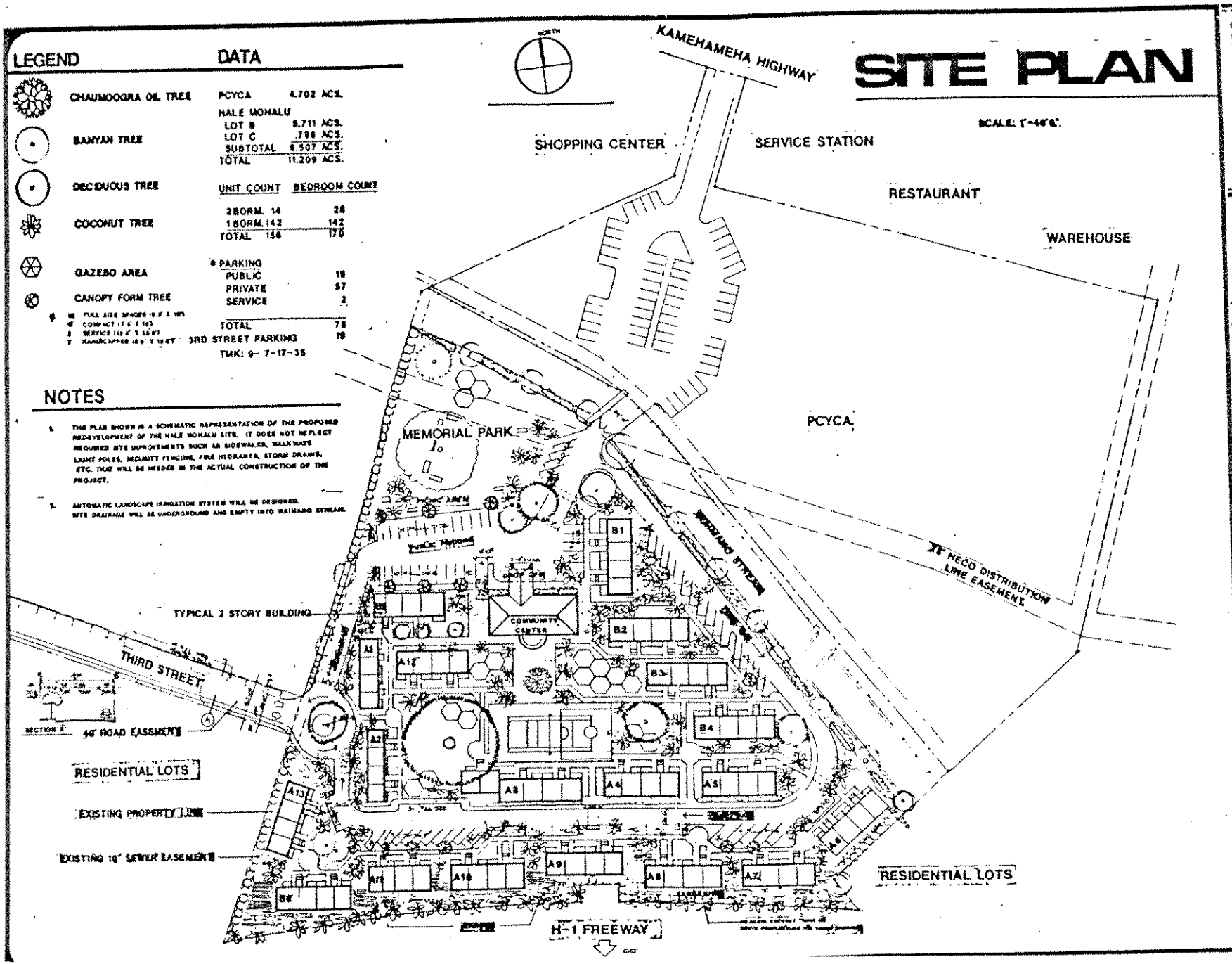
APPENDIX A

LOCATION MAP AND SITE PLAN



Location Plan

SITE PLAN



LEGEND

- CHAUMOOGRA OIL TREE
- BANYAN TREE
- DECIDUOUS TREE
- COCONUT TREE
- GAZEBO AREA
- CANOPY FORM TREE

DATA

PCYCA	4.702 ACS.
HALE MOHALU	
LOT B	5.711 ACS.
LOT C	.796 ACS.
SUBTOTAL	6.507 ACS.
TOTAL	11.209 ACS.

UNIT COUNT	BEDROOM COUNT
2BDRM. 14	28
1BDRM. 142	142
TOTAL 156	170

PARKING	
PUBLIC	19
PRIVATE	57
SERVICE	2
TOTAL	78
3RD STREET PARKING	19

TMK: 9- 7-17-35

NOTES

1. THIS PLAN SHOWN IS A SCHEMATIC REPRESENTATION OF THE PROPOSED REDEVELOPMENT OF THE HALE MOHALU SITE. IT DOES NOT REFLECT REQUIRED SITE IMPROVEMENTS SUCH AS SIDEWALKS, WALKWAYS, LIGHT POLES, SECURITY FENCING, FIRE HYDRANTS, STORM DRAINS, ETC. THAT WILL BE NEEDED IN THE ACTUAL CONSTRUCTION OF THE PROJECT.
2. AUTOMATIC LANDSCAPE IRRIGATION SYSTEM WILL BE DESIGNED. SITE DRAINAGE WILL BE UNDERGROUND AND EMPTY INTO WAIAKAMO STREAM.

SCALE: 1"=40'-0"

collaborative SEVEN

HALE MOHALU
A MIXED-USE PLAN
IN
PEARL CITY, HAWAII
TMK: 9-7-17-35

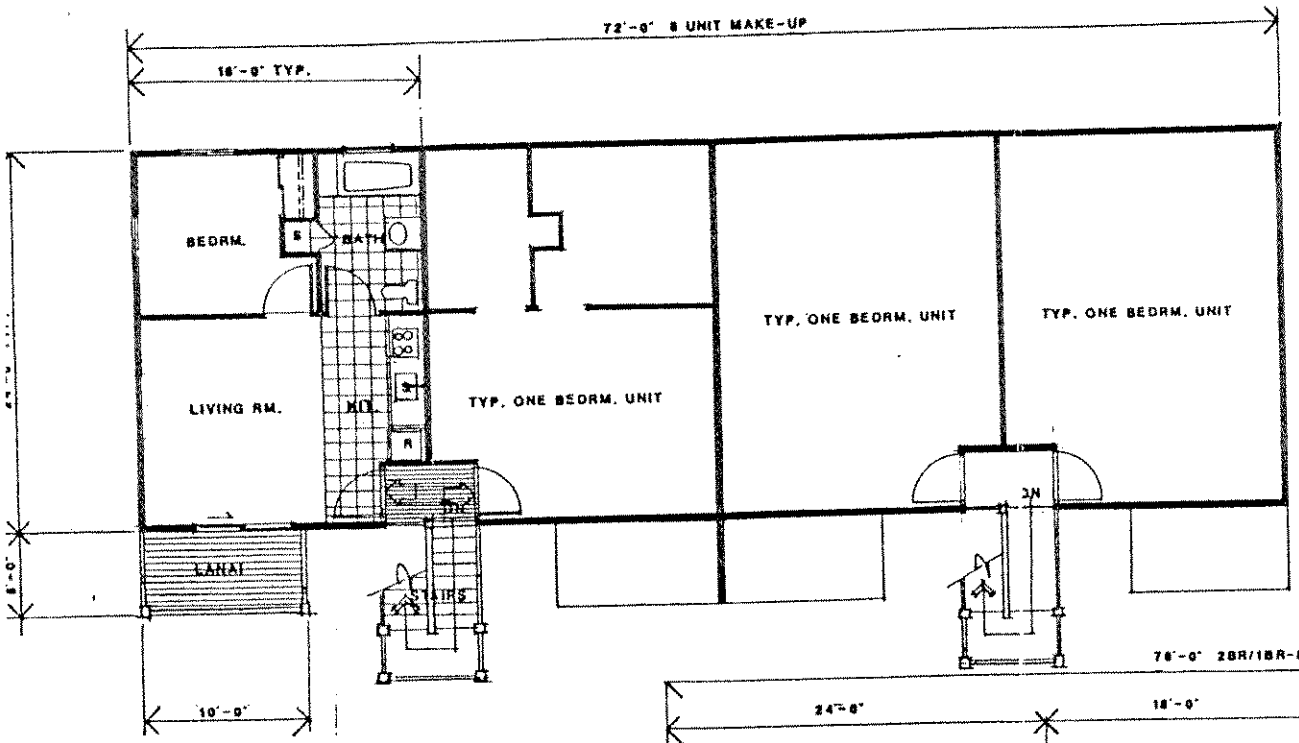
REVISIONS DATE

SHEET CONTENT

JOB NUMBER DATE

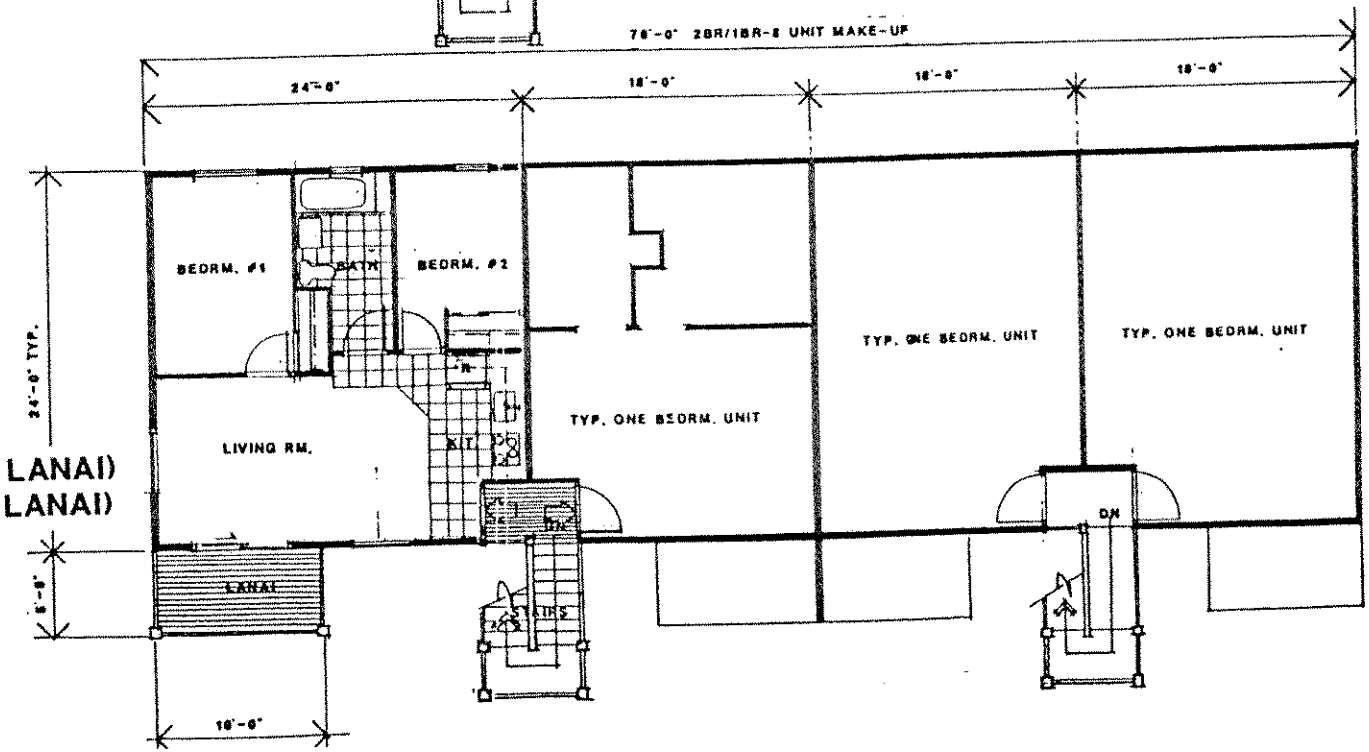
1/3

PRELIMINARY NOT FOR CONSTRUCTION



TYPICAL 8 ONE BEDROOM LAYOUT
8 UNITS 2-STORY SCHEME
(420 S.F. LIVING, 50 S.F. LANAI)

BUILDING TYPE A



TYPICAL 2 TWO-BEDROOM/
6 ONE-BEDROOM LAYOUT
8 UNITS 2-STORY SCHEME
(2 BR=576 S.F. LIVING, 50 S.F. LANAI)
(1 BR=420 S.F. LIVING, 50 S.F. LANAI)

BUILDING TYPE B

SEVEN

DEVELOPMENT
PROJECT MGT.
ARCHITECTURE
PLANNING
FINANCE
REAL ESTATE
CONSTRUCTION

APPENDIX B

AGENCIES/INTERESTED PARTIES CONSULTED

Federal

U.S. Department of Transportation, Federal Highway Administration	9/1/88
U.S. Department of Agriculture, Soil Conservation Service	9/13/88
U.S. Army Corps of Engineers	9/14/88
U.S. Department of Housing and Urban Development	9/20/88

State

Department of Agriculture	9/1/88
Department of Land and Natural resources	9/8/88
Land Use Commission	9/12/88
Housing Finance and Development Corporation	9/12/88
Department of Transportation	9/14/88
Department of Health	9/26/88

City and County

Building Department	8/31/88
Police Department	9/6/88
Fire Department	9/9/88
Department of Public works	9/9/88
Board of Water Supply	9/12/88
Department of General Planning	9/13/88
Department of Transportation Service	9/20/88
Department of Land Utilization	10/6/88

Others

Gasco, Inc.	9/2/88
Hawaiian Electric Company, Ltd.	9/19/88

Note: The above agencies and interested parties were responding to the original project plan of 180 units utilizing U.S. Department of Housing and Urban Development Community Development Block Grant funds.

BUILDING DEPARTMENT

CITY AND COUNTY OF HONOLULU

HONOLULU MUNICIPAL BUILDING
650 SOUTH KING STREET
HONOLULU, HAWAII 96813

FRANK F. FASI
MAYOR

HERBERT K. MURAOKA
DIRECTOR AND BUILDING SUPERINTENDENT

PB 88-823

August 31, 1988

'88 SEP -1 P3:39

DEPT OF HOUSING & COMM. DEVELOPMENT

MEMO TO: MIKE MOON, DIRECTOR
DEPARTMENT OF HOUSING & COMMUNITY DEVELOPMENT

FROM: HERBERT K. MURAOKA
DIRECTOR AND BUILDING SUPERINTENDENT

SUBJECT: ENVIRONMENTAL ASSESSMENT
COMMUNITY DEVELOPMENT BLOCK GRANT PROGRAM
HALE MOHALU PROJECT

We have no comments on the proposed elderly housing complex at the former Hale Mohalu Hospital site.

Thank you for the opportunity to comment on the project.

/ Herbert K. Muraoka

HERBERT K. MURAOKA
Director and Building Superintendent

cc: J. Harada

U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION
REGION NINE
Hawaii Division
Box 50206
Honolulu, Hawaii 96850

ARIZONA
CALIFORNIA
NEVADA
HAWAII
GUAM
AMERICAN SAMOA

September 1, 1988

IN REPLY REFER TO

HEC-HI

Mr. Mike Moon, Director
City and County of Honolulu
Department of Housing and Community Development
650 South King Street
Honolulu, Hawaii 96813

'88 SEP -6 AM 8:50
DEPT. OF HOUSING & COMM. DEVELOPMENT

Dear Mr. Moon:

Subject: Hale Mohalu Project, Environmental Assessment

We have reviewed the Environmental Assessment transmitted by your letter dated August 24, 1988 and have no objections or comments regarding the proposed development.

Sincerely yours,

For William R. Lake
Division Administrator

JOHN WAIHEE
GOVERNOR

YUKIO KITAGAWA
CHAIRPERSON, BOARD OF AGRICULTURE

SUZANNE D. PETERSON
DEPUTY TO THE CHAIRPERSON

State of Hawaii
DEPARTMENT OF AGRICULTURE
1428 So. King Street
Honolulu, Hawaii 96814-2512

September 1, 1988

'88 SEP -8 A10:04
DEPT OF HOUSING & COMM. DEVELOPMENT

Mr. Mike Moon, Director
Department of Housing and Community Development
City and County of Honolulu
650 South King Street
Honolulu, Hawaii 96813

Dear Mr. Moon:

Subject: Environmental Assessment
Community Development Block Grant (CDBG)
Program
Hale Mohalu Project
TMK: 9-7-19:35 Pearl City, Hawaii
Area: 5.97 acres

The Department of Agriculture has reviewed the subject Environmental Assessment and has no comments to offer.

Thank you for the opportunity to comment.

Sincerely,

Yukio Kitagawa

YUKIO KITAGAWA
Chairperson, Board of Agriculture

cc: OEQC

PRI Gasco, Inc.

515 Kamakee Street
PO Box 3379 Honolulu, Hawaii 96842
Telephone 808 547-3333 Telex (ITT) 7430292

September 2, 1988

City and County of Honolulu
Department of Housing and Community Development
650 South King Street
Honolulu, Hawaii 96813

Attention: Mr. Mike Moon
Director

'88 SEP -7 P2:01
DEPT OF HOUSING & COMM DEVELOPMENT

Gentlemen:

Subject: Environmental Assessment for
CDBG Program - Hale Mohalu Project
Plan Review and Comment

We refer to your letter of August 24, 1988, requesting our review and comments for the subject development project.

Please be advised that the project area is currently clear of all gas utility facilities, and we have no immediate plans for future gas line work in this area.

Thank you for the opportunity to comment on the proposed elderly housing project.

Very truly yours,

David Y. Morikawa
Supervisor,
Engineering & Projects

DYM:nsd

POLICE DEPARTMENT

CITY AND COUNTY OF HONOLULU

1455 SOUTH BERETANIA STREET
HONOLULU, HAWAII 96814 · AREA CODE (808) 943-3111

FRANK F. FASI
MAYOR

DOUGLAS G. GIBB
CHIEF

WARREN FERREIRA
DEPUTY CHIEF

OUR REFERENCE KN-LK

September 6, 1988

88 SEP -7 P1:59
DEPT OF HOUSING & COMM DEVELOPMENT

TO: MIKE MOON, DIRECTOR
DEPARTMENT OF HOUSING AND COMMUNITY DEVELOPMENT

FROM: DOUGLAS G. GIBB, CHIEF OF POLICE
HONOLULU POLICE DEPARTMENT

SUBJECT: ENVIRONMENTAL ASSESSMENT: COMMUNITY DEVELOPMENT BLOCK GRANT (CDBG) PROGRAM, HALE MOHALU PROJECT

We have reviewed the site plan description and location maps for the Hale Mohalu project and would like to offer the following comments.

While there are no objections to the development of the elderly housing complex, we would urge that consideration be given to environmental security (e.g., deadbolts, window locks, adequate lighting, etc.) when the residential units, parking areas, and picnic area are designed.

We would appreciate being kept informed of the housing complex as details for its development are established.

Thank you for the opportunity to comment.

DOUGLAS G. GIBB
Chief of Police

By
RONALD SOUZA
Assistant Chief of Police
Support Services Bureau

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

LIBERT K. LANDGRAF
DEPUTY

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

SEP 8 1988

Mr. Mike Moon
Director
Department of Housing &
Community Development
City & County of Honolulu
650 South King Street
Honolulu, Hawaii 96813

Dear Mr. Moon:

Subject: Community Development Block Grant Program for Hale Mohalu Project

Thank you for your letter of August 24, 1988 regarding the subject project.

The proposed Elderly Housing Center is consistent with the Board's approval of May 27, 1988, withdrawing lands from the Pearl City Youth Complex Association for issuance of a direct lease to the Hawaii Council of Churches. As a result, we have no objections to the proposed activity.

Should you have any questions regarding this matter, please feel free to contact Mr. Dean Uchida at 548-3262.

Very truly yours,

WILLIAM W. PATY, Chairperson
Board of Land and Natural Resources

cc: Mr. J. D. Ing
Mr. M. Kealoha

DEPT OF PARKS &
COMM. DEVELOPMENT

'88 SEP -9 A10:05

FIRE DEPARTMENT

CITY AND COUNTY OF HONOLULU

1455 S. BERETANIA STREET, ROOM 305
HONOLULU, HAWAII 96814

FRANK F. FASI
MAYOR

FRANK K. KAHOOHANOHANO
FIRE CHIEF

LIONEL E. CAMARA
DEPUTY FIRE CHIEF

September 9, 1988

TO: MICHAEL M. H. MOON, DIRECTOR
DEPARTMENT OF HOUSING & COMMUNITY DEVELOPMENT

FROM: FRANK K. KAHOOHANOHANO, FIRE CHIEF

SUBJECT: ENVIRONMENTAL ASSESSMENT
COMMUNITY DEVELOPMENT BLOCK GRANT (CDBD) PROGRAM
HALE MOHALU PROJECT

'88 SEP 12 P2:00
DEPT. OF HOUSING & COMM. DEVELOPMENT

We have reviewed your proposal and have the following comments:

1. Project will place an extra burden on us, however, present and planned fire protection and emergency services are considered adequate.

2. We would like to suggest you install a sprinkler system to enhance fire protection capabilities and increase protection for the elderly.

3. Fire protection and medical co-response service is available from the Pearl City Fire Station. Response time to your proposed complex will be under one minute.

Should you have any questions, please contact Battalion Chief Kenneth Word of our Administrative Services Bureau at local 3838.

Frank K. Kahoohanohano

FRANK K. KAHOOHANOHANO
Fire Chief

DF:ny

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

FRANK F. FASI
MAYOR

ALFRED J. THIEDE
DIRECTOR AND CHIEF ENGINEER

In reply refer to:
PRO 88-272(449)

September 9, 1988

'88 SEP 12 P1:53
DEPT OF HOUSING & COMM. DEVELOPMENT

MEMORANDUM

TO: MIKE MOON, DIRECTOR
DEPARTMENT OF HOUSING AND COMMUNITY DEVELOPMENT

FROM: ALFRED J. THIEDE, DIRECTOR AND CHIEF ENGINEER

SUBJECT: ENVIRONMENTAL ASSESSMENT - HALE MOHALU PROJECT

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

1. A drainage report should be submitted to our Drainage Section, Engineering Division, for review and approval.

2. Will the existing sewer lines within the property be utilized and maintained by the developer?

3. How is the area being serviced?

4. Since the proposed development will have an impact on the Honouliuli Wastewater Treatment Plant, a development schedule should be submitted to our Division of Wastewater Management for evaluation.

ALFRED J. THIEDE
Director and Chief Engineer

STATE OF HAWAII

DEPARTMENT OF BUSINESS
AND ECONOMIC DEVELOPMENT

LAND USE COMMISSION

Room 104, Old Federal Building, 335 Merchant Street
Honolulu, Hawaii 96813 Telephone: 548-4611

JOHN WAIHEE
Governor

RENTON L.K. NIP
Chairman

LAWRENCE F. CHUN
Vice Chairman

COMMISSION MEMBERS:

Sharon R. Himeno
Teofilo Phil Tacbian
Allen Kajioka
Robert Tamaye
Frederick P. Whittemore
Toru Suzuki
Allen K. Hoe

ESTHER UEDA
Executive Officer

September 12, 1988

Mr. Mike Moon, Director
Department of Housing and
Community Development
City and County of Honolulu
650 South King Street
Honolulu, Hawaii 96813

'88 SEP 14 P1:26
DEPT. OF HOUSING & COMM. DEVELOPMENT

Dear Mr. Moon:

Subject: Environmental Assessment - Community Development Block Grant (CDBG) Program - Hale Mohalu Project

We have no comments to offer on the subject project except that the proposed site is designated within the State Land Use Urban District.

Thank you for this opportunity to comment.

Sincerely,

ESTHER UEDA
Executive Officer

EU:to

BOARD OF WATER SUPPLY

CITY AND COUNTY OF HONOLULU

630 SOUTH BERETANIA STREET

HONOLULU, HAWAII 96843

September 12, 1988

'88 SEP 15 P1:40

DEPT. OF HOUSING & COMM. DEVELOPMENT

TO: MICHAEL M. H. MOON, DIRECTOR
DEPARTMENT OF HOUSING AND COMMUNITY DEVELOPMENT

FROM: KAZU HAYASHIDA, MANAGER AND CHIEF ENGINEER
BOARD OF WATER SUPPLY

SUBJECT: ENVIRONMENTAL ASSESSMENT FOR THE COMMUNITY DEVELOPMENT BLOCK GRANT (CDBG) PROGRAM, HALE MOHALU PROJECT

We have the following comments on the subject:

1. The existing water system can accommodate the proposed development.

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

3. The developer has until October 26, 1988 to reactivate the water service. Thereafter, the developer will be assessed our Water System Facilities Charges for source, transmission and daily storage.

4. Submit three (3) sets of construction drawings for our review and approval.

If you have any questions, please contact Lawrence Whang at 527-6138.

UNITED STATES
DEPARTMENT OF
AGRICULTURE

SOIL
CONSERVATION
SERVICE

P.O. BOX 50006
HONOLULU, HAWAII
96850

Mr. Mike Moon
Director
Department of Housing and Community Development
City and County of Honolulu
650 South King Street
Honolulu, Hawaii 96813

September 13, 1988

'88 SEP 15 P1:49
DEPT. OF HOUSING
& COMM. DEVELOPMENT

Dear Mr. Moon:

Subject: Environmental Assessment
Community Development Block Grant Program
Hale Mohalu Project

The soil of the housing portion of the proposed development is Honouliuli clay. This series is described as being a very sticky and very plastic clay with a high shrink-swell potential. This soil may require extra steps to insure stable foundations.

The presence of the 100-year flood zone may require additional flood control structures.

Thank you for the opportunity to comment on this project.

Sincerely,

Lawrence T. Yamamoto
District Conservationist

DEPARTMENT OF GENERAL PLANNING
CITY AND COUNTY OF HONOLULU
650 SOUTH KING STREET
HONOLULU, HAWAII 96813

FRANK F. FASI
MAYOR

DONALD A. CLEGG
CHIEF PLANNING OFFICER

GENE CONNELL
DEPUTY CHIEF PLANNING OFFICER

MM/DGP 8/88-3102

September 13, 1988

MEMORANDUM

TO: MICHAEL M. H. MOON, DIRECTOR
DEPARTMENT OF HOUSING AND COMMUNITY DEVELOPMENT

FROM: DONALD A. CLEGG, CHIEF PLANNING OFFICER
DEPARTMENT OF GENERAL PLANNING

SUBJECT: ENVIRONMENTAL ASSESSMENT
COMMUNITY DEVELOPMENT BLOCK GRANT (CDBG)
HALE MOHALU PROJECT

'88 SEP 16 A8:09
DEPT. OF HOUSING & COMM. DEVELOPMENT

This is in response to your request for comment on the Environmental Assessment identified above. The subject parcel is designated on the Primary Urban Center Development Plan Land Use Map for Public Facility use. This designation recognized the State's Hale Mohalu facility.

We have initiated an amendment to redesignate the Hale Mohalu site for Residential and Park uses. This follows the recent action by the State to earmark the Hale Mohalu facility for both housing and park and playground purposes. The proposed amendment is viewed as a reflection of State's action.

Your proposal is consistent with the General Plan policies providing for affordable housing for the elderly and handicapped and for maximal use of the Primary Urban Center lands. It does, however, exceed the densities normally associated with the existing R-5 Residential zoning district and the proposed Residential Land Use Designation of the Development Plans.

It is our understanding that you will be seeking an exemption from applicable planning and zoning regulations in order to facilitate the proposed project. With that in mind and in consideration of the critical need for specialized housing that is being proposed, we have no objections to the proposal.

The environmental assessment should elaborate upon the 100 year flood plain area, and its impact upon the proposal. The traffic associated with the project should be addressed as well as the general availability of facilities and utilities that will service the proposed development.

Thank you for the opportunity to comment on this matter. If you have any questions, please contact Mel Murakami of my staff at 527-6020.

DONALD A. CLEGG
Chief Planning Officer

DAC:lh

JOHN WAIHEE
GOVERNOR

Joseph K. Conant
Executive Director

STATE OF HAWAII
Department of Business and Economic Development
Housing Finance and Development Corporation
P. O. Box 29360
Honolulu, Hawaii 96820-1760

IN REPLY REFER

TO:

88:PLNG/973B JT

September 14, 1988

'88 SEP 15 A11:36
DEPT OF HOUSING & COMM. DEVELOPMENT

Mr. Mike Moon
Department of Housing and
Community Development
City and County of Honolulu
650 South King Street
Honolulu, Hawaii 96813

Dear Mr. Moon:

Re: Environmental Assessment
Community Development Block Grant (CDBG) Program
Hale Mohalu Project

Thank you for the opportunity to review the subject environmental assessment.

Although we have no substantial comments to offer at this time, we would like to share a thought on group homes.

Through nine years of experience in operating group homes, the Catholic Charities has found that groups of four or five work out much better. "Residents are not left out and it is easier to work out differences and problems in the houses. However, due to the four or five different lifestyles, this arrangement also requires a higher staff ratio to provide house meetings and problem resolution." (Diane Murayama, Executive Director)

We appreciate the opportunity to comment and apologize for the late response.

Sincerely,

JOSEPH K. CONANT
Executive Director

cc: The Honorable Roger A. Ulveling

DEPARTMENT OF THE ARMY
U. S. ARMY ENGINEER DISTRICT, HONOLULU
BUILDING 230
FT. SHAFTER, HAWAII 96858-5440

REPLY TO
ATTENTION OF

September 14, 1988

Planning Branch

'88 SEP 20 P1:38

DEPT OF HOUSING AND
COMM. DEVELOPMENT

Mr. Mike Moon, Director
Department of Housing and
Community Development
650 South King Street, 5th Floor
Honolulu, Hawaii 96813

Dear Mr. Moon:

Thank you for the opportunity to review the Environmental Assessment preparation notice for the proposed Hale Mohalu project at Pearl City, Oahu. The following comments are offered:

a. A Department of the Army permit would be required for any fills or structures placed within Waimano Stream. The site plan in Exhibit II indicates that there may be roads, walkways, and utility lines crossing the stream. The applicant should contact Operations Branch at 438-9258 for further details on permit requirements.

b. According to the Flood Insurance Study for the City and County of Honolulu, the project parcel is located in Zone D (areas in which flood hazards are undetermined).

Sincerely,

C Jay

Kisuk Cheung
Chief, Engineering Division

Hawaiian Electric Company, Inc. • PO Box 2750 • Honolulu, HI 96840-0001

ENV 2-1
JA/G

September 19, 1988

'88 SEP 21 P1:34
DEPT OF HOUSING & COMM DEVELOPMENT

Mr. Mike Moon, Director
Department of Housing and Community
Development
City and County of Honolulu
650 South King Street
Honolulu, Hawaii 96813

Subject: Environmental Assessment Community Development Block Grant (CDBG) Program Hale Mohalu Project

We have reviewed the subject document and have the following comment:

1. There are no existing 138KV transmission lines crossing or in close proximity to the subject development. However, the route for the future Waiau-CIP 138KV lines may be impacted.

Sincerely,

William A. Bonnet
Manager, Environmental Department

DEPARTMENT OF TRANSPORTATION SERVICES

CITY AND COUNTY OF HONOLULU

HONOLULU MUNICIPAL BUILDING
650 SOUTH KING STREET
HONOLULU, HAWAII 96813

FRANK F. FASI
MAYOR

JOHN E. HIRTEN
DIRECTOR

JOSEPH M. MAGALDI, JR.
DEPUTY DIRECTOR

TE-5788
PL1.1255

September 20, 1988

MEMORANDUM

TO: MIKE MOON, DIRECTOR
DEPARTMENT OF HOUSING AND COMMUNITY DEVELOPMENT

FROM: JOHN E. HIRTEN, DIRECTOR

SUBJECT: HALE MOHALU PROJECT
COMMUNITY DEVELOPMENT BLOCK GRANT PROGRAM
ENVIRONMENTAL ASSESSMENT
TMK: 9-7-19: 35

'88 SEP 20 P1:34
CITY OF HONOLULU
DEPT. OF HOUSING & COMM. DEVELOPMENT

This is in response to your memorandum dated August 24, 1988 requesting our review and comments for the subject assessment.

Provisions should be made to accommodate the excess parking demand from the youth center events to minimize the impact to the surrounding residents.

Should you have any questions, please contact Kenneth Hirata of my staff at Local 5031.

JOHN E. HIRTEN

U.S. Department of Housing and Urban Development
Honolulu Office, Region IX
300 Ala Moana Blvd., Room 3318, Box 50007
Honolulu, Hawaii 96850-4991

88-412

September 20, 1988

'88 SEP 21 P1:33

DEPT OF HOUSING & COMM. DEVELOPMENT

Mr. Mike Moon, Director
City & County of Honolulu
Dept. of Housing & Community Development
650 South King Street
Honolulu, HI 96813

Dear Mr. Moon:

SUBJECT: Hale Mohalu Project
Environmental Assessment

We have reviewed the proposed project for environmental concerns that should be considered in your environmental assessment. Our comments follow.

1. If Community Development Block Grant (CDBG) funds are used for site improvements or other improvements that will be located within the 100-year Floodplain, you must comply with Executive Order 11988 Floodplain Management. Flood insurance would also be required on the improvements while they are located in the floodplain.

2. It is recommended that you contact Nathan Napoka, Historian with the Historic Sites Division, State Department of Land and Natural Resources. The State is considering extending the listing of the Oahu Railway & Land Co. right-of-way from the Ewa area to a point Diamond Head of the subject property.

   Should it be determined that the abandoned railway line be on the National Register of Historic Places, compliance with Section 106 of the National Historic Preservation Act of 1966 would be required.

3. The noise levels generated by vehicular traffic from Kamehameha Highway and the H-1 Freeway should be evaluated to determine if the site is subjected to noise levels over 65 LDN. HUD's Noise Assessment Guidelines may be used to make this determination.

If you have any questions, please call Frank Johnson at 541-1326.

Very sincerely yours,

James K. Nakakuni for

Calvin Lew
Director
Community Planning and
Development Division

JOHN WAIHEE
GOVERNOR

EDWARD Y. HIRATA
DIRECTOR

DEPUTY DIRECTORS
JOHN K. UCHIMA
RONALD N. HIRANO
DAN T. KOCHI
JEANNE K. SCHULTZ

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

IN REPLY REFER TO:

STP 8.3158

September 21, 1988

Mr. Michael M.H. Moon, Director
Department of Housing and Community Development
City and County of Honolulu
650 South King Street
Honolulu, Hawaii 96813

Dear Mr. Moon:

Environmental Assessment
Community Development Block Grant Program
Hale Mohalu Project

We have the following comments to offer on the proposed Hale Mohalu project:

1. We need a Traffic Assessment report for our review and approval. The report should also consider the potential impacts from traffic generated by the adjacent Pearl City Youth Complex development.

2. During the design stage, the developer should take into consideration the proposed transit corridor running along the makai boundary of the parcel. There should be as much open space as possible by placing structures away from the boundary.

3. We strongly suggest that Third Street be upgraded and become the major access to both the Youth Complex and the Hale Mohalu project.

4. Work to be done within our State highway rights-of-way requires our review and approval and all highway improvements will be the responsibility of the developer.

Thank you for this opportunity to provide comments.

Very truly yours,

Edward Y. Hirata
Director of Transportation

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:
EPHSD

September 26, 1988

MEMORANDUM

To: Mr. Mike Moon, Director, Department of Housing & Community Development, City & County of Honolulu

From: Deputy Director for Environmental Health

Subject: Environmental Assessment (EA) for Community Development Block Grant (CDBG) Program - Hale Mohalu Project

Thank you for allowing us to review and comment on the subject environmental assessment. There are reservations to the proposed project in that noise associated with sports events (such as yelling and cheering, and from public announcement systems) from the proposed adjacent Pearl City Youth Complex could adversely impact residents of the proposed housing project.

Bruce S. Anderson

BRUCE S. ANDERSON, Ph.D.

'88 OCT -4 AM 9:32
DEPT OF HOUSING & COMM DEVELOPMENT

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

FRANK F. FASI
MAYOR

JOHN P. WHALEN
DIRECTOR

BENJAMIN B. LEE
DEPUTY DIRECTOR

LU8/88-6214(ASK)

October 6, 1988

MEMORANDUM

TO: MIKE MOON, DIRECTOR
DEPARTMENT OF HOUSING AND COMMUNITY DEVELOPMENT

FROM: JOHN P. WHALEN, DIRECTOR

SUBJECT: ENVIRONMENTAL ASSESSMENT -- COMMUNITY DEVELOPMENT BLOCK GRANT (CDBG) PROGRAM -- HALE MOHALU

'88 OCT -7 P1:35
DEPT. OF HOUSING & COMM. DEVELOPMENT

We have reviewed the conceptual plan to develop an elderly housing complex in Pearl City and have the following comments:

1. Density. The planned 180 units exceeds the 69 which would be allowed under a cluster permit. Development of the proposed plan would require either a Planned Development-Housing (PD-H) approval or exemption from LUO provisions through exercise of county housing powers.

2. Site Plan. Comments relative to development as a PD-H are as follows:

   a. A minimum of 50 percent of the land area must be maintained in open space.

   b. Walkways may be required for pedestrian access to all dwelling units and project facilities.

   c. Switching the picnic area with the adjacent parking would increase pedestrian safety, enhance security and provide a buffer for the residential area from vehicular traffic.

   d. The main access to the site appears to be from Kamehameha Highway through the Youth Complex parking lot. Access could be very difficult when parking becomes congested, especially during weekend sports events. Will access also be provided from Third Street?

3. Height. The heights of the three-story structures bordering the freeway should be staggered. Structures which exceed the 25-foot height limit will require a variance or an exemption under county housing powers.

4. Parking. The number of proposed parking stalls is below LUO standards and would require a variance or an exemption under county housing powers. Although the 19 proposed guest stalls are adequate, a Conditional Use Permit may be required to allow shared use with the park.

5. The environmental assessment should address freeway noise and any hazards associated with the proximity of Waimano Stream.

Thank you for allowing us the opportunity to comment on this proposal. If you have any questions, please contact Ardis Shaw-Kim of our Environmental Affairs Branch at 523-4077.

JOHN P. WHALEN
Director of Land Utilization

JPW:sl
0239N

APPENDIX C

AIR QUALITY ANALYSIS

Note: This analysis was based on a 200 unit development.

AIR QUALITY STUDY

FOR THE PROPOSED

HALE MOHALU HOUSING PROJECT

PEARL CITY, OAHU, HAWAII

Prepared for:

Gerald Park, Urban Planner

Prepared by:

Barry D. Root & Barry D. Neal

October 1988

CONTENTS

FIGURES

TABLES

Table

1.0 INTRODUCTION AND PROJECT DESCRIPTION

The Hawaii Council of Churches is proposing to develop a housing project for the elderly and for persons with physical disabilities including Hansen's disease patients at Hale Mohalu, Pearl City, Oahu, Hawaii. The primary goal of the project is to create affordable rental housing for these persons and a community where residents can be assured a secure, stable and comfortable lifestyle. Figure 1 is a project location map showing the location of the Hale Mohalu site. The proposed site is located between the H-1 Freeway to the south and Kamehameha Highway to the north, just east of Lehua Street.

Presently, the project site is not being used. As indicated in the site plan presented in Figure 2, the proposed housing development at Hale Mohalu would consist of multiple studio, one-bedroom and five-bedroom housing units, a community center, a public parking lot, a picnic area, and other associated facilities. A total of 200 housing units is planned on the 6.5-acre site. Development of the proposed project is expected to be completed by 1990.

The purpose of this study is to describe existing air quality in the project area and to assess the potential short-term and long-term direct and indirect air quality impacts that could result from construction and use of the proposed project as planned. Measures to mitigate any potential impacts are suggested where possible and applicable. Additionally, due to the close proximity of the H-1 Freeway, both present and future air quality impacts from freeway traffic on the project site are assessed.

2.0 AMBIENT AIR QUALITY STANDARDS (AAQS)

National Ambient Air Quality Standards (AAQS) are specified in Section 40, Part 50 of the Code of Federal Regulations (CFR), while State of Hawaii AAQS are defined in Chapter 11-59 of the Hawaii Administrative Rules. Table 1 summarizes both the national and the state AAQS that are specified in the cited documents. As indicated in the table, AAQS have been established for six pollutants. The pollutants for which AAQS have been established include particulate matter, sulfur dioxide, nitrogen dioxide, carbon monoxide, ozone and lead. National AAQS are stated in terms of primary and secondary standards. National primary standards are designed to protect the public health with an "adequate margin of safety". National secondary standards, on the other hand, define levels of air quality necessary to protect the public welfare from "any known or anticipated adverse effects of a pollutant". Secondary public welfare impacts may include such effects as decreased visibility, diminished comfort levels, or other potential injury to the natural or man-made environment, e.g., soiling of materials, damage to vegetation or other economic damage. In contrast to the national AAQS, Hawaii State AAQS are given in terms of a single standard that is designed "to protect public health and welfare and to prevent the significant deterioration of air quality".

Each of the regulated pollutants has the potential to create or exacerbate some form of adverse health effect or to produce environmental degradation when present in sufficiently high concentration for prolonged periods of time. The AAQS specify a maximum allowable concentration for a given pollutant for one or more averaging times to prevent harmful effects. Averaging times vary from one hour to one year depending on the pollutant and type of exposure necessary to cause adverse effects. In the case of the

short-term (i.e., 1- to 24-hour) AAQS, both national and state standards allow one exceedance per year.

State of Hawaii AAQS are in some cases considerably more stringent than comparable national AAQS. In particular, the State of Hawaii 1-hour AAQS for carbon monoxide is four times more stringent than the comparable national limit.

Under the provisions of the Federal Clean Air Act [1], the U.S. Environmental Protection Agency (EPA) is required to periodically review and re-evaluate national AAQS in light of research findings more recent than those which were available at the time the standards were originally set. Occasionally new standards are created as well. Most recently, the national standard for particulate matter has been revised to include specific limits for particulates 10 microns or less in diameter (PM-10) [2]. The State of Hawaii has not explicitly addressed the question of whether to set limits for this category of air pollutant, but national AAQS prevail where states have not set their own more stringent levels.

Hawaii AAQS for sulfur dioxide were relaxed in 1986 to make them essentially the same as national limits. It has been proposed in various forums that the state also relax its carbon monoxide standards to the national levels, but at present there are no indications that such a change is being considered.

3.0 PRESENT AIR QUALITY

The State Department of Health operates an air quality monitoring station in Pearl City less than one mile northwest of the project

site. However, at the present time, only measurements of particulate matter are being obtained at the Pearl City monitoring station. In previous years, sulfur dioxide was also measured at this station. The nearest other monitoring stations are located at Barbers Point, Sand Island and urban Honolulu. Table 2 is a composite summary of air pollutant measurements from Pearl City and other nearby State of Hawaii long-term monitoring stations for the years 1981 through 1987.

Measurements of 24-hour particulate matter concentrations made at the Pearl City monitoring station in 1987 averaged 34 ug/m^3 and ranged from 20 to 61 ug/m^3. There were no exceedances of the state AAQS. Data for 1981 through 1986 exhibited similar statistics. PM-10 measurements were also initiated at the Pearl City station during 1987, with readings averaging about 50 percent of the reported total particulate matter levels.

As indicated in the table, sulfur dioxide concentrations were monitored at Pearl City through 1984. After that date the nearest measurements were made at Barbers Point, about 10 miles south of Hale Mohalu. Measured 24-hour sulfur dioxide concentrations at these two locations rarely exceeded the measurement threshold of 5 ug/m^3. There were no reported exceedances of the state AAQS during any of the years 1981 through 1987.

During 1981 the nearest carbon monoxide concentrations were measured at Fort DeRussey in Waikiki (about 12 miles southeast of the project). In 1982-83 the closest carbon monoxide levels were monitored at Leahi Hospital in Kaimuki (about 14 miles southeast of the project). From 1984 onward the only leeward Oahu carbon

monoxide measurements were made at the Department of Health building in downtown Honolulu (about 11 miles southeast of Hale Mohalu). In recent years, the average daily maximum 1-hour concentration has been measured at about 2 mg/m^3. During the most recent year reported, 1987, the daily maximum 1-hour concentration ranged from 0.3 to 11.1 mg/m^3; one exceedance of the state AAQS was recorded. During the previous year (1986), three exceedances of the state AAQS were reported.

The nearest available ozone measurements were taken at Sand Island (about 9 miles southeast of the project site). During 1987 the Sand Island daily maximum 1-hour concentration averaged 38 ug/m^3 and ranged from 4 to 84 ug/m^3, and there were no exceedances of the state AAQS. Maximum 1-hour concentrations during 1986 and 1987 were significantly lower than those measured between 1983 and 1985.

The only nitrogen dioxide data for Oahu were obtained at Sand Island during 1981. Twenty-four hour values ranged from 6 to 77 ug/m^3 with an average of 25 ug/m^3. This was well within the state AAQS.

Monitoring for lead was initiated in 1984 at the Department of Health monitoring station in Downtown Honolulu. During the past four years, the annual average quarterly lead concentrations have had a downward trend falling from 0.3 to 0.0 ug/m^3. No exceedances of the state AAQS have ever been recorded.

From the data presented in Table 2, it appears that State of Hawaii AAQS for particulates, sulfur dioxide, nitrogen dioxide and lead

are currently being met at monitoring stations nearest to the project site. The ozone AAQS has not been exceeded during the past two years. Carbon monoxide readings from urban Honolulu, on the other hand, indicate that the state AAQS for carbon monoxide may be exceeded at a rate of one to three times per year. Since carbon monoxide is primarily a vehicle-related air pollutant, any new development in leeward Oahu generating vehicular traffic could potentially exacerbate the problem.

4.0 SHORT-TERM DIRECT AND INDIRECT IMPACTS OF PROJECT CONSTRUCTION

For a project of this nature, there are two potential sources of air pollution emissions which could directly result in short-term air quality impacts during project construction: (1) fugitive dust from vehicle movement and soil excavation and (2) exhaust emissions from on-site construction equipment. There could also be short-term indirect impacts from slow-moving construction equipment traveling to and from the project site, and from a temporary increase in local traffic caused by commuting construction workers.

Fugitive dust emissions may arise from grading and dirt-moving activities within the project site. The emission rate for fugitive dust is nearly impossible to estimate accurately because of its elusive nature and because the potential for its generation varies greatly depending upon the type of soil at the construction site, the amount and type of dirt-disturbing activity taking place, the moisture content of exposed soil in work areas, and the wind speed. The EPA [3] has provided a rough estimate for uncontrolled fugitive dust emissions from construction activity of 1.2 tons per acre per month under conditions of "medium" activity, moderate soil silt content (30%), and semiarid climate. In any case, State of Hawaii Air Pollution Control Regulations [4] require that visible

emissions of fugitive dust from construction activity be essentially nil.

Adequate fugitive dust control can usually be accomplished by establishment of a frequent watering program to keep bare-dirt surfaces in work areas from becoming significant dust generators. Control regulations also require that open-bodied trucks be covered at all times when in motion if they are transporting materials likely to give rise to airborne dust. Paving of parking areas and establishment of landscaping as early in the construction process as possible can also lower the potential for fugitive dust emissions.

On-site mobile and stationary construction equipment will also emit some air pollutants in the form of engine exhausts. The largest of this equipment is usually diesel-powered. Nitrogen oxides emissions from diesel engines can be relatively high compared to gasoline-powered equipment, but the standard for nitrogen dioxide is set on an annual basis and is not likely to be violated by short-term construction equipment emissions. Carbon monoxide emissions from diesel engines, on the other hand, are very low and should be essentially insignificant compared to normal vehicular emissions on nearby roadways.

Indirectly, slow-moving construction vehicles on roadways leading to and from the project site could obstruct the normal flow of traffic to such an extent that overall vehicular emissions of carbon monoxide are increased, but this impact can be mitigated by moving heavy construction equipment during periods of low traffic volume. Likewise, the schedules of commuting construction workers can be adjusted to avoid peak hours in the project vicinity. Thus,

most potential short-term air quality impacts from project construction are relatively easy to mitigate.

5.0 LONG-TERM INDIRECT IMPACTS

After the project is completed, residents and visitors will generate increased motor vehicle traffic in the project area. Thus, the proposed project must be considered to be a potential indirect air pollution source. Motor vehicles with gasoline-powered engines are significant sources of carbon monoxide. They also emit nitrogen oxides and those burning leaded gasoline can also contribute lead to the atmosphere. The use of leaded gasoline in new automobiles is now prohibited. As older vehicles continue to disappear from the numbers of those currently operating on Oahu roadways, lead emissions are approaching zero. Nationally, so few vehicles now require leaded gasoline that the EPA is proposing a total ban on leaded gasoline to take effect immediately. Even without such a ban, reported quarterly averages of lead in air samples collected in urban Honolulu have been near zero since early 1986. Thus, lead in the atmosphere is not considered to be a problem anywhere in the state.

Federal air pollution control regulations also call for increased efficiency in removing carbon monoxide and nitrogen oxides from vehicle exhausts. By the year 1995 carbon monoxide emissions are expected to be about one fourth less than the amounts now emitted. At present, however, no further reductions in vehicular emissions have been mandated and increases in traffic levels after 1995 will result in directly proportional increases in vehicle-related pollutant emissions.

To evaluate the potential long-term indirect air quality impact of increased traffic associated with a project such as this, it is standard practice to utilize computerized atmospheric dispersion models to estimate ambient carbon monoxide concentrations along roadways leading to and from the project. Carbon monoxide is selected for modeling because it is both the most stable and the most abundant of the motor vehicle generated pollutants, and it is also the air pollutant with the greatest likelihood of violating AAQS.

To begin the carbon monoxide modeling study, critical receptor areas in the vicinity of the project were identified for analysis. Generally speaking, roadway intersections are the primary concern because of the increase in vehicular emissions associated with traffic cycling: decelerating, stopping, queueing and accelerating. In this case, two intersections were identified for analysis: (1) the intersection of the project entry road and Kamehameha Highway, and (2) the nearby Puu Momi Street intersection with Kamehameha Highway. Both of these intersections are "T" intersections, with Puu Momi Street being signalized. Puu Momi Street intersects Kamehameha Highway approximately 80 meters (260 feet) Ewa of the project entry road. In the vicinity of Hale Mohalu, Kamehameha Highway is three lanes wide in each direction with a left turn lane for eastbound traffic to turn mauka at Puu Momi street.

The main objectives of the modeling study were to estimate both current and projected levels of maximum 1-hour average carbon monoxide which could be directly compared to the national and state AAQS. The traffic impact assessment report for the project [5] indicates that peak traffic with or without the project is expected to occur on weekdays. Weekday traffic along this portion of Kamehameha Highway peaks in the morning between 6:15 and 7:15 am

and again during the afternoon between 3:30 and 4:30 pm. Both morning and afternoon peak traffic volumes are roughly equal in magnitude with the afternoon peak being only slightly higher. Worst-case atmospheric dispersion conditions usually occur during the early morning hours, and thus the morning peak traffic hour can be expected to cause the highest roadway concentrations.

Modeling was performed for the years 1988 and 1990 (the planned year of project completion). Based on recent vehicle registration figures, the present and projected vehicle mix in the project area is estimated to be 91.9% light-duty gasoline-powered vehicles, 4.2% light-duty gasoline-powered trucks and vans, 0.5% heavy-duty gasoline-powered vehicles, 1% diesel-powered trucks and buses, and 1% motorcycles.

The EPA computer model MOBILE3 [6] was used to calculate vehicular carbon monoxide emission estimates for each of the years studied. For vehicles traversing the roadways, it was assumed that about 21 percent would be operating in the cold-start mode and that about 27 percent would be operating in the hot-start mode. These are standard, default values that are used in calculating cold/hot start emissions. National averages for "mis-fueling" were assumed. A relatively cool ambient temperature of 59 degrees F was used for morning peak-hour emission computations. This is a conservative assumption since the emission estimates given by MOBILE3 are inversely proportional to the ambient temperature.

After computing vehicular carbon monoxide emissions through the use of MOBILE3, these data were then input to the computer model CALINE4 [7]. CALINE4 was developed by the California Transportation Department and the EPA to simulate vehicular

movement and atmospheric dispersion of vehicular emissions. It is designed to predict 1-hour average pollutant concentrations along roadways given input traffic and emission data, roadway/receptor geometry and meteorological conditions.

Input peak traffic data were obtained from the traffic study cited previously. Model receptor sites were located 10 meters from the edge of the roadways near the subject intersections at a height of 1.5 meters above grade to simulate levels within the normal human breathing zone.

Input meteorological conditions for this study were defined to provide "worst-case" results. One of the key meteorological inputs is atmospheric stability category. For these analyses, atmospheric stability category 6 was assumed. This is the most conservative stability category that can be used for estimating morning pollutant dispersion in model calculations. A surface roughness length of 175 cm was assumed based on the numerous buildings, trees and other obstructions in the area. Worst-case wind conditions were defined as a wind speed of 1 meter per second with a wind direction resulting in the highest predicted concentration.

Background concentrations of air pollution in the project vicinity are likely to be moderate due to the surrounding developed areas and given the monitoring data shown in Table 2. Hence, background contributions of carbon monoxide from sources or distant roadways not directly considered in the analysis were accounted for by adding a value of 1 ppm to all predicted concentrations.

Table 3 summarizes the final results of the modeling study in the form of the predicted maximum carbon monoxide concentrations at the two intersections in question. These results can be compared directly to the state and national AAQS. Predicted maximum carbon monoxide concentrations are presented in the table for three scenarios: 1988, 1990 without the project, and 1990 with the project. The locations of these predicted maximum concentrations were all either at or very near the analyzed intersections.

The worst-case 1-hour values given in the table were obtained directly from the modeling results. As indicated in the table, the estimated present (1988) maximum 1-hour carbon monoxide concentration was 8.2 mg/m^3 at the project entry road intersection and 12.3 mg/m^3 at the Puu Momi Street intersection. In 1990 without the project, the predicted maximum 1-hour concentrations decrease somewhat to 7.6 mg/m^3 and 11.4 mg/m^3 even though traffic is predicted to increase by about 3 percent. This is because the increase in traffic will be offset by newer vehicles with more efficient emission control devices. The predicted maximum 1-hour concentrations for the 1990 scenario with the project were the same as the without project scenario. This reflects the fact that the project would generate only a very small increment in peak vehicular traffic in the area, and the contribution to the maximum concentrations from this additional traffic would be inconsequential. All predicted concentrations are well within the 40 mg/m^3 1-hour national AAQS; however, it appears that the corresponding state AAQS of 10 mg/m^3 may be exceeded at the Puu Momi Street intersection during worst-case dispersion conditions. Project traffic contributions to any exceedance of the state standard would be insignificant.

Worst-case 8-hour carbon monoxide concentrations were estimated by multiplying the worst-case 1-hour values by a "meteorological persistence factor" of 0.6. This procedure is recommended in EPA guidelines [8] to account for two factors: (1) hourly traffic volumes averaged over eight hours are lower than the peak 1-hour value, and (2) atmospheric dispersion conditions are more variable (and hence more favorable for dispersion) over an 8-hour period than they are for a single hour. The resulting estimated maximum 8-hour concentrations are indicated in Table 3. The estimated maximum 8-hour carbon monoxide concentrations for 1988 were 4.9 mg/m3 at the project entry road intersection and 7.4 mg/m^3 at the Puu Momi Street intersection. Predicted values for 1990 at these two locations without the project improved somewhat to 4.6 and 6.8 mg/m^3. This again is due to increased efficiency of air pollution control equipment on newer automobiles. With the project, the predicted 1990 values were the same as the without project scenario, i.e., the project would have no measurable impact on the predicted worst-case concentrations due to the small amount of traffic that it would generate. At the project entry road intersection, predicted worst-case 8-hour concentrations are safely within the national AAQS (10 mg/m^3) but are very close to exceeding the state AAQS (5 mg/m^3). At Puu Momi Street, the predicted values exceed the state standard but are within the national standard.

It is important to note that the worst-case meteorological conditions used for modeling have a very low probability of occurrence. With wind speeds of 2 meters per second instead of 1, for example, computed carbon monoxide concentrations would be only about half the values given above.

6.0 IMPACT OF CARBON MONOXIDE EMISSIONS FROM H-1 FREEWAY TRAFFIC

The H-1 Freeway passes by the project site roughly 30 meters (100 feet) from the south boundary. This section of the H-1 is elevated about 9 to 12 meters (30 - 40 feet) above grade, and each direction of the freeway is five lanes wide with a capacity of 10,000 vehicles per hour. Due to the close proximity of the freeway, it is very appropriate to assess what the impact of carbon monoxide emissions from vehicles traversing the freeway is or will be on the project site.

To address this question, methodologies similar to those discussed above in connection with the surface street analysis were employed: morning and afternoon peak-hour freeway traffic data were obtained from the traffic study cited previously; MOBILE3 was used to estimate vehicular carbon monoxide emissions; and CALINE4 was used to simulate atmospheric dispersion of the emissions.

At present the morning peak hour occurs between 6:30 and 7:30 am with roughly 3000 vehicles per hour traveling in each direction, while the afternoon peak hour occurs between 3:30 and 4:30 pm with about 3800 vehicles Honolulu bound and about 5700 vehicles Ewa bound. By 1990, the year of project completion, peak-hour vehicle counts were estimated to increase by about 4 percent.

Inputs for MOBILE3 were the same as those described previously for the surface roadway analyses except that a temperature of 68 degrees F was used to estimate afternoon emissions. All emission estimates were based on a speed of 40 mph. This is relatively conservative as traffic generally moves faster than this, and emission estimates are inversely proportional to vehicle speed.

Similar to the surface roadway analysis, meteorological conditions were defined to provide "worst-case" results. Atmospheric stability category 6 was assumed for the morning case and stability category 4 was assumed for the afternoon case. These are the most conservative stability categories that can be used for estimating morning and afternoon pollutant dispersion in model calculations. A surface roughness length of 100 cm was assumed with a mixing height of 500 meters. Worst-case wind conditions were defined as a wind speed of 1 meter per second with a wind direction resulting in the highest predicted concentration. Background carbon monoxide concentration was estimated to be 1 ppm.

Preliminary modeling results showed that, even though peak-hour afternoon traffic counts were more than 50 percent higher than morning rush-hour counts, the morning case would result in higher predicted concentrations due to less favorable dispersion conditions. Thus, the afternoon case was excluded from further analysis, and maximum concentrations were concluded to occur during the morning peak-traffic hour.

The results of the freeway modeling study for the 1988 scenario are graphically displayed in Figure 3. This figure is an isopleth map showing the magnitude and spatial variation of predicted worst-case 1-hour carbon monoxide concentrations in the vicinity of Hale Mohalu for the year 1988. The highest predicted concentration, 4.5 mg/m^3, occurs along the south site boundary. Predicted concentrations decrease with increasing distance from the freeway to less than 2 mg/m^3 north of the Community Center. The predicted 1-hour values for 1990 shown in Figure 4 improve slightly due to the expected reduction in vehicular emissions from newer vehicles.

The highest predicted on-site concentration in 1990 is 4.2 mg/m^3. These values are all well within state and national AAQS.

Worst-case 8-hour average concentrations were estimated by applying a 0.6 meteorological persistence factor as discussed in the previous section. The resulting predicted values for 1988 and 1990 are given in Figures 5 and 6, respectively. At the site boundary, the predicted 1988 worst-case concentration is 2.7 mg/m^3, with concentrations over much of the project area ranging between 1 and 2 mg/m^3. Values predicted for 1990 are roughly the same with a maximum 8-hour concentration of 2.5 mg/m^3. All predicted values are within state and national AAQS.

Beyond 1990, freeway traffic will undoubtedly continue to grow. If it is assumed that the freeway reaches full capacity sometime beyond the year 2000, it is estimated that present (1988) 1-hour and 8-hour worst-case concentrations would approximately double. If this occurs, worst-case concentrations could come close to exceeding the state AAQS but would remain well within the national AAQS.

It should be noted that all of these estimates of freeway impacts are based on vehicle speeds of 40 mph. If, for example, traffic is slowed to 15 to 20 mph during coincident worst-case meteorological conditions, the predicted concentrations would be 2 to 3 times higher than the values given above.

7.0 SUMMARY OF IMPACTS AND MITIGATIVE CONSIDERATIONS

7.1 Short-Term

The major short-term air quality impact of project construction will be the potential emission of significant quantities of fugitive dust. Strict compliance with State of Hawaii Air Pollution Control Regulations regarding establishment of a regular dust-watering program and covering of dirt-hauling trucks will be required to effectively mitigate this concern.

7.2 Long-Term

Long-term indirect air quality impact from project traffic is expected to be almost nil due to the relatively small number of vehicles involved during peak traffic hours. Detailed dispersion modeling of vehicular carbon monoxide emissions from surface roadway traffic in the area has indicated that worst-case projected levels of carbon monoxide may exceed State of Hawaii AAQS but would comply with national AAQS. Contributions to worst-case concentrations from project traffic would be insignificant. For this reason, no specific mitigative measures are proposed in this regard.

Dispersion modeling of vehicular emissions emanating from H-1 Freeway shows that the impact on the project site would remain within state and national AAQS provided traffic continues to flow relatively freely.

REFERENCES

1. U.S. Congress. Clean Air Act Amendments of 1977 (P.L. 95-95), Section 109, National Ambient Air Quality Standards, August 1977.

2. U.S. Environmental Protection Agency. Revisions to National Ambient Air Quality Standards for Particulate Matter, Federal Register, Vol. 52, p. 2463, July 1, 1987.

3. Compilation of Air Pollutant Emission Factors, Volume I: Stationary Point and Area Sources, Fourth Edition Including Supplement A, AP-42, U.S. Environmental Protection Agency, Research Triangle Park, NC, September 1985.

4. State of Hawaii. Hawaii Administrative Rules, Chapter 11-60, Air Pollution Control.

5. Gerald Park, Traffic Studies for Hale Mohalu Residential Community, September 1988.

6. User's Guide to MOBILE3 (Mobile Source Emissions Model), EPA 460/3-84-002, U.S. Environmental Protection Agency, June 1984.

7. CALINE4 - A Dispersion Model for Predicting Air Pollutant Concentrations Near Roadways, FHWA/CA/TL-84/15, California State Department of Transportation, November 1984 with July 1985 Revisions.

8. Guidelines for Air Quality Maintenance Planning and Analysis; Indirect Sources, Volume 9 Revised, U.S. Environmental Protection Agency, September 1978.

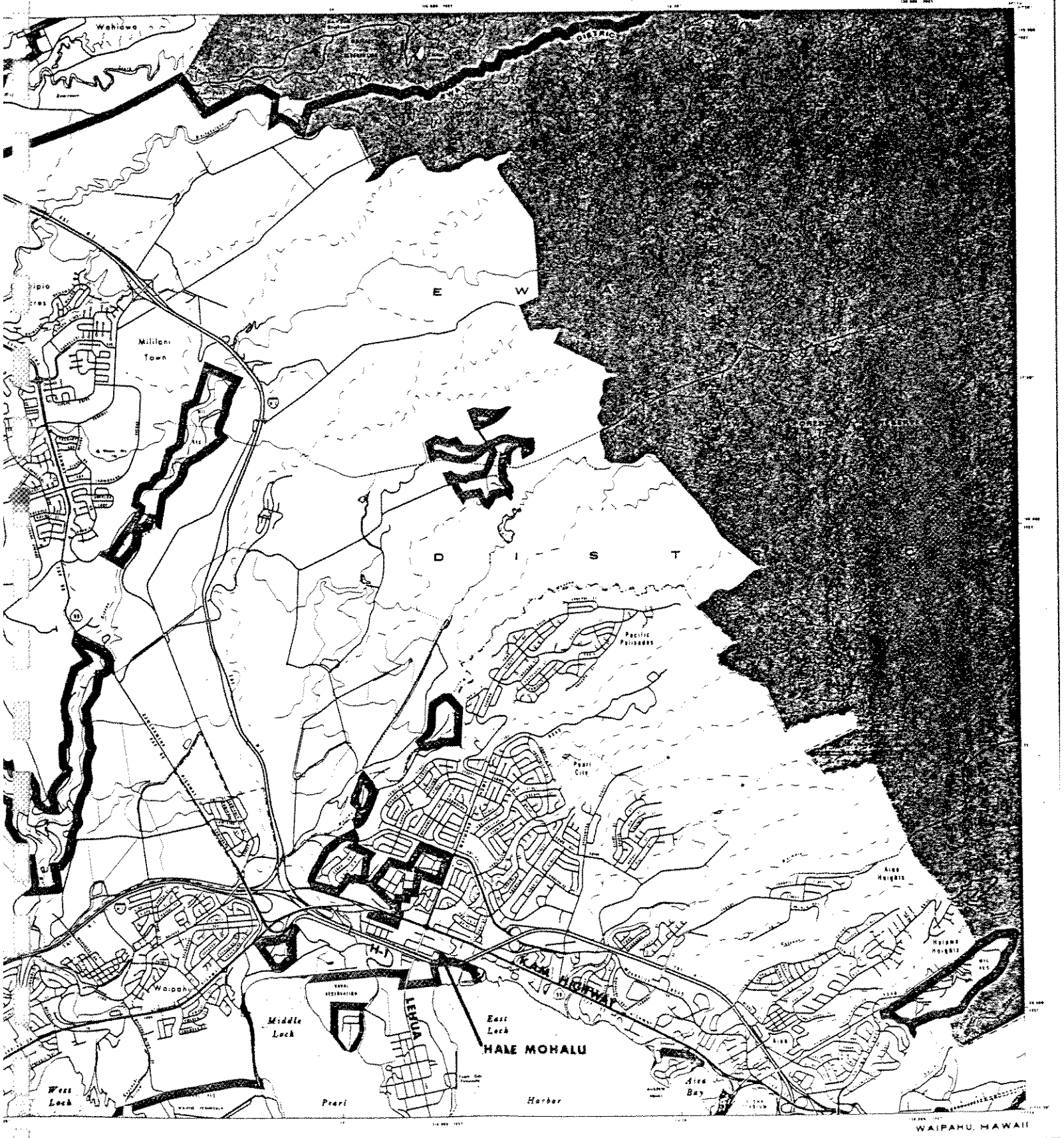


Figure 1

PROJECT LOCATION MAP

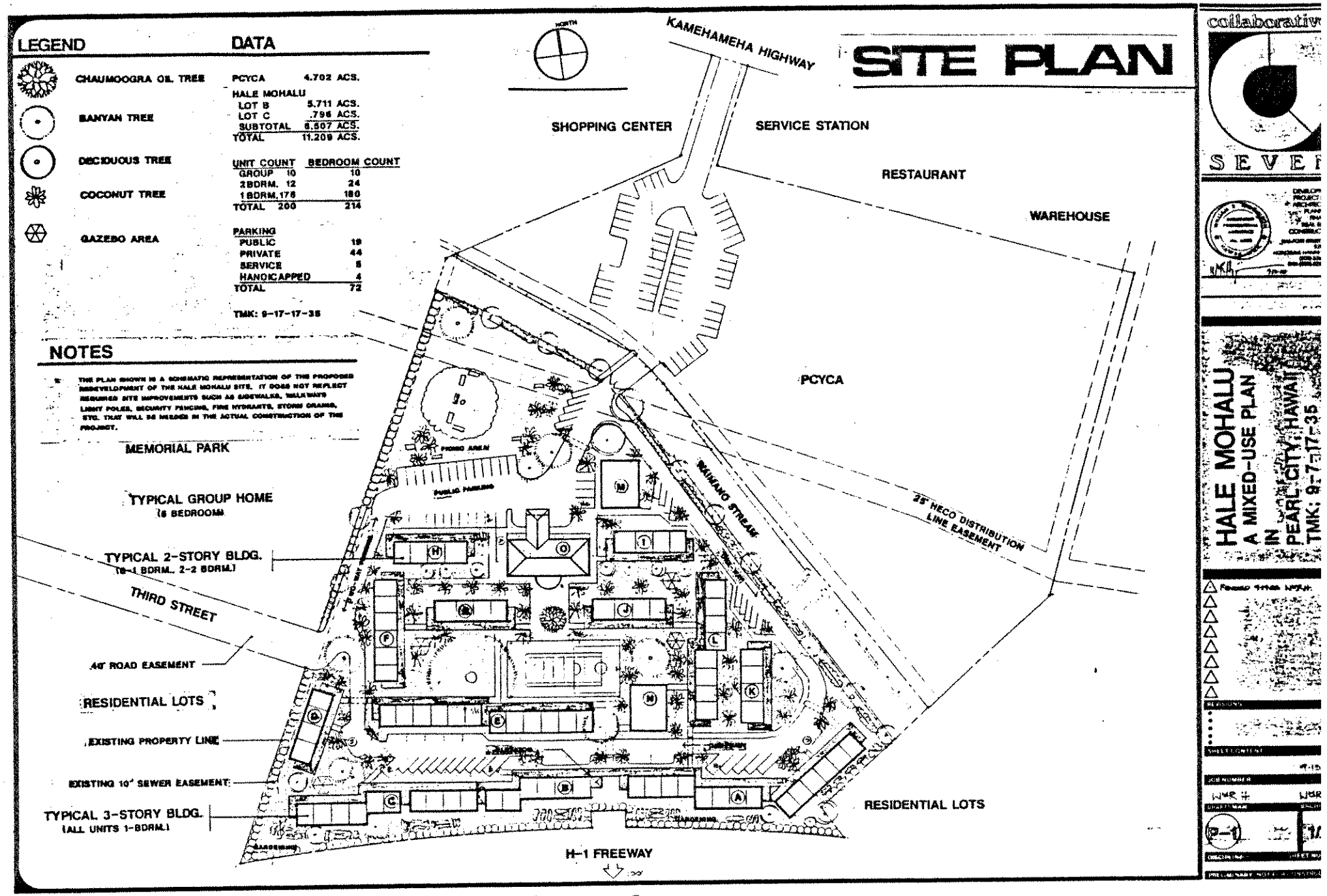


Figure 2
PROJECT SITE PLAN

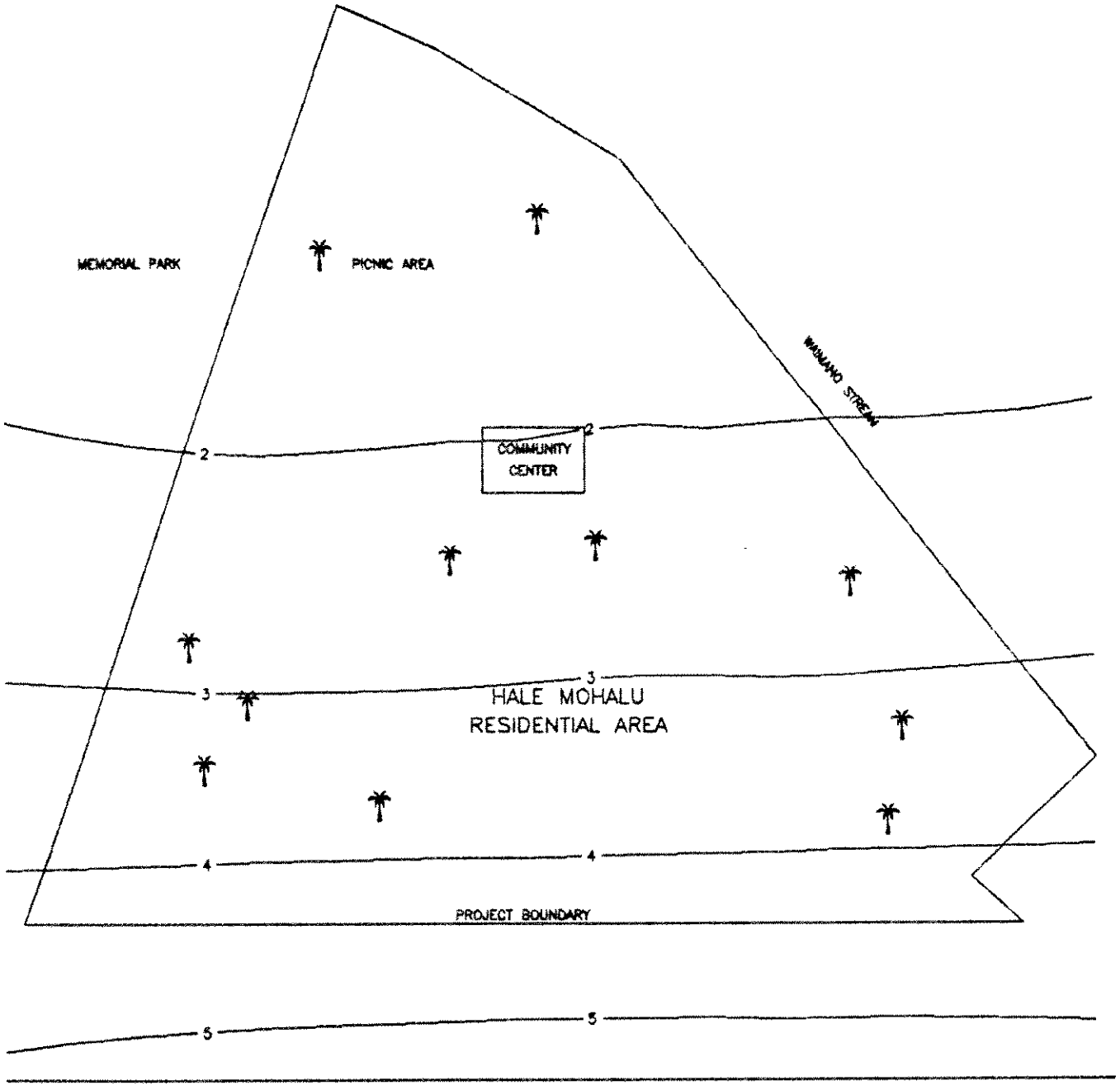
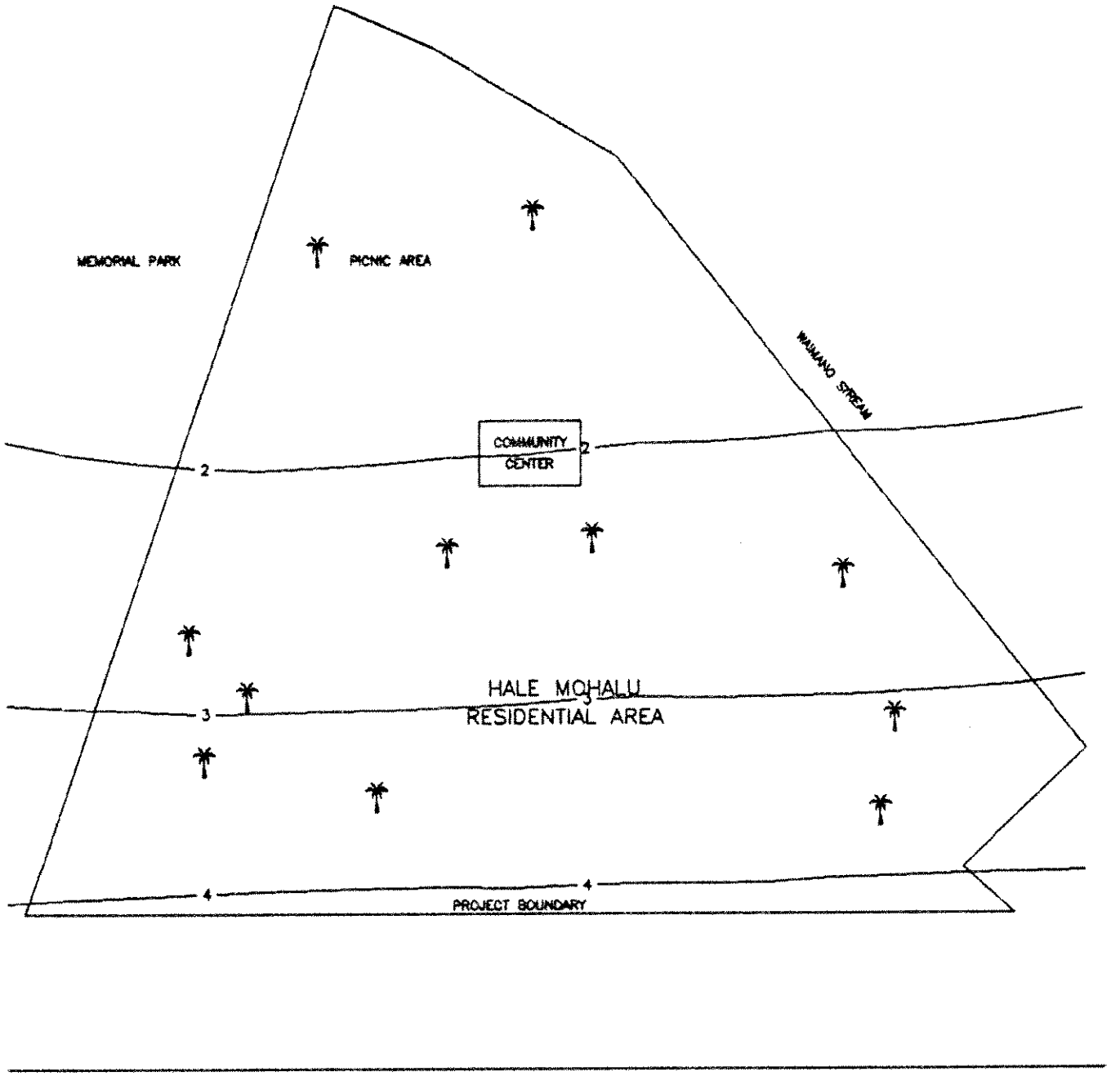


Figure 3
ISOPLETHS OF PREDICTED WORST-CASE 1-HOUR CARBON MONOXIDE CONCENTRATION AT HALE MOHALU FOR YEAR 1988 (mg/m3)



H-1 FREEWAY

(VEHICLE SPEED 40 MPH)

Figure 4
ISOPLETHS OF PREDICTED WORST-CASE 1-HOUR CARBON MONOXIDE CONCENTRATION AT HALE MOHALU FOR YEAR 1990 (mg/m3)

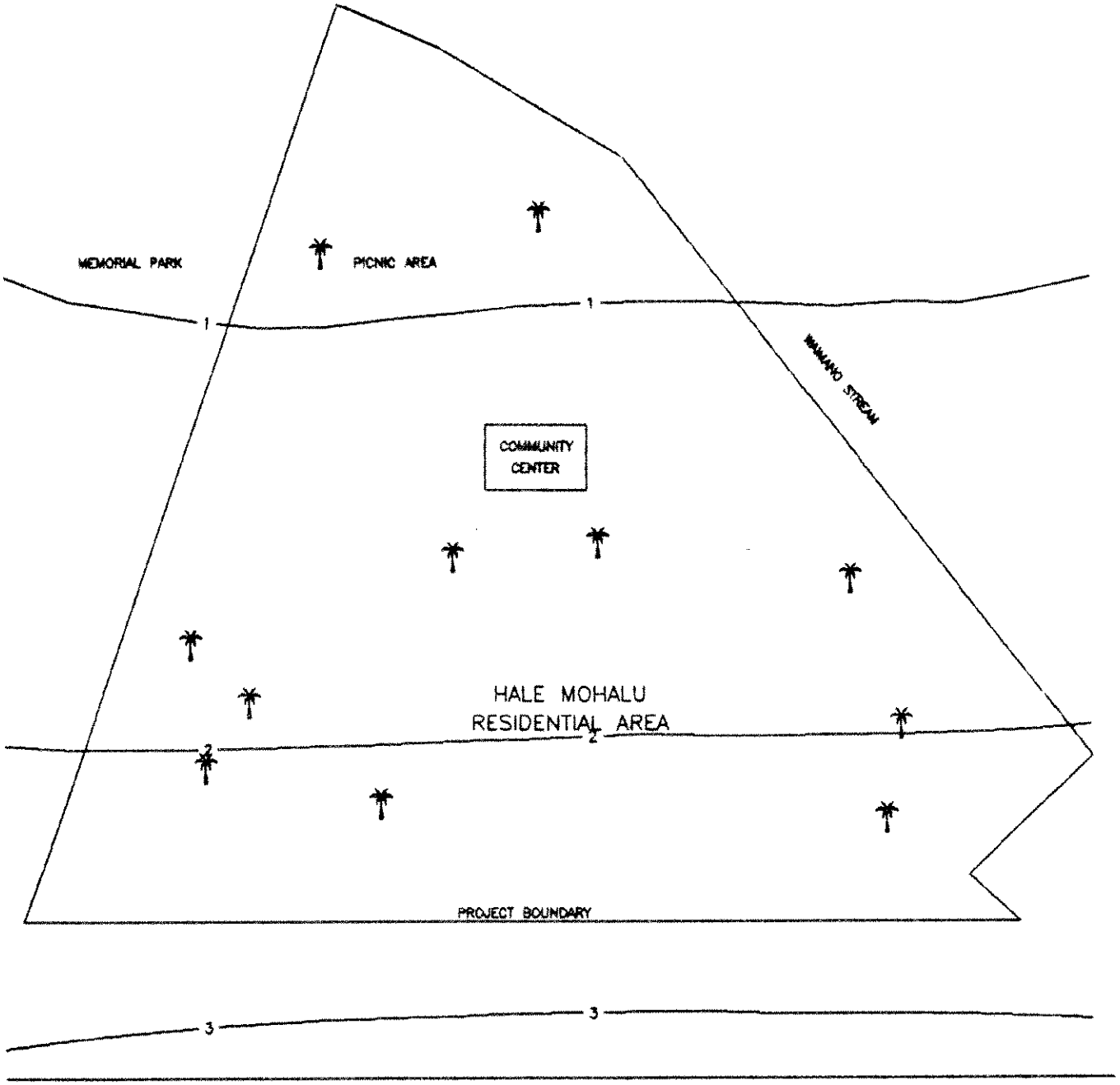


Figure 5
ISOPLETHS OF PREDICTED WORST-CASE 8-HOUR CARBON MONOXIDE CONCENTRATION AT HALE MOHALU FOR YEAR 1988 (mg/m3)

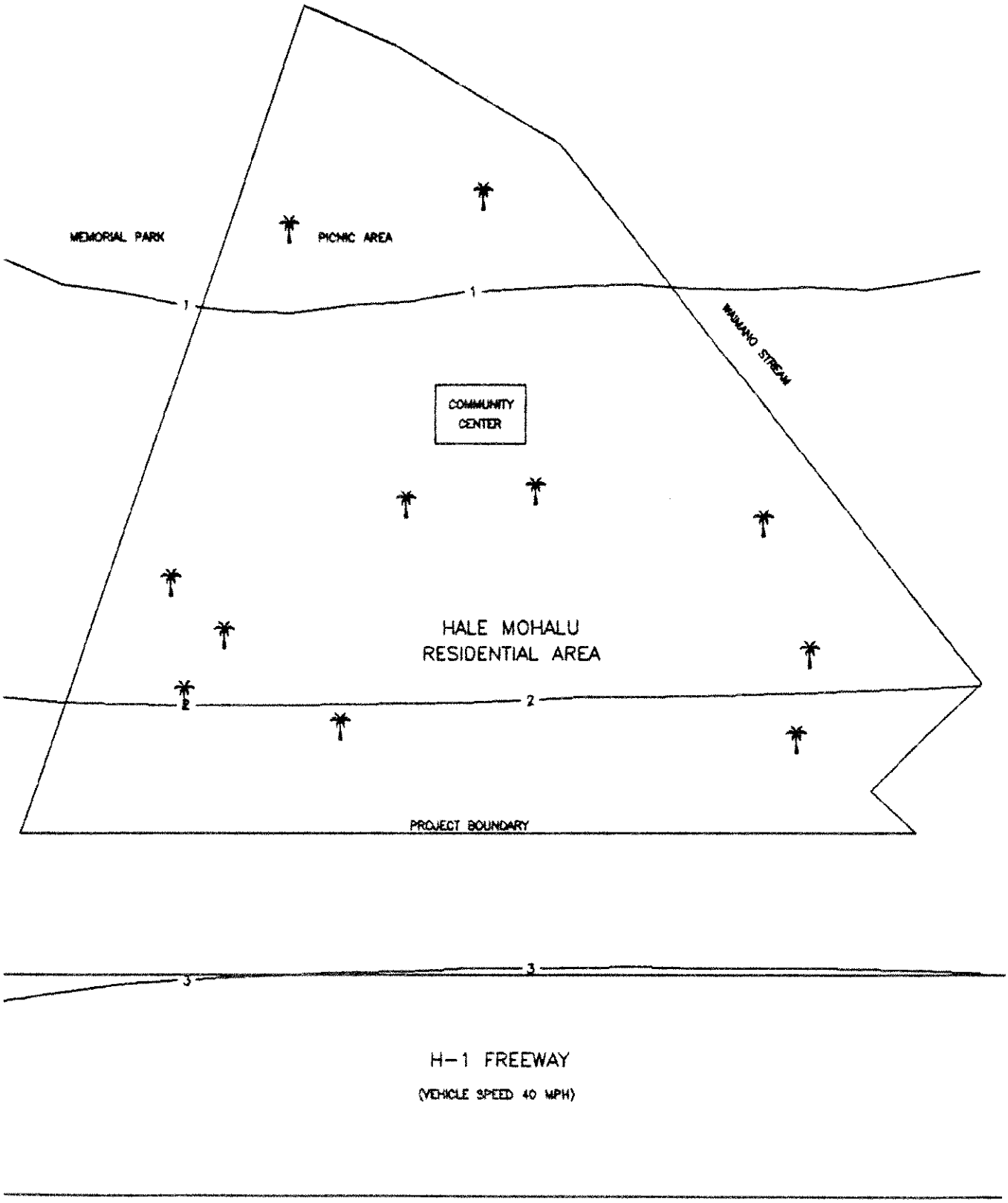


Figure 6
ISOPLETHS OF PREDICTED WORST-CASE 8-HOUR CARBON MONOXIDE CONCENTRATION AT HALE MOHALU FOR YEAR 1990 (mg/m3)

Table 1

SUMMARY OF STATE OF HAWAII AND NATIONAL
AMBIENT AIR QUALITY STANDARDS (AAQS)

Pollutant (units)	Averaging Time	Maximum Allowable Concentration		
		National Primary	National Secondary	State of Hawaii
Suspended Particulate Matter (ug/m^3)	Annual	-	-	60[a]
	24 Hours	-	-	150[b]
Particulate Matter[c] (ug/m^3)	Annual	50	50	-
	24 Hours	150[b]	150[b]	-
Sulfur Dioxide (ug/m^3)	Annual	80	-	80
	24 Hours	365[b]	-	365[b]
	3 Hours	-	1300[b]	1300[b]
Nitrogen Dioxide (ug/m^3)	Annual	100	100	70
Carbon Monoxide (mg/m^3)	8 Hours	10[b]	-	5[b]
	1 Hour	40[b]	-	10[b]
Ozone (ug/m^3)	1 Hour	235[b]	235[b]	100[b]
Lead (ug/m^3)	Calendar Quarter	1.5	1.5	1.5

[a]Geometric mean
[b]Not to be exceeded more than once per year
[c]Particles less than or equal to 10 microns aerodynamic diameter

Table 2

COMPOSITE SUMMARY OF AIR QUALITY MEASUREMENTS
AT MONITORING STATIONS NEAREST HALE MOHALU

Parameter/Location	1981	1982	1983	1984	1985	1986	1987
Particulate Matter							
Pearl City							
No. of 24-Hr Samples	59	53	55	56	47	60	51
Range of 24-Hr Values (ug/m3)	19-71	19-54	17-57	16-45	16-62	17-65	20-61
Average 24-Hr Value (ug/m3)	34	31	30	28	35	29	34
No. of State AAQS Exceedances	0	0	0	0	0	0	0
Sulfur Dioxide							
Pearl City/Barbers Point*							
No. of 24-Hr Samples	56	43	49	42	50	57	53
Range of 24-Hr Values (ug/m3)	<5	<5-10	<5	<5	<5-25	<5-10	<5-13
Average 24-Hr Value (ug/m3)	<5	<5	<5	<5	<5	<5	5
No. of State AAQS Exceedances	0	0	0	0	0	0	0
Carbon Monoxide							
Waikiki/Kaimuki/Honolulu**							
No. of Daily Samples	286	311	173	318	342	348	345
Range of Daily Max. 1-Hr Values (mg/m3)	1.2-13.8	0.0-4.6	0.0-8.6	0.6-10.9	0.0-10.4	0.2-13.5	0.3-11.1
Avg. Daily Maximum 1-hr Value (mg/m3)	5.1	1.2	2.3	2.4	1.5	2.2	1.7
No. of State AAQS Exceedances	13	0	0	1	1	3	1
Ozone							
Sand Island							
No. of Daily Samples	314	335	349	296	341	346	342
Range of Daily Max. 1-Hr Values (ug/m3)	10-104	0-151	0-123	0-104	8-198	10-88	4-84
Avg. Daily Maximum 1-hr Value (ug/m3)	37	32	46	44	43	39	38
No. of State AAQS Exceedances	1	2	2	1	3	0	0
Nitrogen Dioxide							
Sand Island							
No. of 24-Hr Samples	46	-	-	-	-	-	-
Range of 24-Hr Values (ug/m3)	6-77						
Average 24-Hr Value (ug/m3)	25						
No. of State AAQS Exceedances	0						
Lead							
Honolulu							
No. of 24-Hr Samples	-	-	-	54	58	57	57
Range of 24-Hr Values (ug/m3)				0.0-1.8	0.0-0.3	0.0-0.2	0.0-0.2
Average Quarterly Value (ug/m3)				0.3	0.1	0.0	0.0
No. of State AAQS Exceedances				0	0	0	0

*Measurements were made at Pearl City through 1984; 1985 through 1987 data are from Barbers Point.
**Measurements for 1981 are from Waikiki. 1982-83 data were measured in Kaimuki. 1984-87 values are from downtown Honolulu.

Source: State of Hawaii Department of Health

Table 3

ESTIMATED WORST-CASE 1-HOUR CARBON MONOXIDE CONCENTRATIONS
ALONG SURFACE ROADWAYS NEAR HALE MOHALU
(milligrams per cubic meter)

Location	Year/Scenario		
	1988	1990/ Without Project	1990/ With Project
Intersection of Kamehameha Highway and Project Entry Road	8.2	7.6	7.6
Intersection of Kamehameha Highway and Puu Momi Street	12.3	11.4	11.4

Hawaii State AAQS: 10
National AAQS: 40

Table 4

ESTIMATED WORST-CASE 8-HOUR CARBON MONOXIDE CONCENTRATIONS
ALONG SURFACE ROADWAYS NEAR HALE MOHALU
(milligrams per cubic meter)

Location	Year/Scenario		
	1988	1990/ Without Project	1990/ With Project
Intersection of Kamehameha Highway and Project Entry Road	4.9	4.6	4.6
Intersection of Kamehameha Highway and Puu Momi Street	7.4	6.8	6.8

Hawaii State AAQS: 5
National AAQS: 10

APPENDIX D

ACOUSTICAL ANALYSIS

Note: This analysis was based on a 200-unit development.

TRAFFIC NOISE STUDY
FOR THE PROPOSED
HALE MOHALU RESIDENTIAL DEVELOPMENT

PREPARED FOR
GERALD PARK, URBAN PLANNER

BY
Y. EBISU & ASSOCIATES

OCTOBER, 1988

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

I. SUMMARY

The existing and future traffic noise levels in the vicinity of the proposed Hale Mohalu project were evaluated for their potential impact on future residents of the project. The future traffic noise level increases on H-1 Freeway by CY 1990 were calculated, and increases in traffic noise of less than 0.2 Ldn (or dB) are predicted to occur between now and the completion of the development.

Future traffic noise impacts on Hale Mohalu residents can be minimized by the use of buffer zones of adequate depth on the north side of H-1 Freeway, and by the use of sound attenuation treatments for units within the 65 Ldn contours. These sound attenuation treatments could possibly include the use of air conditioning and/or the use of special sound attenuation windows.

II. PURPOSE AND METHODOLOGY

The objectives of this study were to describe the existing and future traffic noise environment in the environs of the proposed Hale Mohalu housing development in Pearl City, Oahu. Potential traffic noise impacts associated with the proposal were to be identified due to traffic on H-1 Freeway. A specific objective was to determine existing and projected traffic noise contours on the project site, and to compare them with existing federal standards.

Traffic noise predictions were performed using the Federal Highway Administration (FHWA) Noise Prediction Model (Reference 1). Traffic data and forecasts used in the noise prediction model were obtained from the traffic study for the project (Reference 2). Historical traffic counts obtained by the State Department of Transportation at Station H-8-B on H-1 Freeway (References 3 and 4) were used to develop the relationship between peak hour Leq(h) and daily Ldn traffic noise levels, and to develop the assumed traffic mixes (see worksheets in APPENDIX C).

Existing traffic noise measurements on the project site were made in September, 1988 to calibrate the FHWA Noise Prediction Model, and to refine predictions of future traffic noise levels. These existing traffic noise measurements were also used to describe the Base Year ambient noise levels in the project environs. For the purposes of the noise study, 1988 was used as the project Base Year, with increases in the traffic noise levels between 1988 and 1990 (estimated project completion period) considered to be insignificant (in the order of 0.2 Ldn). Calibration of the FHWA Noise Prediction Model was performed by measuring traffic noise levels at 210 to 550 FT distances from the center of H-1 Freeway at 3 locations on the project site.

Traffic noise contours were developed over the project site along H-1 Freeway. The Base Year noise contours were developed by including highway viaduct elevations in the highway noise model. Receptor elevations were assumed to be 5, 15, and 25 FT above

ground level, which was assumed to be at 25 FT elevation.

For existing and planned noise sensitive (residential and apartment) developments within traffic noise impact zones, possible noise mitigation measures were described. These measures included the use of increasing setback distances, the use of total closure and air conditioning, and the use of window sound attenuators to reduce future traffic noise at affected residences.

III. NOISE DESCRIPTORS AND THEIR RELATIONSHIP TO LAND USE COMPATIBILITY

Two noise descriptors currently used to relate traffic noise levels to land use compatibility, and to assess environmental noise in general, are the Equivalent Noise Level (Leq) and the Day-Night Average Sound Level (Ldn). Both of these descriptors are averages of instantaneous A-Weighted Sound Levels as read on a standard Sound Level Meter. In traffic noise evaluations, the averaging period for the Leq descriptor is usually an hour, and more specifically, the peak hour of traffic. In all evaluations, the minimum averaging period for the Ldn descriptor is 24 hours (by definition). Additionally, sound levels which occur during the nighttime hours of 10:00 PM to 7:00 AM are increased by 10 decibels (dB) prior to computing the 24-hour average by the Ldn descriptor. A more complete list of noise descriptors is provided in APPENDIX B to this report.

TABLE 1, derived from Reference 5, presents current federal standards and acceptability criteria for residential land uses exposed to various levels of environmental noise. FIGURE 1, extracted from Reference 6, presents suggested land use compatibility guidelines for residential and nonresidential land uses. As a general rule, noise levels of 55 Ldn or less occur in rural areas, or urbanized areas which are shielded from high volume streets. Noise levels typical of communities on Oahu are shown in FIGURE 2. In urbanized areas, Ldn levels generally range from 55 to 65 Ldn, and are usually controlled by motor vehicle traffic noise. Residences which front major roadways are generally exposed to levels of 65 Ldn, and as high as 72 Ldn when the roadway is a high speed freeway. Due to noise shielding effects from intervening structures, residences which are located within interior lots are usually exposed to lower noise levels of 55 Ldn or less.

For the purposes of determining noise acceptability for funding assistance from federal agencies (FHA/HUD and VA), an ex-

TABLE 1

EXTERIOR NOISE EXPOSURE CLASSIFICATION
(RESIDENTIAL LAND USE)

Noise Exposure Class	Day-Night Sound Level	Equivalent Sound Level	Federal Standard (1)
Minimal Exposure	Not Exceeding 55 Ldn	Not Exceeding 55 Leq	Unconditionally Acceptable
Moderate Exposure	Above 55 Ldn But Not Above 65 Ldn	Above 55 Leq But Not Above 65 Leq	Acceptable (2)
Significant Exposure	Above 65 Ldn But Not Above 75 Ldn	Above 65 Leq But Not Above 75 Leq	Normally Unaccepatble
Severe Exposure	Above 75 Ldn	Above 75 Leq	Unacceptable

Note: (1) Federal Housing Administration, Veterans Administration, Department of Defense, and Department of Transportation.

(2) FHWA uses the Leq instead of the Ldn descriptor. For planning purposes, both are equivalent if: (a) heavy trucks do not exceed 10 percent of total traffic flow in vehicles per 24 hours, and (b) traffic between 10:00 PM and 7:00 AM does not exceed 15 percent of average daily traffic flow in vehicles per 24 hours.

Source: Reference 5.

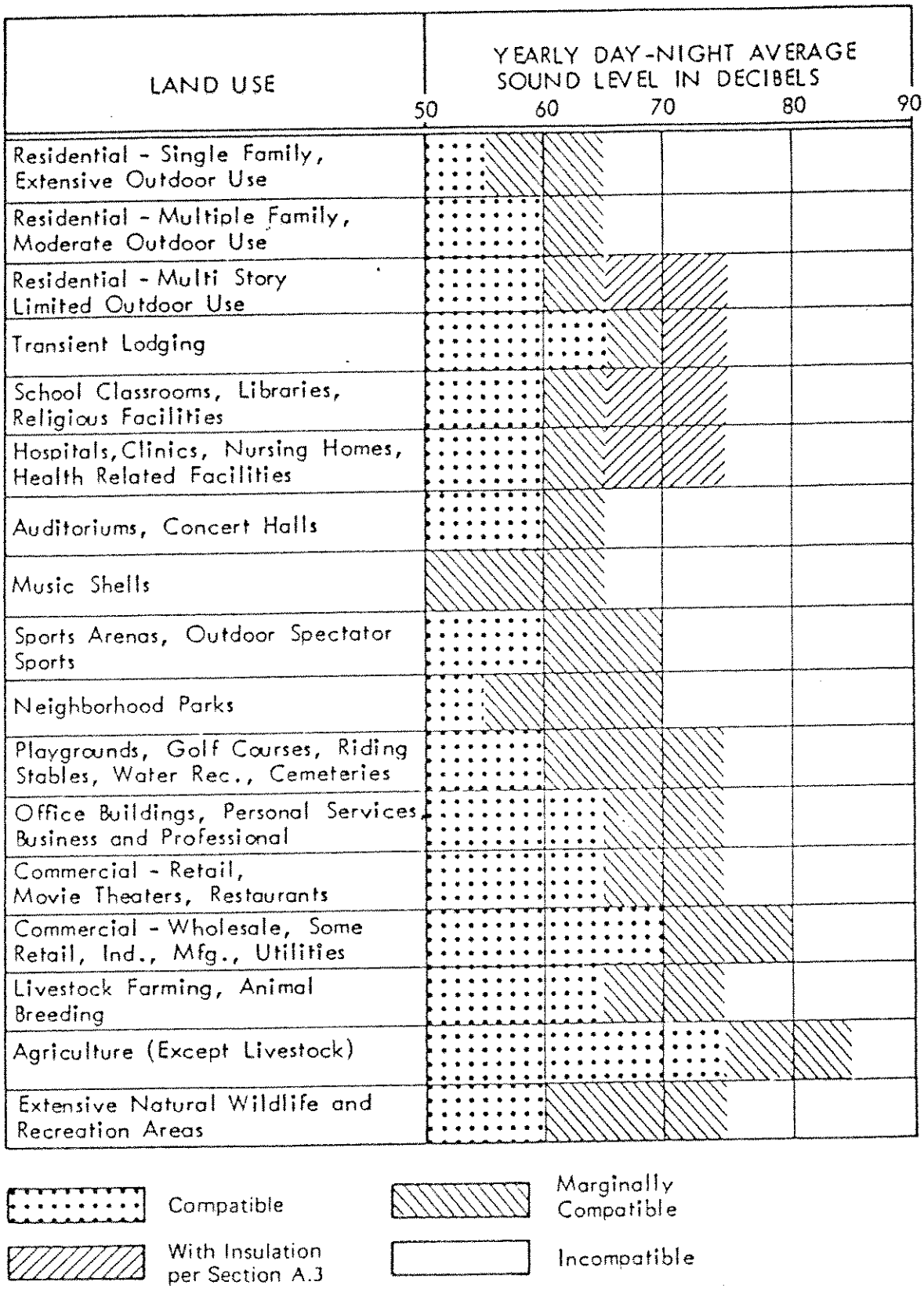
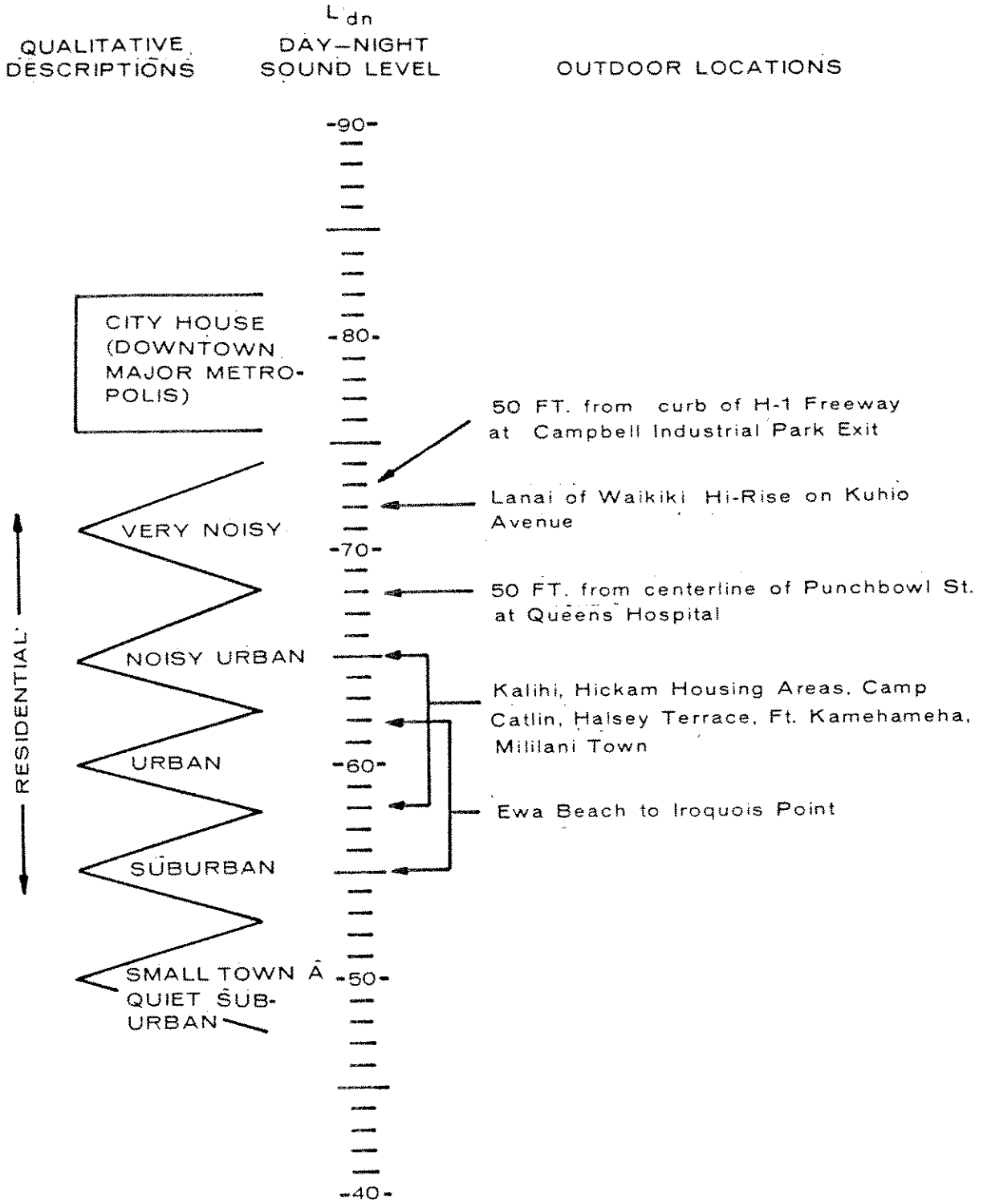


FIG. 1. Land use compatibility with yearly day–night average sound level at a site for buildings as commonly constructed. [For information only; not a part of American National Standard for Sound Level Descriptors for Determination of Compatible Land Use S3.23-1980.]

FIGURE 2

RANGE OF EXTERIOR BACKGROUND AMBIENT NOISE LEVELS



terior noise level of 65 Ldn or lower is considered acceptable. This standard is applied nationally (see Reference 7), including Hawaii. Because of our open-living conditions, the predominant use of naturally ventilated dwellings, and the relatively low exterior-to-interior sound attenuation afforded by these naturally ventilated structures, an exterior noise level of 65 Ldn does not eliminate all risks of noise impacts. For these reasons, and as recommended in Reference 8, a lower level of 55 Ldn is considered as the "Unconditionally Acceptable" (or "Near-Zero Risk") level of exterior noise. However, after considering the cost and feasibility of applying the lower level of 55 Ldn, government agencies such as FHA/HUD and VA have selected 65 Ldn as a more appropriate regulatory standard.

For commercial, industrial, and other non-noise sensitive land uses, exterior noise levels as high as 75 Ldn are generally considered acceptable. Exceptions to this occur when naturally ventilated office and other commercial establishments are exposed to exterior levels which exceed 65 Ldn.

IV. EXISTING TRAFFIC NOISE ENVIRONMENT

The existing traffic noise environment along H-1 Freeway in the area of the project is in the "Significant Exposure, Normally Unacceptable" category, with traffic noise at 70+ Ldn along the north (or mauka) Right-of-Way. Although the nearest residential structure in the proposed development is at a distance of approximately 205 FT from the freeway Right-of-Way, the majority of the proposed residential units of the project are located within the areas of "Significant Exposure, Normally Unacceptable" noise exposure category.

The results of the September 15, 1988 traffic noise measurements on the project site are summarized in TABLE 2. The locations of the measurement Sites A thru C are shown in FIGURE 3. In general, the agreement between measured and calculated (predicted) noise levels was fair to good.

FIGURES 3 and 4 depict the Base Year traffic noise contours over the proposed development area for +5 FT AGL and +25 FT AGL height receptors, respectively. The Ldn descriptor was used in generating these contours. The contours shown are applicable for the case where no intervening, man-made, structures (noise shielding barriers) exist between the receptor location and the highway. As will be shown later, these figures can be used to site future residential/apartment units of the development, since future traffic noise levels are predicted to be within 0.2 Ldn unit of existing noise levels depicted by the contour lines in the figures.

TABLE 2

SEPTEMBER 15, 1988 BACKGROUND AMBIENT NOISE MEASUREMENTS

Location	Time of Day (HRS)	Ave.Speed (MPH)	----Hourly Traffic Volume---- Auto	Med.Truck	Heavy Truck	Measured Leq (dB)	Predicted Leq (dB)
SITE A (12' AGL) (205' from Baseline)	1052 TO 1102	50	5,642	148	148	67.2	66.5
SITE A (5' AGL) (205' from Baseline)	1103 TO 1113	50	5,630	148	148	66.4	66.0
SITE B (12' AGL) (370' from Baseline)	1123 TO 1134	50	5,630	148	148	66.8	64.0
SITE B (5' AGL) (370' from Baseline)	1135 TO 1145	50	5,630	148	148	65.6	63.0
SITE C (12' AGL) (550' from Baseline)	1153 TO 1206	50	5,550	146	146	63.3	61.0
SITE C (5' AGL) (550' from Baseline)	1208 TO 1220	50	5,550	146	146	58.1	59.0
SITE B (5' AGL) (370' from Baseline)	1600 TO 1700	48	9,039	238	238	63.2	65.0

Notes:

1. Predictions based on zero excess ground attenuation factor due to elevated viaduct.
2. Hourly traffic volumes are study values estimated from historical data and traffic projections.

FIGURE #3

Existing Traffic Noise Contours Over Proposed Project Area (+5' AGL Receptor)

SCALE 1" = 100'
(Approximate)

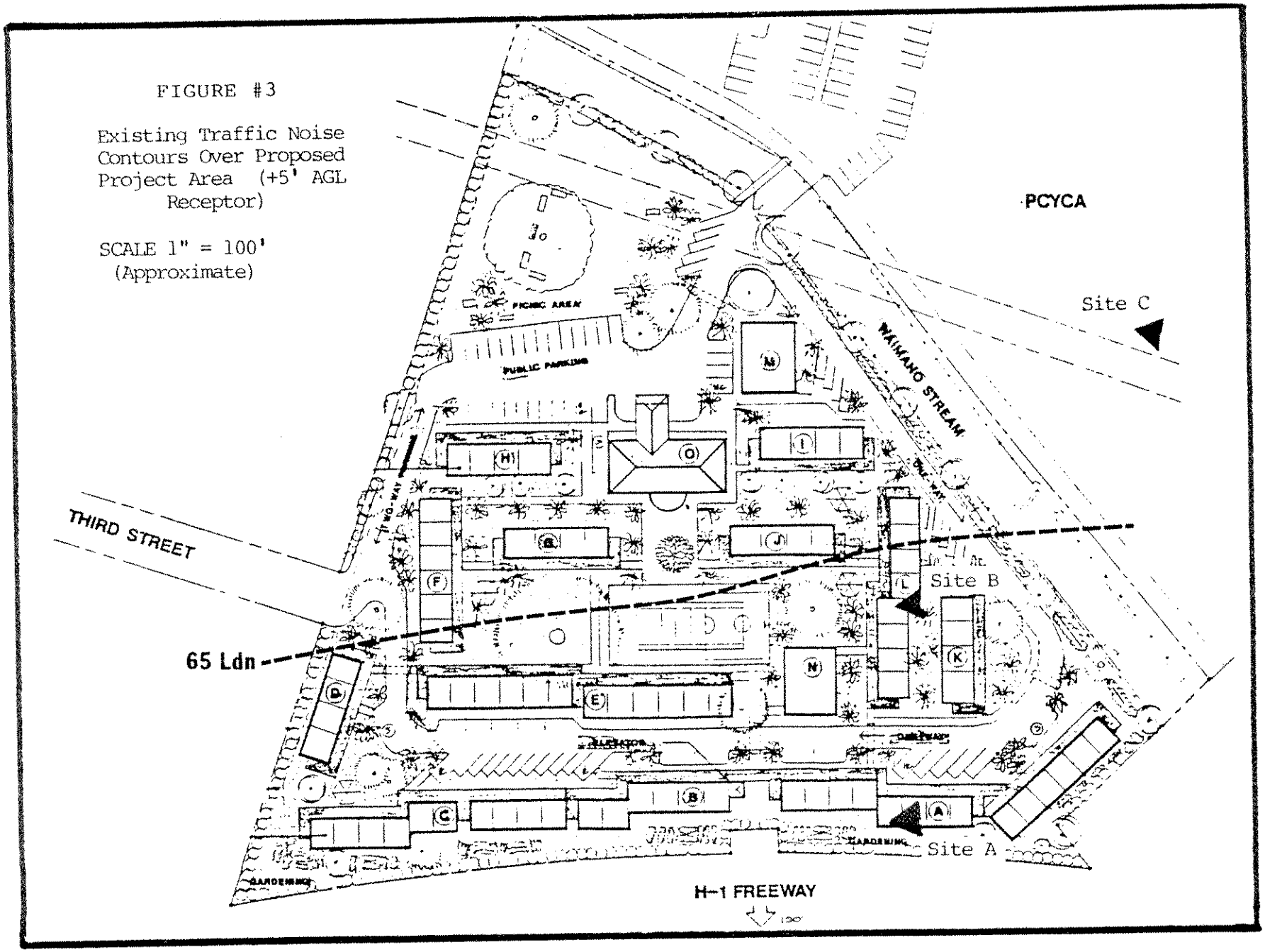
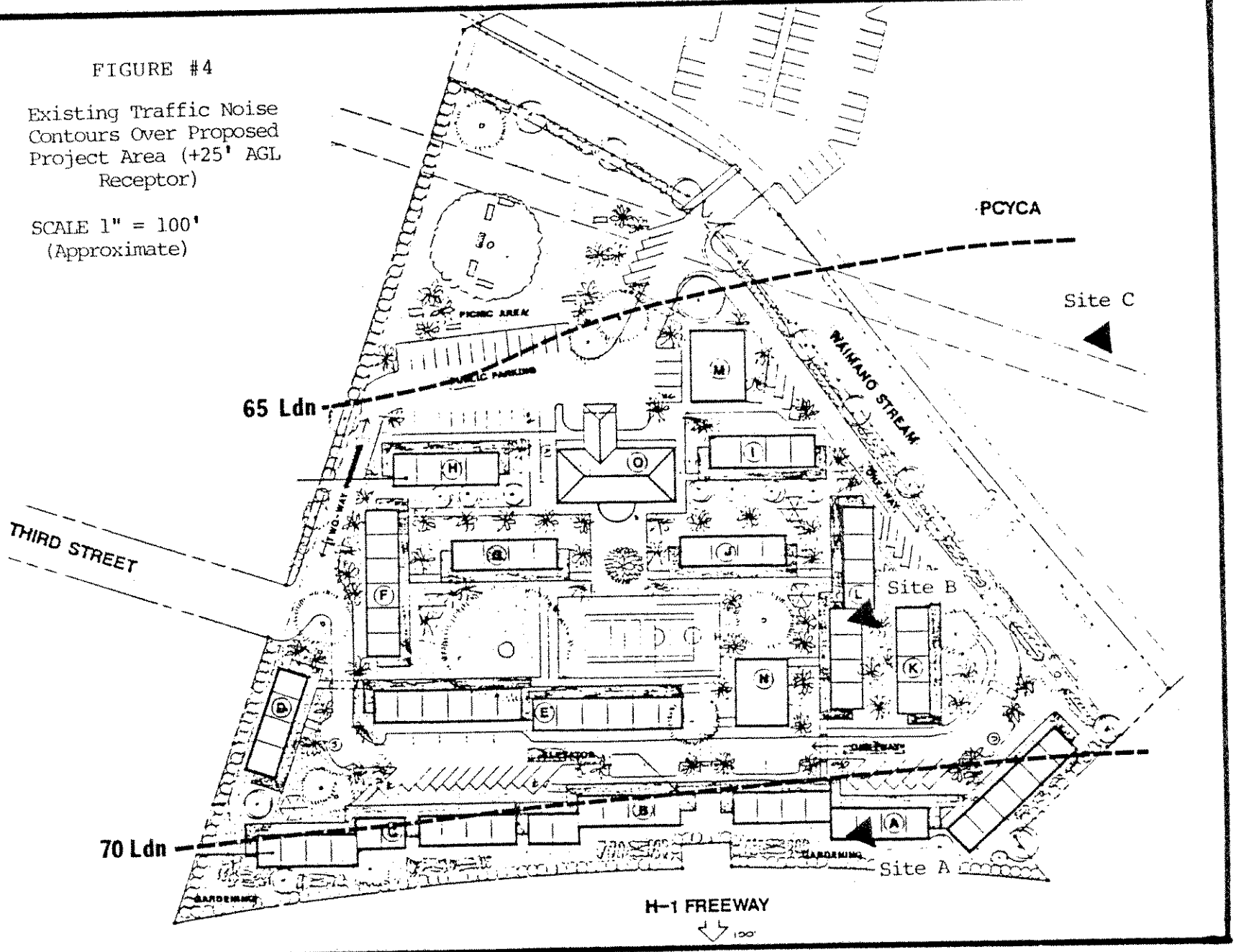


FIGURE #4

Existing Traffic Noise Contours Over Proposed Project Area (+25' AGL Receptor)

SCALE 1" = 100' (Approximate)



V. FUTURE TRAFFIC NOISE ENVIRONMENT

Predictions of future traffic noise levels were made using the traffic volume predictions for CY 1990 as contained in Reference 2. By Reference 2, traffic on H-1 Freeway will increase by approximately four percent from CY 1988 to 1990. Traffic noise level increases attributable to this growth in traffic volume are anticipated to be less than 0.2 Ldn units, which is not considered to be significant. This degree of increase will be difficult to measure, and is well within the accuracy limits of this study. For the purposes of this study, FIGURES 3 and 4 can also be considered to represent the CY 1990 noise contours on the project site without the influence of shielding effects from proposed structures.

VI. DISCUSSION OF FUTURE TRAFFIC NOISE IMPACTS

Traffic noise impacts on future Hale Mohalu project residents can be minimized by location of residential and apartment units beyond (or to the north of) the 65 Ldn traffic noise contour lines. The project site plans in conjunction with the noise contours in FIGURES 3 and 4 indicate that the majority of the residential units will be located within the 65 Ldn contour lines. The first row of structures fronting the south property boundary are expected to be exposed to levels from 68 to 71 Ldn, and are expected to require sound attenuation treatment in order to meet FHA/HUD noise standards. For the planned structures which are north of the first row of 3-story structures, traffic noise levels will probably exceed 65 Ldn if the visual line-of-sight is not blocked between the proposed units and the elevated freeway.

From FIGURE 3, which depicts the traffic noise contours at a receptor elevation of approximately 30 FT MSL (or +5 FT AGL), first floor residential units north of Third Street should be outside the 65 Ldn contour and in the "Moderate Exposure, Acceptable" category. Special sound attenuation measures for these future first floor units north of Third Street are not required by FHA/HUD standards. However, from FIGURE 4, the upper floors of the units north of Third Street may require sound attenuation measures to meet the 65 Ldn or less FHA/HUD criteria if the visual line-of-sight between these upper floor units and the elevated freeway are not blocked.

VII. POSSIBLE NOISE MITIGATION MEASURES

Possible noise mitigation measures which would minimize noise impacts from freeway traffic include measures such as: the use of buffer zones of sufficient depth as indicated in FIGURES 3 and 4; incorporating sound attenuating window design features in units which cannot be shielded by sound attenuating barriers; and air conditioning affected spaces. The applicability of each mitigation measure depends upon other considerations besides noise, such as economic cost, aesthetics, and technical feasibility.

The construction of sound attenuation walls or berms is also a standard mitigation measure, particularly for single-story homes. Wall height requirements become excessive (in the order of 10-plus FT) when multistory residences or elevated roadways are involved in traffic noise mitigation efforts. For this reason, the use of walls or berms as a traffic noise mitigation measure is generally limited to ground-floor residential units, and only for those situations where the roadway is not elevated. For this project, if 3-story structures (32 FT AGL) are constructed between the elevated freeway (17 to 35 FT AGL), partial shielding of the freeway noise will probably occur, and traffic noise levels at units north of the 3-story structures will be lower than those shown in FIGURES 3 and 4. Under these conditions, additional noise mitigation measures may not be required for other project units north of the 3-story structures.

Where none of the above mitigation measures are feasible, the remaining options are air conditioning the affected residential spaces or sound-treating ventilation openings (windows). The use of air conditioning within residences is not common, and is not generally considered a practical option for low income subdivision residences. The use of sound-treated windows has been applied at selected mid-rise structures in Hawaii for the purpose of meeting FHA/HUD noise standards, and is a possible noise mitigation option for any new structure of the project between the 65 and 70 Ldn contours.

A. REFERENCES

(1) Barry, T. and J. Reagan, "FHWA Highway Traffic Noise Prediction Model," FHWA-RD-77-108, Federal Highway Administration, Washington, D.C., December 1978.

(2) Gerald Park, Urban Planner; 1988 and 1990 traffic volumes on H-1 Freeway at Hale Mohalu site; via transmittal dated September 15, 1988.

(3) December 16-17, 1986 24-Hour Traffic Counts, Station H-8-B, H-1 Freeway West of Pearl City Viaduct, State Department of Transportation.

(4) July 29-30, 1985 Vehicle Type Classification, Station H-8-B, H-1 Freeway at Waimano Stream Bridge, State Department of Transportation.

(5) "Guidelines for Considering Noise in Land Use Planning and Control," Federal Interagency Committee on Urban Noise, June 1980.

(6) American National Standard, "Sound Level Descriptors for Determination of Compatible Land Use," ANSI S3.23-1980, Acoustical Society of America.

(7) "Environmental Criteria and Standards, Noise Abatement and Control, 24 CFR, Part 51, Subpart B," U.S. Department of Housing and Urban Development, July 12, 1979.

(8) "Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety," Environmental Protection Agency, EPA 550/9-74-004), March 1974.

APPENDIX B

EXCERPTS FROM EPA'S ACOUSTIC TERMINOLOGY GUIDE

Descriptor Symbol Usage

The recommended symbols for the commonly used acoustic descriptors based on A-weighting are contained in Table I. As most acoustic criteria and standards used by EPA are derived from the A-weighted sound level, almost all descriptor symbol usage guidance is contained in Table I.

Since acoustic nomenclature includes weighting networks other than "A" and measurements other than pressure, an expansion of Table I was developed (Table II). The group adopted the ANSI descriptor-symbol scheme which is structured into three stages. The first stage indicates that the descriptor is a level (i.e., based upon the logarithm of a ratio), the second stage indicates the type of quantity (power, pressure, or sound exposure), and the third stage indicates the weighting network (A, B, C, D, E.....). If no weighting network is specified, "A" weighting is understood. Exceptions are the A-weighted sound level and the A-weighted peak sound level which require that the "A" be specified. For convenience in those situations in which an A-weighted descriptor is being compared to that of another weighting, the alternative column in Table II permits the inclusion of the "A". For example, a report on blast noise might wish to contrast the $L_C dn$ with the LAdn.

Although not included in the tables, it is also recommended that "L_{PN}" and "L_{EPN}" be used as symbols for perceived noise levels and effective perceived noise level, respectively.

It is recommended that in their initial use within a report, such terms be written in full, rather than abbreviated. An example of preferred usage is as follows:

> The A-weighted sound level (LA) was measured before and after the installation of acoustical treatment. The measured LA values were 85 and 75 dB respectively.

Descriptor Nomenclature

With regard to energy averaging over time, the term "average" should be discouraged in favor of the term "equivalent". Hence, L_{eq}, is designated the "equivalent sound level". For L_d, L_n, and L_{dn}, "equivalent" need not be stated since the concept of day, night, or day-night averaging is by definition understood. Therefore, the designations are "day sound level", "night sound level", and "day-night sound level", respectively.

The peak sound level is the logarithmic ratio of peak sound pressure to a reference pressure and not the maximum root mean square pressure. While the latter is the maximum sound pressure level, it is often incorrectly labelled peak. In that sound level meters have "peak" settings, this distinction is most important.

"Background ambient" should be used in lieu of "background", "ambient", "residual", or "indigenous" to describe the level characteristic of the general background noise due to the contribution of many unidentifiable noise sources near and far.

With regard to units, it is recommended that the unit decibel (abbreviated dB) be used without modification. Hence, dBA, PNdB, and EPNdB are not to be used. Examples of this preferred usage are: the Perceived Noise Level (L_{PN} was found to be 75 dB. L_{PN} = 75 dB.) This decision was based upon the recommendation of the National Bureau of Standards, and the policies of ANSI and the Acoustical Society of America, all of which disallow any modification of bel except for prefixes indicating its multiples or submultiples (e.g., deci).

Noise Impact

In discussing noise impact, it is recommended that "Level Weighted Population" (LWP) replace "Equivalent Noise Impact" (ENI). The term "Relative Change of Impact" (RCI) shall be used for comparing the relative differences in LWP between two alternatives.

Further, when appropriate, "Noise Impact Index" (NII) and "Population Weighted Loss of Hearing" (PHL_x) shall be used consistent with CHABA Working Group 69 Report Guidelines for Preparing Environmental Impact Statements (1977).

TABLE I: A-Weighted Recommended Descriptor List

	Term	Symbol
1.	A-Weighted Sound Level	L_A
2.	A-Weighted Sound Power Level	L_{WA}
3.	Maximum A-Weighted Sound Level	L_{max}
4.	Peak A-Weighted Sound Level	L_{Apk}
5.	Level Exceeded x% of the time	L_x
6.	Equivalent Sound Level	L_{eq}
7.	Equivalent Sound Level over Time (T) (1)	$L_{eq(T)}$
8.	Day Sound Level	L_d
9.	Night Sound Level	L_n
10.	Day-Night Sound Level	L_{dn}
11.	Yearly Day-Night Sound Level	$L_{dn(y)}$
12.	Sound Exposure Level	L_{SE}

(1) Unless otherwise specified, time is in hours (e.g. the hourly equivalent level is L_{eq} (1)). Time may be specified in non-quantitative terms (e.g., could be specified a $L_{eq(WASH)}$ to mean the washing cycle noise for a washing machine.)

Published by THE BUREAU OF NATIONAL AFFAIRS, INC., WASHINGTON, D.C. 20037

TABLE II: Recommended Descriptor List

	TERM	A-WEIGHTING	ALTERNATIVE(1) A-WEIGHTING	OTHER WEIGHTING (2)	UNWEIGHTED
1.	Sound (Pressure) (3) Level	L_A	L_{pA}	L_B, L_{pB}	L_p
2.	Sound Power Level	L_{WA}		L_{WB}	L_W
3.	Max. Sound Level	L_{max}	L_{Amax}	L_{Bmax}	L_{pmax}
4.	Peak Sound (Pressure) Level	L_{Apk}		L_{Bpk}	L_{pk}
5.	Level Exceeded x% of the time	L_x	L_{Ax}	L_{Bx}	L_{px}
6.	Equivalent Sound Level	L_{eq}	L_{Aeq}	L_{Beq}	L_{peq}
7.	Equivalent Sound Level Over Time(T) (4)	$L_{eq(T)}$	$L_{Aeq(T)}$	$L_{Beq(T)}$	$L_{peq(T)}$
8.	Day Sound Level	L_d	L_{Ad}	L_{Bd}	L_{pd}
9.	Night Sound Level	L_n	L_{An}	L_{Bn}	L_{pn}
10.	Day-Night Sound Level	L_{dn}	L_{Adn}	L_{Bdn}	L_{pdn}
11.	Yearly Day-Night Sound Level	$L_{dn(y)}$	$L_{Adn(Y)}$	$L_{Bdn(Y)}$	$L_{pdn(Y)}$
12.	Sound Exposure Level	L_S	L_{SA}	L_{SB}	L_{Sp}
13.	Energy Average value over (non-time domain) set of observations	$L_{eq(e)}$	$L_{Aeq(e)}$	$L_{Beq(e)}$	$L_{peq(e)}$
14.	Level exceeded x% of the total set of (non-time domain) observations	$L_{x(e)}$	$L_{Ax(e)}$	$L_{Bx(e)}$	$L_{px(e)}$
15.	Average L_x value	L_x	L_{Ax}	L_{Bx}	L_{px}

(1) "Alternative" symbols may be used to assure clarity or consistency.

(2) Only B-weighting shown. Applies also to C,D,E,..... weighting.

(3) The term "pressure" is used only for the unweighted level.

(4) Unless otherwise specified, time is in hours (e.g., the hourly equivalent level is $L_{eq(1)}$). Time may be specified in non-quantitative terms (e.g., could be specified as $L_{eq(WASH)}$ to mean the washing cycle noise for a washing machine)).

- 0 -

HOUR	SPEED (MPH)	VPH	% AUTO	% MT	% HT	**** LEQ(H) IN dB @ 50' **** AUTO	MT	HT	ALL VEH	*** HOURLY LEQ IN dB @ 210 FT. AUTO	MT	HT	ALL VEH
0000-0100	50	1,348	95	2.5	2.5	62.1	57.2	61.6	65.5	55.8	51.0	55.4	59.3
0100-0200	50	747	95	2.5	2.5	59.5	54.7	59.1	63.0	53.3	48.5	52.8	56.8
0200-0300	50	524	95	2.5	2.5	58.0	53.1	57.5	61.4	51.7	46.9	51.3	55.2
0300-0400	50	632	95	2.5	2.5	58.8	54.0	58.3	62.3	52.5	47.7	52.1	56.0
0400-0500	50	1,439	95	2.5	2.5	62.3	57.5	61.9	65.8	56.1	51.3	55.7	59.6
0500-0600	50	5,198	95	2.5	2.5	67.9	63.1	67.5	71.4	61.7	56.9	61.2	65.2
0600-0700	50	6,186	95	2.5	2.5	68.7	63.9	68.2	72.2	62.4	57.6	62.0	65.9
0700-0800	50	6,416	95	2.5	2.5	68.8	64.0	68.4	72.3	62.6	57.8	62.2	66.1
0800-0900	50	5,360	95	2.5	2.5	68.1	63.2	67.6	71.5	61.8	57.0	61.4	65.3
0900-1000	50	5,463	95	2.5	2.5	68.1	63.3	67.7	71.6	61.9	57.1	61.5	65.4
1000-1100	50	5,939	95	2.5	2.5	68.5	63.7	68.1	72.0	62.3	57.5	61.8	65.8
1100-1200	50	5,926	95	2.5	2.5	68.5	63.7	68.0	72.0	62.3	57.4	61.8	65.7
1200-1300	50	5,842	95	2.5	2.5	68.4	63.6	68.0	71.9	62.2	57.4	61.8	65.7
1300-1400	50	6,242	95	2.5	2.5	68.7	63.9	68.3	72.2	62.5	57.7	62.0	66.0
1400-1500	50	7,172	95	2.5	2.5	69.3	64.5	68.9	72.8	63.1	58.3	62.6	66.6
1500-1600	48	9,192	95	2.5	2.5	69.7	65.0	69.5	73.3	63.5	58.8	63.3	67.1
1600-1700	48	9,515	95	2.5	2.5	69.9	65.1	69.7	73.5	63.6	58.9	63.4	67.2
1700-1800	50	8,420	95	2.5	2.5	70.0	65.2	69.6	73.5	63.8	59.0	63.3	67.3
1800-1900	50	6,815	95	2.5	2.5	69.1	64.3	68.7	72.6	62.9	58.1	62.4	66.4
1900-2000	50	4,694	95	2.5	2.5	67.5	62.7	67.0	71.0	61.2	56.4	60.8	64.7
2000-2100	50	3,757	95	2.5	2.5	66.5	61.7	66.1	70.0	60.3	55.5	59.8	63.8
2100-2200	50	3,526	95	2.5	2.5	66.2	61.4	65.8	69.7	60.0	55.2	59.6	63.5
2200-2300	50	3,092	95	2.5	2.5	65.7	60.9	65.2	69.2	59.4	54.6	59.0	62.9
2300-2400	50	2,310	95	2.5	2.5	64.4	59.6	64.0	67.9	58.2	53.4	57.7	61.7
H-1 FREEWAY, STA H-8-B; TWO-WAY; PROJECTED CY 1988													
TOTAL VPD:		115,755				LDN @ 50 FT: 71.8	67.0	71.4	75.3	LDN @ 210.0 FT:			69.1

APPENDIX C. WORKSHEET #1

HOUR	SPEED (MPH)	VPH	% AUTO	% MT	% HT	**** LEQ(H) IN dB @ 50' **** AUTO	MT	HT	ALL VEH	*** HOURLY LEQ IN dB @ 210 FT. AUTO	MT	HT	ALL VEH
0000-0100	50	1,255	95	2.5	2.5	62.1	57.2	61.6	65.5	55.8	51.0	55.4	59.3
0100-0200	50	695	95	2.5	2.5	59.5	54.7	59.1	63.0	53.3	48.5	52.8	56.8
0200-0300	50	488	95	2.5	2.5	58.0	53.1	57.5	61.4	51.7	46.9	51.3	55.2
0300-0400	50	589	95	2.5	2.5	58.8	54.0	58.3	62.3	52.5	47.7	52.1	56.0
0400-0500	50	1,341	95	2.5	2.5	62.3	57.5	61.9	65.8	56.1	51.3	55.7	59.6
0500-0600	50	4,841	95	2.5	2.5	67.9	63.1	67.5	71.4	61.7	56.9	61.3	65.2
0600-0700	50	5,758	95	2.5	2.5	68.7	63.9	68.2	72.2	62.4	57.6	62.0	65.9
0700-0800	50	5,974	95	2.5	2.5	68.8	64.0	68.4	72.3	62.6	57.8	62.2	66.1
0800-0900	50	4,990	95	2.5	2.5	68.1	63.2	67.6	71.5	61.8	57.0	61.4	65.3
0900-1000	50	5,086	95	2.5	2.5	68.1	63.3	67.7	71.6	61.9	57.1	61.5	65.4
1000-1100	50	5,529	95	2.5	2.5	68.5	63.7	68.1	72.0	62.3	57.5	61.8	65.8
1100-1200	50	5,518	95	2.5	2.5	68.5	63.7	68.1	72.0	62.3	57.5	61.8	65.8
1200-1300	50	5,440	95	2.5	2.5	68.4	63.6	68.0	71.9	62.2	57.4	61.8	65.7
1300-1400	50	5,814	95	2.5	2.5	68.7	63.9	68.3	72.2	62.5	57.7	62.0	66.0
1400-1500	50	6,676	95	2.5	2.5	69.3	64.5	68.9	72.8	63.1	58.3	62.6	66.6
1500-1600	48	8,559	95	2.5	2.5	69.7	65.0	69.5	73.3	63.5	58.8	63.3	67.1
1600-1700	48	8,861	95	2.5	2.5	69.9	65.1	69.7	73.5	63.6	58.9	63.4	67.2
1700-1800	50	7,840	95	2.5	2.5	70.0	65.2	69.6	73.5	63.8	59.0	63.3	67.3
1800-1900	50	6,346	95	2.5	2.5	69.1	64.3	68.7	72.6	62.9	58.1	62.4	66.4
1900-2000	50	4,372	95	2.5	2.5	67.5	62.7	67.0	71.0	61.2	56.4	60.8	64.7
2000-2100	50	3,498	95	2.5	2.5	66.5	61.7	66.1	70.0	60.3	55.5	59.8	63.8
2100-2200	50	3,283	95	2.5	2.5	66.2	61.4	65.8	69.7	60.0	55.2	59.6	63.5
2200-2300	50	2,879	95	2.5	2.5	65.7	60.9	65.2	69.2	59.4	54.6	59.0	62.9
2300-2400	50	2,151	95	2.5	2.5	64.4	59.6	64.0	67.9	58.2	53.4	57.7	61.7
H-1 FREEWAY, STA H-8-B; TWO-WAY; 12/16-17/86													
TOTAL VPD:		107,783				LDN @ 50 FT:	71.8	67.0	71.4	75.3	LDN @	210.0 FT:	69.1

APPENDIX C. (CONT.) WORKSHEET #2