DEPARTMENT OF PLANNING AND PERMITTING
CITY AND COUNTY OF HONOLULU
650 SOUTH KING STREET • HONOLULU, HAWAII 96813
TELEPHONE: (808) 523-4414 • FAX: (808) 527-6743

JEREMY HARRIS
MAYOR

JAN NAOE SULLIVAN
DIRECTOR

LORETTA K.C. CHEE
DEPUTY DIRECTOR

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November 10, 1999

1999/SDD-41(ST)
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Ms. Genevieve Salmonson, Director
Office of Environmental Quality Control
State of Hawaii
State Office Tower, Room 702
235 South Beretania Street
Honolulu, Hawaii 96813

Dear Ms. Salmonson:

WAIKIKI SPECIAL DISTRICT PERMIT
CHAPTER 343, HRS
Environmental Assessment (EA)/Determination
Finding of No Significant Impact

Recorded Owner	:	STARTS International Hawaii, Inc.
Applicant	:	The Genesis Foundation
Agent	:	Media Five International
Location	:	2423 Ala Wai Boulevard, Waikiki, Oahu
Tax Map Key	:	2-6-24: 70 and 71
Request	:	Waikiki Special District Permit
Proposal	:	A 109-unit 8-story rental apartment
Determination	:	A Finding of No Significant Impact is Issued

Attached and incorporated by reference is the Final EA prepared by the applicant for the project. Based on the significance criteria outlined in Title 11, Chapter 200, Hawaii Administrative Rules, we have determined that preparation of an Environmental Impact Statement is not required.

We have enclosed a completed OEQC Bulletin Publication Form and four copies of the Final EA. If you have any questions, please contact Steve Tagawa of our staff at 523-4817.

Very truly yours,

Barbara A. Moon
For JAN NAOE SULLIVAN
Director of Planning
and Permitting

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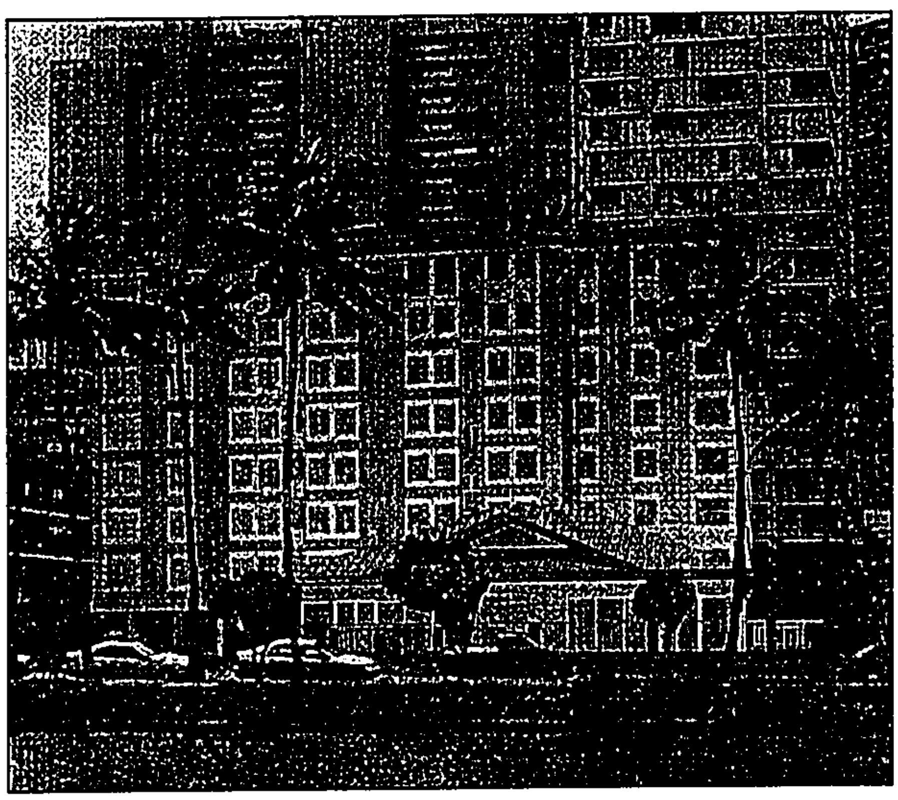
Final Supplemental

Environmental Assessment for

Kahiola, An Affordable Seniors Rental Housing Project in Waikiki, Honolulu, Oahu, Hawaii
TMK: 2 – 6 – 24: 70, 71
2423 Ala Wai Boulevard

October 1999



Applicant:

The Genesis Foundation

Accepting Authority:

City and County of Honolulu
Department of Planning and Permitting
Honolulu, Hawaii

Final Supplemental

Environmental Assessment for

Kahiola, An Affordable Seniors Rental Housing Project in Waikiki, Honolulu, Oahu, Hawaii
TMK: 2 – 6 – 24: 70, 71
2423 Ala Wai Boulevard

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Department of Planning and Permitting
Honolulu, Hawaii

October 1999

Contents

1.0 INTRODUCTION AND SUMMARY

1.1 Overview.

This document supplements the previous project proposal that was the subject of an earlier report entitled *Draft Environmental Assessment for Kahiola, An Affordable Seniors Rental Housing Project in Waikiki, Honolulu, Oahu, Hawaii.* The earlier document was dated April 1999 and published in the *Environmental Notice* on May 8, 1999.

The action discussed in the draft document dated April 1999 was the development of a six-story atrium building of 89 rental apartments for seniors. All of the rental units were proposed to be one-bedroom apartments that ranged in size from 450 to 566 square feet. One two-bedroom unit of 1,350 square feet for the building manager was also proposed. A one-story building would have housed the meeting and activities services areas. Parking and loading was proposed to be on grade. The lobby, offices and building services (i.e., loading and electrical and mechanical equipment rooms) were proposed to be located at the ground floor with other common areas including the serving kitchen, mail room and coin-operated laundry room. A multipurpose room was proposed to be immediately accessible to the primary outdoor recreation space consisting of a covered lanai and an enclosed garden area with shade trees. The landscaping and garden would have contributed to a Hawaiian sense of place. No pile driving was envisioned for the project. Twenty-six parking stalls would have been provided.

Design changes were made subsequent to the publication of the draft document because the proposed scheme of a six-story apartment with minimal allowances for parking would have required an exemption to provide less than the required 90 stalls; an exemption based on this design scheme was not favorably received by the City and County of Honolulu. A supplemental document was therefore determined to be in order because the design scheme was revised to an eight-story atrium with 110 units (109 rentals for seniors and one manager's unit) and 55 parking stalls. Additional impacts associated with design concept revisions such as the driving of short (25-foot) piles needed to be addressed. The City and County of Honolulu Department of Planning and Permitting withdrew the previously prepared draft document on August 2, 1999 and a supplemental document was published in the *Environmental Notice* on August 8, 1999.

This final supplemental document has been revised to incorporate comments that pertain to the *Supplemental Environmental Assessment for Kahiola, An Affordable Seniors Rental Housing Project in Waikiki, Honolulu, Oahu, Hawaii* dated July 1999. All substantive comments that were received and the applicant's responses to those comments are appended to this final document that addresses the proposed design scheme of an eight-story atrium with 110 units and 55 parking stalls.

CORRECTION

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

Contents

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Contents (continued)

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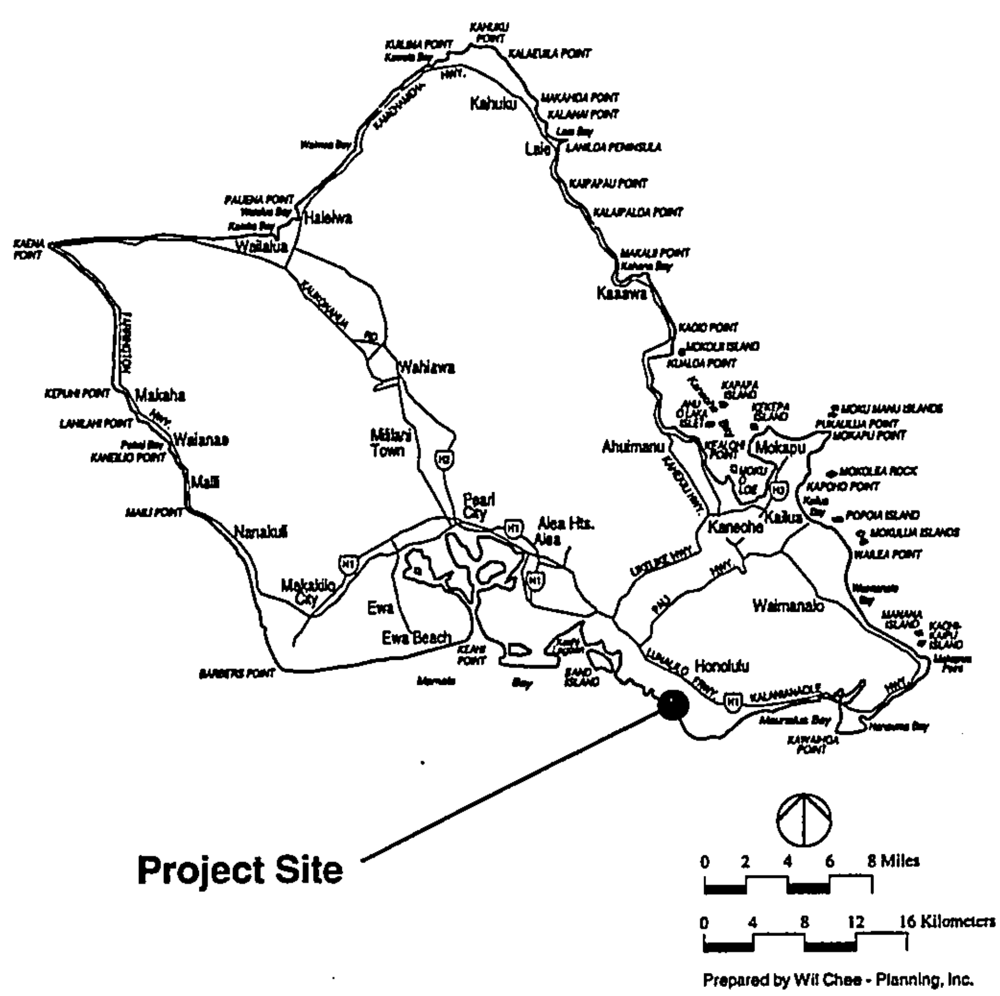
An affordable rental housing apartment complex for seniors is proposed for the property identified by Tax Map Key (TMK) 2 – 6 – 24: 70 and 71 in Honolulu, Oahu, Hawaii (see Figures 1 and 2). The project site is located in Waikiki within the Waikiki Special Design District, Apartment Precinct. The proposed development will meet the established guidelines for renting to individuals with incomes of no more than sixty (60) percent of the Honolulu mean income level. Requirements for State and Federal tax credit equity and bond financing will also be met. Concurrent processing of Hawaii Revised Statutes (HRS) Chapter 201G exemptions, the Environmental Assessment (EA), the application for a joint development Conditional Use Permit and a Waikiki Special District Permit is being accomplished.

Figure 1: General Location.



The Genesis Foundation is the applicant and its representative is Media 5 Ltd. STARTS International Hawaii, Inc. is the fee owner and property manager or agent for the affected property. The fee owner and applicant have a land purchase agreement in effect.

The project site includes two adjacent rectangular parcels east of Kaiulani Avenue between Ala Wai Boulevard and Tusitala Street (see Figure 3). An eight-story atrium building of 109 rental apartments for seniors is proposed. The rental units will be one-bedroom apartments that range in size from 450 to 566 square feet. A two-bedroom unit of 1,350 square feet is proposed for the building manager. A one-story building will house the meeting and activities service areas. Parking and loading will be on grade. The lobby, offices and building services (i.e., loading and electrical and mechanical equipment rooms) will be located at the ground floor with other common areas including the serving kitchen, mail room, toilets, and coin-operated laundry room. A multipurpose room will be immediately accessible to the primary outdoor recreation space consisting of a covered lanai and an enclosed garden area with shade trees. The landscaping and garden will contribute to a Hawaiian sense of place.

Figure 2: Project Vicinity.

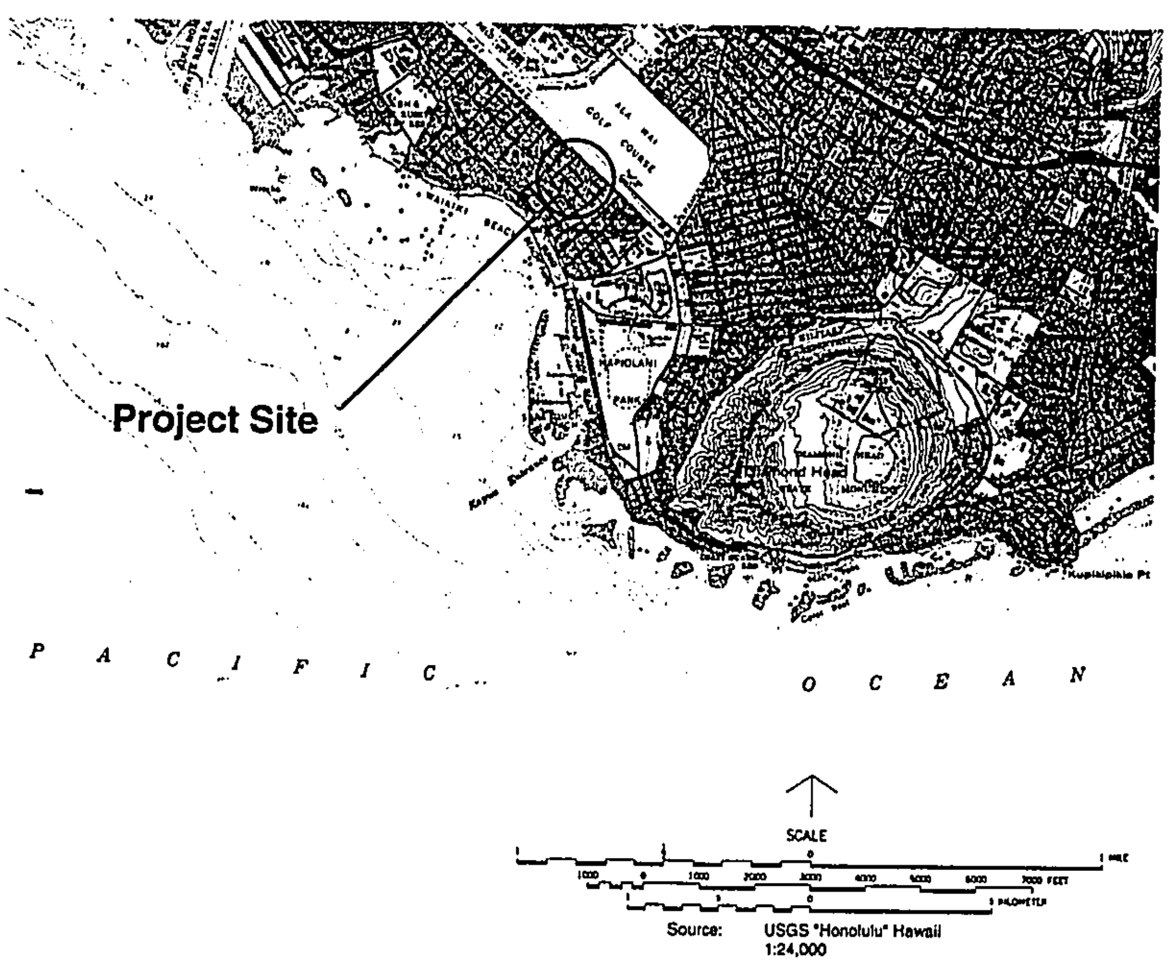
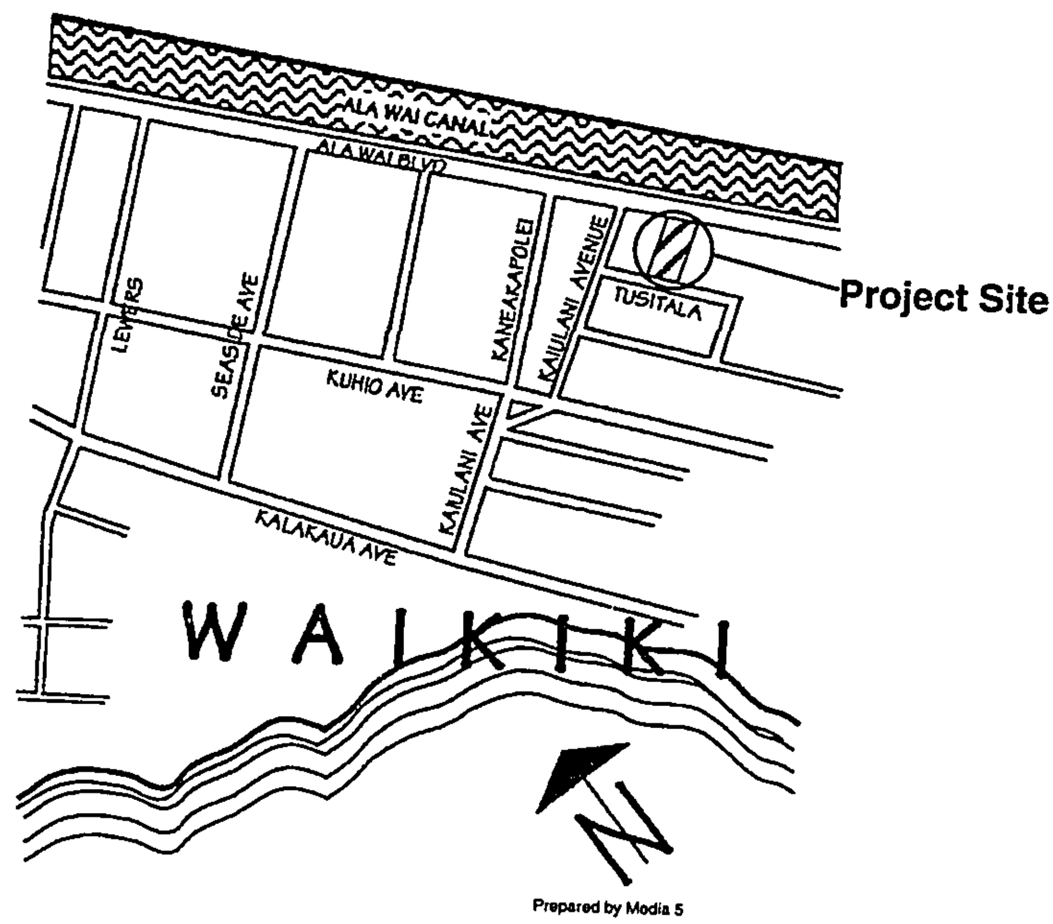


Figure 3: Project Site Location.



1.2 Scope and Authority.

Proposed uses within the Waikiki Special District require the preparation of an environmental review. This EA is prepared pursuant to Chapter 343, HRS and associated Title 11, Chapter 200, Hawaii Administrative Rules. The intent of the document is to ensure that systematic consideration is given to the environmental consequences of the proposed action. A Finding of No Significant Impact (FONSI) is anticipated.

Processing for the Waikiki Special Design District Permit requires approvals from the City and County of Honolulu Director of Planning and Permitting. The City County Zoning Committee will be deliberating on the HRS Chapter 201G application and joint development Conditional Use Permit application with final approval from the City Council. Zoning exemptions for density, height, parking, height setback requirements, open space and the park dedication fee are being sought.

1.3 Project Information.

General project information is listed below.

THE APPLICANT:	The Genesis Foundation Dr. Nicholas B. Christoff, Director P.O. Box 88269 Honolulu, HI 96830-8269
RECORDED FEE OWNER:	STARTS International Hawaii, Inc. Executive Plaza 1953 South Beretania Street, Suite PH C Honolulu, HI 96826
APPLICANT'S REPRESENTATIVE:	Media 5 Ltd. 345 Queen Street, Suite 900 Honolulu, HI 96813 Evan D. Cruthers, FAIA (808) 524-2040
EA PREPARER:	Wil Chee - Planning, Inc. (consultant to Media 5 Ltd.)
PROPERTY MANAGER:	STARTS International Hawaii, Inc. Executive Plaza 1953 South Beretania Street, Suite PH C Honolulu, HI 96826 Ms. Hanako Hata
TMK:	Zone 2, Section 6, Plat 24, Parcels 70 and 71
LOT AREA:	35,761 square feet
AGENCIES CONSULTED:	City & County of Honolulu Department of Design and Construction Department of Environmental Services Department of Planning and Permitting State of Hawaii Department of Health Department of Land and Natural Resources Office of Environmental Quality Control U.S. Government U.S. Fish & Wildlife Services
ACCEPTING AUTHORITY:	City & County of Honolulu Department of Planning and Permitting

2.0 DESCRIPTION OF THE PROPOSED ACTION

2.1 Project Location.

The project site is located in urban Waikiki on the island of Oahu, the third largest and most populous island in the Hawaiian Archipelago. The property identified by TMK: 2 – 6 – 24: 70 and 71 lies east of Kaiulani Avenue and makai (or seaward) of Ala Wai Canal. The four boundaries of the site are Ala Wai Boulevard, the Ala Wai Town House development, Tusitala Street and the Waikiki Bellevue.

2.2 Project Site Description.

In general, the site consists of two adjacent, undeveloped, rectangular parcels totaling 35,761 square feet. Previously, the site contained single family residences. The project site is currently flat and unencumbered by on-site obstructions.

2.3 Project Features.

The proposed action will provide affordable rental housing for seniors with incomes of no more than sixty (60) percent of the Honolulu mean income level. Upon completion, the proposed apartment development will provide more opportunities for independent living to elderly individuals on limited incomes.

2.3.1 TECHNICAL CHARACTERISTICS.

An affordable rental apartment complex for seniors is proposed as follows:

- the development will include an eight-story atrium of 109 rental apartments for seniors;
- one (1) two -bedroom manager's unit is proposed;
- there will be no apartment lanais;
- a one-story building will house the lobby, offices, building services (i.e., loading and electrical and mechanical equipment rooms), serving kitchen, storage and multipurpose room (for meetings and activities), mail room, coin-operated laundry room, and restrooms;
- a total of 55 parking spaces (including three spaces for the physically disabled and one space for loading) are proposed to be on grade;
- the primary outdoor recreation space for the tenants will consist of a covered lanai and an enclosed garden area with shade trees;
- the roof treatment (hip-formed in shape), garden wall treatment (e.g., open ironwork over a base of masonry material), landscaping and fountain will contribute to a Hawaiian sense of place; and
- sustainable building design techniques will be applied to the extent practicable.

The building will be Uniform Building Code Type 1 construction. The structure will be comprised of reinforced concrete foundations and concrete floor slabs with vertical concrete columns and walls founded on short (25-foot) piles. Building exteriors will be finished with an Exterior Insulation and Finish System (EIFS). Interior partitions will be metal framed and drywalled. Public spaces will have resilient or carpeted floors and acoustic ceilings with florescent lighting. The serving kitchen and utility spaces will have finishes to match the use. Windows will be aluminum framed.

Three types of one-bedroom rental apartments are planned: Type A shall be 450 square feet; Type B shall consist of 566 square feet; and Type C shall comprise 552 square feet. The two-bedroom manager's unit will comprise 1,350 square feet. Each apartment will have carpeted floors in the living spaces and resilient flooring in the kitchen and bath. Bathrooms will have a shower, toilet and lavatory, and linen cabinet. The project will comply with the Americans with Disabilities Act (ADA) guidelines. Grab bars and raised toilets will be provided in living units for residents with impaired mobility; flashing fire alarms will be provided in living units for residents with impaired hearing and vision. Kitchens will have pressure laminate cabinets and plastic laminate counter tops. Furnished appliances will include a refrigerator and range with recirculating filter hood. The stainless steel kitchen sink will be equipped with a disposer. Air conditioning will be installed in all units.

2.3.2 ECONOMIC CHARACTERISTICS.

Financing assistance from the State of Hawaii Housing and Community Development Corporation of Hawaii (HCDCH) Financing Program is being requested. Federal and state tax credits for the annual amounts of $1,000,000 and $300,000, respectively, as provided via the Low Income Housing Tax Credit Program are being pursued. A 30-year loan of $3,181,000 at 3.0% interest and a capacity building grant for $50,000 as provided via the Rental Housing Trust Fund Program are also being requested. The financing program application is being concurrently processed with other project applications and this EA.

General construction could begin by the end of the first quarter in the year 2000 if all necessary approvals, permits and exemptions are granted by the 1999 year end. Various construction phases associated with the project would foreseeably encompass the following time frames to allow for project completion by the start of the third quarter in the year 2001:

Mass excavation and grading	2 weeks
Foundations	5 weeks
Primary structure	25 weeks
Complete exterior skin and interior finishes	15 weeks

The immediately surrounding community is expected to experience no direct economic impacts from the proposed action. Instead, construction employment and material expenses are expected to generate general excise tax and income tax revenues to the State of Hawaii. The City and County of Honolulu will most likely benefit from increased real property tax revenue upon completion of the proposed apartment complex for seniors.

2.3.3 SOCIAL CHARACTERISTICS.

Without the proposed project, elderly individuals on limited incomes will have fewer opportunities for independent living within urban Honolulu. The proposed action helps to address the anticipated needs of a growing elderly population by providing affordable rental units within Waikiki specifically for seniors with limited incomes (see the discussion in Section 3.14). The proposed development strives to provide adequate community meeting space (via the multi-purpose room) for a regular elderly luncheon program and other service programs for elderly residents' needs. This multi-purpose room will also be used to involve community leaders and allow resource experts to present workshops/lectures on subjects of interest to the elderly residents (e.g., holistic health, personal safety and welfare).

Information about the Genesis Foundation Housing Project and concerns related to potential impacts (especially pile driving) were discussed at a Waikiki Neighborhood Board meeting held on 21 April 1998. The design concept discussed at this meeting was for an apartment tower of 283 one-bedroom, non-profit, affordable rental units for seniors. The Board moved to support the concept of the Genesis Foundation Housing Project by a vote of 12 – 3 – 0 (refer to the Regular Meeting Minutes in Appendix F). The proposed project discussed in this EA will accomplish the same objectives as the original proposal but on a substantially smaller scale.

2.3.4 ENVIRONMENTAL CHARACTERISTICS.

Impacts to the environment as a result of the proposed action will be mostly temporary and negligible or otherwise insignificant and mitigable. Essentially no adverse impacts to the geography, geology, hydrology, climate, flora, fauna, land use and aesthetic conditions are anticipated. Anticipated impacts to the other areas of environmental concern and proposed mitigation associated with the project are summarized in the following paragraphs.

Land disturbing construction activities have the potential to generate impacts that may affect the following areas of environmental concern: topography, soils, water quality, air quality, noise quality, historical and archaeological resources, circulation and traffic, and public services and facilities. The potential impacts from proposed activities are discussed in Chapter 4.0 and summarized below:

- Minor alterations to the existing topography;
- Disturbance of the earth and soils, soil loss, and silt runoff;
- Generation of effluent from construction dewatering;
- Creation of fugitive dust and pollutant emissions;
- Generation of construction noise emissions;
- Disturbance of historical and cultural resources;
- Disruptions to vehicular traffic and circulation; and
- Interruptions to the delivery of public services.

Potential impacts will be avoided, minimized and/or mitigated through the measures stated in Chapter 4.0 and summarized below:

- Adherence to City and County of Honolulu grading permit requirements;
- Implementation of temporary and permanent erosion and sedimentation control measures, and compliance with State and County erosion control standards and requirements;
- Employment of measures to control runoff;
- Implementation of measures in compliance with provisions of HAR, Chapter 11-60-1, "Air Pollution Control," Section 11-60.1-33, Fugitive Dust;
- Compliance with the DOH Administrative Rules, *Chapter 11-46*, "Community Noise Control;"
- Accomplishment of an archaeological inventory survey, coordination of the findings to determine appropriate actions, implementation of archaeological monitoring during construction, and proper notification upon any discovery of archaeological or historical resources;
- Incorporation of appropriate setbacks and sight distances into the project design and the employment of standard specifications for traffic control; and
- Acquirement of the necessary approvals prior to construction, adherence to all permits and associated requirements, and coordination with utility providers to avoid service disruptions.

The environmental impacts of the proposed action are expected to be insignificant due to the measures that are available for mitigation. Completion of the project is expected to ultimately reduce the total amount of fugitive dust, erosion and sediment transport that occurs from the open areas on the vacant, undeveloped parcel. As a result of the proposed action, bare subsoil areas will be covered with a layer of topsoil and landscaped. This will reduce the overall erosion potential at the project site. Landscaping will also improve the overall aesthetic quality of the site as compared to existing site conditions.

3.0 AFFECTED ENVIRONMENT OF THE PROPOSED ACTION

3.1 Geography and Topography.

The island of Oahu comprises four main geographically distinct areas: the Waianae Range, Koolau Range, Leilehua (or Schofield) Plateau and coastal plains (U.S. Department of Agriculture, 1972). The project site is located in southern Oahu on the Honolulu Coastal Plain.

The project site generally comprises level terrain and is characteristically vacant and largely barren of vegetation. There are no apparent topographic obstructions within project boundaries.

3.2 Geology and Soils.

The project area consists of "a thick sedimentary wedge comprised of intercalated coral/algal reef deposits, terrigenous and marine sediments and volcanics of the Honolulu Volcanic Series" (C.W. Associates, Inc., 1988). In the early 1900's, the area consisted of low marshy wetlands that were subsequently reclaimed by placing man-made fills.

As indicated in the *Soil Survey of Islands of Kauai, Oahu, Maui, Molokai, and Lanai* (U.S. Department of Agriculture, 1972), the land type in the project area is designated as Fill land, mixed (FL) and has no soil capability classification. Fill land is used for urban development including airports, housing areas and industrial facilities (U.S. Department of Agriculture, 1972). Geotechnical engineering exploration for Parcel 70 revealed the following information:

> "Borings encountered a surface fill layer of about five (5) feet thick composed of moderately to highly expansive clays and silts overlying about eleven (11) feet of medium dense beach or shallow marine sands and gravel.
>
> "Very loose lagoonal sands and gravels were encountered from about 16-foot depth through about 30-foot depth below the existing ground surface. Underlying these lagoonal deposits, relatively competent coral/algal reef formation was encountered.
>
> "...there are two (2) coral layers below the site. The shallower ledge was encountered at about 30- to 35-foot depth and the lower ledge was encountered at about 45- to 50-foot depth below the existing ground surface. A relatively large cavity, about 7 feet in height, was encountered in Boring No. 7 at a depth of about 42 feet below the existing ground surface. Basalt was encountered at a depth of about 92 feet" (C.W. Associates, Inc., 1988).

Parcel 71 lies west of parcel 70 and is closer to the estimated location of Kaiulani Channel—a buried river bed eroded to approximately 190 feet below the existing ground surface (Fewell, 1998). This eroded channel is backfilled with soft alluvial deposits. Various coral layers exist outside of the channel and "are blanketed by soft lagoonal deposits covered with a thin crust or fill" (Fewell, 1998).

3.3 Hydrology and Water Quality.

An extensive basal aquifer underlies the Honolulu-Pearl Harbor area. This aquifer contains large supplies of fresh water resources in southern Oahu, particularly in coastal areas. Caprock in these coastal areas "retards the seaward flow of groundwater, resulting in a higher water table than areas of the City (of Honolulu) closer to Koolau mountain range" (NORDIC/PCL and Wilson Okamoto & Associates, Inc., 1995).

Groundwater was encountered during geotechnical exploration of parcel 70 at depths of 5.0 to 6.4 feet below the existing ground surface (C.W. Associates, Inc., 1988). Proximity to the Ala Wai Canal may result in ground water levels that "fluctuate in response to tidal changes and flood conditions in the canal" (C.W. Associates, Inc., 1988).

Shallow groundwater in the vicinity of the project site "is an upper caprock aquifer that is neither a drinking water source nor considered ecologically important" (HIES, 1999). Groundwater flow in this shallow aquifer "is toward Mamala Bay, one-quarter mile south-southwest of the [project site]" (HIES, 1999). Records of drilled wells in the vicinity of the affected property suggest that the basal aquifer is located at more than 250 feet below the ground surface. No drinking wells are located down gradient of the project site and "the nearest drinking water supply well is one-mile east-northeast and upgradient of the [project site]" (HIES, 1999).

3.4 Climate.

Most of Hawaii is characterized by slight seasonal variations that create a climate of year-round mild and equitable temperatures, moderate humidities and predominantly northeast trade winds (Armstrong, 1983). Temperatures at the project site are expected to be similar to those found elsewhere in Hawaii.

The following climatological information is from *The State of Hawaii Data Book 1992: A Statistical Abstract* (Department of Business, Economic Development and Tourism, 1993). According to data recorded at Waikiki (the Honolulu Zoo), average temperatures range from 71.9°F during the coolest months (February to March) to 80.6°F during the warmest months (August and September). The lowest recorded temperature at the Honolulu Zoo is 51°F and the highest recorded temperature is 93°F. Annual precipitation is 25 inches.

3.5 Air Quality.

Meteorological data from the Honolulu International Airport—the nearest long-term weather station—and Hickam Air Force Base were reviewed for the *Air Quality Impact Report (AQIR), Genesis Senior Housing Development, Waikiki, Oahu* (Morrow, 1999). The following paragraphs are excerpted from the report that is appended to this EA.

Historical data demonstrates the prevalence of northwesterly trade winds during most of the year. This data also indicates that low velocities (less than 10 miles per hour) occur frequently. The "normal" northeasterly trade winds begin to lessen in the Fall and give way to more light, variable wind conditions throughout Winter and into early Spring. "It is during these times that Honolulu generally experiences elevated pollution levels" (Morrow, 1999).

Stability wind roses for Hickam Air Force Base indicate that stable conditions occur approximately 28 percent of the time on an annual basis and 36 percent of the time during the peak winter month of January. "It is under such conditions that the greatest potential for air pollutant buildup from ground-level sources, e.g., motor vehicles, exists" (Morrow, 1999).

3.6 Noise Quality.

Source of existing background ambient noise levels at the project site are largely attributed to motor vehicle traffic along streets bordering the project site, and from Ala Wai Boulevard in particular due to its larger traffic capacity and volume.

3.7 Flora.

The project site is situated within urban Waikiki and is largely barren of vegetation. No trees are present on the site. No observed grasses, shrubs or weedy species within the project site are protected under State or Federal environmental laws. The U.S. Department of the Interior, Fish and Wildlife Service (FWS) by letter dated 19 August 1998 (refer to Appendix F) has indicated that "there are no Federally endangered, threatened, or candidate species in the project site" (1998). Similarly, the Hawaii State Department of Land and Natural Resources (DLNR), Division of Forestry and Wildlife reports that "it is highly unlikely that there would be threatened and/or endangered species in the project location" (1998).

3.8 Fauna.

Urbanized areas typically provide no suitable habitat for Oahu threatened, endangered or candidate faunal species—the Hawaiian hoary bat (*Lasiurus cinereaus semotus*), the Hawaiian or Oahu tree snail (genus *Achatinella*), the Hawaiian owl (*Asio flammeus sandwichensis*) and the Oahu creeper (*Paroremyza maculata*). Correspondence with the FWS (1998) and DLNR, Division of Forestry and Wildlife (1998) suggests that the proposed site is uninhabited by and is of little or no resource value to known endangered fauna on the island of Oahu. Birds, mammals, reptiles and amphibians that may frequent the project site are expected to be introduced or indigenous species that are commonly found in urban environments.

3.9 Historical and Archaeological Resources.

Information in this section is from the Phase I Environmental Site Assessment of the affected property (HIES, 1999). Consultation with the DLNR, Historic Preservation Division has been initiated. The letter from the State Historic Preservation Division (SHPD) dated 11 May 1999 is included in Appendix F.

The project site is reportedly located within the boundaries of 'Ainahou—the grand estate of Territorial Governor Archibald S. Cleghorn. His wife was Princess Miriam Likiliki (sister to King Kalakaua and Queen Lili'uokalani); their daughter was Princess Ka'iulani who passed away in 1899.

'Ainahou encompassed the area from Kalakaua Avenue and Ka'iulani Street to the present day Ala Wai Canal. The estate was bestowed to the City of Honolulu when Governor Cleghorn passed away in 1910 and was to become Ka'iulani Park in memory of the young Princess. His gift, however, was turned down because the city fathers at that time had decided that Waikiki had enough park space.

Development of 'Ainahou occurred subsequent to the city's rejection of ownership of the estate. Realtor Percy Pond bought 'Ainahou in 1919 and was responsible for developing several properties in Waikiki. He also lobbied for the development of a canal to drain the fishponds and swamps. Construction of the Ala Wai Canal began in 1921.

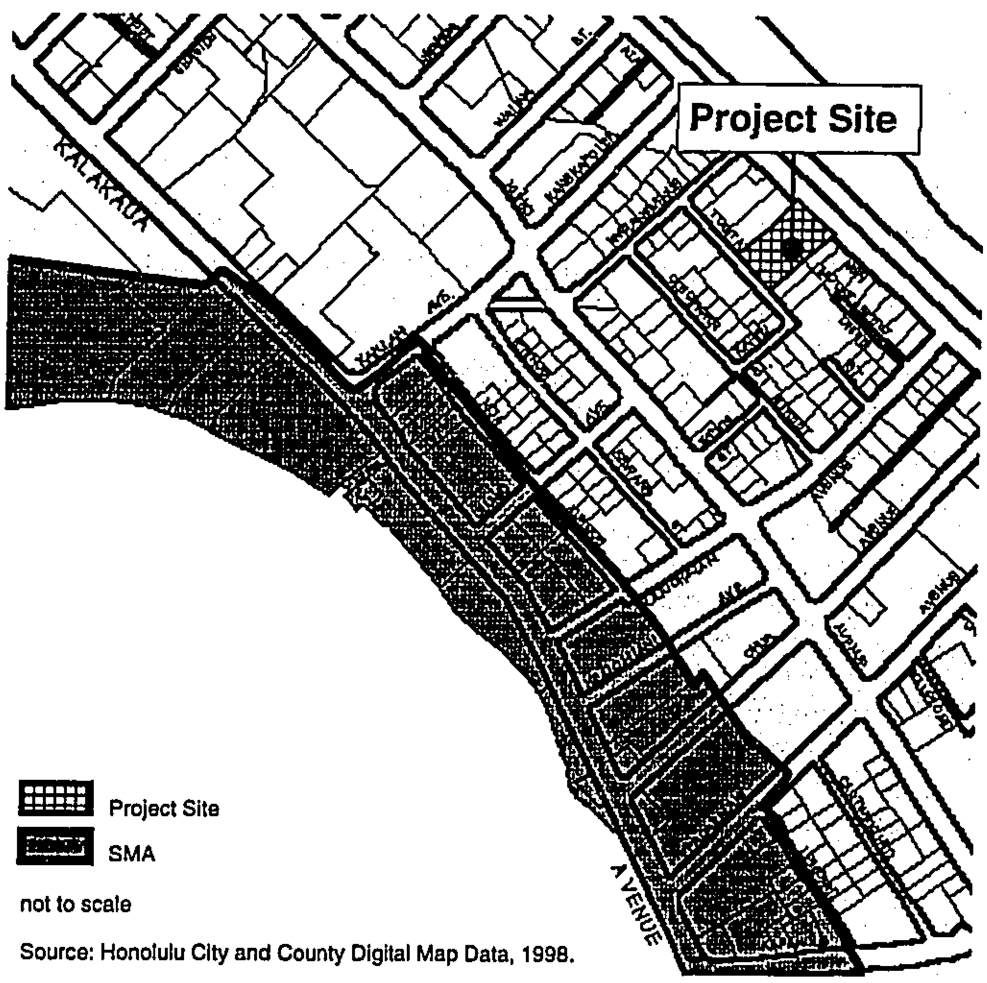
A Sanborn Fire Insurance Map from 1927 reveals that the area of the project site was fully developed by 1927. Single, duplex and fourplex-style bungalows existed. "At least a dozen duplex-style buildings have been built on what are now Parcels 70 and 71" (HIES, 1999). Parcel 71 initially contained two buildings: a fourplex and a single-family bungalow. The homes were owned in fee; the fourplex was owned condominium style with each apartment belonging to a separate owner. A third building of five apartments was constructed on Parcel 71 during the 1950's. No new owners appear on the title and it is construed that these units were rental apartments. Bungalows constructed in the 1920's on Parcel 70 and the general layout of sidewalks and parking areas remained unchanged until demolition in the 1980's.

Other evidence of previous development on the project site is revealed in an aerial photograph from 1948. Two structures are present on Parcel 71; eight structures exist on Parcel 70. An aerial photograph from 1959 shows virtually the same layout for Parcel 70, but a new apartment structure is visible on Parcel 71. The aerial photograph from 1970 reveals that bungalows and duplexes east of the project site have been replaced by apartment buildings (the Dynasty and Waikiki Bellevue); construction (of the Ala Wai Townhouse Condominium) on the parcel immediately west of the project site is under way. An aerial photograph from 1997 shows the project site as it exists today with no structures standing or present.

3.10 Land Use Considerations.

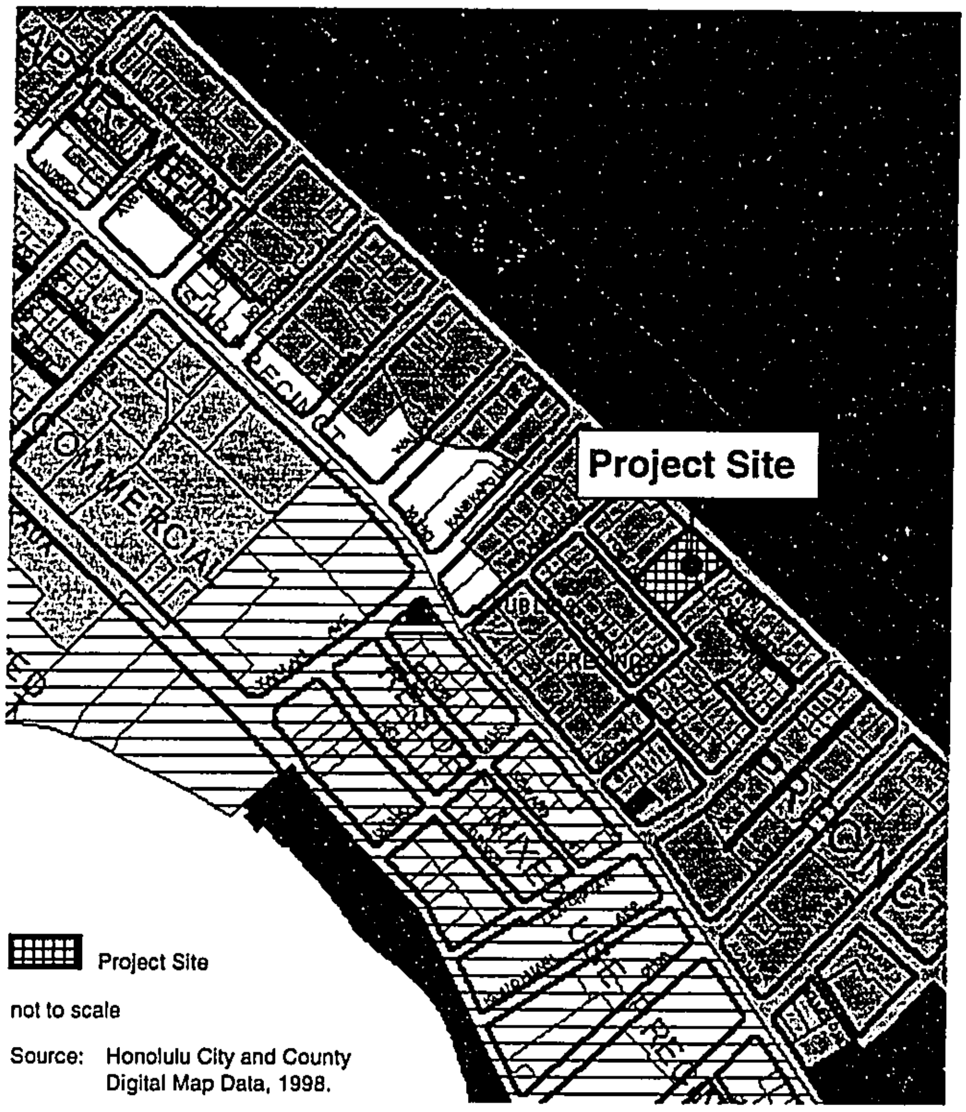
The project site is located outside of the Special Management Area (SMA) that extends along the shoreline of Waikiki (see Figure 4). No SMA Use Permit is expected to be required for the project.

Figure 4: SMA in the Vicinity of the Project Site.



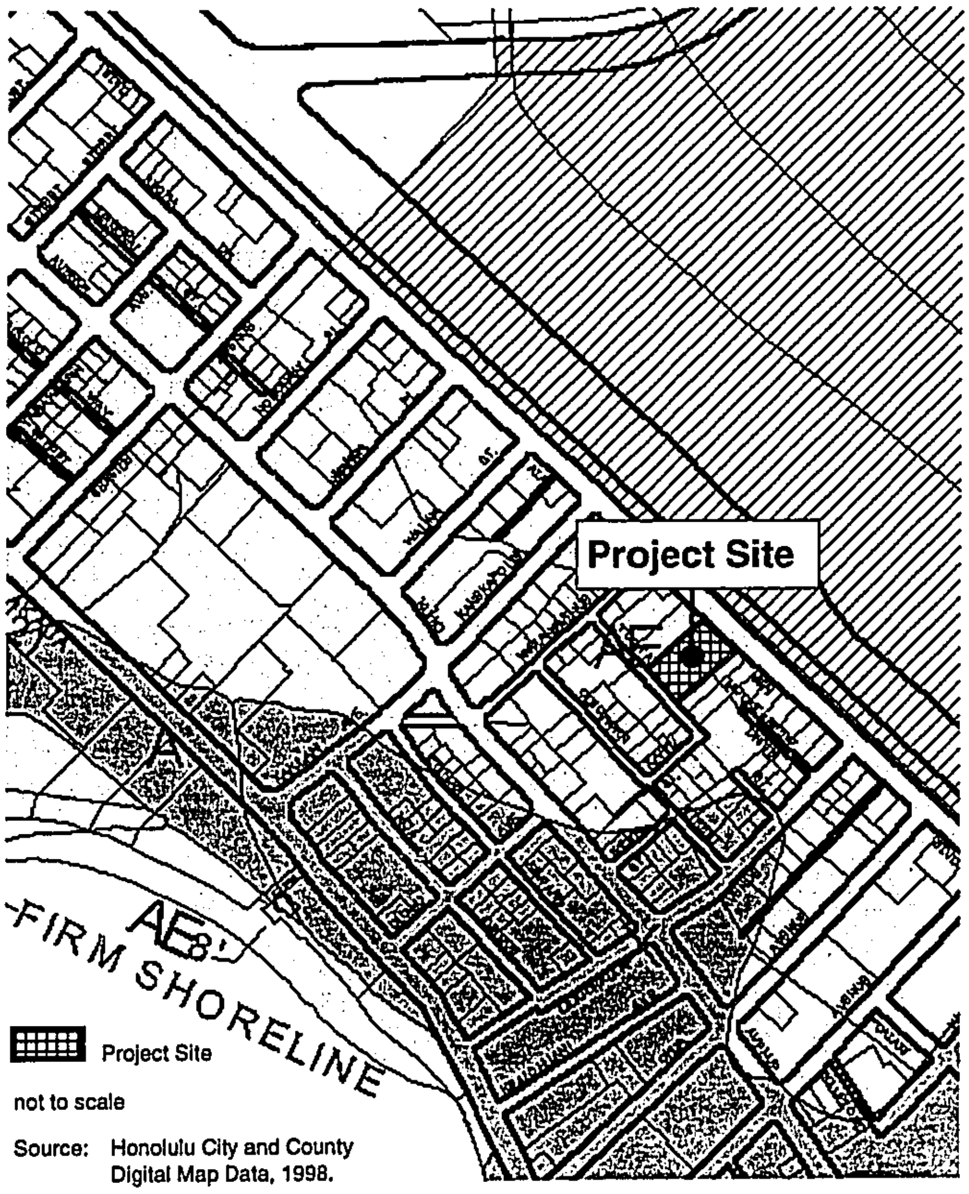
The State land use designation for the general area that encompasses the project site is Urban. The project site is located in the Primary Urban Center that is designated for full development according to the objectives and policies of the City and County of Honolulu General Plan. The City and County of Honolulu Development Plan designation for the project vicinity is Medium Density Apartments. Existing land uses surrounding the project site include apartments such as the Ala Wai Townhouse, Waikiki Bellevue and Dynasty. The area encompassing the project site falls within the Apartment Precinct land use designation within the Waikiki Special Design District (see Figure 5).

Figure 5: Land Use Designations in the Vicinity of the Project Site.



The entire project site is located within Zone AE of the 100-year flood hazard area on the Flood Insurance Rate Map (FIRM). Base flood elevations are determined to be ±6 feet above mean sea level. The project site lies outside the tsunami inundation zone.

Figure 6: FIRM Designations in the Vicinity of the Project Site.



3.11 Aesthetic Considerations.

Existing views from the project site are generally obscured by neighboring apartments with the exception of views to the northeast. Views looking toward Ala Wai canal reveal existing urban uses mauka of the canal and the distant mountains.

3.12 Circulation and Traffic.

Information in this section is excerpted from *Traffic Impact Analysis Report: Genesis Senior Housing Development in Waikiki, Honolulu, Oahu, Hawaii* (Phillip Rowell and Associates, 1999).

> "Liliuokalani Avenue is a one-lane, one-way roadway in the mauka direction. Unrestricted parking is allowed along both sides between Kuhio Avenue and Mountain View Drive. The section between Mountain View Drive and Ala Wai Boulevard has been widened to provide two left-turn lanes from Liliuokalani Avenue to Ala Wai Boulevard. No parking is allowed along this section.
>
> "Ala Wai Boulevard is a major one-way arterial in the Ewa direction. During off-peak periods, Ala Wai Boulevard is three lanes wide and parking is allowed along the mauka side. From 6:30 AM to 8:30 AM and from 3:30 PM to 5:30 PM, parking is prohibited to provide a fourth travel lane.
>
> "Kanekapolei Street is a two-way, north-south roadway. The section of roadway immediately south of Ala Wai Boulevard has a passenger loading zone on each side. These loading zones are used for pick up and drop off of tourist(s) from the adjacent hotels.
>
> "Kaiulani Avenue is a one-lane, one way street in the mauka direction" (Phillip Rowell and Associates, 1998).

Signalized intersections include Ala Wai Boulevard at Liliuokalani Avenue and Ala Wai Boulevard at Kanekapolei Street. The Ala Wai Boulevard/Kaiulani Avenue intersection is controlled by a STOP sign on the Kaiulani Avenue approach. Methodologies for signalized and unsignalized intersections, respectively, were applied to assess existing levels-of-service (LOS). LOS definitions vary for the two types of intersections, but in general, LOS "A" represents the most favorable operating conditions and LOS "F" represents least favorable conditions.

The signalized intersections were found to operate at level-of-service (LOS) "A/B" during the morning and afternoon peak hours. The left turn movement from the unsignalized intersection at Kaiulani Avenue has a long delay that causes LOS "D" conditions.

3.13 Public Services and Facilities.

3.13.1 WATER SYSTEM.

The Honolulu Board of Water Supply (BWS) provides potable water to the project area through its distribution system. No demand for potable water is currently generated by the undeveloped project site.

3.13.2 WASTEWATER SYSTEM.

Municipal wastewater service is provided via underground lines, mains and collection systems that generally follow existing roadway alignments. The project site currently generates no demand for wastewater collection services. Wastewater system improvements in the project vicinity may be accomplished by the City and County of Honolulu in the near future (refer to Section 4.13 for the discussion of proposed improvements).

3.13.3 SOLID WASTE DISPOSAL.

Solid waste collection for the project area is provided by the City and County of Honolulu. No solid waste is currently generated at the vacant, undeveloped property.

3.13.4 DRAINAGE SYSTEM.

Provisions for drainage within the project area generally follow roadway alignments. No on-site drainage systems presently exist.

3.13.5 ELECTRICAL AND COMMUNICATION SYSTEMS.

Electrical, telephone and cable television services are provided to the project area via overhead distribution lines. The undeveloped site generates no demand for these services.

3.14 Socio-Economic Conditions.

The project site is located within a populated urbanized area and is largely surrounded by multi-story apartments. In an undeveloped state, the project site makes relatively no contribution to the social or economic condition of the general area.

The State of Hawaii Data Book 1997 that is published by the Department of Business, Economic Development and Tourism (DBEDT) includes census data for the 1990 resident population that suggests a greater proportion of people age 65 years and older than in the previous decade. This age group in 1990 comprised approximately 11.3 percent of the total population, whereas in 1980 the group consisted of roughly 7.9 percent of the population (U.S. Bureau of the Census, July 1982 and June 1992 in DBEDT, 1997). Provisional estimates of the 1997 resident population show a continued increase in the number of people age 65 years and older. The 1997 projections suggest that this age group comprised about 13.2 percent of the Hawaii population (U.S. Bureau of the Census in DBEDT, 1997).

For the foreseeable future, it is anticipated that the City and County of Honolulu will continue to have considerably more elderly residents than the other counties. In 1990, approximately 73.5 percent or 91,832 of 125,005 Hawaii residents who were 65 years of age and older resided in the City and County of Honolulu (U.S. Bureau of the Census in Department of Business, Economic Development and Tourism, 1997). Estimates of 1996 conditions suggest that 71.7 percent or 109,433 of 152,523 residents who were 65 years of age and older resided in the City and County of Honolulu (U.S. Bureau of the Census, December 1997 in Department of Business, Economic Development and Tourism, 1997).

SMS Research and Marketing Services, Inc. independently prepared a *Preliminary Assessment of Need for Affordable Rental Housing in Waikiki* dated November 1995. Their report cited the Hawaii Housing Policy Study conducted in 1992 which suggests "that some 1,420 households would prefer to have rental housing in Waikiki" (SMS Research and Marketing Services, Inc., 1995). The demand for rental housing is "from residents of Waikiki and the nearby McCully/Mo'ili'ili area" (SMS Research and Marketing Services, Inc., 1995). City and County of Honolulu data for 1994 suggests that "some 126,000 renting households exist on Oahu, including 16,000 elderly households" (Exhibit B in SMS Research and Marketing Services, Inc., 1995).

4.0 ENVIRONMENTAL CONSEQUENCES OF THE PROPOSED ACTION

4.1 Geography and Topography.

The proposed action involves the construction of the eight-story apartment building and its supporting infrastructure on the vacant, undeveloped property. No impacts to the geography of the project area are anticipated.

Excavation, grading and related construction activities will occur, but not to the extent that would significantly affect the general topography of the area. The project site is essentially flat. Short piles will be used for the apartment structure whereas parking will be on grade. Grading and related alterations will be accomplished only to the extent necessary.

MITIGATION: City and County of Honolulu permit requirements for grading, excavation, and related construction work will be adhered to by the construction contractor.

4.2 Geology and Soils.

The underlying geology of the area is expected to be minimally affected by project actions. No mitigation with respect to the geology is proposed or considered to be warranted.

Potential erosion could occur as a consequence of construction activities (e.g., clearing, grading and grubbing) that disturb the earth and soils. Exposed soils are susceptible to erosion, especially if it rains heavily during site work periods. Wind erosion is expected to cause some unavoidable soil loss, but the greater concern is silt runoff. Potential adverse impacts are expected to be short-term and temporary.

Completion of the project and its operation is expected to result in no adverse impacts to soils and would presumably reduce the total amount of erosion and sediment transport from the site. As a result of the proposed action, open areas would be covered with impermeable surface area and bare subsoil areas would be covered with a layer of topsoil and landscaped.

MITIGATION: Temporary and permanent erosion and sedimentation control measures would be implemented. Strict erosion control measures are specified in the reports and regulations of the City and County of Honolulu, State Department of Health (DOH), U.S. Department of Agriculture - Natural Resources Conservation Service, and U.S. Environmental Protection Agency (EPA). Typical erosion control measures include the utilization of cut-off ditches and detention ponds to slow runoff, the use temporary ground cover vegetation, and the application of soil stabilization and protection materials.

Dust control measures include the implementation of a watering program to minimize soil loss and particulate emissions. Good construction management practices at the job-site and the paving or planting of bare earth areas as soon as practicable further minimizes potential impacts.

Landscaping and long-term erosion control involves the placing of new ground cover plantings or other landscaping to generally re-establish the soil retention value of removed vegetation. Continuous long-term management of the property will reduce erosion impacts as compared to existing conditions.

4.3 Hydrology and Water Quality.

Impervious surfaces created as a result of the proposed action are expected to increase localized runoff and decrease total time of concentration since runoff (as would occur from rainfall events) will be directed to man-made drainage systems versus being allowed to percolate through the bare earth and soils. The resulting loss of localized groundwater recharge due to the increase in paved surfaces at the project site is expected to be negligible and ultimately inconsequential to the overall function of the natural hydrological system, especially since groundwater sources are distant from the project site. No mitigation measures with respect to hydrology are proposed or considered to be warranted.

Potential impacts to water quality could result from localized silt runoff during construction; however, the proposed project includes the installation of a site drainage system that will connect to the existing municipal system. The paving and landscaping of bare earth areas is expected to minimize silt runoff and erosion potential that currently exists while the project site remains in an undeveloped state.

MITIGATION: "Proper planning, design and use of erosion control measures and management practices during construction will substantially reduce the total volume of runoff and limit the potential impact to the coastal waters from polluted runoff" (DOH, 1999). Guidance on these management measures and practices for specific project activities can be found in the *Hawaii's Coastal Nonpoint Source Control Plan*, pages III-117 to III-119. The construction contractor is expected to implement temporary runoff control measures to prevent silt runoff from reaching receiving waters.

4.4 Climate.

The proposed action is expected to generate no measurable adverse impacts to the climate in the short- or long-term. Consequently, no mitigation measures are warranted or proposed.

4.5 Air Quality.

Short-term air quality impacts generated by the proposed action are primarily attributed to construction activity. Automotive pollutant concentrations from construction vehicle activity are expected to increase at the project site and along affected existing streets, but these impacts are largely unavoidable and temporary. Other short-term and temporary air quality impacts are anticipated from activities (such as earth moving, grading, concrete and asphalt batching, and site preparation) that generate fugitive dust or particulate emissions.

The proposed action described in this EA includes 110 apartments (109 rental units and one unit for the building manager) and 55 parking stalls. Air quality impacts were assessed in the AQIR (1999) based on the mobile source activity suggested by the traffic impact analysis for 90 units (89 rentals and one manager's unit) and 26 on-site parking stalls.

A previously accomplished AQIR (1998) considered the mobile source activity suggested by the traffic impact analysis for the design concept of a 26-story apartment tower of 283 units and 124 parking spaces. This earlier study (refer to Appendix B) resulted in similar findings to those listed below. It is presumed that the proposed action to develop the eight-story apartment building will generate air quality impacts substantially similar to those identified in the AQIR (1999) despite the described design concept differences (20 rental apartment units and 29 parking stalls). Furthermore, the air quality impacts associated with the proposed action described in this EA are expected to be no greater than those identified in the AQIR (1998) for the significantly larger apartment tower concept (consisting of an additional 174 rental units and 69 parking spaces).

Air quality modeling as described in the AQIR (1999) suggests that "both the federal and state carbon monoxide (CO) standards would be met at all but *one* receptor location in close proximity (less than 10 meters) to the Liliuokalani Avenue intersection" (Morrow, 1999). At that one location, there is "a slight possibility of exceeding the state 1-hour standard under *existing* conditions" (Morrow, 1999). Predicted CO levels declined slightly under assumptions of continued projected growth and are normally attributed to "the attrition of older, more polluting vehicles and the increase in new, lower-emitting vehicles which offset the overall increase in traffic volume due to growth" (Morrow, 1999). From these findings, no mitigation measures are considered to be necessary.

Off-site stationary source impacts are attributed to the increased electrical demand resulting from the proposed project which in turn causes more fuel to be burned and more pollutants to be emitted into the air. The Hawaiian Electric Company (HECO) and similar facilities must continuously demonstrate compliance with all applicable ambient air quality standards and control regulations. Other off-site emissions are associated with the disposal (via incineration) of the solid waste generated by the expected residents. This impact is expected to be very small in comparison to the amount that is generated by the county.

MITIGATION: As indicated in the letter from the DOH dated 7 June 1999 (refer to Appendix F), construction activities must comply with provisions of HAR, Chapter 11-60-1, "Air Pollution Control," Section 11-60.1-33, Fugitive Dust. Adequate measures that control dust from the road areas and during the various phases of construction are not limited to those listed below:

> "Planning the different phases of construction, focusing on minimizing the amount of dust generating materials and activities, centralizing on-site vehicular traffic routes, and locating potentially dusty equipment in areas of the least impact;
>
> "Providing an adequate water source at the site prior to start up of construction activities;
>
> "Landscaping and rapid covering of bare areas, including slopes, starting from the initial grading phase;

"Controlling of dust from shoulders and access roads;

"Providing adequate dust control measures during weekends, after hours, and prior to daily start-up of construction activities; and

"Controlling of dust from debris being hauled away from the project site" (DOH, 1999).

Mitigation for offsite stationary source impacts associated with increased electrical demand include the use of energy efficient features (e.g., light fixtures, air conditioning units) as suggested in guidelines reportedly available from the DBEDT. Encouraging the use of recyclable products is suggested mitigation for impacts related to offsite solid waste disposal.

4.6 Noise Quality.

In the long-term, sources of existing background ambient noise levels at the project site are expected to continue to be controlled by motor vehicle traffic. Unavoidable, short-term and temporary noise impacts are expected to occur during the construction period. Noise from construction activities is predicted to be audible and relatively high at neighboring properties. The noisiest period (during site and foundation work) is expected to last no more than 12 weeks. Actual work may also move from one location on the project site to another during this period. These factors mean the "actual length of exposure to construction noise at any receptor location will probably be less than the total construction period for the entire project" (Y. Ebisu & Associates, 1999).

Living units within the neighboring Ala Wai Townhouse, Waikiki Bellevue and Dynasty are expected "to experience the highest noise levels during construction activities due to their close proximity to the construction site" (Y. Ebisu & Associates, 1999). Measures that reduce construction noise to inaudible levels may not be practical in all cases "due to the intensity of construction noise sources (80 to 90+ decibels at a 50-foot distance), and due to the exterior nature of the work (pile driving, grading and earth moving, trenching, concrete pouring, hammering, etc.)" (Y. Ebisu & Associates, 1999).

The construction noise study (1999) in Appendix C was based on the design concept that involved no pile driving for the 90 units and 26 on-site parking stalls. A previously conducted construction noise study (1998) considered the impacts of pile driving for the original 26-story apartment tower concept. The use of short piles of approximately 25-feet means fewer blows may be required per pile. Nevertheless, additional mitigation measures are presented in this EA and should be considered since pile driving is anticipated for the eight-story apartment structure.

MITIGATION: As indicated in the letter dated 7 June 1999 from the DOH (refer to Appendix F), activities associated with the construction phase of the project must comply with the DOH Administrative Rules, Chapter 11-46, "Community Noise Control." The following measures are specified:

"The contractor must obtain a noise permit if the noise levels from the construction activities are expected to exceed the allowable levels of the rules as stated in Section 11-46-6(a).

"Construction equipment and on-site vehicles requiring an exhaust of gas or air must be equipped with mufflers as stated in Section 11-46-6-(b)(1)(A).

"The contractor must comply with the requirements pertaining to construction activities as specified in the rules and the conditions issued with the permit as stated in Section 11-46-7 (d)(4).

"Heavy vehicles travelling to and from the project site must comply with the provisions of the HAR, Chapter 11-42, 'Vehicular Noise Control for Oahu.'"

"Through facility design, sound levels emanating from stationary equipment such as air conditioning systems, be attenuated to comply with the provisions of the DOH Administrative Rules, Chapter 11-46, 'Community Noise Control'" (DOH, 1999).

To mitigate the impacts of pile driving, the following measures are also recommended:

"Reduction of pile driving noise by approximately 30 decibels may be possible through the use of noise abatement towers which enclose the driven pile and hammer. In addition, if soil conditions allow, the use of vibratory pile driving equipment is also recommended for minimizing noise impacts from pile driving operations. Pre-drilling may reduce the number of blows required to drive a pile to refusal, but is not expected to significantly reduce pile driving noise levels, particularly at refusal. The use of bored-and-cast-in-situ piles can reduce the high level impact noise associated with driven piles by 25 to 30 decibels. However, the implementation of these mitigation measures may not be feasible for the specific conditions of the project.

"In addition to the normal planning and design concerns regarding potential damage due to settling and heaving during construction, consideration should also be given to risks of damage due to vibration from pile driving. A damage criteria of 0.2 inches/second should be initially used in conjunction with the vibration prediction method...to identify the potential damage risk distances to the driven piles.

"If predicted vibration levels from pile driving exceed 0.2 inches/second at nearby buildings, and predicted levels cannot be reduced by sizing of the pile driver or through the use of alternate types of piles (bored or non-displacement type), test piles should be driven and their vibration monitored and recorded. The monitoring of the test piles should be designed to measure the expected peak, 3-axis vibration levels at the nearest buildings. The results of the monitoring, in addition to the specific types of adjacent structures, should be used to define the empirical damage to the adjacent structures during actual construction.

"If predicted vibration levels from pile driving exceed 2.0 inches/second at the adjacent buildings, the use of alternate types of piles should be considered for implementation during the design phase" (Y. Ebisu & Associates, 1998).

The construction contractor is expected to abide by DOH construction noise limits and curfew times. Construction activities will be limited to the regular workday hours (8:30 AM to 3:30 PM, Monday through Friday). Residents in nearby properties that would most likely be affected by the proposed action are expected to be notified in advance of noisy construction activities as a condition of necessary approvals and permits for the project.

4.7 Flora.

The existing vegetation at the project site contains no known threatened, endangered or candidate species. Potential short-term impacts including the loss of existing vegetation from clearing, grading and grubbing are expected to be offset by the long-term benefits of landscaping at the project site. Since landscaping is a project feature, no mitigation measures are proposed or considered to be warranted.

4.8 Fauna.

No known threatened or endangered faunal species or habitats have been identified at the project site. No short- or long-term adverse impacts to threatened, endangered or candidate species are anticipated and no mitigation measures are proposed or considered to be warranted.

4.9 Historical and Archaeological Resources.

The project site may encompass a portion of the large ʻAinahou Estate that once belonged to Territorial Governor Archibald S. Cleghorn. Evidence of this grand past has largely been erased by approximately 70 years of residential development and redevelopment; however, "it is possible that subsurface archaeological deposits could be present in the project area" (SHPD, 1999). Construction activities (i.e., pile driving, grading, excavation, trenching, etc.) by nature have the potential to adversely impact archaeological or historical resources in the short and long-term if any such resources remain at the project site.

MITIGATION: The SHPD in its letter dated 11 May 1999 (refer to Appendix F) recommends the following action:

> "...that an archaeological inventory survey of the proposed project area be performed to determine if historic sites are present, and, if so, to gather sufficient information to evaluate their significance. A report of the finds should be submitted to the State Historic Preservation Division for adequacy review."

The Applicant intends to perform the archaeological inventory survey and report the findings to SHPD as recommended. This work is expected to be accomplished during the site preparation phase of the construction period.

It is also proposed that an archaeologist be on-site during site excavation to monitor earth-disturbing activities. Work will be stopped and the SHPD will be notified in the event of a discovery of human remains or artifacts.

4.10 Land Use Considerations.

The proposed action is consistent with the City and County of Honolulu General Plan and Development Plan designations and the current Apartment Precinct land use designations within the Waikiki Special Design District. The Department of Planning and Permitting (DPP) in a letter dated 7 September 1999 indicates that the project "does not pose any adverse impacts on the General Plan or the City's Primary Urban Center Development Plan nor exceeds the existing unit count for this area which is designated for medium-density apartment use" (DPP, 1999). Concurrent processing of a Waikiki Special District Permit is being accomplished. A Conditional Use Permit (Cm) minor for Joint Development will be required for the development of two separate legal lots of record. The completed project is expected to be compatible with existing surrounding land uses and no short- or long-term adverse impacts are anticipated. No mitigation is proposed or considered to be warranted.

As stated in Section 3.10, the project site is entirely located within the 100-year flood hazard area. The site lies outside the tsunami inundation zone. Development of the proposed apartment complex for seniors is expected to comply with Building Code requirements for structures within the flood zone. Habitable spaces are not allowed below the base flood elevation. The ground floor of the proposed development is located at the 7-foot elevation. Habitable spaces begin at the second floor and are therefore well above the flood level.

4.11 Aesthetic Considerations.

Construction of an eight-story apartment tower on the vacant, undeveloped parcel will result in the replacement of open space with structures. Some views from existing neighboring apartments will be affected; however, there will be no effect on the view of Diamond Head from the Punchbowl lookout.

The proposed action will also improve the general attractiveness of the immediate area by the creation of landscaped areas within and around project structures. The project design includes setbacks and landscaped yards along property lines. Garden wall structures will be constructed much like the walls that border Iolani Palace with a base of masonry topped by an open iron fence. Trees, shrubs and ground cover will be indicative of native Hawaiian species as much as practicable. Shaded hardscape areas will provide the residents with areas for active and passive recreation. A water feature at the entry will provide an attractive active feature that helps to mask traffic noise along Ala Wai Boulevard.

The proposed development is expected to satisfy the design guidelines and special district objectives for the area as a prerequisite to obtaining the Waikiki Special District Permit. No mitigation with respect to aesthetic conditions is proposed.

4.12 Circulation and Traffic.

The analysis in this section is from the *Traffic Impact Analysis Report: Genesis Senior Housing Development in Waikiki, Honolulu, Oahu, Hawaii* (Phillip Rowell and Associates, 1999). The design concept evaluated in this study included 90 units and 26 parking stalls. A previously prepared traffic impact analysis report (1998) addressed the impacts of the earlier design concept of 283 units and 124 parking stalls. The design concept evaluated in this EA is for 110 units and 55 parking stalls. Impacts associated with this design concept presumably fall within the range identified in the two traffic impact analysis reports (refer to Appendix D for both studies). Both reports revealed that the proposed projects would result in insignificant impacts (a margin of less than 0.01) to the volume-to-capacity ratio of the traffic system and only minimal impacts on the surrounding roadway system, particularly Ala Wai Boulevard. The discussion from the more recently prepared traffic impact analysis report is hereby included in this EA due to substantively similar characteristics of the design scheme with 110 units and 55 parking stalls as compared to 90 units and 26 parking stalls.

Upon project completion, access to and egress from the site for all types of traffic vehicles will be via a driveway to and from Ala Wai Boulevard. Driveway connection requires the approval of the City and County Department of Transportation Services. The traffic impact analysis determined that the proposed project is expected to generate 6 trips during the morning peak period and 10 trips during the afternoon peak period.

The operating efficiency of signalized intersections in the vicinity of the site was evaluated according to the methods described in the *1997 Highway Capacity Manual* (HCM). The calculation of a volume-to-capacity (V/C) ratio is related to the LOS. Findings in the traffic impact analysis report indicate that the signalized intersections currently operating as LOS "A/B" during the morning and afternoon peak periods are expected to operate at LOS "B" as determined by the LOS analysis for year 2003 (using both without project and with project assumptions). No mitigation measures are therefore deemed to be necessary.

The long delay for left-turning traffic from the unsignalized Kaiulani Avenue intersection is expected to prevail and result in reduced levels-of-service. The increased delay, however, between cumulative and cumulative plus project conditions is minimal such that impacts to traffic as a result of the proposed project are expected to be insignificant. The proposed intersection of Ala Wai Boulevard with the project driveway is expected to operate at LOS "A" during both peak traffic periods.

The traffic impact analysis concluded that "traffic related impacts at the study intersections are minimal and no mitigation measure[s] are required. All intersections should operate at better than acceptable levels-of-service upon completion of the project" (Phillip Rowell and Associates, 1999).

In a letter from the DPP dated 7 June 1999, the following actions were also recommended:

> "A preliminary plan showing the site layout, the proposed access location and loading and parking areas should be provided. Adequate vehicular sight to pedestrians and vehicle[s] should be provided and maintained at the driveway to this project. All loading and

unloading activities should be conducted on-site and these areas should be designed such that no reversing of vehicles occurs on any public street.

"There is a 2-foot road widening setback along the Tusitala Street frontage. The developer should contact our Traffic Review Branch prior to applying for building permits to determine whether frontage improvements will be required.

"Construction plans for all work within the City's road right-of-way should be submitted for review and approval. Traffic control plans during construction will also be required" (DPP, 1999).

Appropriate setbacks and sight distances will be incorporated into the project design. Coordination and consultation with the Traffic Review Branch is expected to be conducted by the project representative and/or the construction contractor as a requirement for acquiring the necessary project approvals and permits.

4.13 Public Services and Facilities.

The extension and construction of water, wastewater, drainage, electrical and communication systems are necessary for the adequate provision of these services to the proposed development. No adverse short- or long-term impacts to the mentioned utilities and services are anticipated since coordination with the appropriate agency will be accomplished and is required from the City and County of Honolulu in order to implement the proposed action. Approvals pertaining to utility systems include the following items:

- Building Permit for Buildings, Electrical, Plumbing, Sidewalk/Driveway Work (City and County Building Department)
- Grading, Grubbing and Stockpiling Permit (City/County Department of Public Works)
- Water System (Board of Water Supply)
- Sewer Connection (City/County Department of Wastewater Management)

With respect to utilities and services, initial consultation with the Department of Wastewater indicates the need for off-site improvements. Information provided by the City and County of Honolulu indicates that "existing adjacent sewers do not have adequate capacity to accommodate sewage flows from the Kahiola project until [the construction of] a major trunk sewer located at the intersection of Lewers Street and Kuhio Avenue. The City plans to resolve sewer capacity problems within the next ten years by constructing new relief sewers or relocating the Beachwalk Wastewater Pump Station" (URS Greiner Woodware Clyde, 1999). The 7 June 1999 letter from the DPP indicates three inadequacies that require relief projects:

"A new sewer line in Ala Wai Boulevard is required from the subject property to sewer manhole (SMH) 0007 at the intersection of Ala Wai Boulevard and Kanekapolei Street.

"The 27-inch sewer line in Ala Wai Boulevard between SMH 0007 and SMH 0637 requires a relief line.

"The 48-inch sewer line in Lewers Street between SMH 0637 and the SMH 0633 requires a relief line" (DPP, 1999).

The proposed project includes a 10-inch sewer relief line from Kaiulani Avenue to Kanekapolei Street that continues as a 30-inch line along Ala Wai Boulevard to and along a portion of Lewers Street. Work is proposed to be accomplished via the microtunneling method to reduce impacts and trenching problems. Completion of the improvements will facilitate adequate wastewater disposal service for the proposed development. Coordination with the Wastewater Branch to discuss relief projects has been initiated (refer to the letter from URS Greiner Woodward Clyde in Appendix F) and is expected to continue as a requirement for acquiring the necessary project approvals and permits.

The DOH recommended waste minimization during construction and occupancy in its letter dated 7 June 1999. Their letter recommends the development and implementation of a waste minimization plan to mitigate the volumes of solid waste needing disposal. The following statement refers to the regulatory objectives of waste minimization.

> "Act 324-91, the Integrated Solid Waste Management Act, established the State's commitment to waste diversion and set a goal of 50% diversion by the year 2000. This goal will require waste minimization efforts from businesses, government and residents" (DOH, 1999).

4.14 Socio-Economic Conditions.

Completion of the proposed project will generate 109 additional living units in the project area that are specifically for seniors on limited incomes. Elderly individuals will have more opportunities for independent living. Design features of the apartment complex are expected to be appropriate to and accommodating of elderly persons, thereby resulting in a development that is attractive and desirable to this faction of the population. The expected inhabitants of the proposed project are not expected to significantly increase the population of the Waikiki area.

In the short-term, construction employment and material expenses are expected to generate general excise tax and income tax revenues to the State of Hawaii. In the long-term, increased real property tax revenue is expected to be generated to the City and County of Honolulu from the completed development.

The proposed action is expected to generate no significantly adverse socio-economic impact. No mitigation is proposed.

5.0 ALTERNATIVES TO THE PROPOSED ACTION

5.1 Alternative A.

With this alternative, a six-story apartment consisting of 89 rental units and one unit for the building manager would be constructed at the project site. This alternative included 26 parking stalls and no requirements for pile driving. Consultation with the City and County of Honolulu revealed that this alternative had minimal allowances for parking. The requirement is one stall per unit; therefore an exemption to provide less than the required 90 stalls would be needed. An exemption based on this design scheme was not favorably received by the City and County of Honolulu. Consequently, this alternative was dismissed in favor of the proposed action that includes provisions for more than twice as many parking stalls as proposed for Alternative A.

5.2 Alternative B.

This alternative includes the original proposal that consisted of a thirty-story apartment tower. The Diamond Head elevation had minimal articulation. Access to the Thrift Shop on the ground level was from the front. Early consultation with the City and County of Honolulu revealed that this alternative exceeded the 240-foot district envelope. The Thrift Shop activity is not a permitted use since the front access creates more than an ancillary use at the project site. As a result of the consultation process, this alternative was eliminated from further consideration.

5.3 Alternative C.

As a result of the consultation with the City and County of Honolulu, four floors of the apartment tower described in Alternative B were deleted. Three apartments on each floor were converted to six by adding cantilever to the Diamond Head side of the building. The Diamond Head elevation therefore received more articulation. Access to the Thrift Shop was revised to be from within the building. The resultant design was eventually eliminated in favor of the proposed action due to financing concerns that precluded a large-scale project. It was also revealed that the 26-story apartment tower had the potential to impact the visual character of Waikiki and particularly the view from Punchbowl to Diamond Head.

5.4 No Action.

No action would result in no apartment complex on the subject property in Waikiki. Short- and long-term impacts, both beneficial and adverse, would not be generated if the project is not constructed.

The perceived need for new rental units specifically for elderly persons in Honolulu would not be met with the no action alternative. There is an anticipated high demand for the proposed units because of the design quality, affordability and convenient location of the project within urban Honolulu.

Under the no action alternative, the affected property would continue to be underutilized. Existing zoning allows apartment development. Real property taxes are assessed to the owner without them gaining any offsetting income from the property.

6.0 FINDINGS AND DETERMINATIONS

The results of this assessment are that the negative impacts that have been identified in this document shall be adequately minimized by the suggested mitigation measures. Therefore, the proposed action should not result in significant impacts on the environment. It is suggested that an Environmental Impact Statement (EIS) is not required for the proposed project. A Finding of No Significant Impact (FONSI) is anticipated, and a Negative Declaration is determined to be in order.

A review of the "Significance Criteria" used as a basis for the above determination is presented below. An action is determined to have a significant impact on the environment if it meets any one of the thirteen (13) criteria.

(1) Involves an irrevocable commitment to loss or destruction of any natural or cultural resources.

The development of the existing unimproved site is expected to result in no loss or destruction of natural or cultural resources identified in Chapters 3.0 and 4.0 of this document because such resources at the site are limited. Mitigation measures that will be implemented to control erosion and runoff in the short- and long-term will also prevent, control or minimize potential impacts from the project. Measures to prevent, control and/or minimize impacts to historical and archaeological resources, if these are found to exist at the site, will also be implemented.

(2) Curtails the range of beneficial uses of the environment.

The project site in an undeveloped state results in no beneficial use of the property. Some environmental degradation (e.g., uncontrolled runoff, soil loss) occurs from the unimproved site. Completion of the proposed project will establish a beneficial use on the project site and result in the construction of permanent erosion control and runoff control features.

(3) Conflicts with the State's long-term environmental policies or goals and guidelines as expressed in Chapter 343, HRS; and any revisions thereof and amendments thereto, court decisions, or executive orders;

The proposed project is consistent with the environmental policies established in Chapter 344, HRS.

(4) Substantially affects the economic or social welfare of the community or state;

Completion of the proposed project will provide more independent living options to the elderly who are on limited incomes. Tax revenues at both the local and state levels will be generated. Development of the project will provide construction jobs. These impacts are all viewed as benefits of the proposed action.

(5) Substantially affects public health;

Anticipated water quality, air quality, noise quality and traffic impacts that may affect public health will be short-term and temporary. These impacts are generally unavoidable and necessary for construction. Mitigation measures will be employed to control and reduce unavoidable impacts. The overall long-term water quality, air quality, noise quality and traffic impacts resulting from the proposed project are expected to be minimal.

(6) Involves substantial secondary impacts, such as population changes or effects on public facilities;

The proposed project itself will result in insignificant population changes or effects on public facilities because the occupants of the seniors apartment structure are expected to comprise existing area residents of Waikiki.

(7) Involves a substantial degradation of environmental quality;

Environmental degradation currently occurs from the undeveloped vacant project site. Construction of the proposed apartment structure and paving of the necessary areas will minimize impacts such as erosion and soil loss such that less environmental degradation occurs. With proposed landscaping, the visual character of the site will also be improved.

(8) Is individually limited but cumulatively has considerable effect on the environment, or involves a commitment for larger actions;

The proposed project helps to address the needs of a growing elderly population. The development of the apartment project in the Primary Urban District in an area zoned for Medium Density Apartments is consistent with State and local planning objectives and policies that presumably consider the effects on the environment. This project is not tied to a larger action.

(9) Substantially affects a rare, threatened or endangered species or its habitat;

No threatened or endangered or candidate threatened or endangered species or habitats exist within the project site.

(10) Detrimentally affects air or water quality or ambient noise levels;

Short-term and temporary impacts to water quality, air quality and noise quality are anticipated. These impacts are generally unavoidable and necessary for construction. Mitigation measures will be employed to control and reduce unavoidable impacts. The overall long-term water quality, air quality, and noise quality impacts resulting from the proposed project are expected to be minimal.

(11) Affects or is likely to suffer damage by being located in an environmentally sensitive area, such as a flood plain, tsunami zone, beach, erosion-prone area, geologically hazardous land, estuary, freshwater, or coastal waters;

Development of the proposed apartment complex is compatible with the criteria for flood zone AE where the base flood elevations are ±6 feet above mean sea level. No other criteria pertaining to environmentally sensitive areas apply to the project.

(12) Substantially affects scenic vistas and view planes identified in county or state plans or studies;

The development of the low-rise apartment structure is not expected to affect significant aesthetic resources such as the view of Diamond Head from the Punchbowl lookout.

(13) Requires substantial energy consumption.

The construction of the low-rise apartment structure is not expected to require substantial energy consumption relative to other similar projects.

7.0 REFERENCES CITED

Armstrong, R.W. (ed.). 1983. *Atlas of Hawaii, Second Edition.*

C.W. Associates Inc. (dba Geolabs-Hawaii). 1988. *Geotechnical Engineering Exploration (for) Proposed 25-Story Condominium, 2429 Ala Wai Boulevard, Honolulu, Oahu, Hawaii, Tax Map Key: 2-6-24:70.* Prepared for STARTS International. 5 December.

City and County of Honolulu, Department of Planning and Permitting. 1999. Letter pertaining to the *Draft Environmental Assessment for Kahiola: An Affordable Seniors Rental Housing Project in Waikiki, Oahu, Hawaii* signed by DPP Staff for Jan Naoe Sullivan. 7 June.

City and County of Honolulu, Department of Planning and Permitting. 1999. Letter pertaining to the *Supplemental Environmental Assessment for Kahiola: An Affordable Seniors Rental Housing Project in Waikiki, Oahu, Hawaii* signed by DPP Staff for Jan Naoe Sullivan. 7 September.

Department of Business, Economic Development and Tourism. 1997. *The State of Hawaii Data Book 1997: A Statistical Abstract.*

Fewell, Richard B., P.E. 1998. Letter pertaining to General Foundation Conditions, Genesis Senior Rental Housing Development, Ala Wai Boulevard, Waikiki, Oahu, Hawaii, Tax Map Key: 2-8-24:70, 71 addressed to Mr. Evan Cruthers. 16 March.

Hawai'i International Environmental Services, Inc. 1999. *Phase I Environmental Site Assessment: Property at 2423 Ala Wai Boulevard, Honolulu, Hawaii TMK (1) 2-06-24: 70 and 71.* 26 January.

Morrow, J.W. 1998. *Air Quality Impact Report: Genesis Senior Housing Development, Waikiki, Oahu.* 1 June.

Morrow, J.W. 1999. *Air Quality Impact Report: Genesis Senior Housing Development, Waikiki, Oahu.* Revised 6 April.

NORDIC/PCL and Wilson Okamoto & Associates, Inc. 1995. *Draft Environmental Impact Statement for the Hawaii Convention Center, Honolulu, Hawaii.* Prepared for the Convention Center Authority, State of Hawaii. January.

Phillip Rowell and Associates. 1998. *Traffic Impact Analysis Report, Genesis Senior Housing Development in Waikiki, Honolulu, Oahu, Hawaii.* 11 May.

Phillip Rowell and Associates. 1999. *Traffic Impact Analysis Report, Genesis Senior Housing Development in Waikiki, Honolulu, Oahu, Hawaii.* Revised on 10 March.

SMS Research and Marketing Services, Inc. 1995. *Preliminary Assessment of Need for Affordable Rental Housing in Waikiki.* November.

State of Hawaii, Department of Health. 1999. Letter pertaining to the *Draft Environmental Assessment for Kahiola: An Affordable Seniors Rental Housing Project in Waikiki, Oahu, Hawaii* signed by Gary Gill. 7 June.

State of Hawaii, Department of Land and Natural Resources, Department of Forestry and Wildlife. 1998. Facsimile pertaining to the *Environmental Assessment for Kahiola: An Affordable Seniors Rental Housing Project in Waikiki, Oahu, Hawaii* from David Smith. 08 July.

State of Hawaii, Historic Preservation Division. *1999.* Letter pertaining to the Pre-Assessment Consultation Request for the *Environmental Assessment for Kahiola, An Affordable Seniors Rental Housing Project in Waikiki* signed by Don Hibbard. 11 May.

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

United States Environmental Protection Agency. 1996. *Compilation of Air Pollutant Emission Factors*, Fifth Edition, as updated on the EPA Technology Transfer Network (TTN). October. (As cited in Morrow, 1998).

United States Department of the Interior, Fish and Wildlife Service. 1998. Letter pertaining to the *Environmental Assessment for Kahiola: An Affordable Seniors Rental Housing Project in Waikiki, Oahu, Hawaii* signed by Donald Palawski for Robert P. Smith. 19 August.

URS Greiner Woodward Clyde. 1999. Memorandum pertaining to Sewer Service Alternatives to Evan Cruthers from David R. Yogi, Jr. 27 September.

Y. Ebisu & Associates. 1998. *Construction Noise Study for the Kahiola Seniors Rental Project, Honolulu, Hawaii.* June.

Y. Ebisu & Associates. 1999. *Construction Noise Study for the Kahiola Seniors Rental Project, Honolulu, Hawaii.* March.

8.0 LIST OF PREPARERS

PREPARER	AFFILIATION	RESPONSIBILITIES
Cruthers, Evan D.	Media 5, Ltd.	Project Manger, FAIA
Chee, Wilbert C.F.	Wil Chee - Planning, Inc.	Principal, Senior Planner
Nash, *Stephen Ellis*	*Media 5, Ltd.*	*Architect*
Tom, Claire-Anne	Wil Chee - Planning, Inc.	Planner

9.0 LIST OF INDIVIDUALS AND AGENCIES CONSULTED

Individuals

Bawden, Murray, Contractor, Mortenson Construction
Bratakos, Dimitrios, Structural Engineer, American Structural Engineers, Ltd.
Ebisu, Yoichi, Acoustic Consultant, Y Ebisu and Associates
Fewell, Richard, Geotechnical Engineer, FGE, Ltd.
Hirota, Dennis, Civil Engineer, Sam O. Hirota, Inc.
Morrow, Jim, Air Quality Consultant
Moss, Rick, Electrical Engineer, Moss Engineering, Inc.
Rowell, Philip, Traffic Consultant
Short, Edward, Landscape Architect, Edward Short & Associates
Thom, Kenneth, Mechanical Engineer, Kenneth Thom Associates, Ltd.
Yogi, David, Off-Site Sewer Engineer, Woodward-Clyde

Agencies

Hawaiian Electric Company

City and County of Honolulu
- Board of Water Supply
- Department of Environmental Services (formerly the Department of Wastewater Management)
- Department of Planning & Permitting (formerly the Building Department and the Department of Land Utilization)

State of Hawaii
- Department of Health
- Department of Land & Natural Resources, Department of Forestry & Wildlife
- Department of Land & Natural Resources, Historic Preservation Division
- Office of Environmental Quality Control

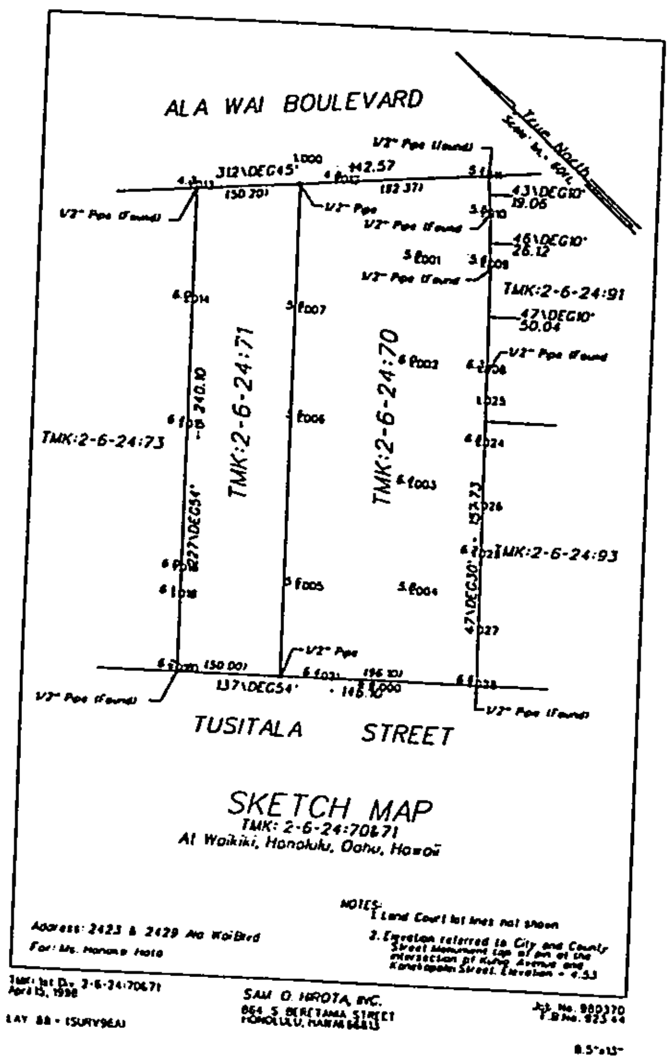
U.S. Government
- Department of the Interior, Fish & Wildlife Services

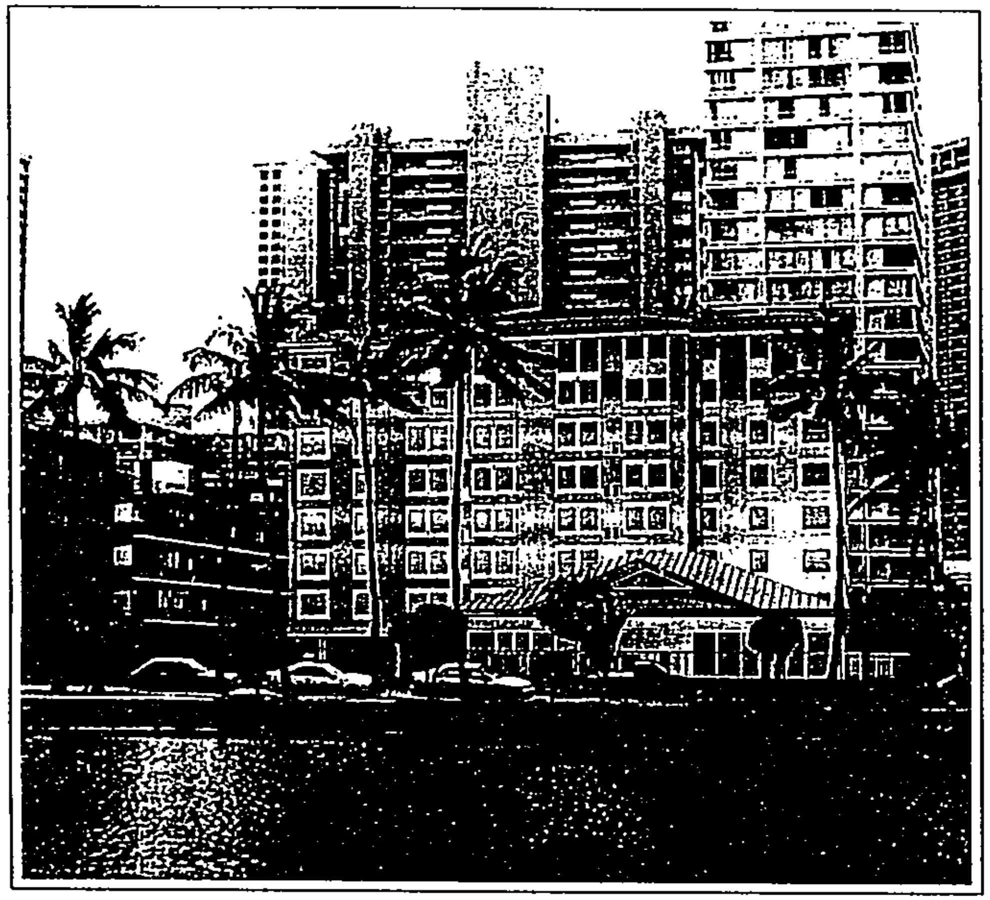
Other

Waikiki Neighborhood Board

Appendix A

Site Survey and Project Information

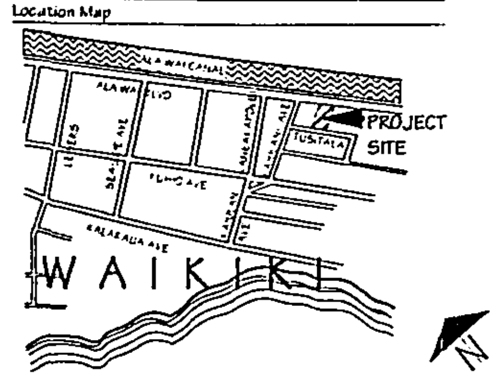

ALA WAI BOULEVARD
True North
TMK:2-6-24:71
TMK:2-6-24:70
TMK:2-6-24:73
TMK:2-6-24:91
TMK:2-6-24:93
312\DEG45'
142.57
43\DEG10'
19.06
46\DEG10'
26.12
47\DEG10'
50.04
137\DEG54'
TUSITALA STREET
SKETCH MAP
TMK: 2-6-24:70&71
At Waikiki, Honolulu, Oahu, Hawaii
NOTES:
1. Land Court lot lines not shown
SAM O. HIROTA, INC.
8.5"x13"



KAHIOLA

An Affordable Seniors Rental Housing Project
A GENESIS DEVELOPMENT

Location Map



Developer:	THE GENESIS FOUNDATION
Address:	2423 Ala Wai Boulevard
TMK:	2 - 6 - 24 : 70, 71
Contractor:	MORTENSON CONSTRUCTION
Architect:	MEDIA FIVE LTD.

Consultants:

Development:	Gary S. Furuta
Environmental Asses:	Will Chee Planning Inc.
Phase I Environmental:	Hawaii International Environmental Services
Acoustics:	Y. Ebisu & Associates
Air Quality:	Jim Morrow
Traffic:	Philip Rowell
Off-Site Civil:	Woodward-Clyde International
Site Civil:	Sam O. Hirota Inc.
Geotechnical:	Fewell Geotechnical Engineering Ltd.
Structural:	American Structural Engineers Ltd.
Mechanical:	Kenneth Thom Associates Ltd.
Electrical:	Moss Engineering, Inc.
Landscape:	Edward Short & Associates

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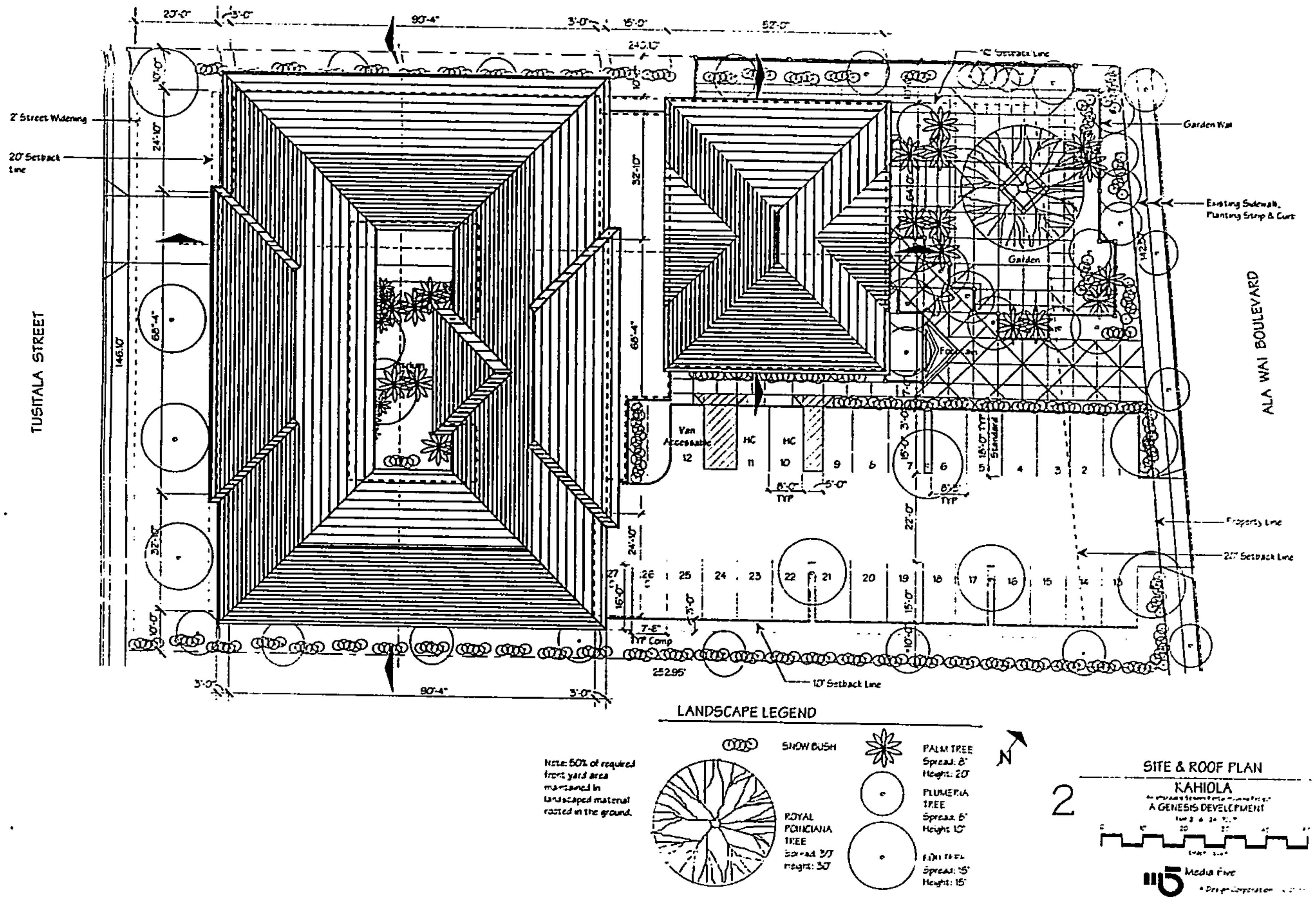
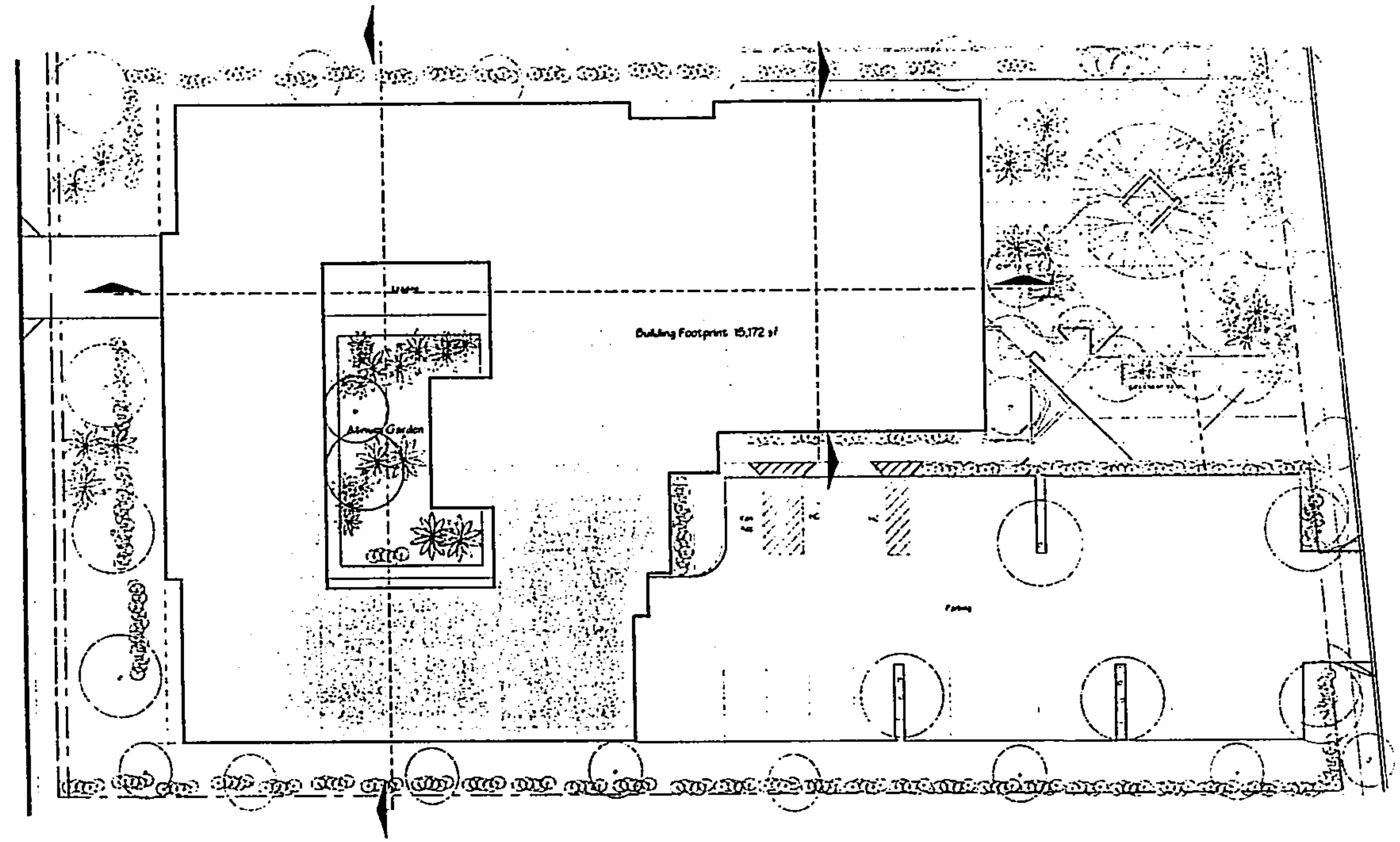
Media Five



TUSITALA STREET
ALA WAI BOULEVARD
2' Street Widening
20' Setback Line
10' Setback Line
Garden Wall
Existing Sidewalk, Planting Strip & Curb
Property Line
20' Setback Line
Garden
Van Accessible
HC
HC
Standard
TYP
TYP Comp
252.95'
146.10'
240.10'
90'-4"
52'-0"
15'-0"
20'-0"
3'-0"
N
LANDSCAPE LEGEND
SNOW BUSH
PALM TREE Spread: 8' Height: 20'
PLUMERIA TREE Spread: 6' Height: 10'
ROYAL POINCIANA TREE Spread: 30' Height: 30'
Note: 50% of required front yard area maintained in landscaped material rooted in the ground.
2
SITE & ROOF PLAN
KAHIOLA
A GENESIS DEVELOPMENT
Media Five



OPEN SPACE CALCULATION

Lot Area:	35,761 sf
Less Building:	(15,172)
Less Site Parking/Loading:	(7,193)
Open Space =	13,396 sf

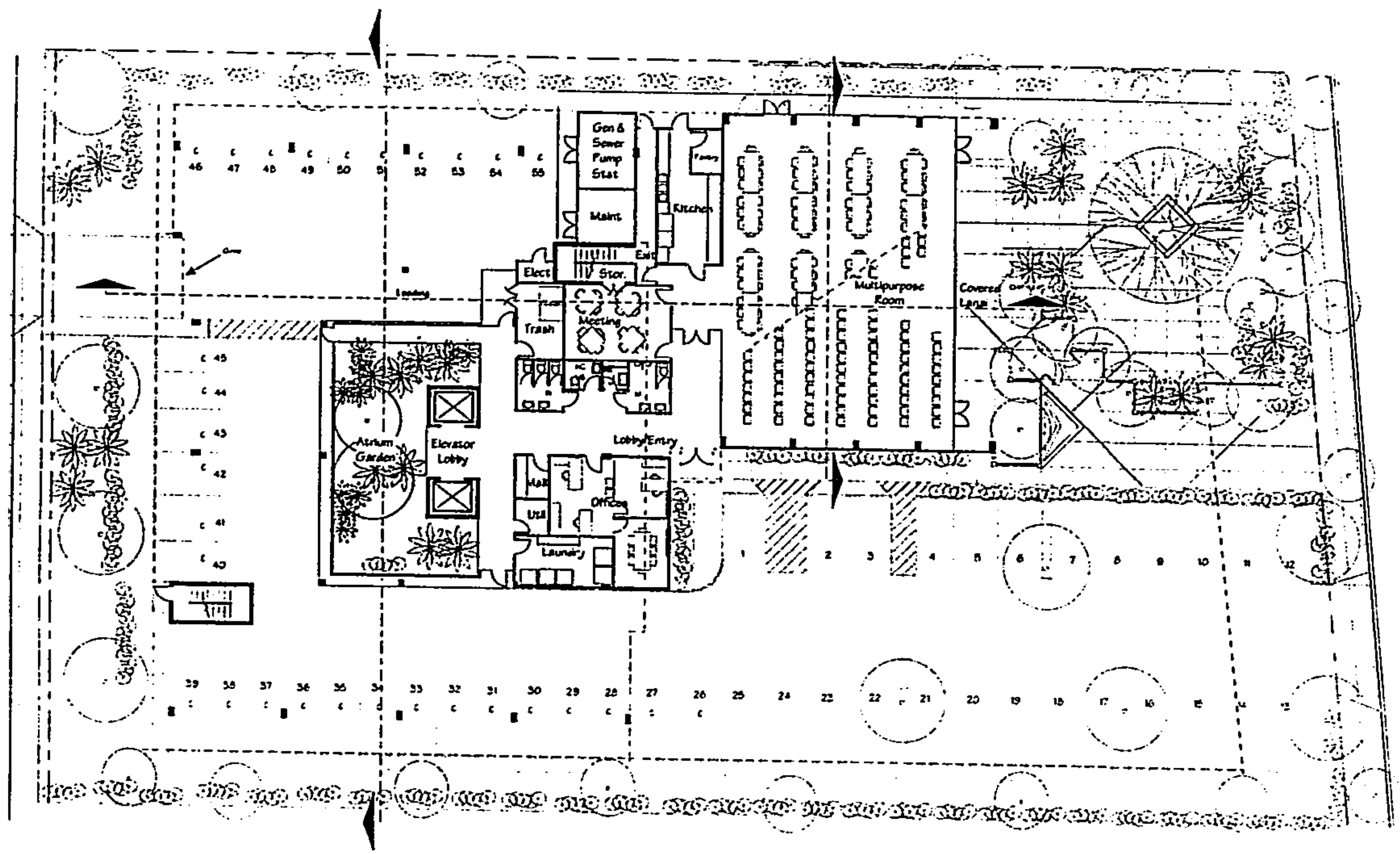
3

SITE & OPEN SPACE PLAN

KAHIOLA

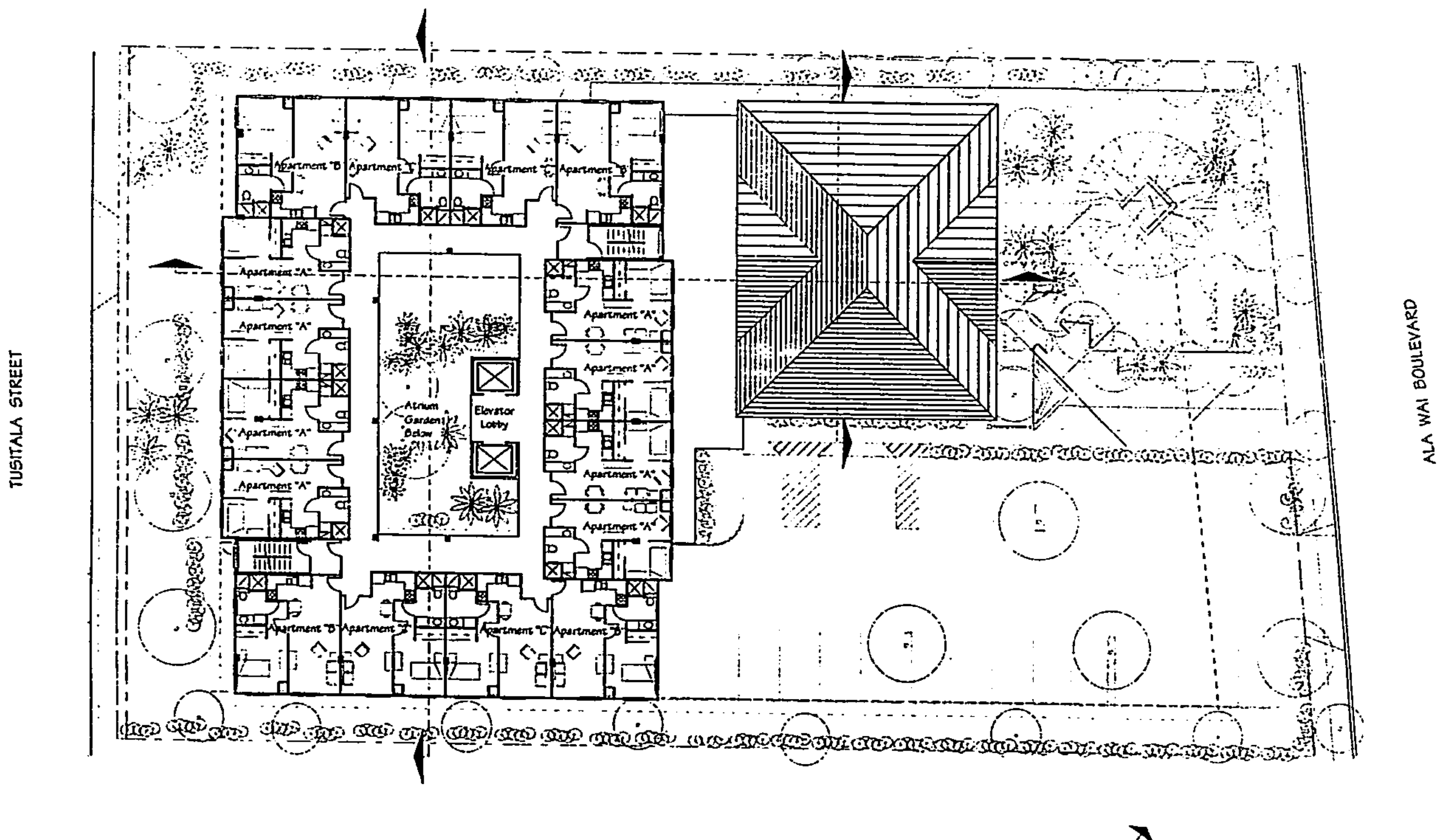
A GENESIS DEVELOPMENT

Media Five



4 GROUND FLOOR PLAN
KAHIOLA
A GENESIS DEVELOPMENT

Media Five



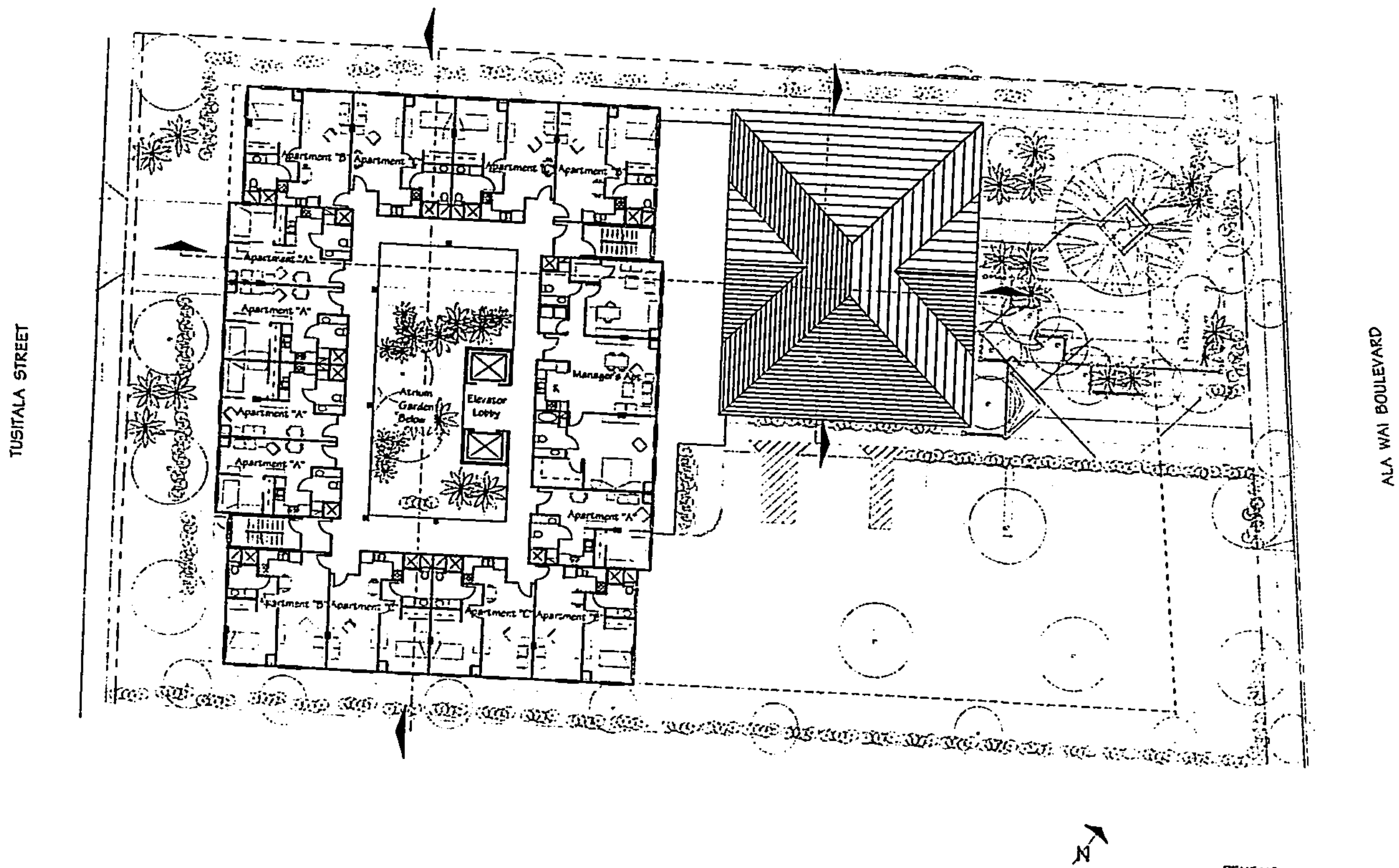
5

TYPICAL APARTMENT LEVEL PLAN

KAHIOLA

A GENESIS DEVELOPMENT

Media Five



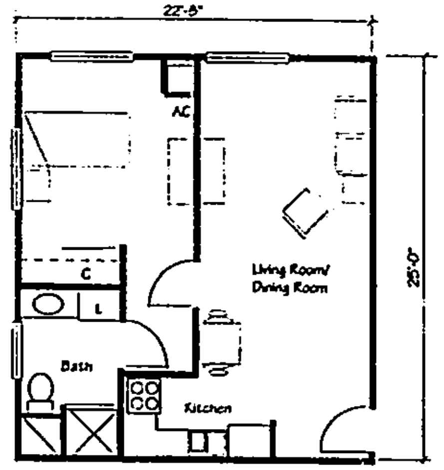
6

PENT HOUSE LEVEL PLAN

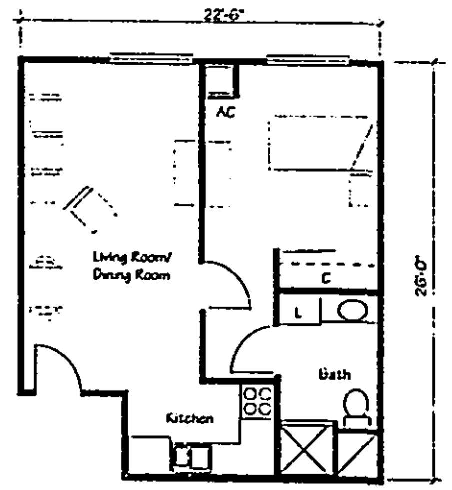
KAHIOLA

A GENESIS DEVELOPMENT

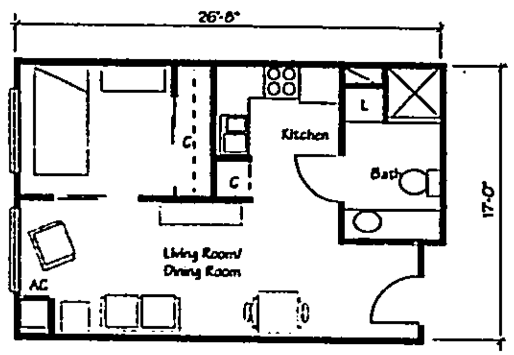
Media Five



Apartment "B"
566 sf



Apartment "C"
552sf



Apartment "A"
450sf

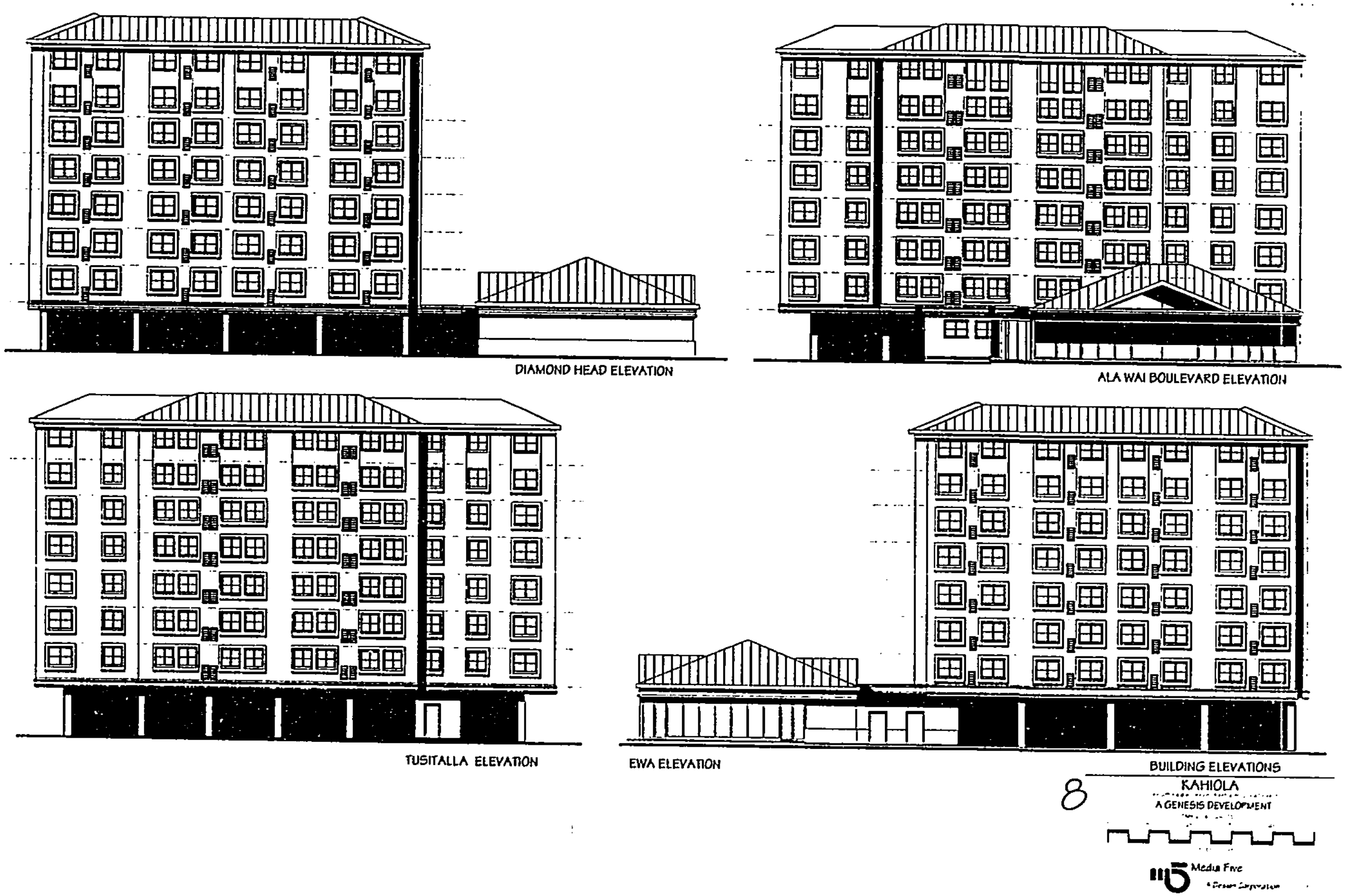
7

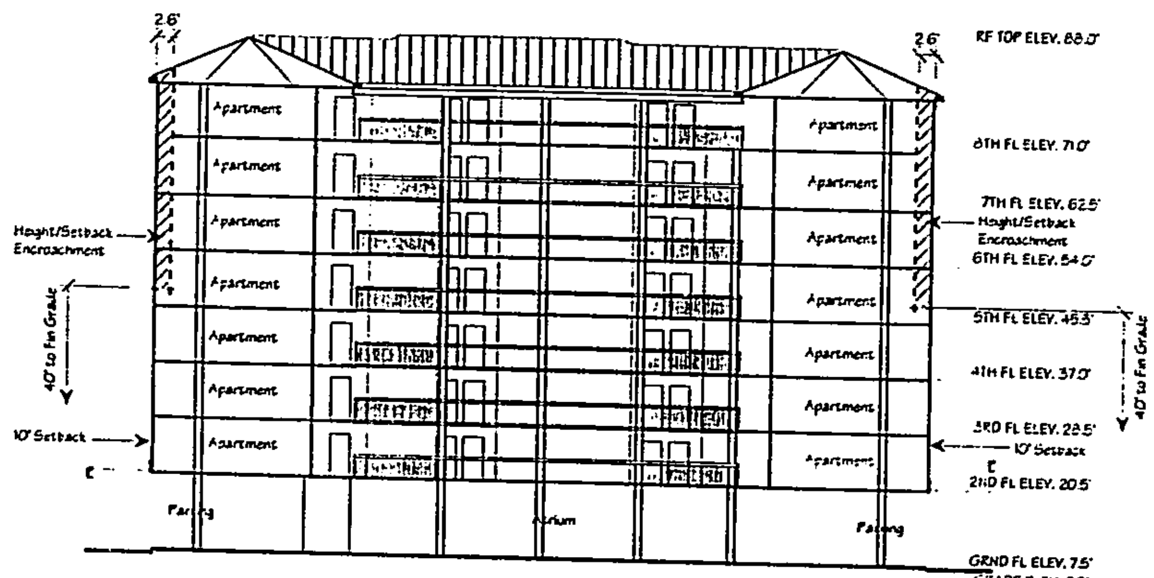
APARTMENT A-C PLANS

KAHIOLA

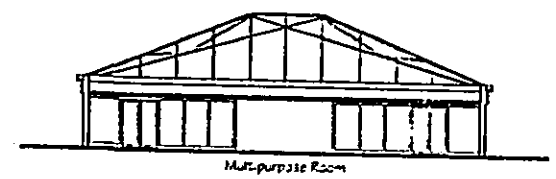
A GENESIS DEVELOPMENT

Media Five

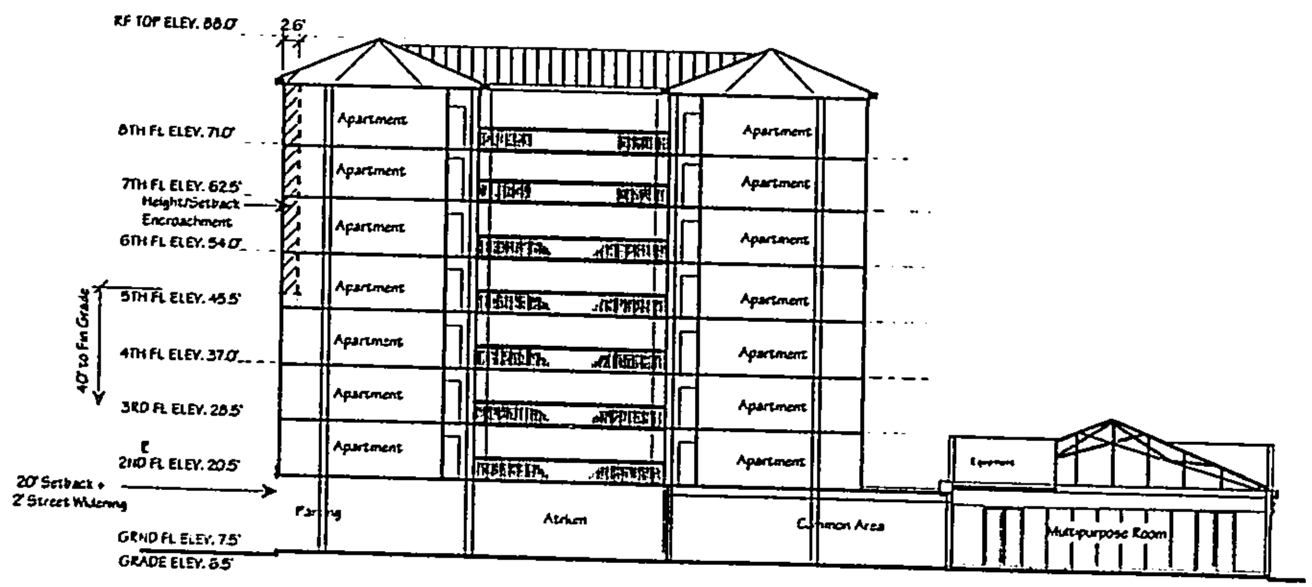

DIAMOND HEAD ELEVATION
ALA WAI BOULEVARD ELEVATION
TUSITALLA ELEVATION
EWA ELEVATION
BUILDING ELEVATIONS
8
KAHIOLA
A GENESIS DEVELOPMENT
Media Five



DH/EWA CROSS SECTION



DH/EWA CROSS SECTION



USITALLA/ALA WAI BLVD CROSS SECTION

9

BUILDING SECTIONS

KAHIOLA

A GENESIS DEVELOPMENT

Appendix B

Air Quality Impact Report

AIR QUALITY IMPACT REPORT (AQIR)

GENESIS SENIOR HOUSING DEVELOPMENT
WAIKIKI, OAHU

6 April 1999
(Revised)

PREPARED FOR:

Wil Chee - Planning, Inc.

PREPARED BY:

J. W. MORROW
Environmental Management Consultant
1481 South King Street, Suite 548
Honolulu, Hawaii 96814

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1. INTRODUCTION

The Genesis Foundation, a nonprofit corporation, is proposing to construct an affordable 90-unit apartment complex for senior citizens on a parcel of land situated along the Ala Wai Boulevard in Waikiki, Oahu (TMK 2 :6:24:70,71) (Figure 1). The site is currently vacant and surrounded on three sides by high and low-rise residential buildings as clearly shown in Figure 2.

The purpose of this report is to assess the impact of the proposed development on air quality on a local and regional scale. The overall project can be considered an "indirect source" of air pollution as defined in the federal Clean Air Act[1] since its primary association with air quality is its inherent attraction for mobile sources, i.e., motor vehicles. Much of the focus of this analysis, therefore, is on the project's ability to generate traffic and the resultant impact on air quality. Air quality impact was evaluated for existing (1998) and future (2003) conditions with and without the proposed development.

A project such as this also has offsite impacts due to increased demand for electrical energy which must be met by the combustion of some type of fuel and the incineration of solid waste generated by project residents. Both these processes result in pollutant emissions to the air which have been addressed in this report.

Finally, during construction of the various buildings and facilities air pollutant emissions will be generated onsite and offsite due to vehicular movement, grading, concrete and asphalt batching, and general dust-generating construction activities. These impacts have also been addressed.

2. AIR QUALITY STANDARDS

A summary of State of Hawaii and national ambient air quality standards is presented in Table 1.[2,3] Note that Hawaii's standards are not divided into primary and secondary standards as are the federal standards.

Primary standards are intended to protect public health with an adequate margin of safety while secondary standards are intended to protect public welfare through the prevention of damage to soils, water, vegetation, man-made materials, animals, wildlife, visibility, climate, and economic values[4].

Some of Hawaii's standards (CO, NO_2, and O_3) are clearly more stringent than their federal counterparts but, like their federal counterparts, may be exceeded once per year. It should also be noted that in November 1993, the Governor signed amendments to Chapter 59, Ambient Air Quality Standards[3], adopting the federal standard for particulate matter equal to or less than 10 microns in diameter (PM_{10}). Since measurement data in Hawaii indicate that PM_{10} comprises about 50% of total particulate matter (TSP), the adoption of that federal standard with a numerical value equal to the original state TSP standard of 150 mg/m^3 represented a substantial relaxation of the standard (approximately doubling it). In the case of the automotive pollutants [carbon monoxide (CO), nitrogen dioxide (NO_2), and ozone (O_3)], there are only primary standards.

FIGURE 1

PROJECT LOCATION

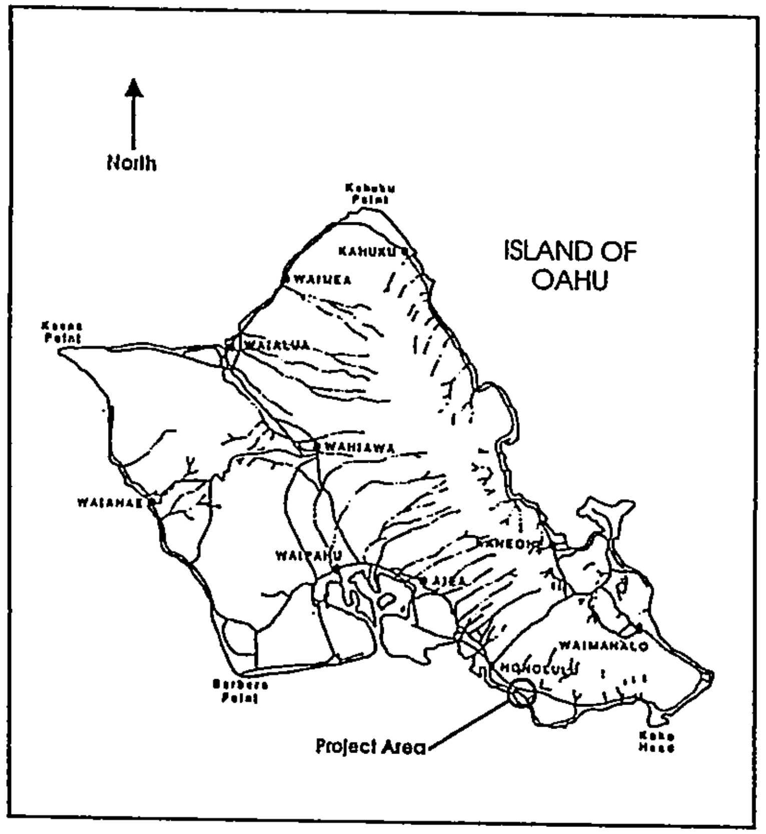
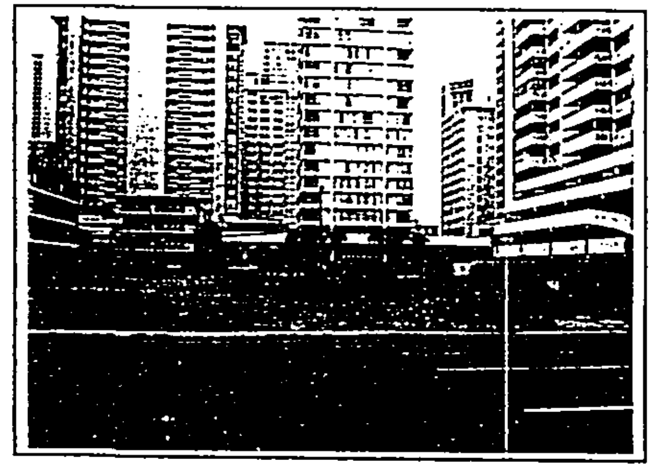
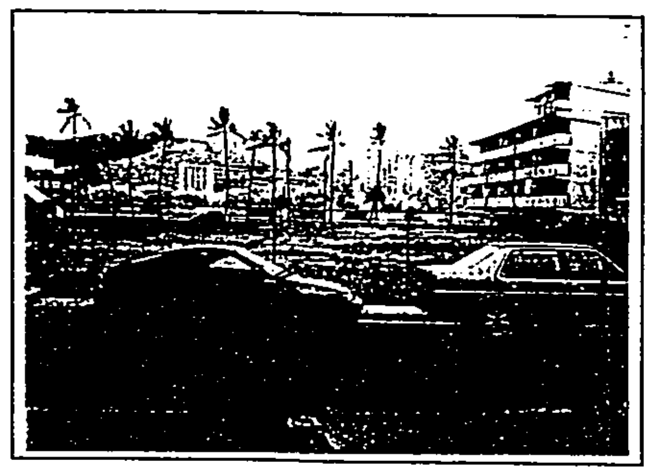


FIGURE 2

EXISTING SITE CONDITIONS



Project Site - Ala Wai Blvd (facing southwest)



Project Site - Tusitala Street (facing northeast)

TABLE I

SUMMARY OF STATE OF HAWAII AND FEDERAL AMBIENT AIR QUALITY STANDARDS

POLLUTANT	SAMPLING PERIOD	NAAQS PRIMARY	NAAQS SECONDARY	STATE STANDARDS
PM_{10}	Annual	50	50	50
	24-hr	150	150	150
SO_2	Annual	80	—	80
	24-hr	365	—	365
	3-hr	—	1,300	1,300
NO_2	Annual	100	—	70
CO	8-hr	10	—	5
	1-hr	40	—	10
O_3	1-hr	235	—	100
H_2S	1-hr	—	—	35
Pb	Calendar Quarter	1.5	—	1.5

KEY:
PM_{10} - particulate matter < 10 microns
SO_2 - sulfur dioxide
NO_2 - nitrogen dioxide
CO - carbon monoxide
O_3 - ozone
H_2S - hydrogen sulfide
Pb - lead

All concentrations in micrograms per cubic meter ($\mu g/m^3$) except CO which is in milligrams per cubic meter.

Until 1983, there was also a hydrocarbons standard which was based on the precursor role hydrocarbons play in the formation of photochemical oxidants rather than any unique toxicological effect they had at ambient levels. The hydrocarbons standard was formally eliminated in January 1983 [5].

The U.S. Environmental Protection Agency (EPA) is mandated by Congress to periodically review and re-evaluate the federal standards in light of new research findings[1]. The latest review resulted in an EPA proposal to tighten the ozone standard from 235 to 160 micrograms/cubic meter (ug/m^3) and also implement $PM_{2.5}$ standards for particulate matter [6]. The carbon monoxide (CO), sulfur dioxide (SO_2), and nitrogen dioxide (NO_2) standards have been reviewed in the past, but no new standards have been proposed.

Finally, the State of Hawaii also has fugitive dust regulations for particulate matter (PM) emanating from construction activities [7]. There simply can be no visible emissions from fugitive dust sources.

3. EXISTING AIR QUALITY

3.1 General. The state Department of Health (DOH) maintains a limited network of air monitoring stations around the state to gather data on the following regulated pollutants:

- particulate matter ≤ 10 microns (PM_{10})
- total suspended particulate matter (TSP)
- sulfur dioxide (SO_2)
- nitrogen dioxide (NO_2)
- carbon monoxide (CO)
- ozone (O_3)
- lead (Pb)

In the case of PM_{10}, measurements are made on a 24-hour basis to correspond with the averaging period specified in state and federal standards. Samples are collected once every six days in accordance with U.S. Environmental Protection Agency (EPA) guidelines. Carbon monoxide, sulfur dioxide, and ozone, however, are measured on a continuous basis due to their short-term (1- and 3-, and 8-hour) standards. Nitrogen dioxide is measured with continuous instruments and averaged over a full year to correspond to its annual standards. Lead concentrations are determined from particulate matter (TSP) samples.

3.2 Department of Health Monitoring. There is only one DOH monitoring site in the Waikiki area, which measures carbon monoxide. A summary of the most recent published air quality data from that station and the nearest other stations in Honolulu is presented in Table 2.

3.3 Onsite Carbon Monoxide Sampling. In conjunction with this project, air sampling was conducted in May 1998 at the project site. A continuous carbon monoxide (CO) instrument was set up and operated during the a.m. and p.m. peak traffic hours. An anemometer and vane were also installed to

TABLE 2

AIR QUALITY DATA
DEPARTMENT OF HEALTH MONITORING SITES
1996

Pollutant	Concentration (µg/m³)
Particulate matter ≤ 10 microns (PM_{10}) 24-hr (max)	28
Annual	14
Sulfur dioxide (SO_2) 3-hr (max)	73
24-hr (max)	18
Annual	3
Carbon monoxide (CO) 1-hr (max)	5,200
8-hr (max)	3,400
Annual	1,200
Ozone (O_3) 1-hr (max)	92
Annual	27
Lead (Pb) Quarterly (max)	0.0
Annual	0.0

Notes: 1. CO data are from the Waikiki site.
2. TSP, SO_2, and Pb are from the DOH building.
3. O_3 data are from the Sand Island site.

to record onsite surface winds during the air sampling. A simultaneous manual count of traffic was performed. The variability of each of the parameters measured during the peak hours is clearly seen in Figures 3 and 4.

Weather conditions during the morning peak hour of 26 May 1998 were characterized by partly cloudy skies and light northeasterly trade winds averaging 6.1 mph. Total traffic along Ala Wai Boulevard fronting the project site was about 96% of the a.m. peak hour volume reported for that street segment in the traffic consultant's report on existing conditions [8]. CO concentrations measured were low, averaging only 1.5 mg/m³ due to the steady winds and generally free flow traffic conditions.

On the afternoon of 27 May 1998, the northeasterly winds were of slightly greater velocity than they had been the previous morning, averaging 8.7 mph. Skies were again partly cloudy. Total traffic was 97% of the existing p.m. volume reported by the traffic consultant [8]. The CO level was lower than the a.m., averaging 1.0 mg/m³, due primarily to the lower traffic volume and higher wind speeds.

4. CLIMATE AND METEOROLOGY

4.1 Temperature and Rainfall. Temperatures in the project area are expected to be similar to those found elsewhere in Hawaii. The nearest long-term weather station operated by the National Weather Service is located at the Honolulu International Airport. In an annual summary for that station, the National Climatic Center has summarized Honolulu's temperature regime as follows:

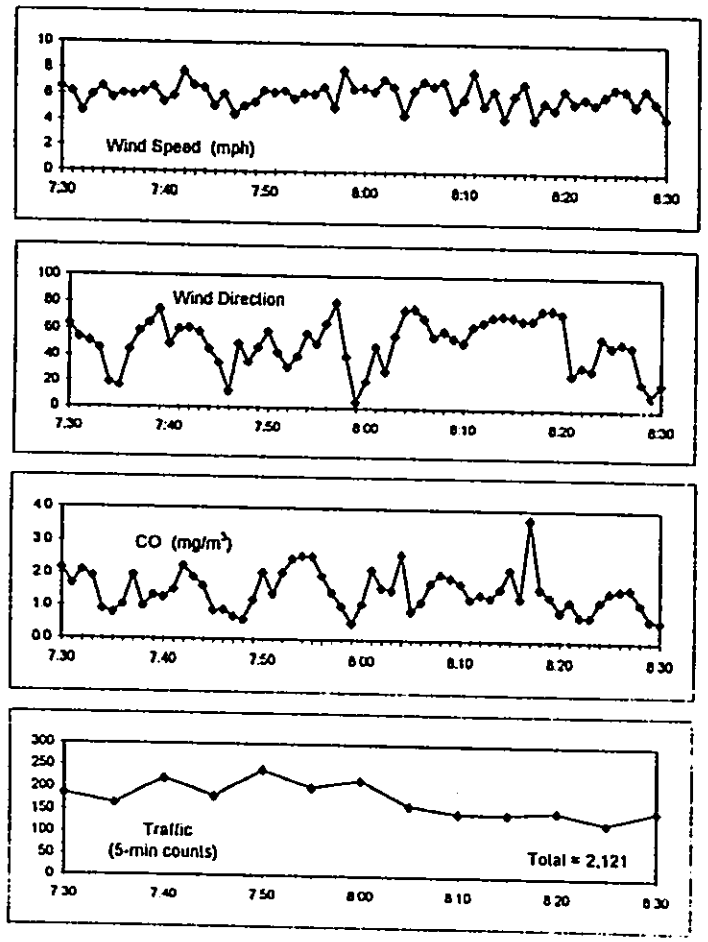
> Hawaii's equable temperatures are associated with the small seasonal variation in the amount of energy received from the sun and the tempering effect of the surrounding ocean. The range of temperatures averages only 7 degrees between the warmest months (August and September) and the coolest months (January and February) and about 12 degrees between day and night. Daily maximums run from the high 70's in winter to the mid-80's in summer, and daily minimums from the mid-60's to the low 70's. However, the Honolulu Airport area has recorded as high as 93 degrees and as low as 53 [9].

Historical data from the National Weather Service at Honolulu International Airport indicate that annual rainfall on the leeward side of Oahu averages 22.0 inches [10]. In accordance with Thornwaite's scheme for climatic classification, the area would therefore be considered semi-arid [11].

4.2 Surface Winds. Meteorological data records were reviewed from the Honolulu International Airport and Hickam Air Force Base. The annual prevalence of northeast trade winds is clearly shown in Table 3. A closer examination of the data, however, indicates that low velocities (less than 10 mph) occur frequently and that the "normal" northeasterly trade winds tend to break down in the Fall giving way to more light, variable wind conditions through the Winter and on into early Spring. It is during these times that Honolulu generally experiences elevated pollutant levels. This seasonal difference in wind conditions can be easily contrasted by comparing August and January wind roses (Figures 5 and 6).

FIGURE 3

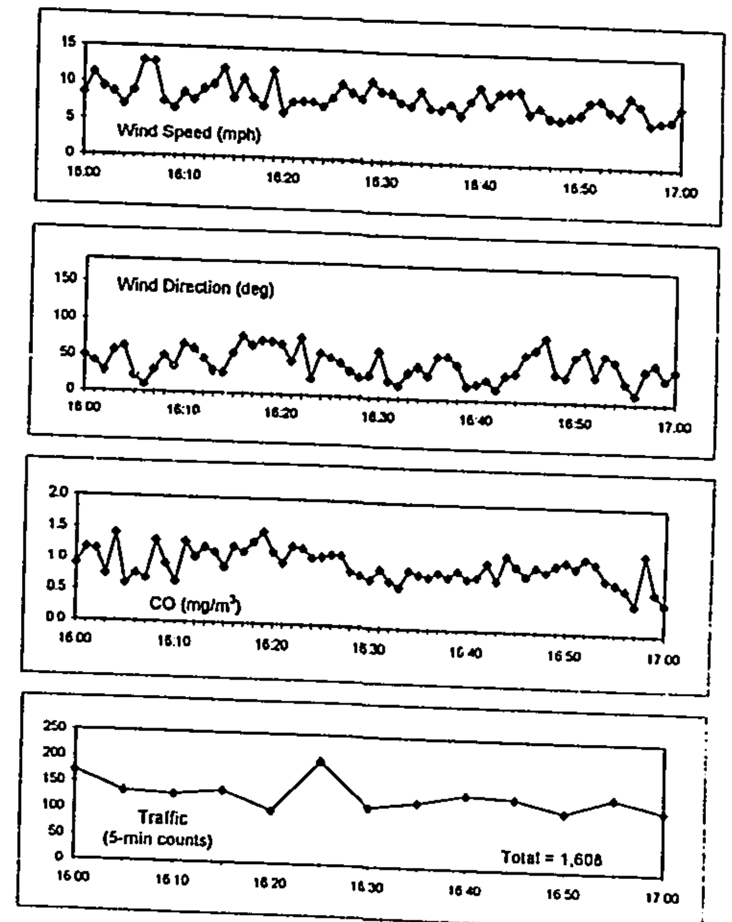
A.M. PEAK HOUR CONDITIONS
ALA WAI BOULEVARD BETWEEN LILIUOKALANI AND KAIULANI AVENUES
26 MAY 1998



Time of Day

FIGURE 4

P.M. PEAK HOUR CONDITIONS
ALA WAI BOULEVARD BETWEEN LILIUOKALANI AND KAIULANI AVENUES
27 MAY 1998



Time of Day

TABLE 3

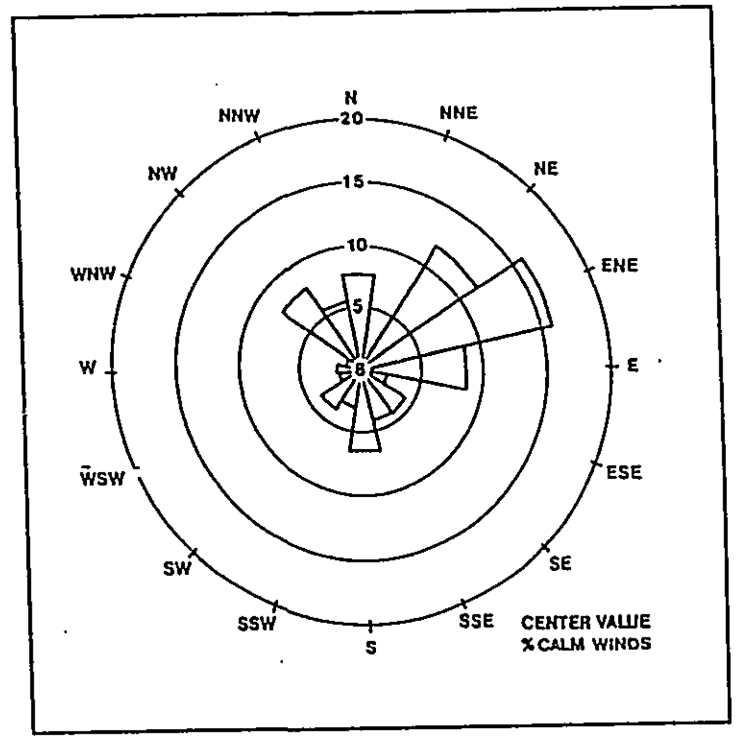
ANNUAL JOINT FREQUENCY DISTRIBUTION OF WIND SPEED AND DIRECTION HONOLULU INTERNATIONAL AIRPORT

	Wind Speed (m/sec)						
Dir (deg)	< 3.1	< 4.5	< 5.8	< 7.2	< 8.5	>/= 8.5	All
10	0.0065	0.0038	0.0023	0.0016	0.0009	0.0001	0.0151
20	0.0082	0.0041	0.0025	0.0023	0.0011	0.0001	0.0183
30	0.0100	0.0061	0.0051	0.0038	0.0028	0.0007	0.0286
40	0.0188	0.0157	0.0258	0.0222	0.0174	0.0040	0.1039
50	0.0268	0.0290	0.0449	0.0385	0.0307	0.0054	0.1752
60	0.0344	0.0289	0.0436	0.0273	0.0238	0.0041	0.1621
70	0.0250	0.0181	0.0197	0.0122	0.0096	0.0009	0.0855
80	0.0113	0.0081	0.0065	0.0039	0.0009	0.0003	0.0310
90	0.0073	0.0049	0.0040	0.0009	0.0008	0.0000	0.0179
100	0.0031	0.0016	0.0014	0.0006	0.0002	0.0000	0.0068
110	0.0027	0.0019	0.0010	0.0007	0.0005	0.0001	0.0069
120	0.0027	0.0013	0.0019	0.0009	0.0003	0.0003	0.0075
130	0.0022	0.0032	0.0018	0.0015	0.0007	0.0002	0.0095
140	0.0034	0.0033	0.0039	0.0018	0.0011	0.0006	0.0141
150	0.0022	0.0030	0.0019	0.0003	0.0002	0.0005	0.0081
160	0.0024	0.0033	0.0023	0.0010	0.0005	0.0000	0.0094
170	0.0031	0.0046	0.0023	0.0007	0.0003	0.0000	0.0109
180	0.0055	0.0042	0.0018	0.0008	0.0005	0.0000	0.0128
190	0.0065	0.0038	0.0013	0.0002	0.0000	0.0000	0.0117
200	0.0057	0.0032	0.0011	0.0001	0.0000	0.0000	0.0101
210	0.0076	0.0038	0.0016	0.0001	0.0000	0.0000	0.0131
220	0.0083	0.0077	0.0016	0.0001	0.0001	0.0000	0.0179
230	0.0076	0.0049	0.0014	0.0001	0.0001	0.0000	0.0141
240	0.0042	0.0016	0.0013	0.0000	0.0000	0.0000	0.0071
250	0.0040	0.0010	0.0003	0.0000	0.0000	0.0000	0.0054
260	0.0064	0.0023	0.0005	0.0000	0.0000	0.0000	0.0091
270	0.0065	0.0010	0.0005	0.0002	0.0000	0.0000	0.0082
280	0.0099	0.0005	0.0002	0.0000	0.0000	0.0000	0.0106
290	0.0123	0.0003	0.0002	0.0001	0.0000	0.0000	0.0130
300	0.0167	0.0018	0.0011	0.0000	0.0000	0.0000	0.0197
310	0.0235	0.0022	0.0015	0.0001	0.0000	0.0000	0.0272
320	0.0200	0.0022	0.0013	0.0006	0.0001	0.0000	0.0241
330	0.0121	0.0023	0.0011	0.0005	0.0000	0.0000	0.0159
340	0.0094	0.0010	0.0003	0.0001	0.0000	0.0000	0.0109
350	0.0082	0.0025	0.0016	0.0002	0.0000	0.0000	0.0125
360	0.0093	0.0027	0.0022	0.0008	0.0005	0.0001	0.0154
All	0.3537	0.1898	0.1917	0.1240	0.0932	0.0174	0.9698
						Calms:	0.0302

SOURCE: National Weather Service, 1992

FIGURE 5

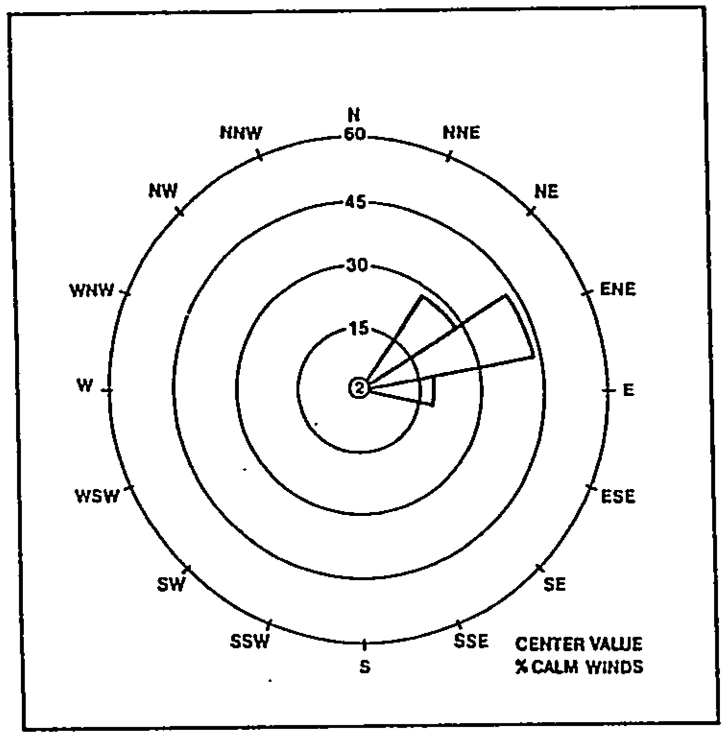
JANUARY WIND ROSE HONOLULU INTERNATIONAL AIRPORT



SOURCE: National Weather Service
Historical Records, 1940-57

FIGURE 6

AUGUST WIND ROSE
HONOLULU INTERNATIONAL AIRPORT



SOURCE: National Weather Service
Historical Records, 1940-57

Of particular interest from an air pollution standpoint were the stability wind roses prepared for Hickam Air Force Base [12]. These data indicated that stable conditions, i.e., Pasquill-Gifford stability categories E and F [13], occur about 28% of the time on an annual basis and 36% of the time during the peak winter month (January). It is under such conditions that the greatest potential for air pollutant buildup from groundlevel sources, e.g., motor vehicles, exists.

5. SHORT-TERM IMPACTS

5.1 Onsite Impacts. The principal source of short-term air quality impact will be construction activity. Construction vehicle activity will increase automotive pollutant concentrations along the existing streets as well as on the project site itself. Since the Ala Wai Boulevard is currently operating at a level of service "A" [8], construction vehicle traffic is not likely to exceed street capacity. The presence of large trucks at times may cause a temporary reduction and lower average travel speeds.

The site preparation and earth moving will create particulate emissions as will construction of the building itself. Construction vehicles movement on unpaved on-site roads will also generate particulate emissions. EPA studies on fugitive dust emissions from construction sites indicate that about 1.2 tons/acre per month of activity may be expected under conditions of medium activity, moderate soil silt content (30%), and a precipitation/ evaporation (P/E) index of 50 [11,14]. The close proximity of other occupied buildings at the project site portends potential dust impact

5.2 Offsite Impacts. In addition to the onsite impacts attributable to construction activity, there will also be offsite impacts due to the operation of concrete and asphalt batching plants needed for construction. Such plants routinely emit particulate matter and other gaseous pollutants. It is too early, however, to identify the specific facilities that will be providing these materials and thus the discussion of air quality impacts is necessarily generic. The batch plants which will be producing the concrete for foundations, curbing, etc. and the asphalt for roadways must be permitted by the Department of Health Clean Air Branch pursuant to state regulations [7]. In order to obtain these permits they must demonstrate their ability to continuously comply with both emission [7] and ambient air quality [3] standards. Under the recently promulgated federal Title V operating permit requirements [15], now incorporated in Hawaii's rules [7], air pollution sources must regularly attest to their compliance with all applicable requirements.

6. MOBILE SOURCE IMPACTS

6.1 Mobile Source Activity. The traffic impact analysis [8] prepared for the proposed project served as the basis for this mobile source impact analysis. Existing peak-hour traffic volumes and projections for 2003 for the three principal intersections serving the project area were provided. This analysis focused on those same three Ala Wai Boulevard intersections which were Liliuokalani Avenue, Kaiulani Avenue, and Kanekapolei Street.

6.2 Emission Factors. Automotive emission factors for carbon monoxide (CO) were generated for calendar years 1998 and 2003 using the Mobile Source Emissions Model (MOBILE-5B)[16]. To localize the emission factors as much as possible, the March 1992 age distribution for registered vehicles in the City & County of Honolulu [17] was used in lieu of national statistics. That same age distribution was the basis for the distribution of vehicle miles traveled as well.

6.3 Modeling Methodology. Due to the present state-of-the-art in air quality modeling, analyses such as this generally focus on estimating concentrations of non-reactive pollutants. For projects involving mobile sources as the principal source, carbon monoxide is normally selected for modeling because it has a relatively long half-life in the atmosphere (ca. 1 month)[18], and it comprises the largest fraction of automotive emissions.

Using the traffic data provided, modeling was performed for the aforementioned intersections for 1998 and 2003 (with and without the project). A stable atmosphere (Category "F") was entered for the a.m. while neutral atmosphere (Category "D") [13] was used for the p.m. peak hours. A worst case 1 meter per second (m/sec) wind speed was assumed.

The EPA guideline model CAL3QHC [19, 20] was employed to estimate near-intersection carbon monoxide concentrations. An array of 48 receptor sites at distances of 10 - 30 meters from the road edge were entered in the model. Because the area is urban, a background CO concentration of 1.0 milligrams per cubic meter (mg/m^3) was assumed. The model uses an iterative process to identify the wind direction producing the maximum CO concentration at each receptor location.

6.4 Results: 1-Hour Concentrations. The results of this modeling are presented in Figures 7, 8 and 9. Each figure depicts the locations of the 48 receptor sites around the respective intersections. Maximum estimated concentrations in milligrams per cubic meter (mg/m^3) for each of the evaluated scenarios are also presented along with the particular receptor location at which they were predicted.

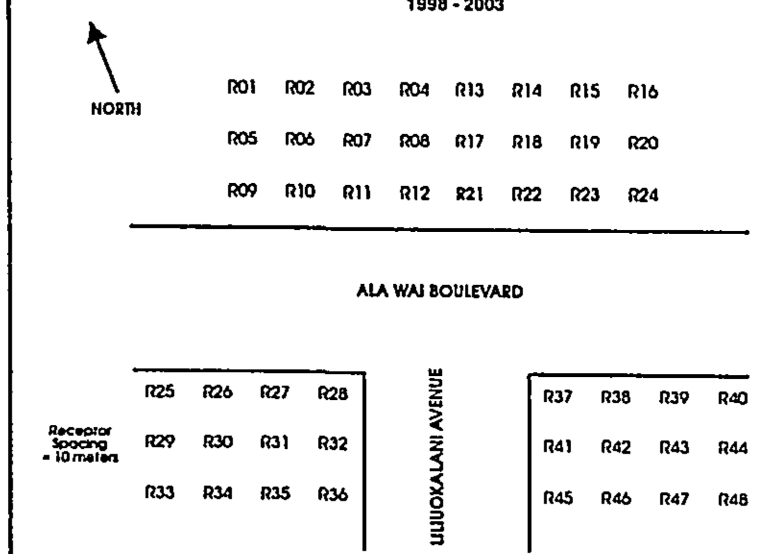
The results suggest that, under *worst case* conditions of meteorology and traffic, both the federal and state 1-hour CO standards would be met at all but *one* receptor location in close proximity (< 10 meters) to the Liliuokalani Avenue intersection. There was a slight decline in CO levels between existing and future conditions, with or without the proposed housing project.

6.5 Results: 8-Hour Concentrations. Estimates of 8-hour CO concentrations can be derived by applying a "persistence" factor to the maximum 1-hour concentrations. This "persistence" factor accounts for the fact that the worst case 1-hour meteorology and traffic volumes do not persist for 8 hours. EPA recommends calculation of a persistence factor based on actual 1-hour and 8-hour CO measurements. A local persistence factor was computed from Department of Health data for a recent project [21] in the Waikiki area and used here to estimate 8-hour concentrations by applying it to the *worst case* 1-hour concentration, i.e., the a.m. peak hour level. The results, depicted in Figures 7 - 9, demonstrate compliance with federal and state 8-hour standards at all three intersections.

6.6 Parking Facility. The proposed development includes 26 parking stalls for tenants and guests. Given the nature of the residents, i.e., seniors, a high level of vehicle activity is not anticipated. The traffic study [8] indicated a range of 6 - 10 total inbound/outbound vehicle movements during the peak hours which is not likely to have a significant air quality impact.

FIGURE 7

ESTIMATES OF MAXIMUM 1- AND 8-HOUR CARBON MONOXIDE CONCENTRATIONS
Ala Wai Boulevard at Liliuokalani Avenue
Peak Traffic Hours
1998 - 2003



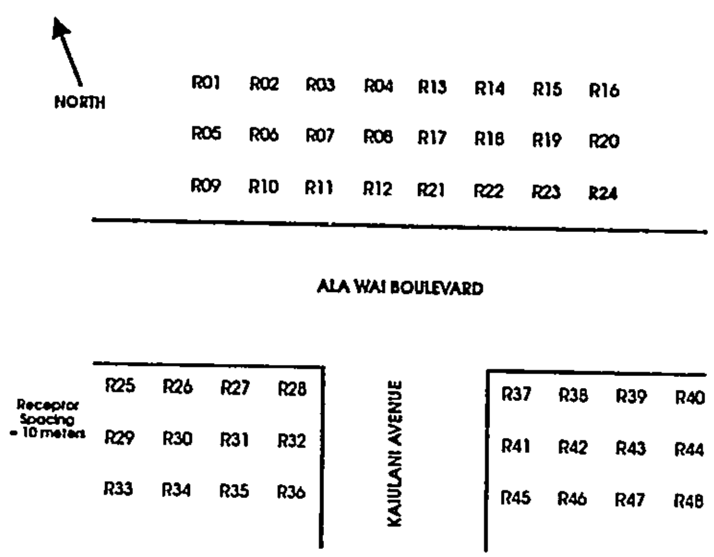
Estimated Maximum Concentrations (mg/m^3)

Period	1998	2003 w/o proj	2003 w/proj
A.M.	10.4	10.0	10.1
P.M.	7.6	7.8	7.8
8-Hr	4.9	4.7	4.8

LOCATION: RECEPTOR # 21

FIGURE 8

ESTIMATES OF MAXIMUM 1- AND 8-HOUR CARBON MONOXIDE CONCENTRATIONS
Ala Wai Boulevard at Kaiulani Avenue
Peak Traffic Hours
1998 - 2003



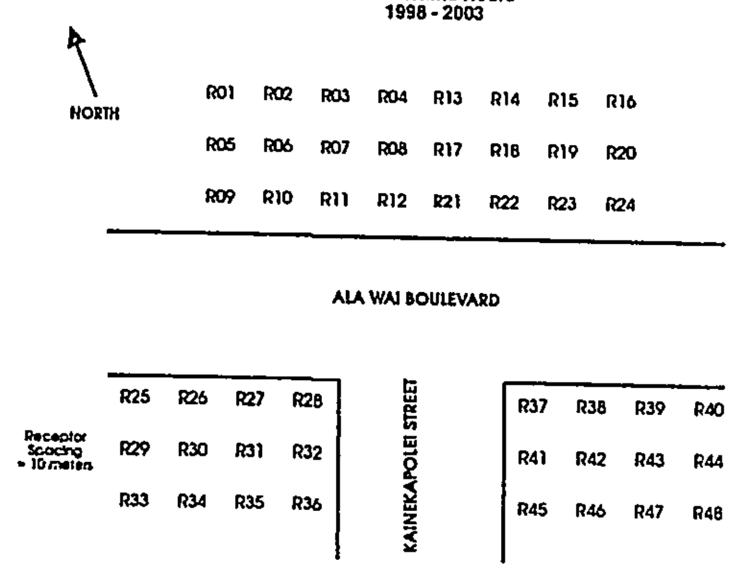
Estimated Maximum Concentrations
(mg/m³)

Period	1998	2003 w/o proj	2003 w/proj
A.M.	7.5	7.8	7.8
P.M.	4.0	4.2	4.2
8-Hr	3.5	3.6	3.6

LOCATION: RECEPTOR #24

FIGURE 9

ESTIMATES OF MAXIMUM 1- AND 8-HOUR CARBON MONOXIDE CONCENTRATIONS
Ala Wai Boulevard at Kanekapolei Street
Peak Traffic Hours
1998 - 2003



Estimated Maximum Concentrations
(mg/m³)

Period	1998	2003 w/o proj	2003 w/proj
A.M.	9.8	9.6	9.1
P.M.	7.4	7.4	7.2
8-Hr	4.6	4.5	4.3

LOCATION: RECEPTOR # 21

7. OFFSITE STATIONARY SOURCE IMPACTS

7.1 Electrical Generation. The estimated 540,000 kilowatt hours (kwhrs) of annual electrical demand by the project will necessitate the generation of electricity by power plants. Currently, most of Oahu's electrical energy is generated by Hawaiian Electric Company's oil-fired plants at Kahe Point and Waiau. These units fire low sulfur (0.5%) fuel oil. The estimated emissions resulting from fuel burned to provide the power needed by the project are presented in Table 4.

7.2 Solid Waste Disposal. The refuse generated by the residents of the proposed apartments will required disposal. Historically, about 80% of Oahu's refuse was being landfilled with the remaining 20% being burned at the Waipahu Incinerator (which was recently closed down). With the opening of the City's resource recovery facility (HPOWER) at Campbell Industrial Park several years ago, most refuse is now being pre-processed and burned leaving less mass to be landfilled. This facility was originally designed to handle most of Oahu's domestic refuse (1,800 T/day). Estimates of annual emissions attributable to the combustion of refuse from the proposed development are included in Table 4.

TABLE 4

ESTIMATES OF ANNUAL EMISSIONS FROM OFFSITE SOURCES

Pollutant	Emissions (T/Yr)	
	Electrical Generation	Solid Waste Disposal
Nitrogen oxides (NOx)	2.0	0.5
Sulfur oxides (SOx)	1.5	0.1
Particulate matter (PM)	0.2	0.05
Carbon monoxide (CO)	0.1	0.5
Volatile organic compounds (VOC)	0.02	0.03

8. DISCUSSION, CONCLUSIONS AND MITIGATION

8.1 Short-Term Impacts. Since, as noted above, the development area is considered semi-arid by Thornwaite's classification system, there is an increased potential for fugitive dust. It will be very important to employ adequate dust control measures during the construction period. Dust control

could be accomplished through frequent watering of unpaved roads and areas of exposed soil. The EPA estimates that twice daily watering can reduce fugitive dust emissions by as much as 50% [14]. The soonest possible landscaping of completed areas will also help

8.2 Mobile Source Impacts.

As noted in Section 6, under *worst case* meteorology during peak traffic hours, both federal and state carbon monoxide standards are generally met. Only at one location within 10 meters of the Liliuokalani Avenue intersection did there appear to be a slight possibility of exceeding the state 1-hour standard under *existing* conditions. With continued projected growth, including the proposed seniors housing project, the predicted CO levels actually *declined* slightly. Such predicted declines are normally due to the attrition of older, more polluting vehicles and the increase in new, lower-emitting vehicles which offset the overall increase in traffic volume due to growth. It must also be emphasized that the analysis presented herein is based on worst case conditions which have a very low frequency of occurrence. Under the prevailing, more normal conditions, CO levels would be comparable to the values found in our onsite sampling and at the DOH's Waikiki monitoring station.

8.3 Offsite Stationary Source Impacts. The proposed project will increase electrical demand which in turn will cause more fuel to be burned and more pollutants to be emitted into the air. These impacts can be mitigated by energy efficient design of the proposed dwelling units. The state Department of Business, Economic Development and Tourism has energy conservation design guidelines to assist in this effort. As for HECO's facilities which provide the power, each must continuously demonstrate compliance with all applicable ambient air quality standards and control regulations in order to retain its operating permit.

Emissions associated with the disposal of solid waste generated by the project are very small compared to the entire county. Nevertheless, they can be reduced by encouragement of use of recyclable products.

REFERENCES

1. Clean Air Act, 42 U.S.C.A. §7409 (CAA §109), National primary and secondary ambient air quality standards.
2. Code of Federal Regulations, Title 40, Protection of Environment, Part 50, *National Primary and Secondary Ambient Air Quality Standards.*
3. State of Hawaii. Title 11, Administrative Rules, Chapter 59, *Ambient Air Quality Standards*, as amended, November 1993.
4. Library of Congress, Congressional Research Service. *A Legislative History of the Clean Air Amendments of 1970*, Volume 1, p. 411, January 1974.
5. U. S. Environmental Protection Agency. *National Ambient Air Quality Standards for Hydrocarbons: Final Rulemaking*, Federal Register, Volume 48, No. 3, p. 628, January 1983.
6. U. S. Environmental Protection Agency. Proposed Rulemaking, Federal Register, Volume 61, No. 241, pp. 65638, 65780, and 65716, 13 December 1996.
7. State of Hawaii. Title 11, Administrative Rules, Chapter 60.1, *Air Pollution Control*, November 1993.
8. Philip Rowell and Associates. *Traffic Impact Analysis Report: Genesis Senior Housing Development*, Revised 10 March 1999.
9. U.S. Department of Commerce, National Oceanographic and Atmospheric Administration, National Environmental Satellite, Data and Information Service, National Climatic Center. *Local Climatological Data: Annual Summary with Comparative Data, Honolulu, Hawaii, 1982*
10. State of Hawaii, Department of Business, Economics and Tourism. *State of Hawaii Data Book - 1996.*
11. Thornwaite, C. W. Climates of North America According to a New Classification, *Geog. Rev. 21*: 633-655, 1931.
12. U.S. Air Force, Environmental Technical Applications Center Report No. 7461: *Stability Wind Roses, Hickam AFB, HI, 0000-2400 LST By Boundary Layer Section*, 4 September 1974.
13. U. S. Environmental Protection Agency. *Workbook of Atmospheric Dispersion Estimates*, AP-26 (Sixth Edition), 1973.
14. U.S. Environmental Protection Agency. *Compilation of Air Pollutant Emission Factors*, Fifth Edition, as updated on the EPA Technology Transfer Network (TTN), October 1996

15. Clean Air Act Amendments of 1990, P.L. 101-549, 15 November 1990.
16. U. S. Environmental Protection Agency. *MOBILE-5B (Mobile Source Emission Factor Model)*. 14 September 1996.
17. City & County of Honolulu, Department of Data Systems. Age Distribution of Registered Vehicles in the City & County of Honolulu (unpublished report), March 1992.
18. Seinfeld, John H. *Air Pollution: Physical and Chemical Fundamentals*, p. 69, McGraw-Hill Book Company, 1975
19. U.S. Environmental Protection Agency. *Guideline on Air Quality Models (Revised)*, 40 CFR 51, Appendix W, 26 June 1996.
20. U.S. Environmental Protection Agency. *User's Guide to CAL3QHC Version 2.0: A Modeling Methodology for Predicting Pollutant Concentrations Near Roadway Intersections*, EPA-450/R-92-006, November 1992.
21. Morrow, J. W. *Air Quality Impact Analysis: Hawai'i Convention Center (Revised)*, 27 June 1995.

AIR QUALITY IMPACT REPORT (AQIR)

GENESIS SENIOR HOUSING DEVELOPMENT
WAIKIKI, OAHU

1 June 1998

PREPARED FOR:

Wil Chee - Planning, Inc.

PREPARED BY:

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Environmental Management Consultant
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1. INTRODUCTION

The Genesis Foundation, a nonprofit corporation, is proposing to construct an affordable 283-unit apartment complex for senior citizens on a parcel of land situated along the Ala Wai Boulevard in Waikiki, Oahu (TMK 2 :6:24:70,71) (Figure 1). The site is currently vacant and surrounded on three sides by high and low-rise residential buildings as clearly shown in Figure 2.

The purpose of this report is to assess the impact of the proposed development on air quality on a local and regional scale. The overall project can be considered an "indirect source" of air pollution as defined in the federal Clean Air Act[1] since its primary association with air quality is its inherent attraction for mobile sources, i.e., motor vehicles. Much of the focus of this analysis, therefore, is on the project's ability to generate traffic and the resultant impact on air quality. Air quality impact was evaluated for existing (1998) and future (2003) conditions with and without the proposed development.

A project such as this also has offsite impacts due to increased demand for electrical energy which must be met by the combustion of some type of fuel and the incineration of solid waste generated by project residents. Both these processes result in pollutant emissions to the air which have been addressed in this report.

Finally, during construction of the various buildings and facilities air pollutant emissions will be generated onsite and offsite due to vehicular movement, grading, concrete and asphalt batching, and general dust-generating construction activities. These impacts have also been addressed.

2. AIR QUALITY STANDARDS

A summary of State of Hawaii and national ambient air quality standards is presented in Table 1.[2,3] Note that Hawaii's standards are not divided into primary and secondary standards as are the federal standards.

Primary standards are intended to protect public health with an adequate margin of safety while secondary standards are intended to protect public welfare through the prevention of damage to soils, water, vegetation, man-made materials, animals, wildlife, visibility, climate, and economic values[4].

Some of Hawaii's standards (CO, NO_2, and O_3) are clearly more stringent than their federal counterparts but, like their federal counterparts, may be exceeded once per year. It should also be noted that in November 1993, the Governor signed amendments to Chapter 59, Ambient Air Quality Standards[3], adopting the federal standard for particulate matter equal to or less than 10 microns in diameter (PM_{10}). Since measurement data in Hawaii indicate that PM_{10} comprises about 50% of total particulate matter (TSP), the adoption of that federal standard with a numerical value equal to the original state TSP standard of 150 mg/m^3 represented a substantial relaxation of the standard (approximately doubling it). In the case of the automotive pollutants [carbon monoxide (CO), nitrogen dioxide (NO_2), and ozone (O_3)], there are only primary standards.

FIGURE 1

PROJECT LOCATION

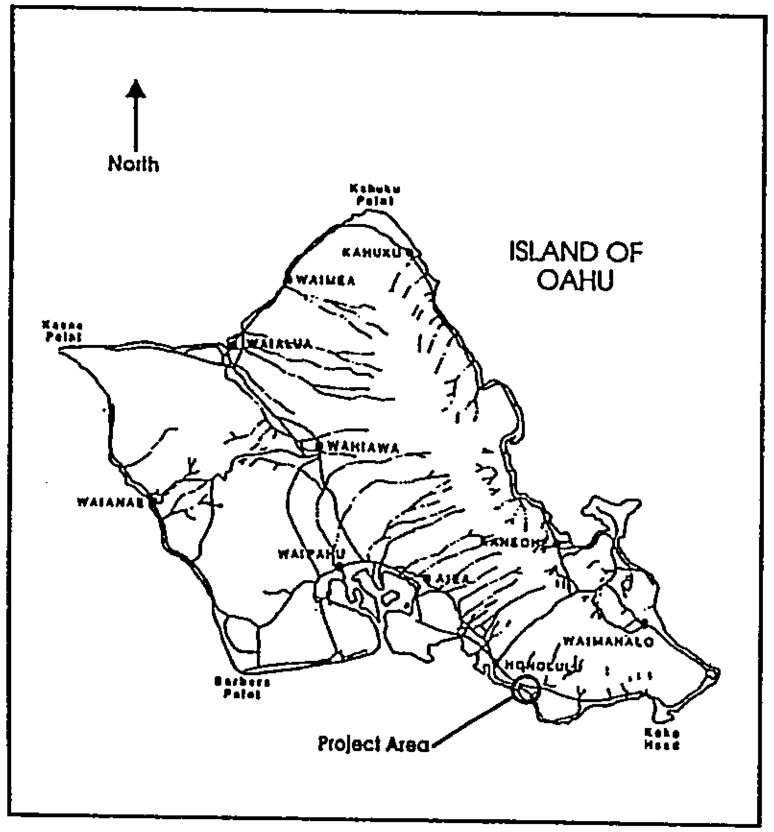
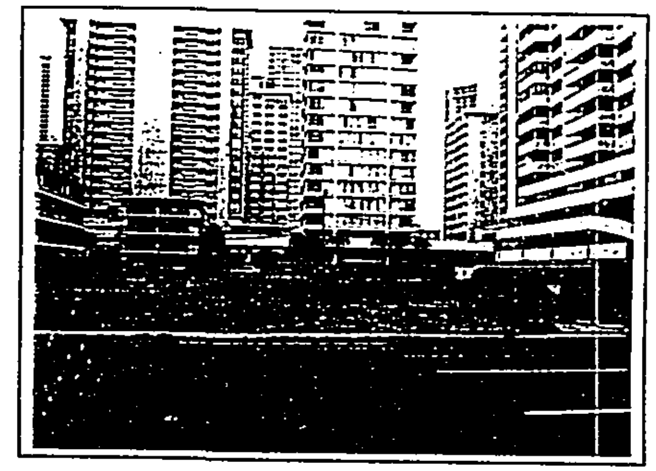


FIGURE 2

EXISTING SITE CONDITIONS

Project Site - Ala Wai Blvd
(facing southwest)



Project Site - Tusitala Street
(facing northeast)

TABLE 1

SUMMARY OF STATE OF HAWAII AND FEDERAL AMBIENT AIR QUALITY STANDARDS

POLLUTANT	SAMPLING PERIOD	NAAQS PRIMARY	NAAQS SECONDARY	STATE STANDARDS
PM_{10}	Annual	50	50	50
	24-hr	150	150	150
SO_2	Annual	80	—	80
	24-hr	365	—	365
	3-hr	—	1,300	1,300
NO_2	Annual	100	—	70
CO	8-hr	10	—	5
	1-hr	40	—	10
O_3	1-hr	235	—	100
H_2S	1-hr	—	—	35
Pb	Calendar Quarter	1.5	—	1.5

KEY:
PM_{10} - particulate matter < 10 microns
SO_2 - sulfur dioxide
NO_2 - nitrogen dioxide
CO - carbon monoxide
O_3 - ozone
H_2S - hydrogen sulfide
Pb - lead

All concentrations in micrograms per cubic meter ($\mu g/m^3$) except CO which is in milligrams per cubic meter.

Until 1983, there was also a hydrocarbons standard which was based on the precursor role hydrocarbons play in the formation of photochemical oxidants rather than any unique toxicological effect they had at ambient levels. The hydrocarbons standard was formally eliminated in January 1983 [5].

The U.S. Environmental Protection Agency (EPA) is mandated by Congress to periodically review and re-evaluate the federal standards in light of new research findings[1]. The latest review resulted in an EPA proposal to tighten the ozone standard from 235 to 160 micrograms/cubic meter (ug/m^3) and also implement $PM_{2.5}$ standards for particulate matter [6]. The carbon monoxide (CO), sulfur dioxide (SO_2), and nitrogen dioxide (NO_2) standards have been reviewed in the past, but no new standards have been proposed.

Finally, the State of Hawaii also has fugitive dust regulations for particulate matter (PM) emanating from construction activities [7]. There simply can be no visible emissions from fugitive dust sources.

3. EXISTING AIR QUALITY

3.1 General. The state Department of Health (DOH) maintains a limited network of air monitoring stations around the state to gather data on the following regulated pollutants:

- particulate matter ≤ 10 microns (PM_{10})
- total suspended particulate matter (TSP)
- sulfur dioxide (SO_2)
- nitrogen dioxide (NO_2)
- carbon monoxide (CO)
- ozone (O_3)
- lead (Pb)

In the case of PM_{10}, measurements are made on a 24-hour basis to correspond with the averaging period specified in state and federal standards. Samples are collected once every six days in accordance with U.S. Environmental Protection Agency (EPA) guidelines. Carbon monoxide, sulfur dioxide, and ozone, however, are measured on a continuous basis due to their short-term (1- and 3-, and 8-hour) standards. Nitrogen dioxide is measured with continuous instruments and averaged over a full year to correspond to its annual standards. Lead concentrations are determined from particulate matter (TSP) samples.

3.2 Department of Health Monitoring. There is only one DOH monitoring site in the Waikiki area, which measures carbon monoxide. A summary of the most recent published air quality data from that station and the nearest other stations in Honolulu is presented in Table 2.

3.3 Onsite Carbon Monoxide Sampling. In conjunction with this project, air sampling was conducted in May 1998 at the project site. A continuous carbon monoxide (CO) instrument was set up and operated during the a.m. and p.m. peak traffic hours. An anemometer and vane were also installed to

TABLE 2

AIR QUALITY DATA
DEPARTMENT OF HEALTH MONITORING SITES
1996

Pollutant	Concentration (μg/m³)
Particulate matter ≤ 10 microns (PM_{10}) 24-hr (max)	28
Annual	14
Sulfur dioxide (SO_2) 3-hr (max)	73
24-hr (max)	18
Annual	3
Carbon monoxide (CO) 1-hr (max)	5,200
8-hr (max)	3,400
Annual	1,200
Ozone (O_3) 1-hr (max)	92
Annual	27
Lead (Pb) Quarterly (max)	0.0
Annual	0.0

Notes: 1. CO data are from the Waikiki site.
2. TSP, SO_2, and Pb are from the DOH building
3. O_3 data are from the Sand Island site.

to record onsite surface winds during the air sampling. A simultaneous manual count of traffic was performed. The variability of each of the parameters measured during the peak hours is clearly seen in Figures 3 and 4.

Weather conditions during the morning peak hour of 26 May 1998 were characterized by partly cloudy skies and light northeasterly trade winds averaging 6.1 mph. Total traffic along Ala Wai Boulevard fronting the project site was about 96% of the a.m. peak hour volume reported for that street segment in the traffic consultant's report on existing conditions [8]. CO concentrations measured were low, averaging only 1.5 mg/m³ due to the steady winds and generally free flow traffic conditions.

On the afternoon of 27 May 1998, the northeasterly winds were of slightly greater velocity than they had been the previous morning, averaging 8.7 mph. Skies were again partly cloudy. Total traffic was 97% of the existing p.m. volume reported by the traffic consultant [8]. The CO level was lower than the a.m., averaging 1.0 mg/m³, due primarily to the lower traffic volume and higher wind speeds.

4. CLIMATE AND METEOROLOGY

4.1 Temperature and Rainfall. Temperatures in the project area are expected to be similar to those found elsewhere in Hawaii. The nearest long-term weather station operated by the National Weather Service is located at the Honolulu International Airport. In an annual summary for that station, the National Climatic Center has summarized Honolulu's temperature regime as follows:

> Hawaii's equable temperatures are associated with the small seasonal variation in the amount of energy received from the sun and the tempering effect of the surrounding ocean. The range of temperatures averages only 7 degrees between the warmest months (August and September) and the coolest months (January and February) and about 12 degrees between day and night. Daily maximums run from the high 70's in winter to the mid-80's in summer, and daily minimums from the mid-60's to the low 70's. However, the Honolulu Airport area has recorded as high as 93 degrees and as low as 53 [9].

Historical data from the National Weather Service at Honolulu International Airport indicate that annual rainfall on the leeward side of Oahu averages 22.0 inches [10]. In accordance with Thornwaite's scheme for climatic classification, the area would therefore be considered semi-arid [11].

4.2 Surface Winds. Meteorological data records were reviewed from the Honolulu International Airport and Hickam Air Force Base. The annual prevalence of northeast trade winds is clearly shown in Table 3. A closer examination of the data, however, indicates that low velocities (less than 10 mph) occur frequently and that the "normal" northeasterly trade winds tend to break down in the Fall giving way to more light, variable wind conditions through the Winter and on into early Spring. It is during these times that Honolulu generally experiences elevated pollutant levels. This seasonal difference in wind conditions can be easily contrasted by comparing August and January wind roses (Figures 5 and 6).

FIGURE 3

A.M. PEAK HOUR CONDITIONS
ALA WAI BOULEVARD BETWEEN LILIUOKALANI AND KAIULANI AVENUES
26 MAY 1998

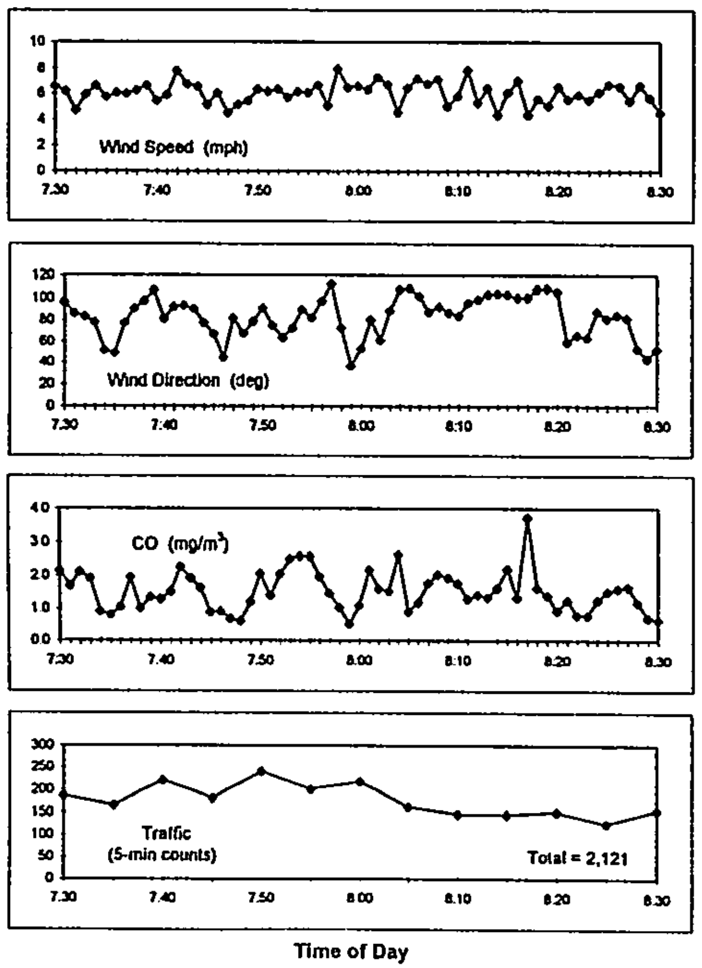


FIGURE 4

P.M. PEAK HOUR CONDITIONS
ALA WAI BOULEVARD BETWEEN LILIUOKALANI AND KAIULANI AVENUES
27 MAY 1998

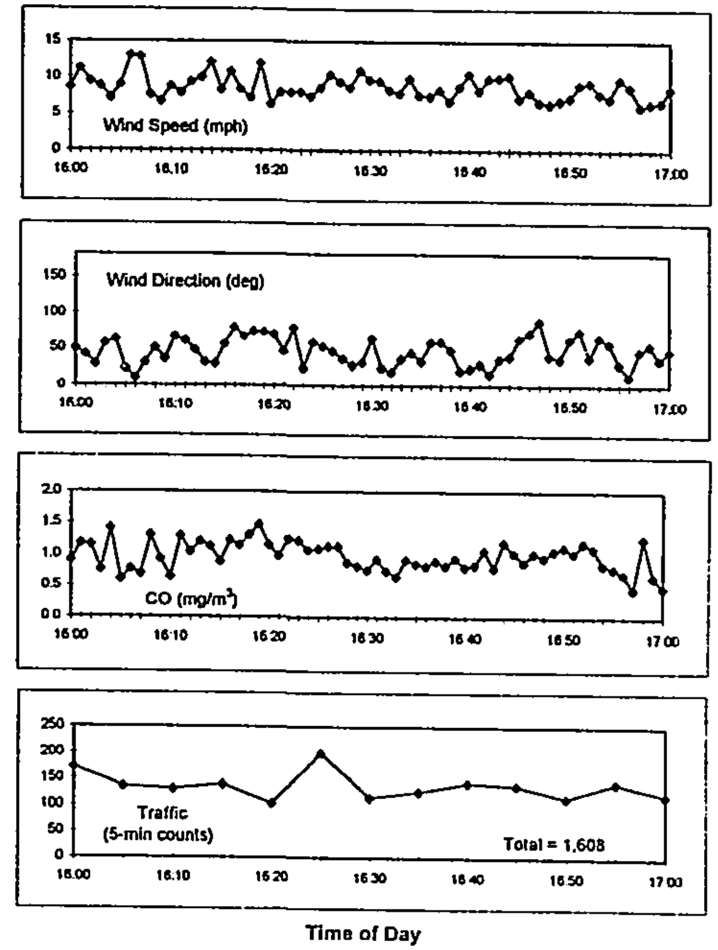


TABLE 3

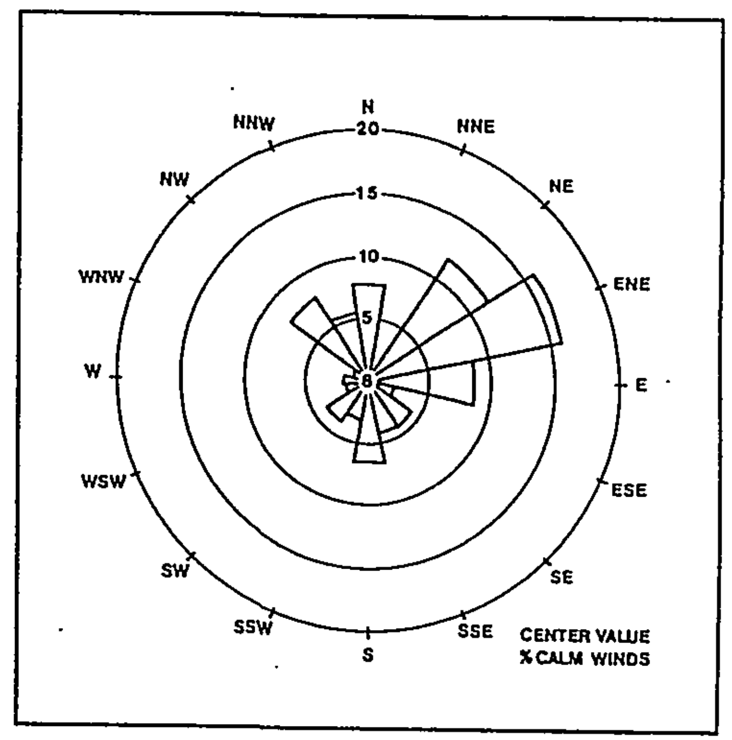
ANNUAL JOINT FREQUENCY DISTRIBUTION
OF WIND SPEED AND DIRECTION
HONOLULU INTERNATIONAL AIRPORT

	Wind Speed (m/sec)						
Dir (deg)	≤ 3.1	≤ 4.5	≤ 5.8	≤ 7.2	≤ 8.5	>/= 8.5	All
10	0.0065	0.0038	0.0023	0.0016	0.0009	0.0001	0.0151
20	0.0082	0.0041	0.0025	0.0023	0.0011	0.0001	0.0183
30	0.0100	0.0061	0.0051	0.0038	0.0028	0.0007	0.0286
40	0.0188	0.0157	0.0258	0.0222	0.0174	0.0040	0.1039
50	0.0268	0.0290	0.0449	0.0385	0.0307	0.0054	0.1752
60	0.0344	0.0289	0.0438	0.0273	0.0238	0.0041	0.1621
70	0.0250	0.0181	0.0197	0.0122	0.0096	0.0009	0.0855
80	0.0113	0.0081	0.0065	0.0039	0.0009	0.0003	0.0310
90	0.0073	0.0049	0.0040	0.0009	0.0008	0.0000	0.0179
100	0.0031	0.0016	0.0014	0.0006	0.0002	0.0000	0.0068
110	0.0027	0.0019	0.0010	0.0007	0.0005	0.0001	0.0069
120	0.0027	0.0013	0.0019	0.0009	0.0003	0.0003	0.0075
130	0.0022	0.0032	0.0018	0.0015	0.0007	0.0002	0.0095
140	0.0034	0.0033	0.0039	0.0018	0.0011	0.0006	0.0141
150	0.0022	0.0030	0.0019	0.0003	0.0002	0.0005	0.0081
160	0.0024	0.0033	0.0023	0.0010	0.0005	0.0000	0.0094
170	0.0031	0.0046	0.0023	0.0007	0.0003	0.0000	0.0109
180	0.0055	0.0042	0.0018	0.0008	0.0005	0.0000	0.0128
190	0.0065	0.0038	0.0013	0.0002	0.0000	0.0000	0.0117
200	0.0057	0.0032	0.0011	0.0001	0.0000	0.0000	0.0101
210	0.0076	0.0038	0.0016	0.0001	0.0000	0.0000	0.0131
220	0.0083	0.0077	0.0016	0.0001	0.0001	0.0000	0.0179
230	0.0076	0.0049	0.0014	0.0001	0.0001	0.0000	0.0141
240	0.0042	0.0016	0.0013	0.0000	0.0000	0.0000	0.0071
250	0.0040	0.0010	0.0003	0.0000	0.0000	0.0000	0.0054
260	0.0064	0.0023	0.0005	0.0000	0.0000	0.0000	0.0091
270	0.0065	0.0010	0.0005	0.0002	0.0000	0.0000	0.0082
280	0.0099	0.0005	0.0002	0.0000	0.0000	0.0000	0.0106
290	0.0123	0.0003	0.0002	0.0001	0.0000	0.0000	0.0130
300	0.0167	0.0018	0.0011	0.0000	0.0000	0.0000	0.0197
310	0.0235	0.0022	0.0015	0.0001	0.0000	0.0000	0.0272
320	0.0200	0.0022	0.0013	0.0006	0.0001	0.0000	0.0241
330	0.0121	0.0023	0.0011	0.0005	0.0000	0.0000	0.0159
340	0.0094	0.0010	0.0003	0.0001	0.0000	0.0000	0.0109
350	0.0082	0.0025	0.0016	0.0002	0.0000	0.0000	0.0125
360	0.0093	0.0027	0.0022	0.0008	0.0005	0.0001	0.0154
All	0.3537	0.1898	0.1917	0.1240	0.0932	0.0174	0.9698
						Calms:	0.0302

SOURCE: National Weather Service, 1992

FIGURE 5

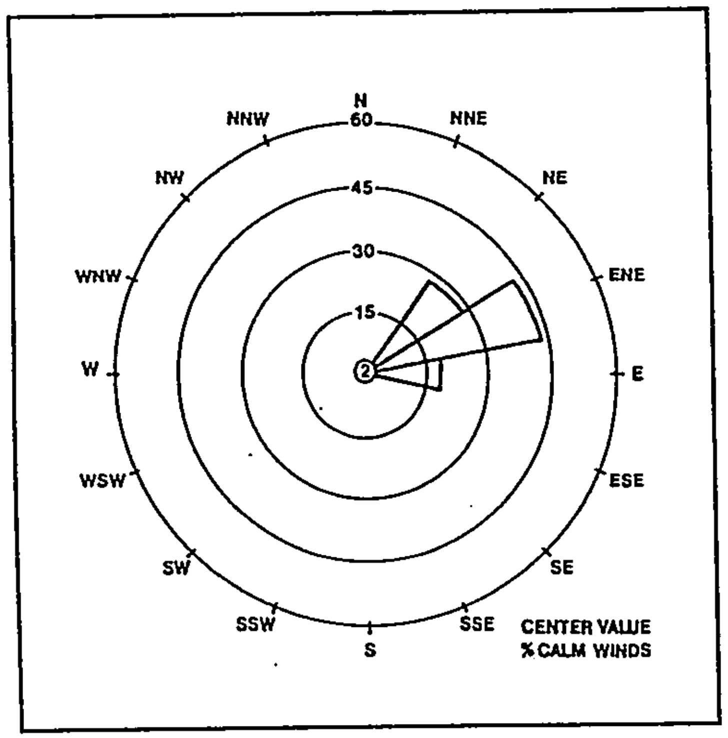
JANUARY WIND ROSE
HONOLULU INTERNATIONAL AIRPORT



SOURCE: National Weather Service
Historical Records, 1940-57

FIGURE 6

AUGUST WIND ROSE
HONOLULU INTENATIONAL AIRPORT



SOURCE: National Weather Service
Historical Records, 1940-57

Of particular interest from an air pollution standpoint were the stability wind roses prepared for Hickam Air Force Base [12]. These data indicated that stable conditions, i.e., Pasquill-Gifford stability categories E and F [13], occur about 28% of the time on an annual basis and 36% of the time during the peak winter month (January). It is under such conditions that the greatest potential for air pollutant buildup from groundlevel sources, e.g., motor vehicles, exists.

5. SHORT-TERM IMPACTS

5.1 Onsite Impacts. The principal source of short-term air quality impact will be construction activity. Construction vehicle activity will increase automotive pollutant concentrations along the existing streets as well as on the project site itself. Since the Ala Wai Boulevard is currently operating at a level of service "A" [8], construction vehicle traffic is not likely to exceed street capacity. The presence of large trucks at times may cause a temporary reduction and lower average travel speeds.

The site preparation and earth moving will create particulate emissions as will construction of the building itself. Construction vehicles movement on unpaved on-site roads will also generate particulate emissions. EPA studies on fugitive dust emissions from construction sites indicate that about 1.2 tons/acre per month of activity may be expected under conditions of medium activity, moderate soil silt content (30%), and a precipitation/ evaporation (P/E) index of 50 [11, 13]. The close proximity of other occupied buildings at the project site portends potential dust impact

5.2 Offsite Impacts. In addition to the onsite impacts attributable to construction activity, there will also be offsite impacts due to the operation of concrete and asphalt batching plants needed for construction. Such plants routinely emit particulate matter and other gaseous pollutants. It is too early, however, to identify the specific facilities that will be providing these materials and thus the discussion of air quality impacts is necessarily generic. The batch plants which will be producing the concrete for foundations, curbing, etc. and the asphalt for roadways must be permitted by the Department of Health Clean Air Branch pursuant to state regulations [7]. In order to obtain these permits they must demonstrate their ability to continuously comply with both emission [7] and ambient air quality [3] standards. Under the recently promulgated federal Title V operating permit requirements [15], now incorporated in Hawaii's rules [7], air pollution sources must regularly attest to their compliance with all applicable requirements.

6. MOBILE SOURCE IMPACTS

6.1 Mobile Source Activity. The traffic impact analysis [8] prepared for the proposed project served as the basis for this mobile source impact analysis. Existing peak-hour traffic volumes and projections for 2003 for the three principal intersections serving the project area were provided. This analysis focused on those same three Ala Wai Boulevard intersections which were Liliuokalani Avenue, Kaiulani Avenue, and Kanekapolei Street.

6.2 Emission Factors Automotive emission factors for carbon monoxide (CO) were generated for calendar years 1998 and 2003 using the Mobile Source Emissions Model (MOBILE-5B)[16]. To localize the emission factors as much as possible, the March 1992 age distribution for registered vehicles in the City & County of Honolulu [17] was used in lieu of national statistics. That same age distribution was the basis for the distribution of vehicle miles traveled as well.

6.3 Modeling Methodology. Due to the present state-of-the-art in air quality modeling, analyses such as this generally focus on estimating concentrations of non-reactive pollutants. For projects involving mobile sources as the principal source, carbon monoxide is normally selected for modeling because it has a relatively long half-life in the atmosphere (ca. 1 month)[18], and it comprises the largest fraction of automotive emissions.

Using the traffic data provided, modeling was performed for the aforementioned intersections for 1998 and 2003 (with and without the project). Because of the suburban nature of the area, a stable atmosphere (Category "F") was entered for the a.m. while neutral atmosphere (Category "D") [13] was used for the p.m. peak hours. A worst case 1 meter per second (m/sec) wind speed was assumed.

The EPA guideline model CAL3QHC [19, 20] was employed to estimate near-intersection carbon monoxide concentrations. An array of 48 receptor sites at distances of 10 - 30 meters from the road edge were entered in the model. Because the area is urban, a background CO concentration of 1.0 milligrams per cubic meter (mg/m^3) was assumed. The model uses an iterative process to identify the wind direction producing the maximum CO concentration at each receptor location.

6.4 Results: 1-Hour Concentrations. The results of this modeling are presented in Figures 7, 8 and 9. Each figure depicts the locations of the 48 receptor sites around the respective intersections. Maximum estimated concentrations in milligrams per cubic meter (mg/m^3) for each of the evaluated scenarios are also presented along with the particular receptor location at which they were predicted.

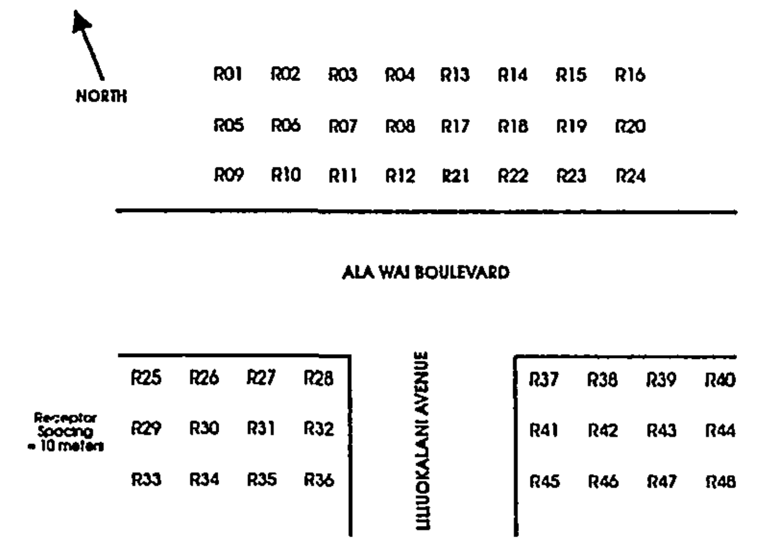
The results suggest that, under *worst case* conditions of meteorology and traffic, both the federal and state 1-hour CO standards would be met at all but *one* receptor location in close proximity (< 10 meters) to the Liliuokalani Avenue intersection. There was a slight decline in CO levels between existing and future conditions, with or without the proposed housing project.

6.5 Results: 8-Hour Concentrations. Estimates of 8-hour CO concentrations can be derived by applying a "persistence" factor to the maximum 1-hour concentrations. This "persistence" factor accounts for the fact that the worst case 1-hour meteorology and traffic volumes do not persist for 8 hours. EPA recommends calculation of a persistence factor based on actual 1-hour and 8-hour CO measurements. A local persistence factor was computed from Department of Health data for a recent project [21] in the Waikiki area and used here to estimate 8-hour concentrations by applying it to the *worst case* 1-hour concentration, i.e., the a.m. peak hour level. The results, depicted in Figures 7 - 9, demonstrate compliance with federal and state 8-hour standards at all three intersections.

6.6 Parking Facility. The proposed development includes 124 parking stalls for tenants and guests. Given the nature of the residents, i.e., seniors, a high level of vehicle activity is not anticipated. The traffic study [8] indicated a range of 18 - 31 total inbound/outbound vehicle movements during the peak hours which is not likely to have a significant air quality impact.

FIGURE 7

ESTIMATES OF MAXIMUM 1- AND 8-HOUR CARBON MONOXIDE CONCENTRATIONS
Ala Wai Boulevard at Liliuokalani Avenue
Peak Traffic Hours
1998 - 2003



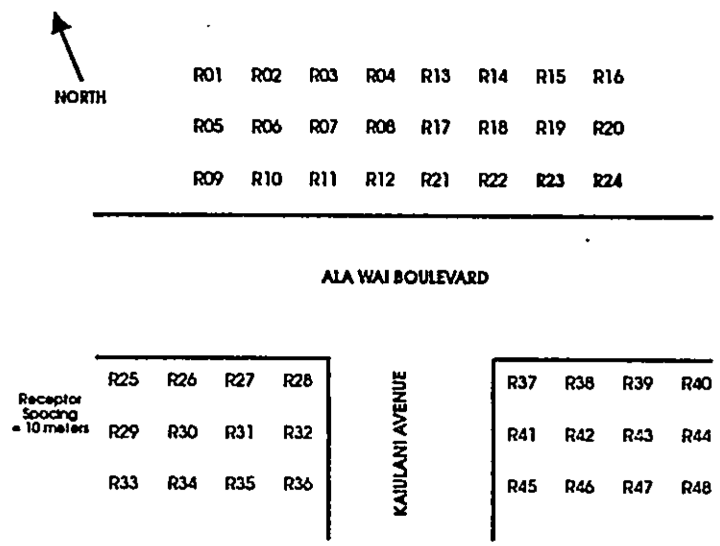
Estimated Maximum Concentrations (mg/m^3)

Period	1998	2003 w/o proj	2003 w/proj
A.M.	10.4	10.0	10.1
P.M.	7.6	7.8	7.8
8-Hr	4.9	4.7	4.8

LOCATION: RECEPTOR # 21

FIGURE 8

ESTIMATES OF MAXIMUM 1- AND 8-HOUR CARBON MONOXIDE CONCENTRATIONS
Ala Wai Boulevard at Kaiulani Avenue
Peak Traffic Hours
1998 - 2003



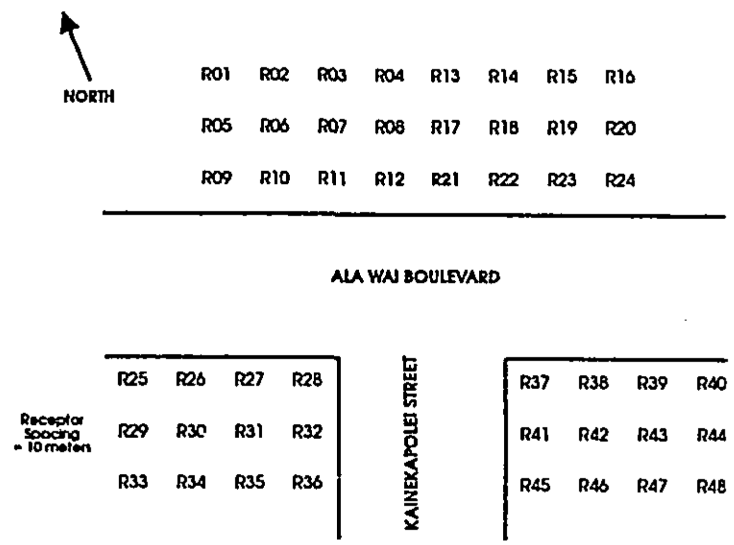
Estimated Maximum Concentrations
(mg/m^3)

Period	1998	2003 w/o proj	2003 w/proj
A.M.	7.5	7.8	7.8
P.M.	4.0	4.2	4.2
8-Hr	3.5	3.6	3.6

LOCATION: RECEPTOR #'S 23 & 24

FIGURE 9

ESTIMATES OF MAXIMUM 1- AND 8-HOUR CARBON MONOXIDE CONCENTRATIONS
Ala Wai Boulevard at Kanekapolei Street
Peak Traffic Hours
1998 - 2003



Estimated Maximum Concentrations
(mg/m^3)

Period	1998	2003 w/o proj	2003 w/proj
A.M.	9.8	9.6	9.6
P.M.	7.4	7.4	7.4
8-Hr	4.6	4.5	4.5

LOCATION: RECEPTOR # 21

7. OFFSITE STATIONARY SOURCE IMPACTS

7.1 Electrical Generation. The estimated 1.7 million kilowatt hours (kwhrs) of annual electrical demand by the project will necessitate the generation of electricity by power plants. Currently, most of Oahu's electrical energy is generated by Hawaiian Electric Company's oil-fired plants at Kahe Point and Waiau. These units fire low sulfur (0.5%) fuel oil. The estimated emissions resulting from fuel burned to provide the power needed by the project are presented in Table 4.

7.2 Solid Waste Disposal. The refuse generated by the residents of the proposed apartments will required disposal. Historically, about 80% of Oahu's refuse was being landfilled with the remaining 20% being burned at the Waipahu Incinerator (which was recently closed down). With the opening of the City's resource recovery facility (HPOWER) at Campbell Industrial Park several years ago, most refuse is now being pre-processed and burned leaving less mass to be landfilled. This facility was originally designed to handle most of Oahu's domestic refuse (1,800 T/day). Estimates of annual emissions attributable to the combustion of refuse from the proposed development are included in Table 4.

TABLE 4

ESTIMATES OF ANNUAL EMISSIONS FROM OFFSITE SOURCES

Pollutant	Emissions (T/Yr)	
	Electrical Generation	Solid Waste Disposal
Nitrogen oxides (NOx)	6.2	1.7
Sulfur oxides (SOx)	4.7	0.4
Particulate matter (PM)	0.5	0.1
Carbon monoxide (CO)	0.3	1.5
Volatile organic compounds (VOC)	0.06	0.1

8. DISCUSSION, CONCLUSIONS AND MITIGATION

8.1 Short-Term Impacts. Since, as noted above, the development area is considered semi-arid by Thornwaite's classification system, there is an increased potential for fugitive dust. It will be very important to employ adequate dust control measures during the construction period. Dust control

could be accomplished through frequent watering of unpaved roads and areas of exposed soil. The EPA estimates that twice daily watering can reduce fugitive dust emissions by as much as 50% [14]. The soonest possible landscaping of completed areas will also help.

8.2 Mobile Source Impacts.

As noted in Section 6, under *worst case* meteorology during peak traffic hours, both federal and state carbon monoxide standards are generally met. Only at one location within 10 meters of the Liliuokalani Avenue intersection did there appear to be a slight possibility of exceeding the state 1-hour standard under *existing* conditions. With continued projected growth, including the proposed seniors housing project, the predicted CO levels actually *declined* slightly. Such predicted declines are normally due to the attrition of older, more polluting vehicles and the increase in new, lower-emitting vehicles which offset the overall increase in traffic volume due to growth. It must also be emphasized that the analysis presented herein is based on worst case conditions which have a very low frequency of occurrence. Under the prevailing, more normal conditions, CO levels would be comparable to the values found in our onsite sampling and at the DOH's Waikiki monitoring station.

8.3 Offsite Stationary Source Impacts. The proposed project will increase electrical demand which in turn will cause more fuel to be burned and more pollutants to be emitted into the air. These impacts can be mitigated by energy efficient design of the proposed dwelling units. The state Department of Business, Economic Development and Tourism has energy conservation design guidelines to assist in this effort. As for HECO's facilities which provide the power, each must continuously demonstrate compliance with all applicable ambient air quality standards and control regulations in order to retain its operating permit.

Emissions associated with the disposal of solid waste generated by the project are very small compared to the entire county. Nevertheless, they can be reduced by encouragement of use of recyclable products.

REFERENCES

1. Clean Air Act, 42 U.S.C.A. §7409 (CAA §109), National primary and secondary ambient air quality standards.
2. Code of Federal Regulations, Title 40, Protection of Environment, Part 50, *National Primary and Secondary Ambient Air Quality Standards.*
3. State of Hawaii. Title 11, Administrative Rules, Chapter 59, *Ambient Air Quality Standards*, as amended, November 1993.
4. Library of Congress, Congressional Research Service. *A Legislative History of the Clean Air Amendments of 1970*, Volume 1, p. 411, January 1974.
5. U. S. Environmental Protection Agency. *National Ambient Air Quality Standards for Hydrocarbons: Final Rulemaking*, Federal Register, Volume 48, No. 3, p. 628, January 1983.
6. U. S. Environmental Protection Agency. Proposed Rulemaking, Federal Register, Volume 61, No. 241, pp. 65638, 65780, and 65716, 13 December 1996.
7. State of Hawaii. Title 11, Administrative Rules, Chapter 60.1, *Air Pollution Control*, November 1993.
8. Philip Rowell and Associates. *Traffic Impact Analysis Report: Genesis Senior Housing Development*, 11 May 1998.
9. U.S. Department of Commerce, National Oceanographic and Atmospheric Administration, National Environmental Satellite, Data and Information Service, National Climatic Center. *Local Climatological Data: Annual Summary with Comparative Data, Honolulu, Hawaii, 1982*
10. State of Hawaii, Department of Business, Economics and Tourism. *State of Hawaii Data Book - 1996.*
11. Thornwaite, C. W. Climates of North America According to a New Classification, *Geog. Rev. 21*: 633-655, 1931.
12. U.S. Air Force, Environmental Technical Applications Center Report No. 7461: *Stability Wind Roses, Hickam AFB, HI, 0000-2400 LST By Boundary Layer Section*, 4 September 1974.
13. U. S. Environmental Protection Agency. *Workbook of Atmospheric Dispersion Estimates*, AP-26 (Sixth Edition), 1973.
14. U.S. Environmental Protection Agency. *Compilation of Air Pollutant Emission Factors*, Fifth Edition, as updated on the EPA Technology Transfer Network (TTN), October 1996

15. Clean Air Act Amendments of 1990, P.L. 101-549, 15 November 1990.
16. U. S. Environmental Protection Agency. *MOBILE-5B (Mobile Source Emission Factor Model)*, 14 September 1996.
17. City & County of Honolulu, Department of Data Systems. Age Distribution of Registered Vehicles in the City & County of Honolulu (unpublished report), March 1992.
18. Seinfeld, John H. *Air Pollution: Physical and Chemical Fundamentals*, p. 69, McGraw-Hill Book Company, 1975
19. U.S. Environmental Protection Agency. *Guideline on Air Quality Models (Revised)*, 40 CFR 51, Appendix W, 26 June 1996.
20. U.S. Environmental Protection Agency. *User's Guide to CAL3QHC Version 2.0: A Modeling Methodology for Predicting Pollutant Concentrations Near Roadway Intersections*, EPA-450/R-92-006, November 1992.
21. Morrow, J. W. *Air Quality Impact Analysis: Hawai'i Convention Center (Revised)*, 27 June 1995.

Appendix C

Construction Noise Study

CONSTRUCTION NOISE STUDY FOR THE KAHIOLA SENIORS RENTAL PROJECT

HONOLULU, HAWAII

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MARCH 1999

CONSTRUCTION NOISE IMPACTS

Summary. Unavoidable, but temporary, noise impacts may occur during the construction period. Because noise from construction activities are predicted to be audible and relatively high at adjoining properties, the quality of the acoustic environment may be degraded to unacceptable levels during periods of construction. Mitigation measures to minimize noise and vibration during the site and foundation work at the project site are recommended, particularly where short separation distances between the high intensity noise and vibration sources and the existing residences are expected to occur. Mitigation measures to reduce construction noise to inaudible levels may not be practical in all cases. Where feasible, the use of quiet equipment, large buffer distances to heavy equipment staging areas, noise barriers, and construction curfew periods as required under the State Department of Health (DOH) noise regulations are recommended to minimize construction noise impacts.

General Construction Noise Impacts. Typical noise levels of various construction equipment at 50 foot distance are shown in FIGURE 1. Audible construction noise will be unavoidable during the planned project construction period. The total time period for construction is approximately 43 weeks, although the noisiest period (Foundation Work) is expected to not exceed 12 weeks. It is also anticipated that the actual work will be moving from one location on the project site to another during that period. Actual length of exposure to construction noise at any receptor location will probably be less than the total construction period for the entire project. Typical levels of noise during the noisier earthwork phase of construction activity are shown in FIGURE 2. Pile driving will not be required during construction of this project.

FIGURE 2 is useful for predicting exterior noise levels at short distances (within 100 FT) from the work when visual line of sight exists between the construction equipment and the receptor. Direct line–of–sight distances from the construction equipment to neighboring residential buildings will range from 10 FT to 200 FT, with corresponding average noise levels of 105 to 65 dBA (plus or minus 5 dBA). The construction noise level vs. distance curve of FIGURE 2 should be reduced by approximately 8 dBA when the work is occurring behind an obstruction or around a building corner, and should be reduced by 15 dBA when work is occurring behind a tall building and the visual line–of–sight is blocked by the intervening building. Typical levels of construction noise inside naturally ventilated and air conditioned structures are approximately 10 and 20 dB less, respectively, than the levels shown in FIGURE 2.

The living units within the neighboring Ala Wai Townhouse, Waikiki Bellevue, and Dynasty east and west of the project site are predicted to experience the highest noise levels during construction activities due to their close proximity to the construction site.

Mitigation of construction noise to inaudible levels may not be practical in all cases due to the intensity of construction noise sources (80 to 90+ dB at 50 FT distance), and due to the exterior nature of the work (pile driving, grading and earth moving, trenching, concrete pouring, hammering, etc.). However, the following noise mitigation measures should be implemented if determined to be feasible:

- The use of construction noise barriers (in the order of 8 to 16 FT high) between the project site and neighboring residences (in the order of 8 to 16 FT high) can reduce construction noise by 5 to 20 dB at low and mid–rise receptors, but are not effective at reducing noise at high–rise receptors.

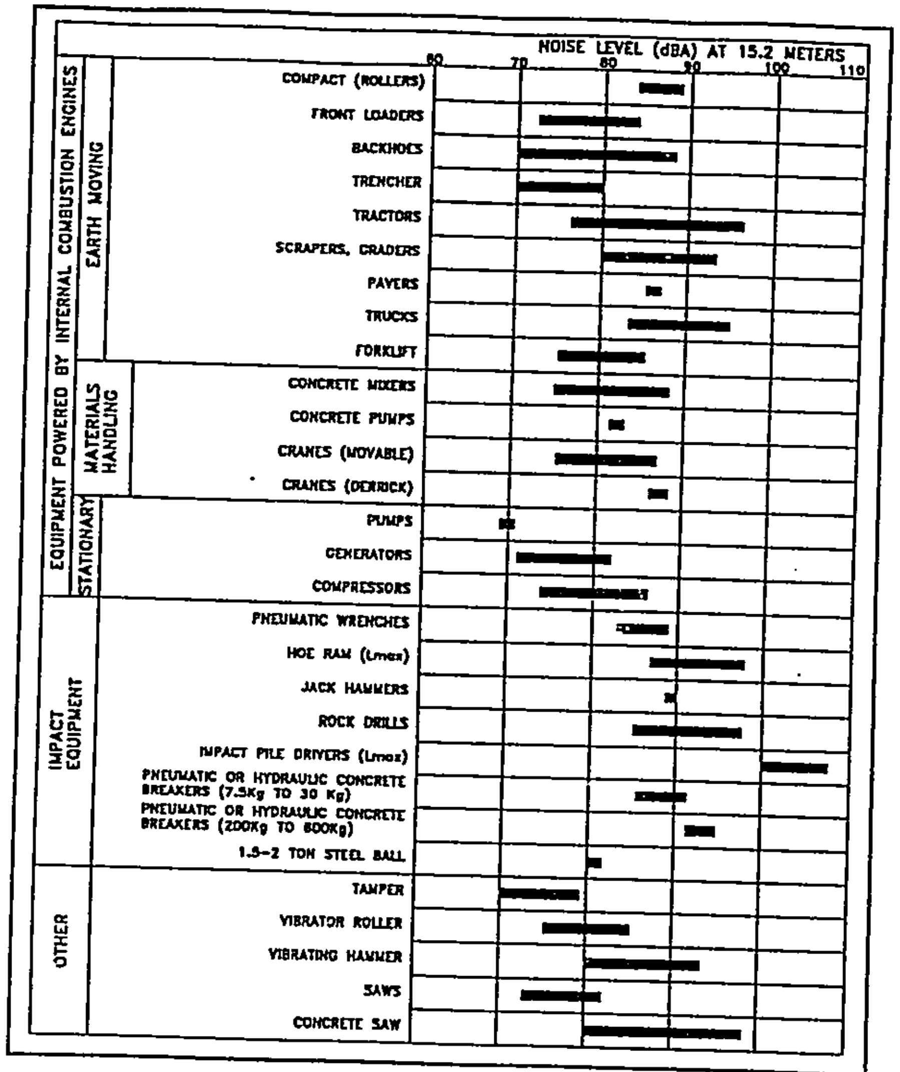
- The use of temporary closure and/or acoustical reinforcement of windows and doors of noise sensitive dwelling units may be the only effective means of reducing indoor noise levels during some periods of noisy construction activities. In addition, installation of air conditioning units may be required due to the loss of flow–through ventilation.

- The use of properly muffled construction equipment should be required on the job site. Heavy equipment and portable diesel engines and generators should be located at least 400 to 500 FT from residences, if possible.

- The incorporation of State Department of Health construction noise limits and curfew times (which are applicable on Oahu) during the construction phases of this project is another noise mitigation measure which is normally used. TABLE 1, which was derived from Reference 1, depicts the allowed hours of construction under the DOH permit procedures for construction noise. Noisy construction activities are not allowed on holidays under the DOH permit procedures.

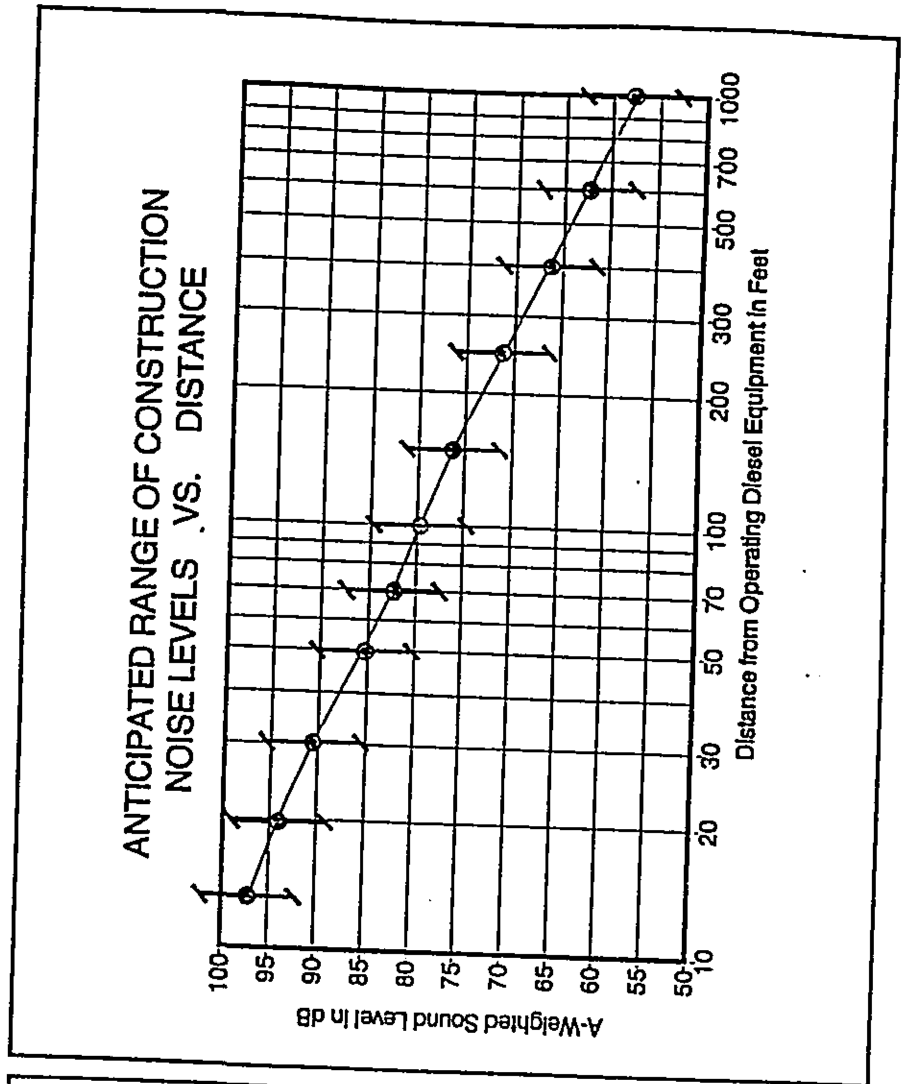
REFERENCES

(1) "Title 11, Administrative Rules, Chapter 46, Community Noise Control," Hawaii State Department of Health; September 23, 1996.



RANGES OF CONSTRUSTION EQUIPMENT NOISE LEVELS

FIGURE 1



CONSTRUCTION NOISE LEVELS VS. DISTANCE

FIGURE 2

CONSTRUCTION NOISE STUDY FOR THE KAHIOLA SENIORS RENTAL PROJECT

HONOLULU, HAWAII

Prepared for:

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JUNE 1998

CONSTRUCTION NOISE IMPACTS

Summary. Unavoidable, but temporary, noise impacts may occur during the construction period. Because noise from construction activities are predicted to be audible and relatively high at adjoining properties, the quality of the acoustic environment may be degraded to unacceptable levels during periods of construction. Mitigation measures to minimize noise and vibration during the site and foundation work at the project site are recommended, particularly where short separation distances between the high intensity noise and vibration sources and the existing residences are expected to occur. Mitigation measures to reduce construction noise to inaudible levels may not be practical in all cases. Where feasible, the use of quiet equipment, large buffer distances to heavy equipment staging areas, noise barriers, and construction curfew periods as required under the State Department of Health (DOH) noise regulations are recommended to minimize construction noise impacts.

General Construction Noise Impacts. Typical noise levels of various construction equipment at 50 foot distance are shown in FIGURE 1. Audible construction noise will be unavoidable during the planned project construction period. The total time period for construction is approximately 22 weeks, although the noisiest period (Foundation Work) is expected to not exceed 12 weeks. It is also anticipated that the actual work will be moving from one location on the project site to another during that period. Actual length of exposure to construction noise at any receptor location will probably be less than the total construction period for the entire project. Typical levels of noise during the noisier phases of construction activity (excluding pile driving activity) are shown in FIGURE 2. The impulsive noise levels of impact pile drivers are approximately 15 dB higher than the levels shown in FIGURE 2, while the intermittent noise levels of vibratory pile drivers are at the upper end of the noise level ranges depicted in the figure.

FIGURE 2 is useful for predicting exterior noise levels at short distances (within 100 FT) from the work when visual line of sight exists between the construction equipment and the receptor. Direct line-of-sight distances from the construction equipment to neighboring residential buildings will range from 10 FT to 200 FT, with corresponding average noise levels of 105 to 65 dBA (plus or minus 5 dBA). The construction noise level vs. distance curve of FIGURE 2 should be reduced by approximately 8 dBA when the work is occurring behind an obstruction or around a building corner, and should be reduced by 15 dBA when work is occurring behind a tall building and the visual line-of-sight is blocked by the intervening building. Typical levels of construction noise inside naturally ventilated and air conditioned structures are approximately 10 and 20 dB less, respectively, than the levels shown in FIGURE 2.

The living units within the neighboring Ala Wai Townhouse, Waikiki Bellevue, and Dynasty east and west of the project site are predicted to experience the highest noise levels during construction activities due to their close proximity to the construction site.

During impact pile driving operations on the project site, maximum noise levels of 104 dB at 50 FT distance, decreasing to 78 dB at 1,000 FT distance can be expected without mitigation measures. Indoors, typical levels of pile driving noise within naturally ventilated and air conditioned structures are approximately 10 and 22 dB less, respectively, than the outdoor levels listed above.

Mitigation of construction noise to inaudible levels may not be practical in all cases due to the intensity of construction noise sources (80 to 90+ dB at 50 FT distance), and due to the exterior nature of the work (pile driving, grading and earth moving, trenching, concrete pouring, hammering, etc.). However, the following noise mitigation measures should be implemented if determined to be feasible:

- The use of construction noise barriers (in the order of 8 to 16 FT high) between the project site and neighboring residences (in the order of 8 to 16 FT high) can reduce construction noise by 5 to 20 dB at low and mid-rise receptors, but are not effective at reducing noise at high-rise receptors.

- The use of temporary closure and/or acoustical reinforcement of windows and doors of noise sensitive dwelling units may be the only effective means of reducing indoor noise levels during some periods of noisy construction activities. In addition, installation of air conditioning units may be required due to the loss of flow-through ventilation.

- The use of properly muffled construction equipment should be required on the job site. Heavy equipment and portable diesel engines and generators should be located at least 400 to 500 FT from residences, if possible.

- Reduction of pile driving noise by approximately 30 dB may be possible through the use of noise abatement towers which enclose the driven pile and hammer. In addition, if soil conditions allow, the use of vibratory pile driving equipment is also recommended for minimizing noise impacts from pile driving operations. Pre-drilling may reduce the number of blows required to drive a pile to refusal, but is not expected to significantly reduce pile driving noise levels, particularly at refusal. The use of bored-and-cast-in-situ piles can reduce the high level impact noise associated with driven piles by 25 to 30 dB. However, the implementation of these mitigation measures may not be feasible for the specific conditions of the project.

- The incorporation of State Department of Health construction noise limits and curfew times (which are applicable on Oahu) during the construction phases of this project is another noise mitigation measure which is normally used. TABLE 1, which was derived from Reference 1, depicts the allowed hours of construction under the DOH permit procedures for construction noise. Noisy construction activities are not allowed on holidays under the DOH permit procedures.

<u>Vibration from Pile Driving</u>. Pile driving will probably be necessary to implant sheet and concrete piles into the ground over the project site. Induced ground vibrations from these pile driving operations have the potential to cause architectural and structural damage to structures.

Ground vibrations generated during pile driving operations are generally described in terms of peak particle (or ground) velocity in units of inches/second. The human being is very sensitive to ground vibrations, which are perceptible at relatively low particle velocities of 0.01 to 0.04 inches/second. Damage to structures, however, occur at even higher levels of vibration as indicated in TABLE 2. The most commonly used damage criteria for structures is the 2.0 inches/second limit derived from work by the U.S. Bureau of Mines. A more conservative limit of 0.2 inches/second is also used, and is suggested for planning purposes on this project because of the repetitive nature of pile driving operations which can increase risks of damage due to fatiguing, and the residential nature of the neighboring buildings adjacent to the project site.

Based on measured vibration levels during pile driving operations under various soil conditions and at various distances, estimates of ground vibration levels vs. distance from the pile driver have been made for various soil conditions and for various energy ratings of the pile drivers. FIGURE 3, which was extracted from Reference 2, may be used to predict vibration levels for the soil conditions indicated. When coral layers must be penetrated, vibration levels can be expected to be higher than those shown in FIGURE 3, particularly if the adjacent structures are supported by the common coral layer. From FIGURE 3, and for wet sand soil conditions, the 0.2

inches/second vibration damage criteria will be exceeded at a scaled energy distance factor of approximately 0.7. The scaled energy distance factor is equal to the square root of the energy (in foot–pounds) per blow of the hammer divided by the distance (in feet) between the pile tip and the monitoring location. For a 30,000 foot–pound pile driver, a scaled energy distance of 0.7 equates to a separation distance of 247 FT. Under clay soil conditions, and using the prediction procedures contained in FIGURE 3, a shorter separation distance of 115 FT is required to not exceed the 0.2 inches/second criteria when using a 30,000 foot–pound pile driver. It should be noted that 0.2 inches/second vibration levels were measured from a 22,400 foot–pound pile driver at even shorter separation distances of approximately 30 FT in sandy, layered soil (Reference 3). The measurement data reported in Reference 3 are significantly lower than the vibration levels predicted by the methodology of Reference 2.

As indicated above, predictions of peak ground vibration levels vs. scaled energy distance factor from the driven pile are not precise, with initial uncertainty factor for a given location in the order of 10:1. For this reason, it is standard practice to employ seismograph monitoring of ground vibrations during pile driving operations with a 3–axis geophone or accelerometer. If pile drivers of approximately 30,000 foot–pounds or larger ratings are anticipated to be used on the job site, the initial vibration predictions indicate that there is some risk of exceeding the 0.2 inches/second vibration damage criteria at 100 to 250 FT separation distances, and monitoring during pile driving operations is warranted. Monitoring alone, however, may not be a practical mitigation measure unless there are alternative pile driving methods or foundation plans which can be employed if the damage criteria is exceeded. For these reasons, the following preventative measures are recommended for implementation during the planning and design phases of the project:

- In addition to the normal planning and design concerns regarding potential damage due to settling and heaving during construction, consideration should also be given to risks of damage due to vibration from pile driving: A damage criteria of 0.2 inches/second should be initially used in conjunction with the vibration prediction method of Reference 2 to identify the potential damage risk distances to the driven piles.

- If predicted vibration levels from pile driving exceed 0.2 inches/second at nearby buildings, and predicted levels cannot be reduced by sizing of the pile driver or through the use of alternate types of piles (bored or non–displacement types), test piles should be driven and their vibrations monitored and recorded. The monitoring of the test piles should be designed to

measure the expected peak, 3–axis vibration levels at the nearest buildings. The results of the monitoring, in addition to the specific types of adjacent structures, should be used to define the empirical distance from the driven pile to the damage risk location, and to reevaluate the risks of structural damage to the adjacent structures during actual construction.

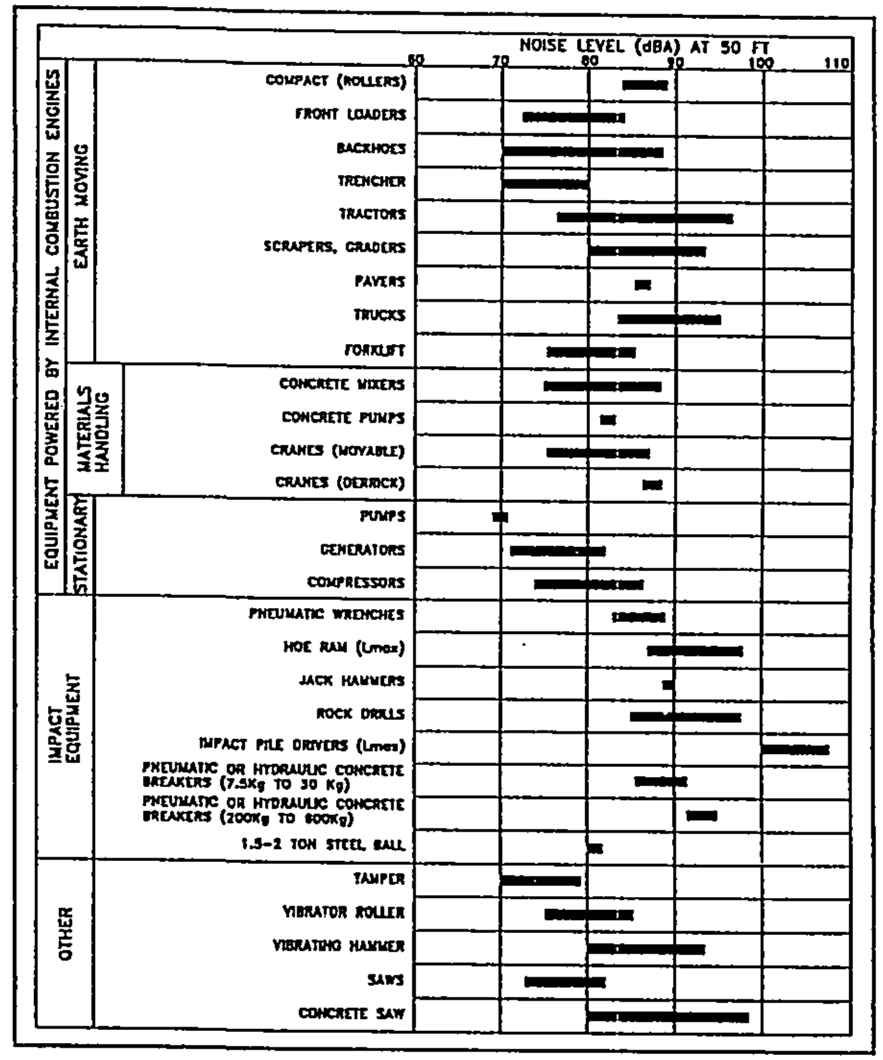
- If predicted vibration levels from pile driving exceed 2.0 inches/second at the adjacent buildings, the use of alternate types of piles should be considered for implementation during the design phase.

REFERENCES

(1) "Title 11, Administrative Rules, Chapter 46, Community Noise Control;" Hawaii State Department of Health; September 23, 1996.

(2) Wiss, John F., Janney, Elstner and Assoc.; "Damage of Pile Driving Vibration;" Highway Research Record, Number 155.

(3) Gutowski, T.G.; Wittig, L.E.; and Dym, C.L.; "Some Aspects of the Ground Vibration Problem;" Noise Control Engineering; May–June 1978.



RANGES OF CONSTRUCTION EQUIPMENT NOISE LEVELS

FIGURE 1

TABLE 1

AVAILABLE WORK HOURS UNDER DOH PERMIT PROCEDURES FOR CONSTRUCTION NOISE

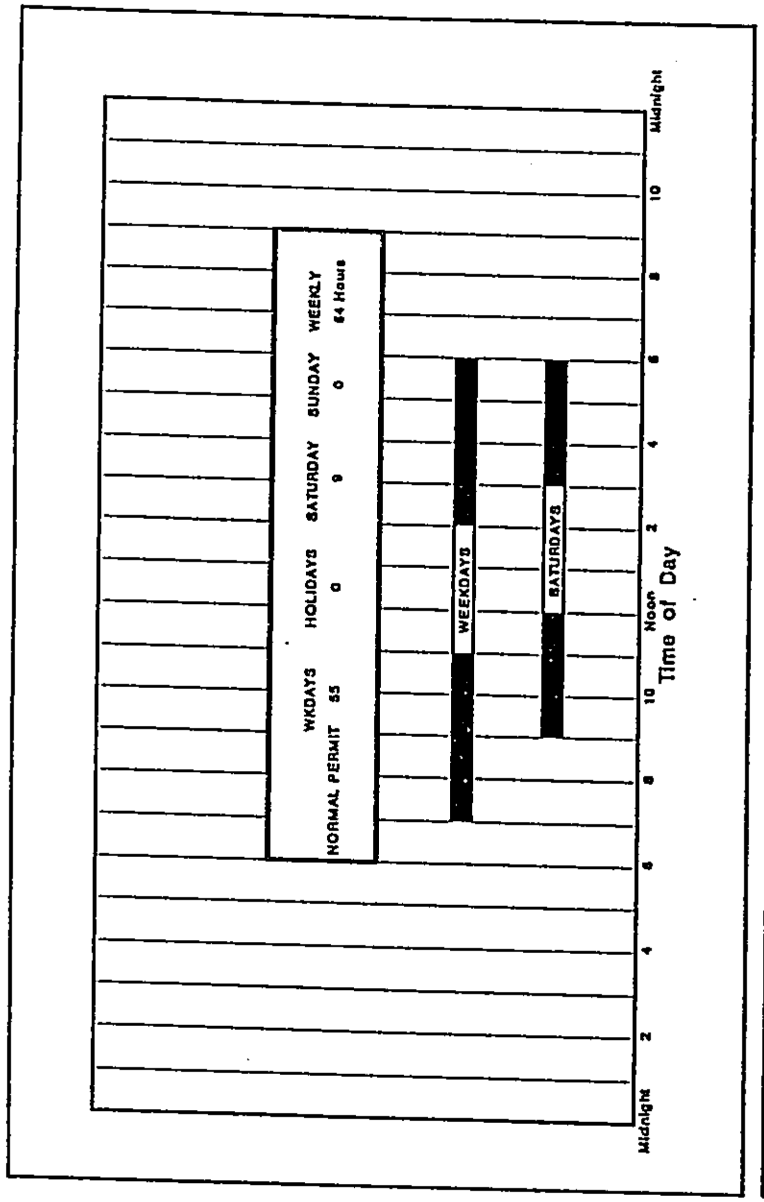
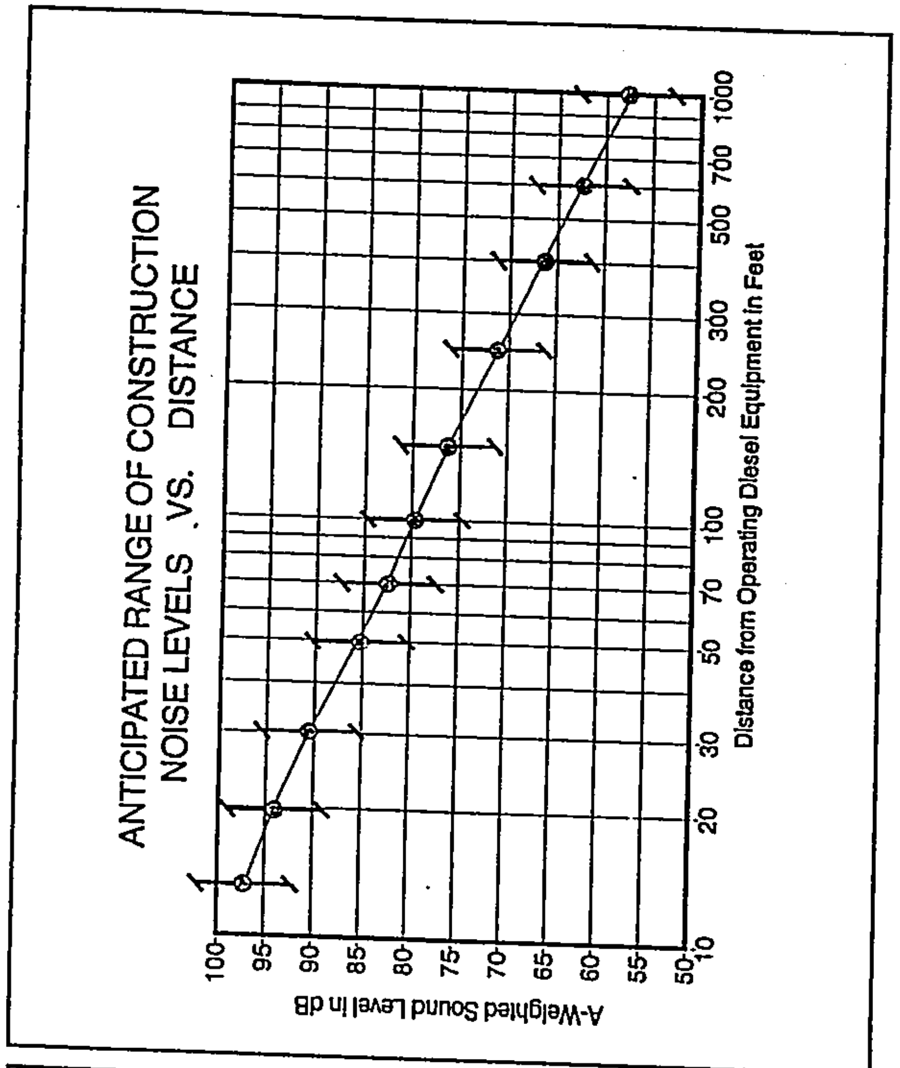


TABLE 2

SUMMARY OF BUILDING DAMAGE CRITERIA

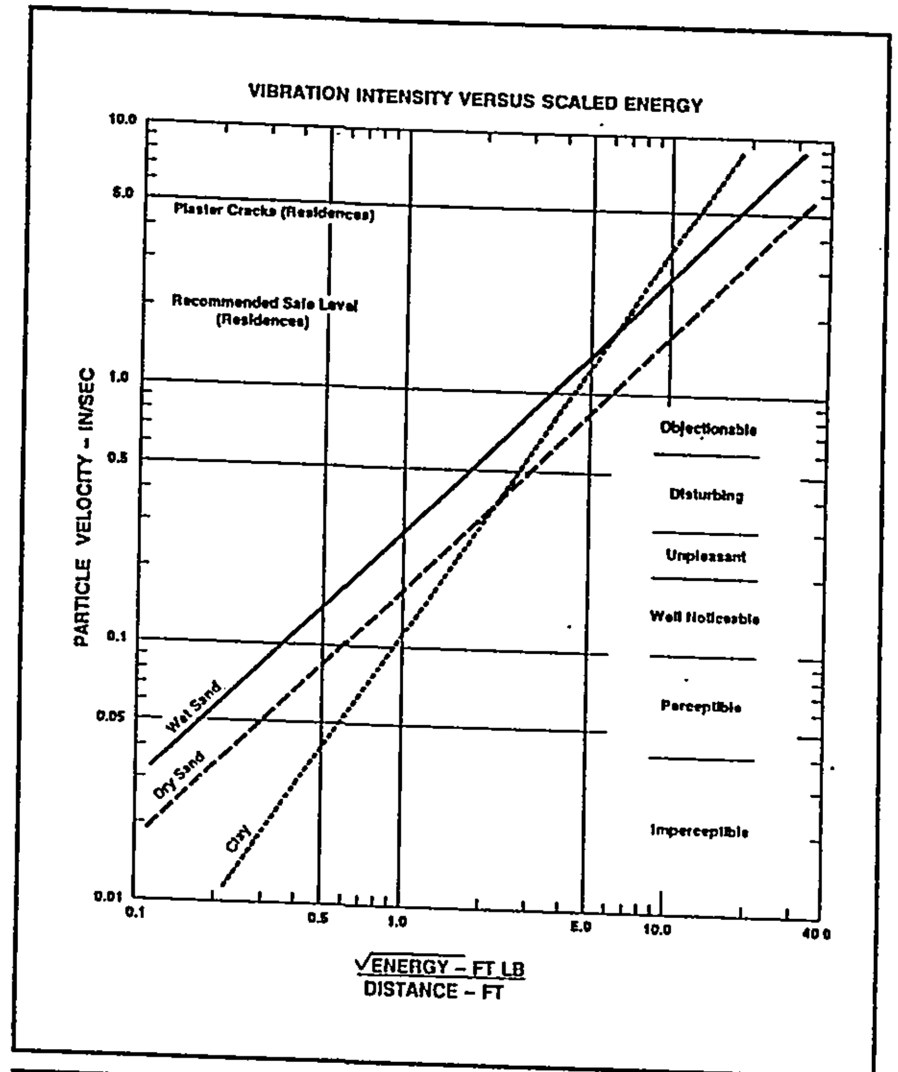
PEAK GROUND VELOCITY (mm/sec)	PEAK GROUND VELOCITY (in/sec)	COMMENT
193.04	7.6	Major damage to buildings (mean of data).
137.72	5.4	Minor damage to buildings (mean of data).
101.16	4.0	'Engineer structures' safe from damage.
50.8	2.0	Safe from damage limit (probability of damage <5%).
		No structural damage.
33.02	1.3	Threshold of risk of 'architectural' damage for houses.
25.4	1.0	No data showing damage to structures for vibration <1 in./sec.
15.24	0.6	No risk of 'architectural' damage to normal buildings.
10.16	0.4	Threshold of damage in older homes.
5.08	0.2	Statistically significant percentage of structures may experience minor damage (including earthquake, nuclear event, and blast data for old and new structures).
		No 'architectural' damage.
3.81	0.5 to 0.15	Upper limits for ruins and ancient monuments.
1.0	0.04	Vertical vibration clearly perceptible to humans.
0.32	0.01	Vertical vibration just perceptible to humans.

Source: 'State-of-the-Art Review: Prediction and Control of Groundborne Noise and Vibration from Rail Transit Trains'; U.S. Department of Transportation; December 1983.



CONSTRUCTION NOISE LEVELS VS. DISTANCE

FIGURE 2



MINIMUM VIBRATION INTENSITIES EXPECTED FROM PILE DRIVING

FIGURE 3

Appendix D

Traffic Impact Analysis

TRAFFIC IMPACT ANALYSIS REPORT

GENESIS SENIOR HOUSING DEVELOPMENT

IN WAIKIKI, HONOLULU, OAHU, HAWAI'I

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May 12, 1998
Revised March 10, 1999

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Executive Summary

Phillip Rowell and Associates has been retained to conduct a Traffic Impact Analysis Report (TIAR) for a proposed senior housing projects to be located on the makai side of Ala Wai Boulevard in Waikiki. The proposed development is to consist of 90 apartment type units. Access to and egress from the site will be via a driveway to and from Ala Wai Boulevard.

The proposed project will generate 6 trips during the morning peak hour and 10 trips during the afternoon peak hour. A summary of the trips generated on a typical day follows:

AM Peak Hour			PM Peak Hour		
In	Out	Total	In	Out	Total
3	3	6	5	5	10

The signalized intersections Ala Wai Boulevard at Kanekapolei Street and Ala Wai Boulevard at Liliuokalani Avenue were analyzed and the results are shown in Table ES-1. The change in the volume-to-capacity ratio was less than 0.01. Therefore, the impacts are insignificant.

Table ES-1 Results of Level-of-Service Analysis for 2003 Conditions[1]

Intersection and Movement	Cumulative			Cumulative Plus Project			Changes	
	V/C[2]	Delay[3]	LOS[4]	V/C	Delay	LOS	V/C	Delay
AM Peak Hour								
Ala Wai Bl. at Kanekapolei St.	0.549	5.3	B	0.550	5.7	B	0.001	0.4
Westbound Left & Thru	0.663	4.8	A	0.663	5.3	B	0.000	0.5
Northbound Left	0.202	13.5	B	0.202	13.5	B	0.000	0.0
Ala Wai Bl. at Kaiulani Ave.	(5)	17.1	C	(5)	17.5	C	0.000	0.4
Northbound Left	(5)	322.1	F	(5)	390.6	F	0.000	68.5
Ala Wai Bl. at Liliuokalani Ave.	0.518	5.6	B	0.519	5.6	B	0.001	0.0
Westbound thru	0.579	4.6	A	0.580	4.6	A	0.001	0.0
Northbound Left	0.359	14.2	C	0.362	14.2	B	0.003	0.0
Ala Wai Bl. at Project Driveway				(5)	0.3	A		
Northbound Left				(5)	209.5	F		
Westbound Thru				(5)	2.1	A		
PM Peak Hour								
Ala Wai Bl. at Kanekapolei St.	0.455	5.1	B	0.456	5.1	B	0.001	0.0
Westbound Left & Thru	0.541	4.4	A	0.542	4.4	A	0.001	0.0
Northbound Left	0.233	13.6	C	0.233	13.6	B	0.000	0.0
Ala Wai Bl. at Kaiulani Ave.	(5)	4.2	A	(5)	4.3	A	0.000	0.1
Northbound Left	(5)	75.6	F	(5)	78.0	F	0.000	2.4
Ala Wai Bl. at Liliuokalani Ave.	0.431	5.7	B	0.432	5.7	B	0.001	0.0
Westbound Thru	0.418	3.9	A	0.419	3.9	A	0.001	0.0
Northbound Left	0.465	14.8	C	0.466	14.8	B	0.001	0.0
Ala Wai Bl. at Project Driveway	DOES NOT EXIST			(5)	0.2	A		
Northbound Left				(5)	89.6	F		
Westbound Thru				(5)	2.1	A		

NOTES:
1. Peak hour conditions analyzed are "worst-case" conditions, which is the sum of the peak hour of the adjacent street plus the peak hour of the generator.
2. V/C denotes ratio of volume to capacity. See Appendix C for calculations.
3. Delay is in seconds per vehicle.
4. LOS denotes Level-of-Service calculated using the operations method described in Highway Capacity Manual. LOS is based on delay. See Tables 1 and 2 for definitions.
5. Volume to capacity ratios are not calculated for unsignalized intersections.

The intersections of Ala Wai Boulevard at Kaiulani Avenue and the project driveway are expected to operate at acceptable levels-of-service. However, long delays are expected for vehicles turning left onto Ala Wai Boulevard during the peak hours.

In conclusion, the traffic impact analysis determined that traffic generated by the project will have minimal traffic impacts on the surrounding roadway system, specifically on Ala Wai Boulevard.

1. INTRODUCTION

Phillip Rowell and Associates has been retained by Wil Chee Planning, Inc. to prepare a Traffic Impact Analysis Report (TIAR) for a proposed senior housing project in the Waikiki area of Honolulu, Hawai'i.

The following report has been prepared to describe the traffic characteristics of the project and likely impacts to the adjacent roadway network. This introductory chapter discusses the location of the project, the proposed development, and the study methodology.

Project Location and Description

The proposed project is to be located along the makai side of Ala Wai Boulevard midway between Kaiulani Avenue and Liliuokalani Avenue. This location is shown on Figure 1. The site is currently vacant.

The proposed project will consist of 90 apartment type units for senior citizens. Access and egress will be provided by a driveway along Ala Wai Boulevard. There will be 26 on-site parking stalls.

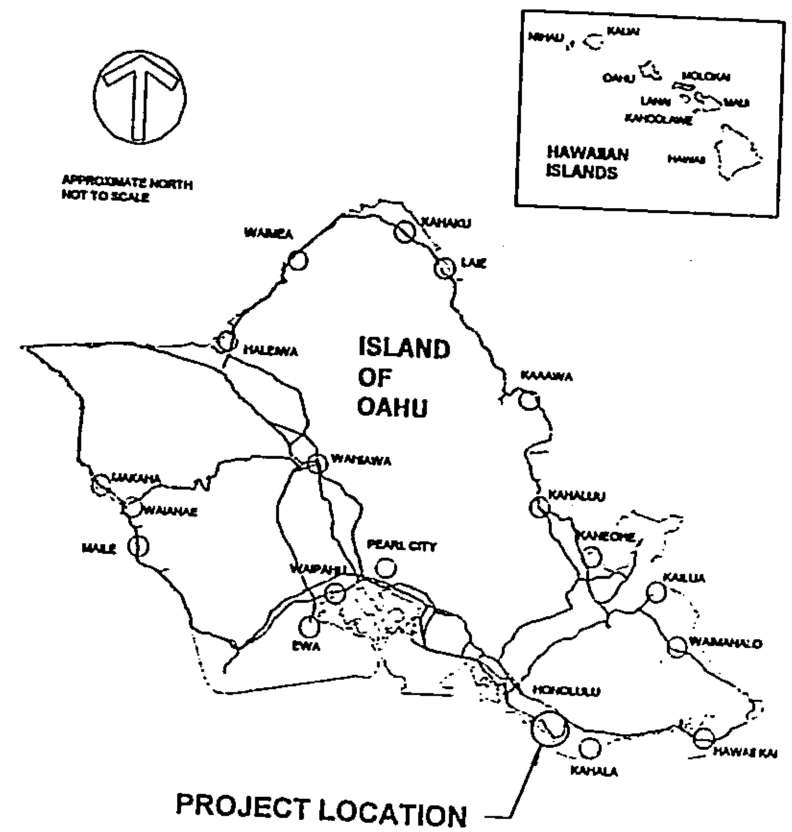

Figure 1

PROJECT LOCATION MAP

Study Methodology and Order of Presentation

In order to conduct this traffic study, a number of tasks were performed. These tasks are discussed in the following paragraphs.

1. Analysis of Existing Traffic Conditions

Existing traffic volumes at the study intersections were determined from traffic counts performed in April and May 1998 for this study. Intersection configurations and traffic signal information were also collected in the field at the time of the traffic counts.

Using the data collected, existing traffic operating conditions in the vicinity of the project were determined. The methodology described in the 1994 *Highway Capacity Manual* (HCM) was used to determine the level-of-service (LoS) at the study intersections.

Existing traffic conditions, the LoS concept and the results of the LoS analysis of existing conditions is presented in Chapter 2.

3. Determination of Cumulative Traffic Projections

The year 2003 was used as the design year. This does not necessarily represent the project completion date. It represents occupancy for purposes of conducting the impact analysis. Cumulative traffic conditions are defined as future traffic conditions without the proposed project. A description of the process used to estimate 2003 cumulative traffic volumes and the resulting cumulative traffic projections are presented in Chapter 3.

4. Analysis of Project-Related Traffic Impacts

The next step in the traffic analysis was to estimate the peak-hour traffic that would be generated by the proposed development. This was done using standard trip generation rates published by the Institute of Transportation Engineers.

These trips were distributed based on the available approach and departure routes. The project-related traffic was then superimposed on 2003 cumulative traffic volumes at the subject intersections. The HCM methodology was used again to conduct a LoS analysis for cumulative plus project conditions. The results of this analysis was compared to 2003 cumulative conditions to determine the impacts of this project.

The 2003 cumulative plus project traffic projections are presented in Chapter 4. The analysis of the project-related impacts and the conclusions of the analyses are presented in Chapter 5.

2. ANALYSIS OF EXISTING CONDITIONS

This chapter presents the existing traffic conditions and volumes on the roadways adjacent to the proposed project. The level-of-service concept and the results of the level-of-service analysis for existing conditions are also presented. The purpose of this analysis is to establish the base conditions for the determination of the impacts of the project which are described in a subsequent chapter.

Description of Existing Streets and Intersection Controls

The intersections analyzed and existing lane configurations are shown on Figure 2. Photographs of the roadway in the area are presented as Appendix A.

The intersections of Ala Wai Boulevard at Liliuokalani Avenue and Ala Wai Boulevard at Kanekapolei Street are controlled by traffic signals. The signals are two phased as shown in Figure 2.

The intersection of Ala Wai Boulevard at Kaiulani Avenue is controlled by a STOP sign on the Kaiulani Avenue approach.

Liliuokalani Avenue is a one-lane, one-way roadway in the mauka direction. Unrestricted parking is allowed along both sides between Kuhio Avenue and Mountain View Drive. The section between Mountain View Drive and Ala Wai Boulevard has been widened to provide two left-turn lanes from Liliuokalani Avenue to Ala Wai Boulevard. No parking is allowed along this section.

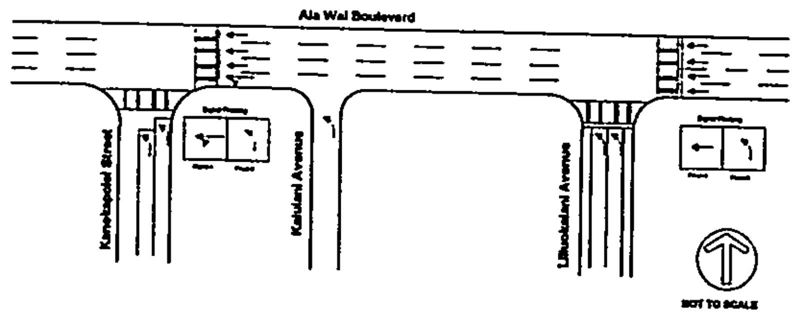

Figure 2
EXISTING ROADWAY NETWORK

Ala Wai Boulevard is a major one-way arterial in the Ewa direction. During off-peak periods, Ala Wai Boulevard is three lanes wide and parking is allowed along the mauka side. From 6:30 AM to 8:30 AM and from 3:30 PM to 5:30 PM, parking is prohibited to provide a fourth travel lane.

Kanekapolei Street is a two-way, north-south roadway. The section of roadway immediately south of Ala Wai Boulevard has a passenger loading zone on each side. These loading zones are used for pick up and drop off of tourist from the adjacent hotels.

Kaiulani Avenue is a one-lane, one way street in the Mauka direction.

Existing Peak Hour Traffic Volumes

Morning and afternoon peak hour traffic volumes were obtained for the intersection of Ala Wai Boulevard at Kanekapolei Street and Ala Wai Boulevard at Kaiulani Avenue from counts performed in April and May 1998. These counts were compared to traffic counts performed in April 1996 for the intersection of Ala Wai Boulevard at Liliuokalani Avenue. The 1998 counts were slightly higher than the 1996 counts. The 1996 counts were increased by approximately 2% to correspond to the 1998. The peak hour traffic volumes at the study intersections and along the streets in the study area is shown in Figure 3. It was also determined from the counts that during the morning peak hour, 8.5% of the vehicles along Kanekapolei Street are heavy vehicles. During the other peak periods along Kanekapolei Street and Ala Wai Boulevard, only 3% of the vehicles are heavy vehicles.

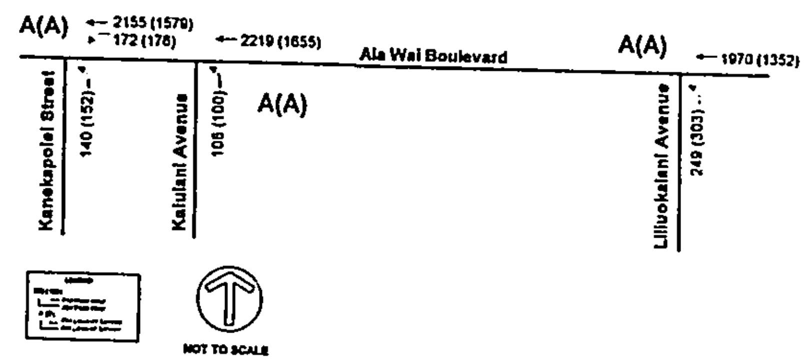

Figure 3
EXISTING PEAK HOUR TRAFFIC VOLUMES

Level-of-Service Concept

Signalized Intersections

The operations method described in the 1997 *Highway Capacity Manual* (HCM) was used to analyze the operating efficiency of the signalized intersections adjacent to the study site. This method involves the calculation of a volume-to-capacity (V/C) ratio which is related to a level-of-service. A maximum intersection capacity based on the number of phases was used for the V/C calculations.

"Level-of-Service" is a term which denotes any of an infinite number of combinations of traffic operating conditions that may occur on a given lane or roadway when it is subjected to various traffic volumes. Level-of-service (LoS) is a qualitative measure of the effect of a number of factors which include space, speed, travel time, traffic interruptions, freedom to maneuver, safety, driving comfort and convenience.

There are six levels-of-service, "A" through "F", which relate to the driving conditions from best to worst, respectively. The characteristics of traffic operations for each level-of-service are summarized in Table 1. In general, LoS "A" represents free-flow conditions with no congestion. LoS "F", on the other hand, represents severe congestion with stop-and-go conditions. Level-of-service "D" is typically considered acceptable for peak hour conditions in urban areas.

Table 1 Level-of-Service Definitions for Signalized Intersections[1]

Level of Service	Interpretation	Volume-to-Capacity Ratio[2]	Stopped Delay (Seconds)
A	Uncongested operations; all vehicles clear in a single cycle.	0.000-0.500	≤10.0
B		0.501-0.700	>10 and ≥20
C	Light congestion; occasional backups on critical approaches	0.701-0.800	>20 and ≥35
D	Congestion on critical approaches but intersection functional. Vehicles must wait through more than one cycle during short periods. No long standing lines formed.	0.801-0.900	>35 and ≥55
E	Severe congestion with some standing lines on critical approaches. Blockage of intersection may occur if signal does not provide protected turning movements.	0.901-1.000	>55 and ≥80
F	Total breakdown with stop-and-go operation	>1.001	>80.0

Notes:
(1) Source: *Highway Capacity Manual*, 1997, p. 9-7.
(2) This is the ratio of the calculated critical volume to Level-of-Service E Capacity

Corresponding to each level-of-service shown in the table is a volume/capacity ratio. This is the ratio of either existing or projected traffic volumes to the capacity of the intersection. Capacity is defined as the maximum number of vehicles that can be accommodated by the roadway during a specified period of time. The capacity of a particular roadway is dependent upon its physical characteristics such as the number of lanes, the operational characteristics of the roadway (one-way, two-way, turn prohibitions, bus stops, etc.), the type of traffic using the roadway (trucks, buses, etc.) and turning movements.

Unsignalized Intersections

Like signalized intersections, the operating conditions of intersections controlled by stop signs can be classified by a level-of-service from "A" to "F". However, the method for determining level-of-service for unsignalized intersections is based on the use of gaps in traffic on the major street by vehicles crossing or turning through that stream. Specifically, the capacity of the controlled legs of an intersection is based on two factors: 1) the distribution of gaps in the major street traffic stream, and 2) driver judgement in selecting gaps through which to execute a desired maneuver. The criteria for level-of-service at an unsignalized intersection is, therefore, based on delay of each turning movement. Table 2 summarizes the definitions for level-of-service and the corresponding delay. A subsequent calculation to determine an overall LoS was made, and these results are presented in tables to summarize traffic conditions using parameters similar to those used for signalized intersections.

Table 2 Level-of-Service Definitions for Unsignalized Intersections[1]

Level-of-Service	Expected Delay to Minor Street Traffic	Delay (Seconds)
A	Little or no delay	≤ 10
B	Short traffic delays	> 10 and ≤ 15
C	Average traffic delays	> 15 and ≤ 25
D	Long traffic delays	> 25 and ≤ 35
E	Very long traffic delays	> 35 and ≤ 50
F	See note (2) below	> 50

Notes:
(1) Source: *Highway Capacity Manual*, 1997, p. 10-25.
(2) When demand volume exceeds the capacity of the lane, extreme delays will be encountered with queuing which may cause severe congestion affecting other traffic movements in the intersection. This condition usually warrants improvement of the intersection.

Existing Level-of-Service Analysis

The signalized intersections were analyzed using the signalized level-of-service (LoS) operations method. Results of these analyses are shown in Table 3. The calculated levels-of-service were confirmed by field observations.

The signalized intersections operate at Level-of-Service A/B during the morning and afternoon peak hours, which is acceptable. The left turn movement from Kaiulani Avenue was calculated to have a long delay. This long delay was confirmed during the traffic counts. The delay for the traffic turning left were long enough to cause the intersection level-of-service to be "D."

Table 3 Results of Level-of-Service Analysis for Existing Conditions

Intersection and Movement	PM Peak Hour			PM Peak Hour		
	V/C[1]	Delay	LOS[2]	V/C	Delay	LOS
Ala Wai Boulevard at Kanekapolei Street	0.504	5.3	A	0.326	4.8	A
Westbound Thru & Left	0.642	4.9	A	0.471	4.1	A
Northbound Left	0.192	13.5	B	0.208	13.5	B
Ala Wai Boulevard at Kaiulani Avenue	(3)	9.1	A	(3)	1.9	B
Northbound Left	(3)	106.0	F	(3)	32.8	D
Ala Wai Boulevard at Liliuokalani Avenue	0.475	5.4	A	0.376	6.5	A
Westbound Thru	0.527	4.3	A	0.361	3.7	A
Northbound Left	0.341	14.1	B	0.415	14.5	B

NOTES
(1) V/C denotes ratio of volume to capacity. See Appendix B for calculations.
(2) LOS denotes Level-of-Service calculated using the operations method described in *Highway Capacity Manual*. LOS is based on delay.
(3) Volume to capacity ratios are not calculated for unsignalized intersections.

3. PROJECTED CUMULATIVE TRAFFIC CONDITIONS

The purpose of this chapter is to discuss the assumptions and data used to estimate 1999 cumulative project traffic conditions. Cumulative traffic conditions are defined as the traffic conditions resulting from background growth and related projects.

Future traffic growth consist of two components. The first is ambient background growth that is a result of regional growth and cannot be attributed to a specific project. This growth rate is typically estimated by analyzing historical counts taken over a period of several years. The second component is estimated traffic that will be generated by other development projects in the vicinity of the proposed project.

Background Traffic Growth Rate

The background growth rate of traffic in the study area was estimated from traffic projections provided in the Waikiki Regional Traffic Impact Study prepared by Kaku Associates in 1995. This study provided as estimate of future trip ends produced within Waikiki for the year 2005. The study estimated that AM peak hour trip ends would increase 11% from 1995 to 2005 and the PM peak hour trip ends would increase 23% for the same period. These increases would represent an average of 1.1% and 2.3% per year increase for the study period. Therefore, existing (1998) AM peak hour traffic volumes were expanded by 1.1% per year for five years to estimate 2003 background growth between 1996 and 2003. PM peak hour traffic volumes were expanded by 2.3% per year for five years for the same period.

Related Project Generated Traffic

The second component in estimating cumulative traffic volumes is the traffic generated by other proposed projects in the vicinity. Related projects are defined as those projects that are under construction or have been approved for construction by the City and would significantly impact traffic in the study area.

It was determined that the expansion factors used to estimate background traffic growth from 1996 to 2003 would include any related projects in the vicinity. It was also determined that the H&M Apartment building project on Liliuokalani Avenue would affect the intersections under study. Traffic projections for this project were obtained from the traffic study[1] prepared for that project and incorporated into the cumulative traffic projections.

2003 Cumulative Traffic Volumes

Estimated 2003 cumulative traffic volumes are calculated by applying the background growth rate to existing traffic volumes and adding trips generated by related projects. The resulting 2003 cumulative peak hour

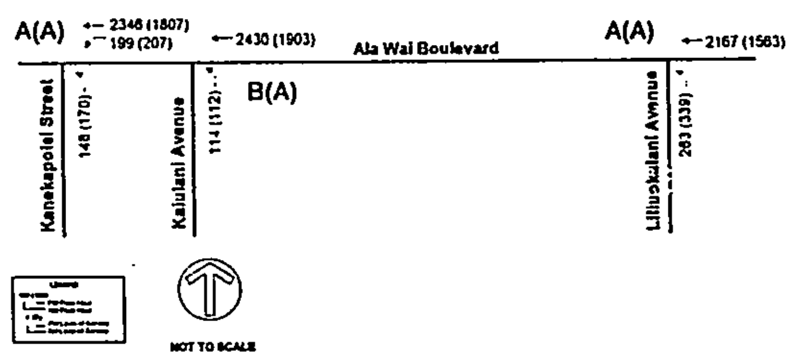

Figure 4
2003 CUMULATIVE PEAK HOUR TRAFFIC VOLUMES WITHOUT PROJECT

traffic projections are shown in Figure 4.

[1] Philip Rowell and Associates, *Traffic Impact Analysis Report for H&M Apartments*, 1996

4. PROJECT-RELATED TRAFFIC CONDITIONS

This chapter discusses the methodology used to identify the traffic-related impacts of the proposed project. Generally, the process involves the determination of weekday and peak-hour trips that would be generated by the proposed project, distribution and assignment of these trips on the approach and departure routes, and finally, determination of the levels-of-service at affected intersections subsequent to implementation of the project.

Trip Generation

Future traffic volumes generated by the project were determined using trip generation factors contained in *Trip Generation*, Fifth Edition, prepared by the Institute of Transportation Engineers. The trip generation calculations were based on rates for Senior Attached Housing (Land Use Code 253). The trip generation analysis and the resulting daily and peak hour volumes are summarized in Table 4.

Trip Distribution and Assignment

The project-related trips were distributed along the anticipated approach routes to the project site. This information was obtained from previously conducted traffic studies in the area, which have been generally accepted by the reviewing agencies.

Table 4 Trip Generation Calculations

Number of Units		90	Units
Period			
Weekday Total	Not Available		
AM Peak Hour of Generator	0.06	6	
% Inbound	50		3
% Outbound	50		3
PM Peak Hour of Generator	0.11	10	
% Inbound	53		5
% Outbound	47		5

Notes:
(1) Source: Institute of Transportation Engineers, *Trip Generation*, Fifth Edition, 1991. Trips rates used are for Senior Housing Attached, Land Use Code 253.

Using the trip generation and trip distribution previously discussed, project-related traffic was assigned to the various traffic movements at the intersections studied. The trip distribution and assignments are shown in Figure 5.

2003 Cumulative Plus Project Peak Hour Traffic Volumes

Future traffic volumes with the project were determined by superimposing the project-generated traffic on the 2003 cumulative traffic volumes presented in Chapter 3. The resulting peak hour traffic volumes for 2003 cumulative plus project conditions on Figure 6. The peak hour volumes shown is the sum of future cumulative peak hour traffic plus peak hour traffic generated by the project. This calculation assumes that the peak hour of the project coincides with the background peak hour. The resulting peak hour is therefore an overestimate since the ITE trip generation data indicates that the trip generation rates during the street peak hour is less that the rates for the project peak hour.

The traffic projection worksheets are presented as Appendix B.

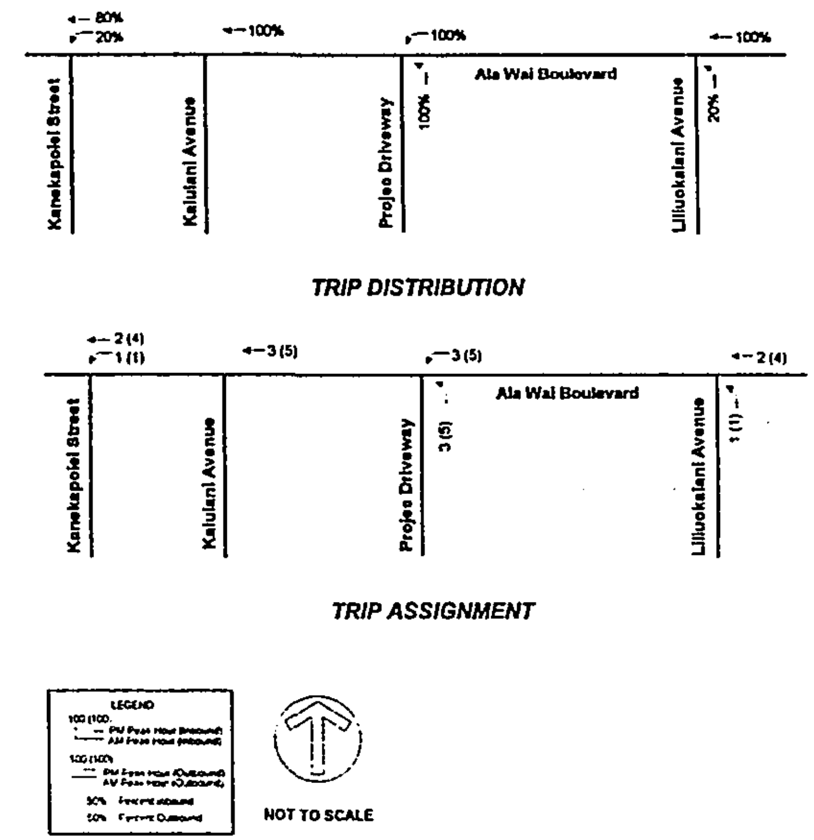

Figure 5
TRIP DISTRIBUTION AND ASSIGNMENT

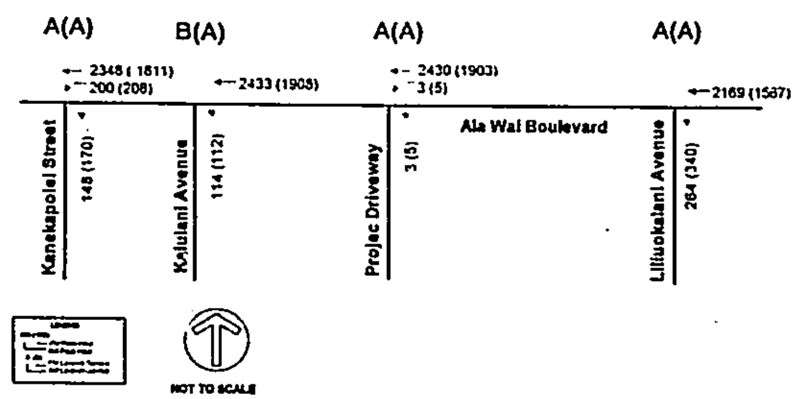

Figure 6
2003 CUMULATIVE PEAK HOUR TRAFFIC VOLUMES WITH PROJECT

5. CONCLUSIONS AND RECOMMENDATIONS

The purpose of this chapter is to present the results of the level-of-service analysis, which identifies the project-related impacts. In addition, any mitigation measures necessary and feasible are identified and other access, egress and circulation issues are discussed.

Definition of Significant Impacts

Criteria for determining if a project has a significant traffic impact for which mitigation measures must be investigated have been established based on traffic impact study guidelines used in other traffic studies. Generally, the criteria are as follows: if the level-of-service (LOS) without the project is E or F and the volume/capacity (V/C) ratio changes less than 0.020, the project's traffic impacts are considered insignificant. However, if the V/C ratio change is greater than 0.020, then mitigation measures which will reduce the V/C ratio change to less than 0.020 must be identified. If the LOS with the project is D or better, then no mitigation measures need to be identified.

The above criteria has been used in the traffic impact studies for the Hawaii Convention Center and the Waikiki Regional Traffic Impact Study prepared for the City and County of Honolulu Department of Transportation Service and therefore has been used for this study.

Project Related Traffic Impacts and Mitigation Measures

The level-of-service analysis for 2003 are summarized in Table 5. During both peak periods, the signalized intersections are expected to operate at LOS B. The level-of-service is the same for without project and with project conditions. In conclusion, the project has no significant impact of the level-of-service of the intersections of Ala Wai Boulevard at Kanekapolei Street and Ala Wai Boulevard at Liliuokalani Avenue.

Table 5 Results of Level-of-Service Analysis for 2003 Conditions[1]

Intersection and Movement	Cumulative			Cumulative Plus Project			Changes	
	V/C[2]	Delay[3]	LOS[4]	V/C	Delay	LOS	V/C	Delay
AM Peak Hour								
Ala Wai Bl. at Kanakapolei St.	0.549	5.3	B	0.550	6.7	B	0.001	0.4
Westbound Left & Thru	0.683	4.8	A	0.683	5.3	B	0.000	0.5
Northbound Left	0.202	13.5	B	0.202	13.5	B	0.000	0.0
Ala Wai Bl. at Kaiulani Ave	(5)	17.1	C	(5)	17.5	C	0.000	0.4
Northbound Left	(5)	322.1	F	(5)	390.6	F	0.000	68.5
Ala Wai Bl. at Liliuokalani Ave.	0.518	5.6	B	0.519	5.6	B	0.001	0.0
Westbound thru	0.579	4.6	A	0.580	4.6	A	0.001	0.0
Northbound Left	0.359	14.2	C	0.362	14.2	B	0.003	0.0
Ala Wai Bl. at Project Driveway				(5)	0.3	A		
Northbound Left				(5)	209.5	F		
Westbound Thru				(5)	2.1	A		
PM Peak Hour								
Ala Wai Bl. at Kanakapolei St.	0.455	5.1	B	0.456	5.1	B	0.001	0.0
Westbound Left & Thru	0.541	4.4	A	0.542	4.4	A	0.001	0.0
Northbound Left	0.233	13.6	C	0.233	13.6	B	0.000	0.0
Ala Wai Bl. at Kaiulani Ave.	(5)	4.2	A	(5)	4.3	A	0.000	0.1
Northbound Left	(5)	75.6	F	(5)	78.0	F	0.000	2.4
Ala Wai Bl. at Liliuokalani Ave.	0.431	5.7	B	0.432	5.7	B	0.001	0.0
Westbound Thru	0.418	3.9	A	0.419	3.9	A	0.001	0.0
Northbound Left	0.465	14.8	C	0.466	14.8	B	0.001	0.0
Ala Wai Bl. at Project Driveway	DOES NOT EXIST			(5)	0.2	A		
Northbound Left				(5)	89.6	F		
Westbound Thru				(5)	2.1	A		

NOTES
1 Peak hour conditions analyzed are "worst-case" conditions, which is the sum of the peak hour of the adjacent street plus the peak hour of the generator
2 V/C denotes ratio of volume to capacity. See Appendix C for calculations
3 Delay is in seconds per vehicle
4 LOS denotes Level-of-Service calculated using the operations method described in Highway Capacity Manual. LOS is based on delay. See Tables 1 and 2 for definitions.
5 Volume to capacity ratios are not calculated for unsignalized intersections

For the unsignalized intersections the levels-of-service are not as good. Future levels-of -service for the intersection of Ala Wai Boulevard at Kaiulani Avenue are 'C' and 'A' for cumulative and cumulative plus project conditions, respectively. As under existing conditions, the reduced level-of-service is the result of the long delays for left turns onto Ala Wai Boulevard. However, the increased delay from cumulative to cumulative plus project conditions is minimal.

Left turns from the project driveway will also have long delays. However, the overall intersection level-of-service is expected to be 'A' or better.

Conclusions and Summary

Traffic related impacts at the study intersections are minimal and no mitigation measure are required. All intersections should operate at better than acceptable levels-of-service upon completion of the project.

APPENDIX A

PHOTOGRAPHS OF STUDY INTERSECTIONS

Figure A-1. Looking west along Ala Wai Blvd. From east of Kanekapolei St.

Figure A-2. Looking east along Ala Wai Blvd. from west of Kanekapolei St.

Figure A-3. Looking north along Kanekapolei St. toward Ala Wai Blvd.

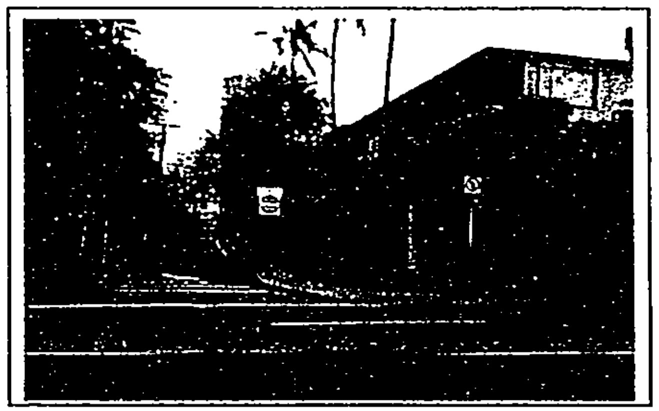

Figure A-4. Looking south along Kaiulani Ave. from Ala Wai Blvd.

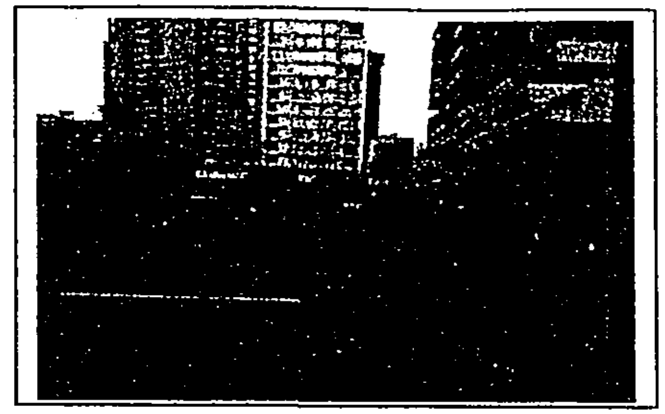

Figure A-5. Looking south at approximate project driveway location.

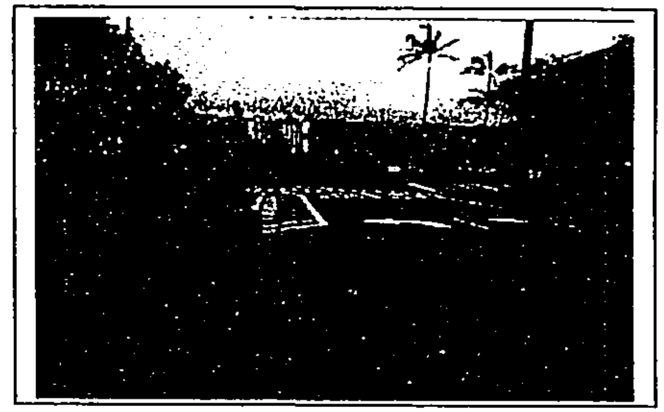

Figure A-6. Looking north along Liliuokalani Ave. toward Ala Wai Blvd.

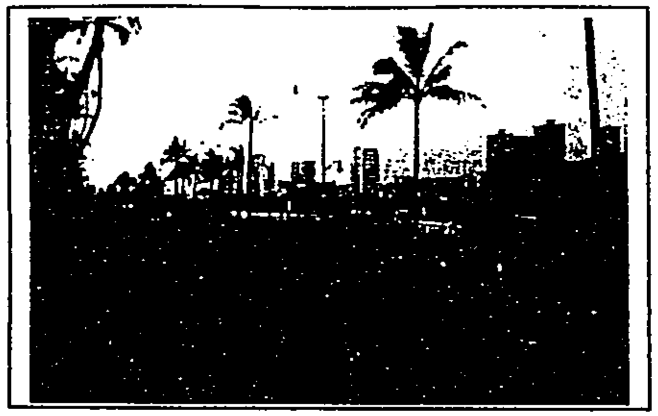

Figure A-7. Looking west along Ala Wai Blvd. from east of Liliuokalani Ave.

APPENDIX B

TRAFFIC PROJECTION WORKSHEETS

APPENDIX C

LEVEL-OF-SERVICE CALCULATIONS


```
HCM: SIGNALIZED INTERSECTION SUMMARY   Version 2.4g        03-10-1999
                       Phillip Rowell And Associates
===========================================================================
Streets: (E-W) Ala Wai Boulevard          (N-S) Kanekapolei Street
Analyst: PJR                              File Name: 1AMEX.HC9
Area Type: Other                          3-9-99 AM Peak
Comment: Existing Conditions
===========================================================================
              |  Eastbound     |  Westbound     |  Northbound    |  Southbound
              | L    T    R    | L    T    R    | L    T    R    | L    T    R
              |---- ---- ----  |---- ---- ----  |---- ---- ----  |---- ---- ----
No. Lanes     | 0    0    0    | 0  > 4    0    | 2    0    0    | 0    0    0
Volumes       |                | 172 2155       | 140            |
Lane W (ft)   |                |     12.0       |12.0            |
RTOR Vols     |                |            0   |            0   |
Lost Time     |                |3.00 3.00       |3.00            |
---------------------------------------------------------------------------
                           Signal Operations
Phase Combination 1     2     3     4 |           5     6     7     8
EB  Left                              |NB  Left   *
    Thru                              |    Thru
    Right                             |    Right
    Peds          *                   |    Peds   *
WB  Left          *                   |SB  Left
    Thru          *                   |    Thru
    Right                             |    Right
    Peds                              |    Peds
NB  Right                             |EB  Right
SB  Right                             |WB  Right
Green          39.0P                  |Green     15.0P
Yellow/AR       3.0                   |Yellow/AR 3.0
Cycle Length:  60 secs  Phase combination order: #1 #5
---------------------------------------------------------------------------
                    Intersection Performance Summary
     Lane  Group:  Adj Sat   v/c     g/C                    Approach:
     Mvmts   Cap    Flow     Ratio   Ratio   Delay   LOS    Delay   LOS
     -----   ----  -------   -----   -----   -----   ---    -----   ---
WB   LT      4825    7424    0.624   0.650     4.9    A       4.9    A
NB   L        885    3539    0.192   0.250    13.5    B      13.5    B
              Intersection Delay =    5.3 sec/veh Intersection LOS = B
Lost Time/Cycle, L =   6.0 sec   Critical v/c(x)      = 0.504
---------------------------------------------------------------------------
```

```
HCM: SIGNALIZED INTERSECTION SUMMARY   Version 2.4g        03-09-1999
                    Phillip Rowell And Associates
=======================================================================
Streets: (E-W) Ala Wai Boulevard          (N-S) Kanekapolei Street
Analyst: PJR                              File Name: 1PMEX.HC9
Area Type: Other                          3-9-99 PM Peak
Comment: Existing Conditions
=======================================================================
             |  Eastbound  |  Westbound  |  Northbound  |  Southbound  |
             | L    T    R | L    T    R | L    T    R  | L    T    R  |
             |---- ---- ---|---- ---- ---|---- ---- ----|---- ---- ----|
No. Lanes    | 0    0    0 | 0  > 4    0 | 2    0    0  | 0    0    0
Volumes      |             | 176 1579    | 152              |
Lane W (ft)  |             |      12.0   |12.0              |
RTOR Vols    |             |           0|              0|
Lost Time    |             |3.00 3.00    |3.00              |
-----------------------------------------------------------------------
                          Signal Operations
Phase Combination 1     2     3     4 |          5     6     7     8
EB  Left                              |NB  Left  *
    Thru                              |    Thru
    Right                             |    Right
    Peds        *                     |    Peds  *
WB  Left        *                     |SB  Left
    Thru        *                     |    Thru
    Right                             |    Right
    Peds                              |    Peds
NB  Right                             |EB  Right
SB  Right                             |WB  Right
Green        39.0P                    |Green     15.0P
Yellow/AR     3.0                     |Yellow/AR 3.0
Cycle Length:  60 secs  Phase combination order: #1 #5
-----------------------------------------------------------------------
                 Intersection Performance Summary
       Lane  Group:  Adj Sat   v/c     g/C                  Approach:
       Mvmts   Cap    Flow    Ratio   Ratio   Delay  LOS   Delay  LOS
       -----  ----   -------  -----   -----   -----  ---   -----  ---
WB     LT     4819    7414    0.471   0.650     4.1   A      4.1    A
NB     L       885    3539    0.208   0.250    13.5   B     13.5    B
               Intersection Delay =    4.8 sec/veh Intersection LOS = A
Lost Time/Cycle, L =    6.0 sec   Critical v/c(x)    = 0.398
-----------------------------------------------------------------------
```



```
HCM: SIGNALIZED INTERSECTION SUMMARY   Version 2.4g        03-09-1999
                    Phillip Rowell And Associates
=======================================================================
Streets: (E-W) Ala Wai Boulevard          (N-S) Kanekapolei Street
Analyst: PJR                              File Name: 1AMCUM.HC9
Area Type: Other                          3-9-99 AM Peak
Comment: Cumulative Conditions
=======================================================================
             |  Eastbound  |  Westbound  |  Northbound  |  Southbound  |
             | L    T    R | L    T    R | L    T    R  | L    T    R  |
             |---- ---- ---|---- ---- ---|---- ---- ----|---- ---- ----|
No. Lanes    | 0    0    0 | 0  > 4    0 | 2    0    0  | 0    0    0
Volumes      |             | 199 2346    | 148              |
Lane W (ft)  |             |      12.0   |12.0              |
RTOR Vols    |             |           0|              0|
Lost Time    |             |3.00 3.00    |3.00              |
-----------------------------------------------------------------------
                          Signal Operations
Phase Combination 1     2     3     4 |          5     6     7     8
EB  Left                              |NB  Left  *
    Thru                              |    Thru
    Right                             |    Right
    Peds        *                     |    Peds  *
WB  Left        *                     |SB  Left
    Thru        *                     |    Thru
    Right                             |    Right
    Peds                              |    Peds
NB  Right                             |EB  Right
SB  Right                             |WB  Right
Green        39.0P                    |Green     15.0P
Yellow/AR     3.0                     |Yellow/AR 3.0
Cycle Length:  60 secs  Phase combination order: #1 #5
-----------------------------------------------------------------------
                 Intersection Performance Summary
       Lane  Group:  Adj Sat   v/c     g/C                  Approach:
       Mvmts   Cap    Flow    Ratio   Ratio   Delay  LOS   Delay  LOS
       -----  ----   -------  -----   -----   -----  ---   -----  ---
WB     LT     4824    7422    0.683   0.650     5.3   B      5.3    B
NB     L       885    3539    0.202   0.250    13.5   B     13.5    B
               Intersection Delay =    5.7 sec/veh Intersection LOS = B
Lost Time/Cycle, L =    6.0 sec   Critical v/c(x)    = 0.549
-----------------------------------------------------------------------
```

```
HCM: SIGNALIZED INTERSECTION SUMMARY   Version 2.4g        03-10-1999
                      Phillip Rowell And Associates
=========================================================================
Streets: (E-W) Ala Wai Boulevard          (N-S) Kanekapolei Street
Analyst: PJR                              File Name: 1PMCUM.HC9
Area Type: Other                          3-9-99 PM Peak
Comment: Cumulative Conditions
=========================================================================
             |  Eastbound     |  Westbound     |  Northbound    |  Southbound
             | L    T    R    | L    T    R    | L    T    R    | L    T    R
             |---- ---- ----  |---- ---- ----  |---- ---- ----  |---- ---- ----
No. Lanes    | 0    0    0    | 0  > 4    0    | 2    0    0    | 0    0    0
Volumes      |                | 207 1807       | 170            |
Lane W (ft)  |                |     12.0       |12.0            |
RTOR Vols    |                |            0   |            0   |
Lost Time    |                |3.00 3.00       |3.00            |
-------------------------------------------------------------------------
                          Signal Operations
Phase Combination 1    2    3    4 |          5    6    7    8
EB  Left                           |NB  Left  *
    Thru                           |    Thru
    Right                          |    Right
    Peds        *                  |    Peds  *
WB  Left        *                  |SB  Left
    Thru        *                  |    Thru
    Right                          |    Right
    Peds                           |    Peds
NB  Right                          |EB  Right
SB  Right                          |WB  Right
Green          39.0P               |Green    15.0P
Yellow/AR       3.0                |Yellow/AR 3.0
Cycle Length:  60 secs  Phase combination order: #1 #5
-------------------------------------------------------------------------
                Intersection Performance Summary
    Lane  Group:  Adj Sat   v/c    g/C                   Approach:
    Mvmts   Cap    Flow    Ratio   Ratio   Delay  LOS   Delay  LOS
    -----   ----  -------  -----   -----   -----  ---   -----  ---
WB  LT     4818    7413    0.541   0.650     4.4   A      4.4   A
NB  L       885    3539    0.233   0.250    13.6   B     13.6   B
               Intersection Delay =   5.1 sec/veh Intersection LOS = B
Lost Time/Cycle, L =   6.0 sec   Critical v/c(x)    = 0.455
-------------------------------------------------------------------------
```



```
HCM: SIGNALIZED INTERSECTION SUMMARY   Version 2.4g        03-09-1999
                      Phillip Rowell And Associates
=========================================================================
Streets: (E-W) Ala Wai Boulevard          (N-S) Kanekapolei Street
Analyst: PJR                              File Name: 1AMPROJ.HC9
Area Type: Other                          3-9-99 AM Peak
Comment: Cumulative Plus Project Conditions
=========================================================================
             |  Eastbound     |  Westbound     |  Northbound    |  Southbound
             | L    T    R    | L    T    R    | L    T    R    | L    T    R
             |---- ---- ----  |---- ---- ----  |---- ---- ----  |---- ---- ----
No. Lanes    | 0    0    0    | 0  > 4    0    | 2    0    0    | 0    0    0
Volumes      |                | 200 2348       | 148            |
Lane W (ft)  |                |     12.0       |12.0            |
RTOR Vols    |                |            0   |            0   |
Lost Time    |                |3.00 3.00       |3.00            |
-------------------------------------------------------------------------
                          Signal Operations
Phase Combination 1    2    3    4 |          5    6    7    8
EB  Left                           |NB  Left  *
    Thru                           |    Thru
    Right                          |    Right
    Peds        *                  |    Peds  *
WB  Left        *                  |SB  Left
    Thru        *                  |    Thru
    Right                          |    Right
    Peds                           |    Peds
NB  Right                          |EB  Right
SB  Right                          |WB  Right
Green          39.0P               |Green    15.0P
Yellow/AR       3.0                |Yellow/AR 3.0
Cycle Length:  60 secs  Phase combination order: #1 #5
-------------------------------------------------------------------------
                Intersection Performance Summary
    Lane  Group:  Adj Sat   v/c    g/C                   Approach:
    Mvmts   Cap    Flow    Ratio   Ratio   Delay  LOS   Delay  LOS
    -----   ----  -------  -----   -----   -----  ---   -----  ---
WB  LT     4824    7422    0.683   0.650     5.3   B      5.3   B
NB  L       885    3539    0.202   0.250    13.5   B     13.5   B
               Intersection Delay =   5.7 sec/veh Intersection LOS = B
Lost Time/Cycle, L =   6.0 sec   Critical v/c(x)    = 0.550
-------------------------------------------------------------------------
```

```
HCM: SIGNALIZED INTERSECTION SUMMARY   Version 2.4g        03-09-1999
                       Phillip Rowell And Associates
==========================================================================
Streets: (E-W) Ala Wai Boulevard          (N-S) Kanekapolei Street
Analyst: PJR                              File Name: 1PMPROJ.HC9
Area Type: Other                          3-9-99 PM Peak
Comment: Cumulative Plus Project Conditions
==========================================================================
             |  Eastbound    |  Westbound    |  Northbound   |  Southbound   |
             | L    T    R   | L    T    R   | L    T    R   | L    T    R   |
             |---- ---- ---- |---- ---- ---- |---- ---- ---- |---- ---- ---- |
No. Lanes    | 0    0    0   | 0  > 4    0   | 2    0    0   | 0    0    0
Volumes      |               | 208 1811      | 170           |
Lane W (ft)  |               |     12.0      |12.0           |
RTOR Vols    |               |           0   |           0   |
Lost Time    |               |3.00 3.00      |3.00           |
--------------------------------------------------------------------------
                          Signal Operations
Phase Combination 1     2     3     4 |                5     6     7     8
EB  Left                              |NB  Left        *
    Thru                              |    Thru
    Right                             |    Right
    Peds           *                  |    Peds        *
WB  Left           *                  |SB  Left
    Thru           *                  |    Thru
    Right                             |    Right
    Peds                              |    Peds
NB  Right                             |EB  Right
SB  Right                             |WB  Right
Green         39.0P                   |Green     15.0P
Yellow/AR      3.0                    |Yellow/AR 3.0
Cycle Length:  60 secs  Phase combination order: #1 #5
--------------------------------------------------------------------------
                  Intersection Performance Summary
     Lane  Group:   Adj Sat   v/c     g/C                   Approach:
     Mvmts   Cap     Flow    Ratio   Ratio   Delay   LOS   Delay   LOS
     -----  ----   -------   -----   -----   -----   ---   -----   ---
WB   LT     4818     7413    0.542   0.650     4.4    A      4.4    A
NB   L       885     3539    0.233   0.250    13.6    B     13.6    B
              Intersection Delay =   5.1 sec/veh Intersection LOS = B
Lost Time/Cycle, L =   6.0 sec   Critical v/c(x)    = 0.456
--------------------------------------------------------------------------
```



```
HCS: Unsignalized Intersections   Release 2.1g    2AMEX.HC0      Page 1
=========================================================================
Phillip Rowell And Associates
47-273 'D' Hui Iwa Street
Kaneohe, HI   96744-
Ph: (808) 239-8206
=========================================================================
Streets: (N-S) Kaiulani Avenue                 (E-W) Ala Wai Boulevard
Major Street Direction.... EW
Length of Time Analyzed... 15 (min)
Analyst................... PJR
Date of Analysis.......... 0/0/0
Other Information.........AM Existing Conditions
Two-way Stop-controlled Intersection
=========================================================================
             |  Eastbound    |  Westbound    |  Northbound   |  Southbound
             | L    T    R   | L    T    R   | L    T    R   | L    T    R
             |---- ---- ---- |---- ---- ---- |---- ---- ---- |---- ---- ----
No. Lanes    | 0    0    0   | 0    4    0   | 1  > 0    0   | 0    0    0
Stop/Yield   |            N  |            N  |               |
Volumes      |               |     2219      | 108           |
PHF          |               |      .9       |  .9           |
Grade        |               |      0        |       0       |
MC's (%)     |               |               |               |
SU/RV's (%)  |               |               |               |
CV's (%)     |               |               |               |
PCE's        |               |               |1.10           |
-------------------------------------------------------------------------

                        Adjustment Factors

Vehicle                                   Critical         Follow-up
Maneuver                                  Gap (tg)         Time (tf)
-------------------------------------------------------------------
Left Turn Major Road                        5.50             2.10
Right Turn Minor Road                       5.50             2.60
Through Traffic Minor Road                  6.50             3.30
Left Turn Minor Road                       *5.00            *2.10
```

HCS: Unsignalized Intersections Release 2.1g 2AMEX.HCO Page 2

Worksheet for TWSC Intersection

Step 4: LT from Minor Street	NB	SB
Conflicting Flows: (vph)	2466	
Potential Capacity: (pcph)	115	
Major LT, Minor TH Impedance Factor:	1.00	
Adjusted Impedance Factor:	1.00	
Capacity Adjustment Factor due to Impeding Movements	1.00	
Movement Capacity: (pcph)	115	

Intersection Performance Summary

Movement	Flow Rate (pcph)	Move Cap (pcph)	Shared Cap (pcph)	Avg. Total Delay (sec/veh)	95% Queue Length (veh)	LOS	Approach Delay (sec/veh)
NB L	132	115 >					
							196.0

Intersection Delay = 9.1 sec/veh

HCS: Unsignalized Intersections Release 2.1g 2PMEX.HCO Page 1

Phillip Rowell And Associates
47-273 'D' Hui Iwa Street
Kaneohe, HI 96744-
Ph: (808) 239-8206

Streets: (N-S) Kaiulani Avenue (E-W) Ala Wai Boulevard
Major Street Direction.... EW
Length of Time Analyzed... 15 (min)
Analyst................... PJR
Date of Analysis.......... [illegible]
Other Information.........PM Existing Conditions
Two-way Stop-controlled Intersection

	Eastbound L	Eastbound T	Eastbound R	Westbound L	Westbound T	Westbound R	Northbound L	Northbound T	Northbound R	Southbound L	Southbound T	Southbound R
No. Lanes	0	0	0	0	4	0	1 >	0	0	0	0	0
Stop/Yield			N			N						
Volumes					1655		100					
PHF					.9		.9					
Grade					0			0				
MC's (%)												
SU/RV's (%)												
CV's (%)												
PCE's							1.10					

Adjustment Factors

Vehicle Maneuver	Critical Gap (tg)	Follow-up Time (tf)
Left Turn Major Road	5.50	2.10
Right Turn Minor Road	5.50	2.60
Through Traffic Minor Road	6.50	3.30
Left Turn Minor Road	*5.00	*2.10

HCS: Unsignalized Intersections Release 2.1g 2PMEX.HCO Page 2

Worksheet for TWSC Intersection

Step 4: LT from Minor Street	NB	SB
Conflicting Flows: (vph)	1839	
Potential Capacity: (pcph)	228	
Major LT, Minor TH Impedance Factor:	1.00	
Adjusted Impedance Factor:	1.00	
Capacity Adjustment Factor due to Impeding Movements	1.00	
Movement Capacity: (pcph)	228	

Intersection Performance Summary

Movement	Flow Rate (pcph)	Move Cap (pcph)	Shared Cap (pcph)	Avg. Total Delay (sec/veh)	95% Queue Length (veh)	LOS	Approach Delay (sec/veh)
NB L	122	228 >					32.5

Intersection Delay = 1.9 sec/veh

HCS: Unsignalized Intersections Release 2.1g 2AMCUM.HCO Page 1

Phillip Rowell And Associates
47-273 'D' Hui Iwa Street
Kaneohe, HI 96744-
Ph: (808) 239-8206

Streets: (N-S) Kaiulani Avenue (E-W) Ala Wai Boulevard
Major Street Direction.... EW
Length of Time Analyzed... 15 (min)
Analyst................... PJR
Date of Analysis.......... 4/29/98
Other Information.........Cumulative AM Conditions
Two-way Stop-controlled Intersection

	Eastbound L	Eastbound T	Eastbound R	Westbound L	Westbound T	Westbound R	Northbound L	Northbound T	Northbound R	Southbound L	Southbound T	Southbound R
No. Lanes	0	0	0	0	4	0	1	0	0	0	0	0
Stop/Yield			N			N						
Volumes					2430		114					
PHF					.9		.9					
Grade					0			0				
MC's (%)												
SU/RV's (%)												
CV's (%)												
PCE's							1.10					

Adjustment Factors

Vehicle Maneuver	Critical Gap (tg)	Follow-up Time (tf)
Left Turn Major Road	5.50	2.10
Right Turn Minor Road	5.50	2.60
Through Traffic Minor Road	6.50	3.30
Left Turn Minor Road	*5.00	*2.10

HCS: Unsignalized Intersections   Release 2.1g   2AHCUM.HCO   Page 2

Worksheet for TWSC Intersection

Step 4: LT from Minor Street	NB	SB
Conflicting Flows: (vph)	2700	
Potential Capacity: (pcph)	89	
Major LT, Minor TH Impedance Factor:	1.00	
Adjusted Impedance Factor:	1.00	
Capacity Adjustment Factor due to Impeding Movements	1.00	
Movement Capacity: (pcph)	89	

Intersection Performance Summary

Movement	Flow Rate (pcph)	Move Cap (pcph)	Shared Cap (pcph)	Avg. Total Delay (sec/veh)	95% Queue Length (veh)	LOS	Approach Delay (sec/veh)
NB L	140	89		382.1	9.2	F	382.1

Intersection Delay = 17.1 sec/veh

HCS: Unsignalized Intersections   Release 2.1g   2PMCUM.HCO   Page 1

Phillip Rowell And Associates
47-273 'D' Hui Iwa Street
Kaneohe, HI 96744-
Ph: (808) 239-8206

Streets: (N-S) Kaiulani Avenue   (E-W) Ala Wai Boulevard
Major Street Direction.... EW
Length of Time Analyzed... 15 (min)
Analyst................... PJR
Date of Analysis.......... 4/29/98
Other Information.........Cumulative PM Conditions
Two-way Stop-controlled Intersection

	Eastbound L	Eastbound T	Eastbound R	Westbound L	Westbound T	Westbound R	Northbound L	Northbound T	Northbound R	Southbound L	Southbound T	Southbound R
No. Lanes	0	0	0	0	4	0	1	0	0	0	0	0
Stop/Yield			N			N						
Volumes					1903		112					
PHF					.9		.9					
Grade					0			0				
MC's (%)												
SU/RV's (%)												
CV's (%)												
PCE's							1.10					

Adjustment Factors

Vehicle Maneuver	Critical Gap (tg)	Follow-up Time (tf)
Left Turn Major Road	5.50	2.10
Right Turn Minor Road	5.50	2.60
Through Traffic Minor Road	6.50	3.30
Left Turn Minor Road	*5.00	*2.10

HCS: Unsignalized Intersections Release 2.1g 2PMCUM.HCO Page 2

Worksheet for TWSC Intersection

Step 4: LT from Minor Street	NB	SB
Conflicting Flows: (vph)	2114	
Potential Capacity: (pcph)	169	
Major LT, Minor TH Impedance Factor:	1.00	
Adjusted Impedance Factor:	1.00	
Capacity Adjustment Factor due to Impeding Movements	1.00	
Movement Capacity: (pcph)	169	

Intersection Performance Summary

Movement	Flow Rate (pcph)	Move Cap (pcph)	Shared Cap (pcph)	Avg. Total Delay (sec/veh)	95% Queue Length (veh)	LOS	Approach Delay (sec/veh)
NB L	136	169		75.6	4.6	F	
							75.6

Intersection Delay = 4.2 sec/veh

HCS: Unsignalized Intersections Release 2.1g 2AMPROJ.HCO Page 1

Phillip Rowell And Associates
47-273 'D' Hui Iwa Street
Kaneohe, HI 96744-
Ph: (808) 239-8206

Streets: (N-S) Kaiulani Avenue (E-W) Ala Wai Boulevard
Major Street Direction.... EW
Length of Time Analyzed... 15 (min)
Analyst................... PJR
Date of Analysis.......... 4/29/98
Other Information.........Cumulative Plus Project AM Peak Hour
Two-way Stop-controlled Intersection

	Eastbound L	Eastbound T	Eastbound R	Westbound L	Westbound T	Westbound R	Northbound L	Northbound T	Northbound R	Southbound L	Southbound T	Southbound R
No. Lanes	0	0	0	0	4	0	1	0	0	0	0	0
Stop/Yield			N			N						
Volumes					2433		114					
PHF					.9		.9					
Grade					0			0				
MC's (%)												
SU/RV's (%)												
CV's (%)												
PCE's							1.10					

Adjustment Factors

Vehicle Maneuver	Critical Gap (tg)	Follow-up Time (tf)
Left Turn Major Road	5.50	2.10
Right Turn Minor Road	5.50	2.60
Through Traffic Minor Road	6.50	3.30
Left Turn Minor Road	*5.00	*2.10

HCS: Unsignalized Intersections Release 2.1g 2AMPROJ.HC0 Page 2

Worksheet for TWSC Intersection

Step 4: LT from Minor Street	NB	SB
Conflicting Flows: (vph)	2703	
Potential Capacity: (pcph)	88	
Major LT, Minor TH Impedance Factor:	1.00	
Adjusted Impedance Factor:	1.00	
Capacity Adjustment Factor due to Impeding Movements	1.00	
Movement Capacity: (pcph)	88	

Intersection Performance Summary

Movement	Flow Rate (pcph)	Move Cap (pcph)	Shared Cap (pcph)	Avg. Total Delay (sec/veh)	95% Queue Length (veh)	LOS	Approach Delay (sec/veh)
NB L	140	88		390.6	9.3	F	
							390.6

Intersection Delay = 17.5 sec/veh

HCS: Unsignalized Intersections Release 2.1g 2PMPROJ.HC0 Page 1

Phillip Rowell And Associates
47-273 'D' Hui Iwa Street
Kaneohe, HI 96744-
Ph: (808) 239-8206

Streets: (N-S) Kaiulani Avenue (E-W) Ala Wai Boulevard
Major Street Direction.... EW
Length of Time Analyzed... 15 (min)
Analyst................... PJR
Date of Analysis.......... 4/29/98
Other Information.........Cumulative Plus Project PM Peak Hour
Two-way Stop-controlled Intersection

	Eastbound L	Eastbound T	Eastbound R	Westbound L	Westbound T	Westbound R	Northbound L	Northbound T	Northbound R	Southbound L	Southbound T	Southbound R
No. Lanes	0	0	0	0	4	0	1	0	0	0	0	0
Stop/Yield			N			N						
Volumes					1908		112					
PHF					.9		.9					
Grade					0			0				
MC's (%)												
SU/RV's (%)												
CV's (%)												
PCE's							1.10					

Adjustment Factors

Vehicle Maneuver	Critical Gap (tg)	Follow-up Time (tf)
Left Turn Major Road	5.50	2.10
Right Turn Minor Road	5.50	2.60
Through Traffic Minor Road	6.50	3.30
Left Turn Minor Road	*5.00	*2.10

HCS: Unsignalized Intersections Release 2.1g 2PMPROJ.HC0 Page 2

Worksheet for TWSC Intersection

Step 4: LT from Minor Street	NB	SB
Conflicting Flows: (vph)	2120	
Potential Capacity: (pcph)	167	
Major LT, Minor TH Impedance Factor:	1.00	
Adjusted Impedance Factor:	1.00	
Capacity Adjustment Factor due to Impeding Movements	1.00	
Movement Capacity: (pcph)	167	

Intersection Performance Summary

Movement	Flow Rate (pcph)	Move Cap (pcph)	Shared Cap (pcph)	Avg. Total Delay (sec/veh)	95% Queue Length (veh)	LOS	Approach Delay (sec/veh)
NB L	136	167		78.0	4.7	F	78.0

Intersection Delay = 4.3 sec/veh

HCM: SIGNALIZED INTERSECTION SUMMARY Version 2.4g 03-09-1999
Phillip Rowell And Associates

Streets: (E-W) Ala Wai Boulevard (N-S) Liliuokalani Avenue
Analyst: PJR File Name: 3ANEX.HC9
Area Type: Other 3-9-99 AM Peak
Comment: Existing Conditions

	Eastbound L	Eastbound T	Eastbound R	Westbound L	Westbound T	Westbound R	Northbound L	Northbound T	Northbound R	Southbound L	Southbound T	Southbound R
No. Lanes	0	0	0	0	4	0	2	0	0	0	0	0
Volumes					1970		249					
Lane W (ft)					12.0		12.0					
RTOR Vols						0			0			
Lost Time					3.00		3.00					

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left					NB Left	*			
Thru					Thru				
Right					Right				
Peds	*				Peds	*			
WB Left	*				SB Left				
Thru	*				Thru				
Right					Right				
Peds					Peds				
NB Right					EB Right				
SB Right					WB Right				
Green	39.0P				Green	15.0P			
Yellow/AR	3.0				Yellow/AR	3.0			

Cycle Length: 60 secs Phase combination order: #1 #5

Intersection Performance Summary

	Lane Group: Mvmts	Cap	Adj Sat Flow	v/c Ratio	g/C Ratio	Delay	LOS	Approach: Delay	LOS
WB	T	4843	7451	0.527	0.650	4.3	A	4.3	A
NB	L	885	3539	0.341	0.250	14.1	B	14.1	B

Intersection Delay = 5.4 sec/veh Intersection LOS = B
Lost Time/Cycle, L = 6.0 sec Critical v/c(x) = 0.475

```
HCM: SIGNALIZED INTERSECTION SUMMARY   Version 2.4g       03-09-1999
                   Phillip Rowell And Associates
=========================================================================
Streets: (E-W) Ala Wai Boulevard          (N-S) Liliuokalani Avenue
Analyst: PJR                              File Name: 3PMEX.HC9
Area Type: Other                          3-9-99 PM Peak
Comment: Existing Conditions
=========================================================================
           |  Eastbound   |  Westbound   |  Northbound  |  Southbound  |
           | L   T   R    | L   T   R    | L   T   R    | L   T   R    |
           |---- ---- ----|---- ---- ----|---- ---- ----|---- ---- ----|
No. Lanes  | 0   0   0    | 0   4   0    | 2   0   0    | 0   0   0
Volumes    |              |    1352      | 303          |
Lane W (ft)|              |    12.0      |12.0          |
RTOR Vols  |              |          0   |          0   |
Lost Time  |              |    3.00      |3.00          |
-------------------------------------------------------------------------
                         Signal Operations
Phase Combination 1    2    3    4 |         5    6    7    8
EB  Left                           |NB  Left  *
    Thru                           |    Thru
    Right                          |    Right
    Peds         *                 |    Peds  *
WB  Left         *                 |SB  Left
    Thru         *                 |    Thru
    Right                          |    Right
    Peds                           |    Peds
NB  Right                          |EB  Right
SB  Right                          |WB  Right
Green        39.0P                 |Green     15.0P
Yellow/AR    3.0                   |Yellow/AR 3.0
Cycle Length:  60 secs  Phase combination order: #1 #5
-------------------------------------------------------------------------
                Intersection Performance Summary
     Lane  Group:   Adj Sat   v/c    g/C                  Approach:
     Mvmts  Cap      Flow    Ratio  Ratio   Delay  LOS   Delay  LOS
     -----  ----   -------   -----  -----   -----  ---   -----  ---
WB   T      4843    7451     0.361  0.650     3.7   A      3.7   A
NB   L       885    3539     0.415  0.250    14.5   B     14.5   B
            Intersection Delay =    5.5 sec/veh Intersection LOS = B
Lost Time/Cycle, L =   6.0 sec   Critical v/c(x)    = 0.376
-------------------------------------------------------------------------
```



```
HCM: SIGNALIZED INTERSECTION SUMMARY   Version 2.4g       03-09-1999
                   Phillip Rowell And Associates
=========================================================================
Streets: (E-W) Ala Wai Boulevard          (N-S) Liliuokalani Avenue
Analyst: PJR                              File Name: 3AMCUM.HC9
Area Type: Other                          3-9-99 AM Peak
Comment: Cumulative Conditions
=========================================================================
           |  Eastbound   |  Westbound   |  Northbound  |  Southbound  |
           | L   T   R    | L   T   R    | L   T   R    | L   T   R    |
           |---- ---- ----|---- ---- ----|---- ---- ----|---- ---- ----|
No. Lanes  | 0   0   0    | 0   4   0    | 2   0   0    | 0   0   0
Volumes    |              |    2167      | 263          |
Lane W (ft)|              |    12.0      |12.0          |
RTOR Vols  |              |          0   |          0   |
Lost Time  |              |    3.00      |3.00          |
-------------------------------------------------------------------------
                         Signal Operations
Phase Combination 1    2    3    4 |         5    6    7    8
EB  Left                           |NB  Left  *
    Thru                           |    Thru
    Right                          |    Right
    Peds         *                 |    Peds  *
WB  Left         *                 |SB  Left
    Thru         *                 |    Thru
    Right                          |    Right
    Peds                           |    Peds
NB  Right                          |EB  Right
SB  Right                          |WB  Right
Green        39.0P                 |Green     15.0P
Yellow/AR    3.0                   |Yellow/AR 3.0
Cycle Length:  60 secs  Phase combination order: #1 #5
-------------------------------------------------------------------------
                Intersection Performance Summary
     Lane  Group:   Adj Sat   v/c    g/C                  Approach:
     Mvmts  Cap      Flow    Ratio  Ratio   Delay  LOS   Delay  LOS
     -----  ----   -------   -----  -----   -----  ---   -----  ---
WB   T      4843    7451     0.579  0.650     4.6   A      4.6   A
NB   L       885    3539     0.359  0.250    14.2   B     14.2   B
            Intersection Delay =    5.6 sec/veh Intersection LOS = B
Lost Time/Cycle, L =   6.0 sec   Critical v/c(x)    = 0.518
-------------------------------------------------------------------------
```

```
HCM: SIGNALIZED INTERSECTION SUMMARY   Version 2.4g        03-09-1999
                    Phillip Rowell And Associates
=======================================================================
Streets: (E-W) Ala Wai Boulevard        (N-S) Liliuokalani Avenue
Analyst: PJR                            File Name: 3PMCUM.HC9
Area Type: Other                        3-9-99 PM Peak
Comment: Cumulative Conditions
=======================================================================
             |  Eastbound     |  Westbound     |  Northbound    |  Southbound    |
             | L    T    R    | L    T    R    | L    T    R    | L    T    R    |
             |---- ---- ----|---- ---- ----|---- ---- ----|---- ---- ----|
No. Lanes    | 0    0    0    | 0    4    0    | 2    0    0    | 0    0    0
Volumes      |                |     1563       | 339            |
Lane W (ft)  |                |     12.0       |12.0            |
RTOR Vols    |                |           0    |           0    |
Lost Time    |                |     3.00       |3.00            |
-----------------------------------------------------------------------
                      Signal Operations
Phase Combination 1    2    3    4 |              5    6    7    8
EB  Left                           |NB  Left      *
    Thru                           |    Thru
    Right                          |    Right
    Peds          *                |    Peds      *
WB  Left          *                |SB  Left
    Thru          *                |    Thru
    Right                          |    Right
    Peds                           |    Peds
NB  Right                          |EB  Right
SB  Right                          |WB  Right
Green         39.0P                |Green     15.0P
Yellow/AR      3.0                 |Yellow/AR 3.0
Cycle Length:  60 secs  Phase combination order: #1 #5
-----------------------------------------------------------------------
                  Intersection Performance Summary
      Lane    Group:   Adj Sat    v/c     g/C                   Approach:
      Mvmts   Cap      Flow       Ratio   Ratio   Delay   LOS   Delay   LOS
      -----   ----     -------    -----   -----   -----   ---   -----   ---
WB    T       4843     7451       0.418   0.650   3.9     A     3.9     A
NB    L       885      3539       0.465   0.250   14.8    B     14.8    B
                 Intersection Delay =    5.7 sec/veh Intersection LOS = B
Lost Time/Cycle, L =   6.0 sec   Critical v/c(x)     = 0.431
-----------------------------------------------------------------------
```



```
HCM: SIGNALIZED INTERSECTION SUMMARY   Version 2.4g        03-09-1999
                    Phillip Rowell And Associates
=======================================================================
Streets: (E-W) Ala Wai Boulevard        (N-S) Liliuokalani Avenue
Analyst: PJR                            File Name: 3AMPROJ.HC9
Area Type: Other                        3-9-99 AM Peak
Comment: Cumulative Plus Project Conditions
=======================================================================
             |  Eastbound     |  Westbound     |  Northbound    |  Southbound    |
             | L    T    R    | L    T    R    | L    T    R    | L    T    R    |
             |---- ---- ----|---- ---- ----|---- ---- ----|---- ---- ----|
No. Lanes    | 0    0    0    | 0    4    0    | 2    0    0    | 0    0    0
Volumes      |                |     2169       | 264            |
Lane W (ft)  |                |     12.0       |12.0            |
RTOR Vols    |                |           0    |           0    |
Lost Time    |                |     3.00       |3.00            |
-----------------------------------------------------------------------
                      Signal Operations
Phase Combination 1    2    3    4 |              5    6    7    8
EB  Left                           |NB  Left      *
    Thru                           |    Thru
    Right                          |    Right
    Peds          *                |    Peds      *
WB  Left          *                |SB  Left
    Thru          *                |    Thru
    Right                          |    Right
    Peds                           |    Peds
NB  Right                          |EB  Right
SB  Right                          |WB  Right
Green         39.0P                |Green     15.0P
Yellow/AR      3.0                 |Yellow/AR 3.0
Cycle Length:  60 secs  Phase combination order: #1 #5
-----------------------------------------------------------------------
                  Intersection Performance Summary
      Lane    Group:   Adj Sat    v/c     g/C                   Approach:
      Mvmts   Cap      Flow       Ratio   Ratio   Delay   LOS   Delay   LOS
      -----   ----     -------    -----   -----   -----   ---   -----   ---
WB    T       4843     7451       0.580   0.650   4.6     A     4.6     A
NB    L       885      3539       0.362   0.250   14.2    B     14.2    B
                 Intersection Delay =    5.6 sec/veh Intersection LOS = B
Lost Time/Cycle, L =   6.0 sec   Critical v/c(x)     = 0.519
-----------------------------------------------------------------------
```

HCM: SIGNALIZED INTERSECTION SUMMARY   Version 2.4g   03-09-1999
Phillip Rowell And Associates

Streets: (E-W) Ala Wai Boulevard   (N-S) Liliuokalani Avenue
Analyst: PJR   File Name: 3PMPROJ.HC9
Area Type: Other   3-9-99 PM Peak
Comment: Cumulative Plus Project Conditions

	Eastbound L	Eastbound T	Eastbound R	Westbound L	Westbound T	Westbound R	Northbound L	Northbound T	Northbound R	Southbound L	Southbound T	Southbound R
No. Lanes	0	0	0	0	4	0	2	0	0	0	0	0
Volumes					1567		340					
Lane W (ft)					12.0		12.0					
RTOR Vols						0			0			
Lost Time					3.00		3.00					

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left					NB Left	*			
Thru					Thru				
Right					Right				
Peds	*				Peds	*			
WB Left	*				SB Left				
Thru	*				Thru				
Right					Right				
Peds					Peds				
NB Right					EB Right				
SB Right					WB Right				
Green	39.0P				Green	15.0P			
Yellow/AR	3.0				Yellow/AR	3.0			

Cycle Length: 60 secs   Phase combination order: #1 #5

Intersection Performance Summary

	Lane Group: Mvmts	Cap	Adj Sat Flow	v/c Ratio	g/C Ratio	Delay	LOS	Approach: Delay	LOS
WB	T	4843	7451	0.419	0.650	3.9	A	3.9	A
NB	L	885	3539	0.466	0.250	14.8	B	14.8	B

Intersection Delay = 5.7 sec/veh   Intersection LOS = B
Lost Time/Cycle, L = 6.0 sec   Critical v/c(x) = 0.432

HCS: Unsignalized Intersections   Release 2.1g   4AMPROJ.HC0   Page 1

Phillip Rowell And Associates
47-273 'D' Hui Iwa Street
Kaneohe, HI 96744-
Ph: (808) 239-8206

Streets: (N-S) Proect Driveway   (E-W) Ala Wai Boulevard
Major Street Direction.... EW
Length of Time Analyzed... 15 (min)
Analyst................... PJR
Date of Analysis.......... 4/29/98
Other Information.........Cumulative Plus Project AM Peak Hour
Two-way Stop-controlled Intersection

	Eastbound L	Eastbound T	Eastbound R	Westbound L	Westbound T	Westbound R	Northbound L	Northbound T	Northbound R	Southbound L	Southbound T	Southbound R
No. Lanes	0	0	0	0	> 4	0	1	0	0	0	0	0
Stop/Yield			N			N						
Volumes				3	2430		3					
PHF				.9	.9		.9					
Grade					0			0				
MC's (%)												
SU/RV's (%)												
CV's (%)												
PCE's				1.10			1.10					

Adjustment Factors

Vehicle Maneuver	Critical Gap (tg)	Follow-up Time (tf)
Left Turn Major Road	5.50	2.10
Right Turn Minor Road	5.50	2.60
Through Traffic Minor Road	6.50	3.30
Left Turn Minor Road	7.00	3.40

HCS: Unsignalized Intersections Release 2.1g 4AMPROJ.HCO Page 2

Worksheet for TWSC Intersection

Step 2: LT from Major Street	WB	EB
Conflicting Flows: (vph)	0	
Potential Capacity: (pcph)	1714	
Movement Capacity: (pcph)	1714	
Prob. of Queue-Free State:	1.00	
TH Saturation Flow Rate: (pcphpl)	6800	
Major LT Shared Lane Prob. of Queue-Free State:	1.00	

Step 4: LT from Minor Street	NB	SB
Conflicting Flows: (vph)	2703	
Potential Capacity: (pcph)	20	
Major LT, Minor TH Impedance Factor:	1.00	
Adjusted Impedance Factor:	1.00	
Capacity Adjustment Factor due to Impeding Movements	1.00	
Movement Capacity: (pcph)	20	

Intersection Performance Summary

Movement	Flow Rate (pcph)	Move Cap (pcph)	Shared Cap (pcph)	Avg. Total Delay (sec/veh)	95% Queue Length (veh)	LOS	Approach Delay (sec/veh)
NB L	3	20		209.5	0.2	F	209.5
WB L	3	1714		2.1	0.0	A	0.0

Intersection Delay = 0.3 sec/veh

HCS: Unsignalized Intersections Release 2.1g 4PMPROJ.HCO Page 1

Phillip Rowell And Associates
47-273 'D' Hui Iwa Street
Kaneohe, HI 96744-
Ph: (808) 239-8206

Streets: (N-S) Proect Driveway (E-W) Ala Wai Boulevard
Major Street Direction.... EW
Length of Time Analyzed... 15 (min)
Analyst................... PJR
Date of Analysis.......... 4/29/98
Other Information.........Cumulative Plus Project PM Peak Hour
Two-way Stop-controlled Intersection

	Eastbound L	Eastbound T	Eastbound R	Westbound L	Westbound T	Westbound R	Northbound L	Northbound T	Northbound R	Southbound L	Southbound T	Southbound R
No. Lanes	0	0	0	0	> 4	0	1	0	0	0	0	0
Stop/Yield			N			N						
Volumes				5	1903		5					
PHF				.9	.9		.9					
Grade					0			0				
MC's (%)												
SU/RV's (%)												
CV's (%)												
PCE's				1.10			1.10					

Adjustment Factors

Vehicle Maneuver	Critical Gap (tg)	Follow-up Time (tf)
Left Turn Major Road	5.50	2.10
Right Turn Minor Road	5.50	2.60
Through Traffic Minor Road	6.50	3.30
Left Turn Minor Road	7.00	3.40

Worksheet for TWSC Intersection

Step 2: LT from Major Street	WB	EB
Conflicting Flows: (vph)	0	
Potential Capacity: (pcph)	1714	
Movement Capacity: (pcph)	1714	
Prob. of Queue-Free State:	1.00	
TH Saturation Flow Rate: (pcphpl)	6800	
Major LT Shared Lane Prob. of Queue-Free State:	0.99	

Step 4: LT from Minor Street	NB	SB
Conflicting Flows: (vph)	2120	
Potential Capacity: (pcph)	47	
Major LT, Minor TH Impedance Factor:	0.99	
Adjusted Impedance Factor:	0.99	
Capacity Adjustment Factor due to Impeding Movements	0.99	
Movement Capacity: (pcph)	47	

Intersection Performance Summary

Movement	Flow Rate (pcph)	Move Cap (pcph)	Shared Cap (pcph)	Avg. Total Delay (sec/veh)	95% Queue Length (veh)	LOS	Approach Delay (sec/veh)
NB L	7	47		89.6	0.3	F	
							89.6
WB L	7	1714		2.1	0.0	A	0.0

Intersection Delay = 0.2 sec/veh

TRAFFIC IMPACT ANALYSIS REPORT

GENESIS SENIOR HOUSING DEVELOPMENT

IN WAIKIKI, HONOLULU, OAHU, HAWAI'I

Prepared For

WIL CHEE PLANNING, INC.

Prepared By

Phillip Rowell and Associates
47-273 'D' Hui Iwa Street
Kaneohe, Hawai'i 96744
TEL: (808) 239-8206
FAX: (808) 239-4175

May 11, 1998

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Executive Summary

Phillip Rowell and Associates has been retained to conduct a Traffic Impact Analysis Report (TIAR) for a proposed senior housing projects to be located on the makai side of Ala Wai Boulevard in Waikiki. The proposed development is to consist of 283 apartment type units. Access to and egress from the site will be via a driveway to and from Ala Wai Boulevard.

The proposed project will generate 18 trips during the morning peak hour and 31 trips during the afternoon peak hour. A summary of the trips generated on a typical day follows:

AM Peak Hour			PM Peak Hour		
In	Out	Total	In	Out	Total
9	9	18	16	15	31

The signalized intersections Ala Wai Boulevard at Kanekapolei Street and Ala Wai Boulevard at Liliuokalani Avenue were analyzed and the results are shown in Table ES-1. The change in the volume-to-capacity ratio was less than 0.01. Therefore, the impacts are insignificant.

Table ES-1 Level-of-Service Analysis for Signalized Intersections[3]

Intersection	AM Peak Hour				PM Peak Hour			
	Without Project		With Project		Without Project		With Project	
	V/C[1]	LoS[2]	V/C[1]	LoS[2]	V/C[1]	LoS[2]	V/C[1]	LoS[2]
Ala Wai Bl. at Kanekapolei St.	0.47	A	0.47	A	0.39	A	0.39	A
Ala Wai Bl. at Liliuokalani Av.	0.45	A	0.45	A	0.37	A	0.38	A

NOTES:
(1) V/C = Volume-to-Capacity Ratio
(2) LoS = Level-of-Service
(3) Level-of-Service calculated using planning method described in *Highway Capacity Manual.*

The results of the level-of-service analysis for the unsignalized intersection of Ala Wai Boulevard at Kaiulani Avenue and the project driveway are shown in Table ES-2. The intersections are expected to operate at acceptable levels-of-service. However, long delays are expected for vehicles turning left onto Ala Wai Boulevard.

Table ES-2 Level-of-Service Analysis for Unsignalized Intersections

Intersection	AM Peak Hour		PM Peak Hour	
	Delay	LoS	Delay	LoS
Ala Wai Bl at Kaiulani Avenue				
Without Project	17.1	C	4.2	A
With Project	17.4	C	4.4	A
Ala Wai Bl at Project Driveway				
With Project Only	0.2	A	0.2	A

NOTES:
(1) V/C = Volume-to-Capacity Ratio
(2) LoS = Level-of-Service
(3) Level-of-Service calculated using planning method described in *Highway Capacity Manual.*

In conclusion, the traffic impact analysis determined that traffic generated by the project will have minimal traffic impacts on the surrounding roadway system, specifically on Ala Wai Boulevard.

1. INTRODUCTION

Phillip Rowell and Associates has been retained by Wil Chee Planning, Inc. to prepare a Traffic Impact Analysis Report (TIAR) for a proposed senior housing project in the Waikiki area of Honolulu, Hawai'i.

The following report has been prepared to describe the traffic characteristics of the project and likely impacts to the adjacent roadway network. This introductory chapter discusses the location of the project, the proposed development, and the study methodology.

Project Location and Description

The proposed project is to be located along the makai side of Ala Wai Boulevard midway between Kaiulani Avenue and Liliuokalani Avenue. This location is shown on Figure 1. The site is currently vacant.

The proposed project will consist of 283 apartment type units for senior citizens. Access and egress will be provided by a driveway along Ala Wai Boulevard. There will be 124 on-site parking stalls.

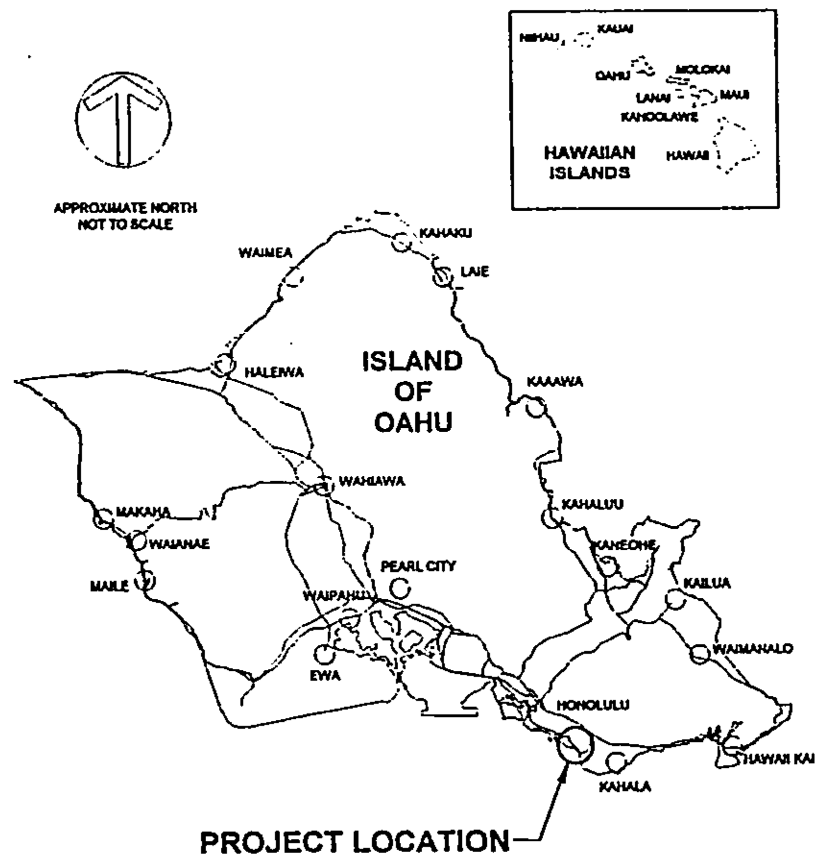

Figure 1

PROJECT LOCATION

Study Methodology and Order of Presentation

In order to conduct this traffic study, a number of tasks were performed. These tasks are discussed in the following paragraphs.

1. Analysis of Existing Traffic Conditions

Existing traffic volumes at the study intersections were determined from traffic counts performed in April and May 1998 for this study. Intersection configurations and traffic signal information were also collected in the field at the time of the traffic counts.

Using the data collected, existing traffic operating conditions in the vicinity of the project were determined. The methodology described in the 1994 *Highway Capacity Manual* (HCM) was used to determine the level-of-service (LoS) at the study intersections.

Existing traffic conditions, the LoS concept and the results of the LoS analysis of existing conditions is presented in Chapter 2.

3. Determination of Cumulative Traffic Projections

The year 2003 was used as the design year. This does not necessarily represent the project completion date. It represents occupancy for purposes of conducting the impact analysis. Cumulative traffic conditions are defined as future traffic conditions without the proposed project. A description of the process used to estimate 2003 cumulative traffic volumes and the resulting cumulative traffic projections are presented in Chapter 3.

4. Analysis of Project-Related Traffic Impacts

The next step in the traffic analysis was to estimate the peak-hour traffic that would be generated by the proposed development. This was done using standard trip generation rates published by the Institute of Transportation Engineers.

These trips were distributed based on the available approach and departure routes. The project-related traffic was then superimposed on 2003 cumulative traffic volumes at the subject intersections. The HCM methodology was used again to conduct a LoS analysis for cumulative plus project conditions. The results of this analysis was compared to 2003 cumulative conditions to determine the impacts of this project.

The 2003 cumulative plus project traffic projections are presented in Chapter 4. The analysis of the project-related impacts and the conclusions of the analyses are presented in Chapter 5.

2. ANALYSIS OF EXISTING CONDITIONS

This chapter presents the existing traffic conditions and volumes on the roadways adjacent to the proposed project. The level-of-service concept and the results of the level-of-service analysis for existing conditions are also presented. The purpose of this analysis is to establish the base conditions for the determination of the impacts of the project which are described in a subsequent chapter.

Description of Existing Streets and Intersection Controls

The intersections analyzed and existing lane configurations are shown on Figure 2. Photographs of the roadway in the area are presented as Appendix A.

The intersections of Ala Wai Boulevard at Liliuokalani Avenue and Ala Wai Boulevard at Kanekapolei Street are controlled by traffic signals. The signals are two phased as shown in Figure 2.

The intersection of Ala Wai Boulevard at Kaiulani Avenue is controlled by a STOP sign on the Kaiulani Avenue approach.

Liliuokalani Avenue is a one-lane, one-way roadway in the mauka direction. Unrestricted parking is allowed along both sides between Kuhio Avenue and Mountain View Drive. The section between Mountain View Drive and Ala Wai Boulevard has been widened to provide two left-turn lanes from Liliuokalani Avenue to Ala Wai Boulevard. No parking is allowed along this section.

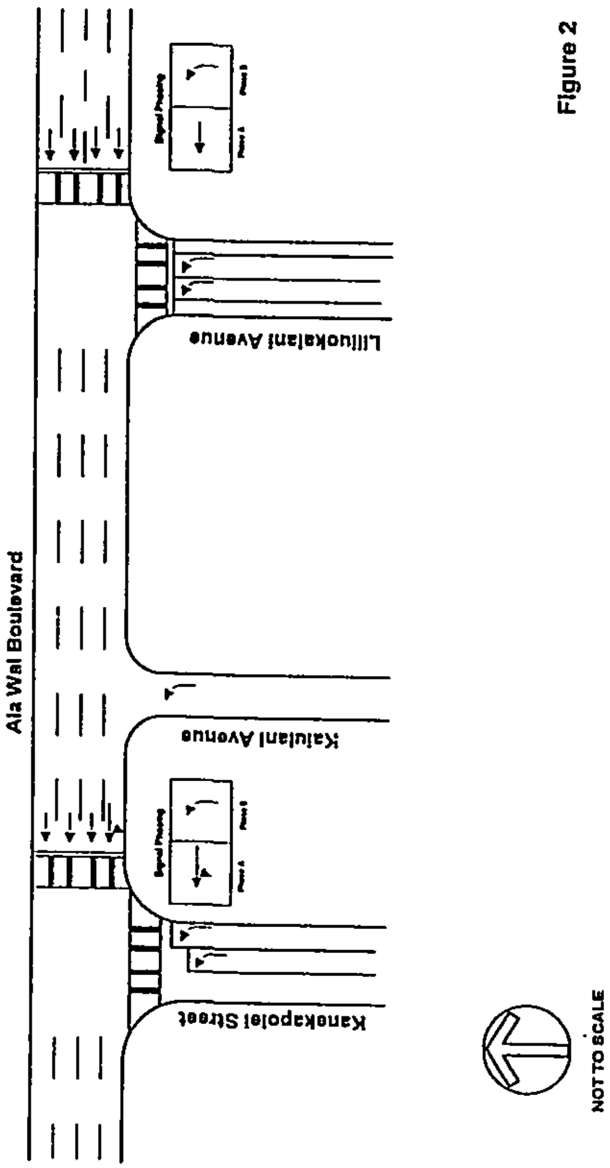

Figure 2
EXISTING CONDITIONS

Ala Wai Boulevard is a major one-way arterial in the Ewa direction. During off-peak periods, Ala Wai Boulevard is three lanes wide and parking is allowed along the mauka side. From 6:30 AM to 8:30 AM and from 3:30 PM to 5:30 PM, parking is prohibited to provide a fourth travel lane.

Kanekapolei Street is a two-way, north-south roadway. The section of roadway immediately south of Ala Wai Boulevard has a passenger loading zone on each side. These loading zones are used for pick up and drop off of tourist from the adjacent hotels.

Kaiulani Avenue is a one-lane, one way street in the Mauka direction.

Existing Peak Hour Traffic Volumes

Morning and afternoon peak hour traffic volumes were obtained for the intersection of Ala Wai Boulevard at Kanekapolei Street and Ala Wai Boulevard at Kaiulani Avenue from counts performed in April and May 1998. These counts were compared to traffic counts performed in April 1996 for the intersection of Ala Wai Boulevard at Liliuokalani Avenue. The 1998 counts were slightly higher than the 1996 counts. The 1998 counts were increased by approximately 2% to correspond to the 1996. The peak hour traffic volumes at the study intersections and along the streets in the study area is shown in Figure 3.

Level-of-Service Concept

Signalized Intersections

The planning method described in the 1994 *Highway Capacity Manual* (HCM) was used to analyze the operating efficiency of the signalized intersections adjacent to the study site. This method involves the calculation of a volume-to-capacity (V/C) ratio which is related to a level-of-service. A maximum intersection capacity based on the number of phases was used for the V/C calculations.

"Level-of-Service" is a term which denotes any of an infinite number of combinations of traffic operating conditions that may occur on a given lane or roadway when it is subjected to various traffic volumes. Level-of-service (LoS) is a qualitative measure of the effect of a number of factors which include space, speed, travel time, traffic interruptions, freedom to maneuver, safety, driving comfort and convenience.

There are six levels-of-service, "A" through "F", which relate to the driving conditions from best to worst, respectively. The characteristics of traffic operations for each level-of-service are summarized in Table 1. In general, LoS "A" represents free-flow conditions with no congestion. LoS "F", on the other hand, represents severe congestion with stop-and-go conditions. Level-of-service "D" is typically considered acceptable for peak hour conditions in urban areas.

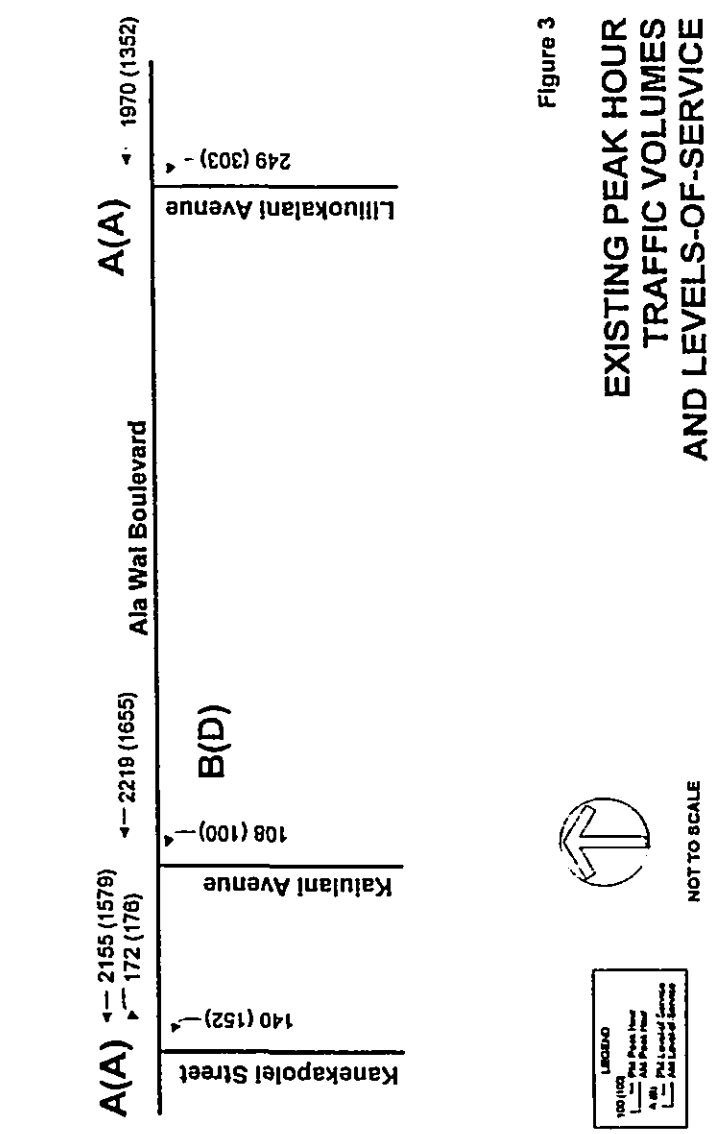

Figure 3

EXISTING PEAK HOUR TRAFFIC VOLUMES AND LEVELS-OF-SERVICE

Table 1 Level-of-Service Definitions for Signalized Intersections[1]

Level of Service	Interpretation	Volume-to-Capacity Ratio[2]	Stopped Delay (Seconds)
A, B	Uncongested operations; all vehicles clear in a single cycle.	0.000-0.700	<15.0
C	Light congestion; occasional backups on critical approaches	0.701-0.800	15.1-25.0
D	Congestion on critical approaches but intersection functional. Vehicles must wait through more than one cycle during short periods. No long standing lines formed.	0.801-0.900	25.1-40.0
E	Severe congestion with some standing lines on critical approaches. Blockage of intersection may occur if signal does not provide protected turning movements.	0.901-1.000	40.1-60.0
F	Total breakdown with stop-and-go operation	>1.001	>60.0

Notes:
(1) Source: *Highway Capacity Manual*, 1994
(2) This is the ratio of the calculated critical volume to Level-of-Service E Capacity.

Corresponding to each level-of-service shown in the table is a volume/capacity ratio. This is the ratio of either existing or projected traffic volumes to the capacity of the intersection. Capacity is defined as the maximum number of vehicles that can be accommodated by the roadway during a specified period of time. The capacity of a particular roadway is dependent upon its physical characteristics such as the number of lanes, the operational characteristics of the roadway (one-way, two-way, turn prohibitions, bus stops, etc.), the type of traffic using the roadway (trucks, buses, etc.) and turning movements.

Unsignalized Intersections

Like signalized intersections, the operating conditions of intersections controlled by stop signs can be classified by a level-of-service from "A" to "F". However, the method for determining level-of-service for unsignalized intersections is based on the use of gaps in traffic on the major street by vehicles crossing or turning through that stream. Specifically, the capacity of the controlled legs of an intersection is based on two factors: 1) the distribution of gaps in the major street traffic stream, and 2) driver judgement in selecting gaps through which to execute a desired maneuver. The criteria for level-of-service at an unsignalized intersection is, therefore, based on delay of each turning movement. Table 2 summarizes the definitions for level-of-service and the corresponding delay. A subsequent calculation to determine an overall LoS was made, and these results are presented in tables to summarize traffic conditions using parameters similar to those used for signalized intersections.

Table 2 Level-of-Service Definitions for Unsignalized Intersections[1]

Level-of-Service	Expected Delay to Minor Street Traffic	Delay (Seconds)
A	Little or no delay	<5
B	Short traffic delays	5.1 to 10.0
C	Average traffic delays	10.1 to 20.0
D	Long traffic delays	20.1 to 30.0
E	Very long traffic delays	30.1 to 45.0
F	See note (2) below	>45.1

Notes:
(1) Source: *Highway Capacity Manual*, 1994.
(2) When demand volume exceeds the capacity of the lane, extreme delays will be encountered with queuing which may cause severe congestion affecting other traffic movements in the intersection. This condition usually warrants improvement of the intersection.

Existing Level-of-Service Analysis

The signalized intersections were analyzed using the signalized level-of-service (LoS) planning method. Results of these analyses are shown in Table 3. The calculated levels-of-service were confirmed by field observations.

The signalized intersections operate at Level-of-Service A/B during the morning and afternoon peak hours, which is acceptable.

Table 3 Existing Level-of-Service Analysis for Signalized Intersections(3)(4)

Intersection	AM Peak Hour		PM Peak Hour	
	V/C(1)	LoS(2)	V/C(1)	LoS(2)
Ala Wai Bl. at Kanekapolei Ave.	0.43	A/B	0.34	A/B
Ala Wai Bl. at Liliuokalani Ave.	0.41	A/B	0.33	A/B

NOTES:
(1) V/C = Volume-to-Capacity Ratio
(2) LoS = Level-of-Service
(3) Level-of-Service calculated using planning method described in *Highway Capacity Manual*.
(4) For calculations, see Appendix C.

The level-of-service analysis for the unsignalized intersections is presented in Table 4. The left turn movement from Kaiulani Avenue was calculated to have a long delay. This long delay was confirmed during the traffic counts. The delay for the traffic turning left were long enough to cause the intersection level-of-service to be "D."

Table 4 Existing Level-of-Service Analysis for Unsignalized Intersections(1)

Intersection	AM Peak Hour		PM Peak Hour	
	Delay	LoS	Delay	LoS
Ala Wai Boulevard at Kaiulani Avenue	9.1	B	26.7	D

NOTE:
(1) For calculations, see Appendix C.
(2) Delay is the average vehicle delay in seconds per vehicle.
(3) LoS denotes Level-of-Service.

3. PROJECTED CUMULATIVE TRAFFIC CONDITIONS

The purpose of this chapter is to discuss the assumptions and data used to estimate 1999 cumulative project traffic conditions. Cumulative traffic conditions are defined as the traffic conditions resulting from background growth and related projects.

Future traffic growth consist of two components. The first is ambient background growth that is a result of regional growth and cannot be attributed to a specific project. This growth rate is typically estimated by analyzing historical counts taken over a period of several years. The second component is estimated traffic that will be generated by other development projects in the vicinity of the proposed project.

Background Traffic Growth Rate

The background growth rate of traffic in the study area was estimated from traffic projections provided in the Waikiki Regional Traffic Impact Study prepared by Kaku Associates in 1995. This study provided as estimate of future trip ends produced within Waikiki for the year 2005. The study estimated that AM peak hour trip ends would increase 11% from 1995 to 2005 and the PM peak hour trip ends would increase 23% for the same period. These increases would represent an average of 1.1% and 2.3% per year increase for the study period. Therefore, existing (1998) AM peak hour traffic volumes were expanded by 1.1% per year for five years to estimate 2003 background growth between 1996 and 2003. PM peak hour traffic volumes were expanded by 2.3% per year for five years for the same period.

Related Project Generated Traffic

The second component in estimating cumulative traffic volumes is the traffic generated by other proposed projects in the vicinity. Related projects are defined as those projects that are under construction or have been approved for construction by the City and would significantly impact traffic in the study area.

It was determined that the expansion factors used to estimate background traffic growth from 1996 to 2003 would include any related projects in the vicinity. It was also determined that the H&M Apartment building project on Liliuokalani Avenue would affect the intersections under study. Traffic projections for this project were obtained from the traffic study[1] prepared for that project.

2003 Cumulative Traffic Volumes

Estimated 2003 cumulative traffic volumes are calculated by applying the background growth rate to existing traffic volumes and adding trips generated by related projects. The resulting 2003 cumulative peak hour traffic projections are shown in Figure 4.

[1] Philip Rowell and Associates, *Traffic Impact Analysis Report for H&M Apartments*, 1996

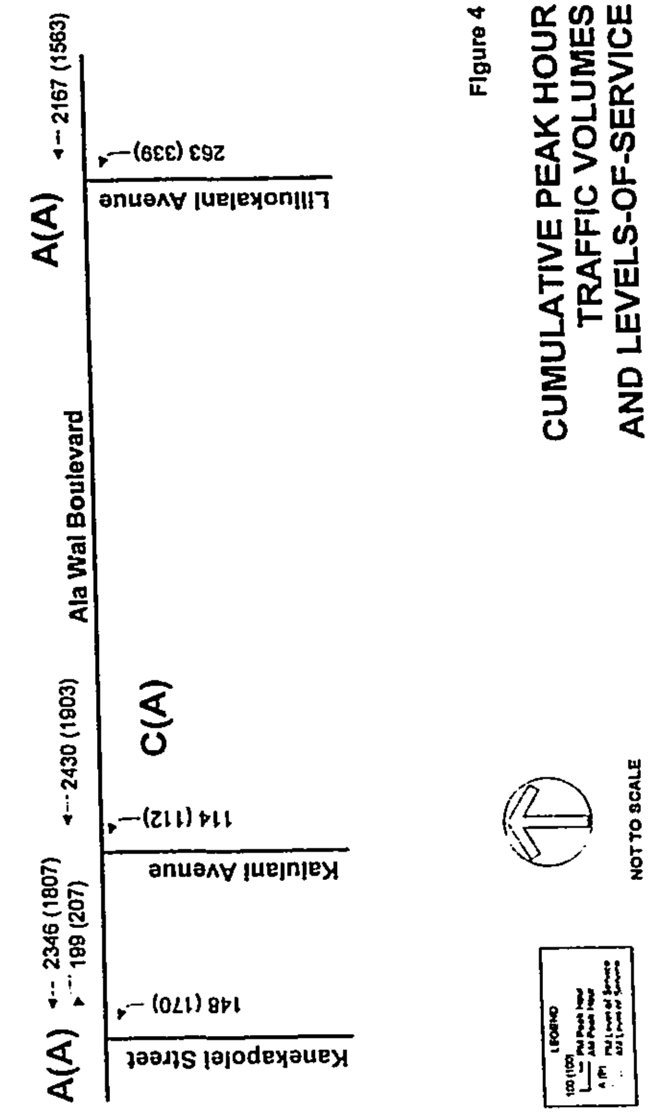

Figure 4
CUMULATIVE PEAK HOUR TRAFFIC VOLUMES AND LEVELS-OF-SERVICE

4. PROJECT-RELATED TRAFFIC CONDITIONS

This chapter discusses the methodology used to identify the traffic-related impacts of the proposed project. Generally, the process involves the determination of weekday and peak-hour trips that would be generated by the proposed project, distribution and assignment of these trips on the approach and departure routes, and finally, determination of the levels-of-service at affected intersections subsequent to implementation of the project.

Trip Generation

Future traffic volumes generated by the project were determined using trip generation factors contained in *Trip Generation*, Fifth Edition, prepared by the Institute of Transportation Engineers. The trip generation calculations were based on rates for Senior Attached Housing (Land Use Code 253). The trip generation analysis and the resulting daily and peak hour volumes are summarized in Table 5.

Trip Distribution and Assignment

The project-related trips were distributed along the anticipated approach routes to the project site. This information was obtained from previously conducted traffic studies in the area, which have been generally accepted by the reviewing agencies.

Table 5 Trip Generation Calculations

Number of Units		283	Units
Period			
Weekday Total		Not Available	
AM Peak Hour of Adjacent Street	0.05	14	
% Inbound	50		7
% Outbound	50		7
PM Peak Hour of Adjacent Street	0.08	23	
% Inbound	62		14
% Outbound	38		9
AM Peak Hour of Generator	0.06	17	
% Inbound	50		9
% Outbound	50		8
PM Peak Hour of Generator	0.11	31	
% Inbound	53		16
% Outbound	47		15

Notes:
(1) Source: Institute of Transportation Engineers, *Trip Generation*, Fifth Edition, 1991.
Trips rates used are for Senior Housing Attached, Land Use Code 253

Using the trip generation and trip distribution previously discussed, project-related traffic was assigned to the various traffic movements at the intersections studied. The trip distribution and assignments are shown in Figure 5.

2003 Cumulative Plus Project Peak Hour Traffic Volumes

Future traffic volumes with the project were determined by superimposing the project-generated traffic on the 2003 cumulative traffic volumes presented in Chapter 3. The resulting peak hour traffic volumes for 2003 cumulative plus project conditions on Figure 6. The peak hour volumes shown is the sum of future cumulative peak hour traffic plus peak hour traffic generated by the project. This calculation assumes that the peak hour of the project coincides with the background peak hour. The resulting peak hour is therefore an overestimate since the ITE trip generation data indicates that the trip generation rates during the street peak hour is less that the rates for the project peak hour as shown in Table 5.

The traffic projection worksheets are presented as Appendix B.

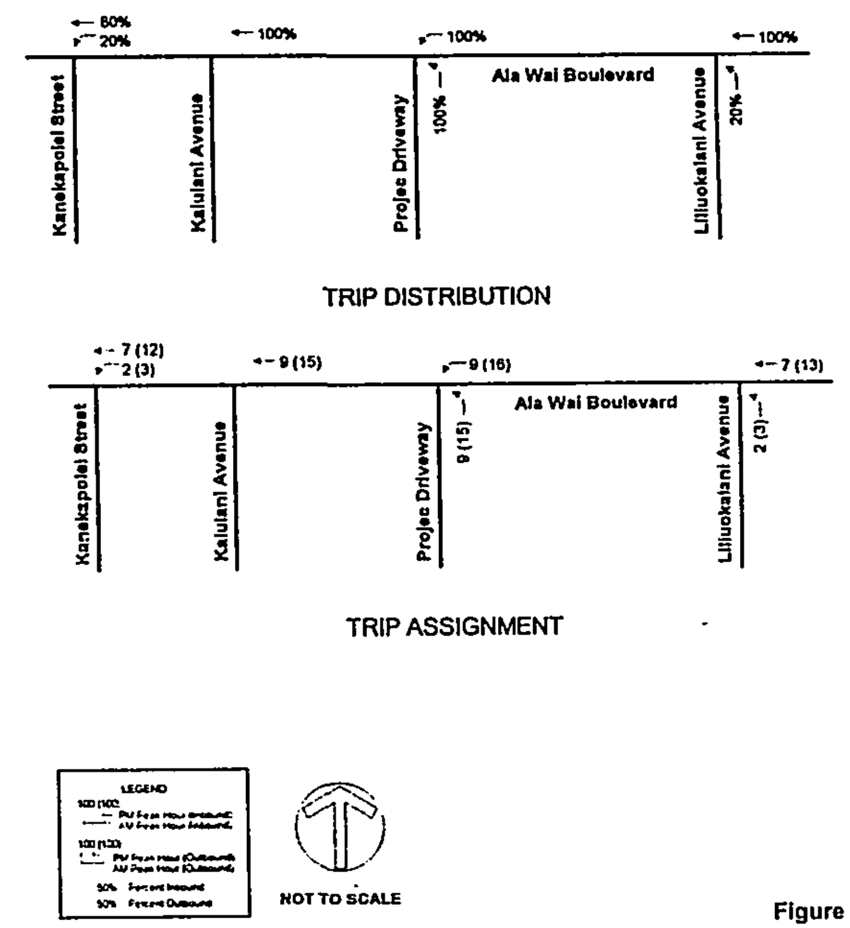

Figure 5

TRIP DISTRIBUTION AND ASSIGNMENT

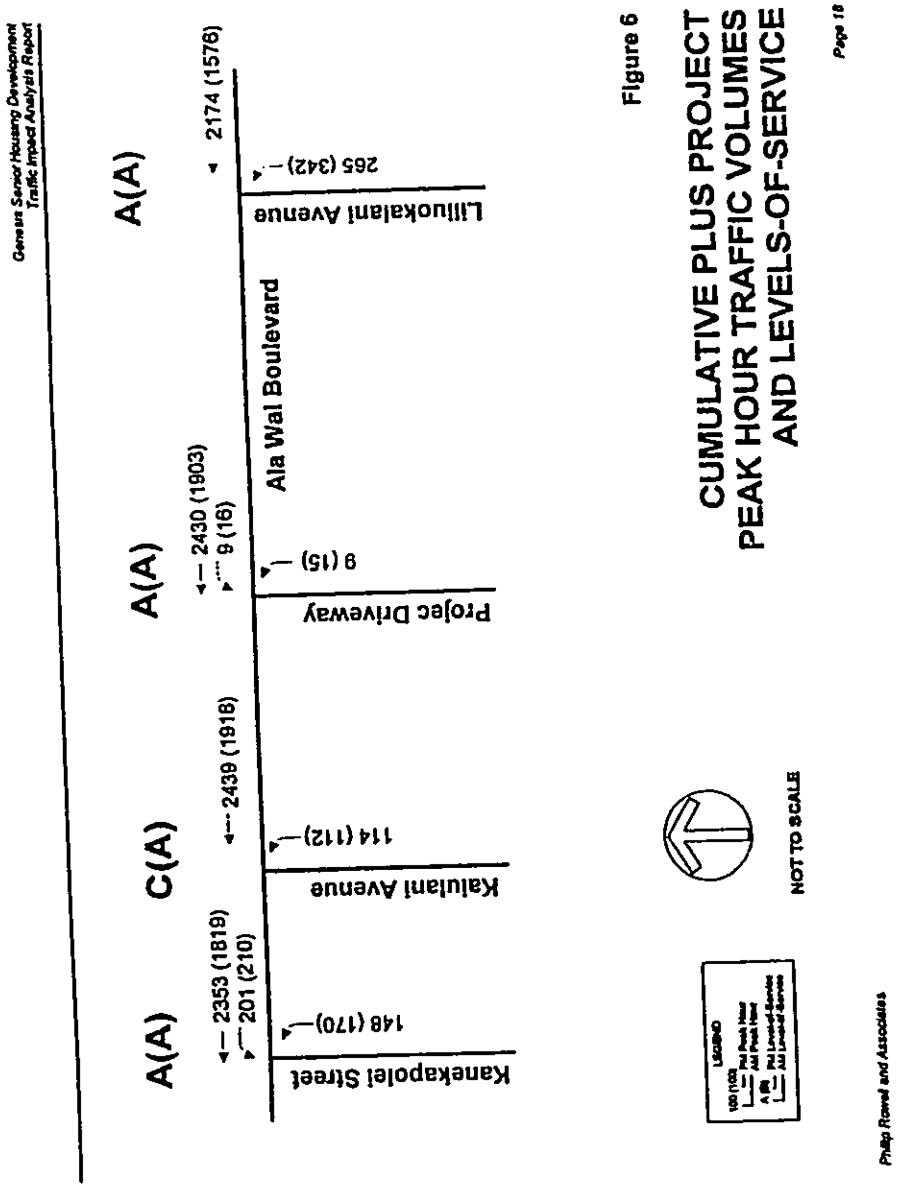

Figure 6

CUMULATIVE PLUS PROJECT PEAK HOUR TRAFFIC VOLUMES AND LEVELS-OF-SERVICE

5. CONCLUSIONS AND RECOMMENDATIONS

The purpose of this chapter is to present the results of the level-of-service analysis, which identifies the project-related impacts. In addition, any mitigation measures necessary and feasible are identified and other access, egress and circulation issues are discussed.

Definition of Significant Impacts

Criteria for determining if a project has a significant traffic impact for which mitigation measures must be investigated have been established based on traffic impact study guidelines used in other traffic studies. Generally, the criteria are as follows: if the level-of-service (LOS) without the project is E or F and the volume/capacity (V/C) ratio changes less than 0.020, the project's traffic impacts are considered insignificant. However, if the V/C ratio change is greater than 0.020, then mitigation measures which will reduce the V/C ratio change to less than 0.020 must be identified. If the LOS with the project is D or better, then no mitigation measures need to be identified.

The above criteria has been used in the traffic impact studies for the Hawaii Convention Center and the Waikiki Regional Traffic Impact Study prepared for the City and County of Honolulu Department of Transportation Service and therefore has been used for this study.

Project Related Traffic Impacts and Mitigation Measures

The level-of-service analysis for 2003 are summarized in Tables 6 and 7. During both peak periods, the signalized intersections are expected to operate at LOS A. The level-of-service is the same for without project and with project conditions. In conclusion, the project has no impact of the level-of-service of the intersections of Ala Wai Boulevard at Kanekapolei Street and Ala Wai Boulevard at Liliuokalani Avenue.

Table 6 Level-of-Service Analysis for Signalized Intersections[3]

Intersection	AM Peak Hour				PM Peak Hour			
	Without Project		With Project		Without Project		With Project	
	V/C[1]	LoS[2]	V/C[1]	LoS[2]	V/C[1]	LoS[2]	V/C[1]	LoS[2]
Ala Wai Bl. at Kanekapolei St.	0.47	A	0.47	A	0.39	A	0.39	A
Ala Wai Bl. at Liliuokalani Av.	0.45	A	0.45	A	0.37	A	0.38	A

NOTES:
(1) V/C = Volume-to-Capacity Ratio
(2) LoS = Level-of-Service
(3) Level-of-Service calculated using planning method described in *Highway Capacity Manual*.

Table 7 Level-of-Service Analysis for Unsignalized Intersections

Intersection	AM Peak Hour		PM Peak Hour	
	Delay	LoS	Delay	LoS
Ala Wai Bl at Kaiulani Avenue				
Without Project	17.1	C	4.2	A
With Project	17.4	C	4.4	A
Ala Wai Bl at Project Driveway				
With Project Only	0.2	A	0.2	A

NOTES:
(1) V/C = Volume-to-Capacity Ratio
(2) LoS = Level-of-Service
(3) Level-of-Service calculated using planning method described in *Highway Capacity Manual*.

For the unsignalized intersections the levels-of-service are not as good. Future levels-of-service for the intersection of Ala Wai Boulevard at Kaiulani Avenue are 'C' and 'A' for cumulative and cumulative plus project conditions, respectively. As under existing conditions, the reduced level-of-service is the result of the long delays for left turns onto Ala Wai Boulevard. However, the increased delay from cumulative to cumulative plus project conditions is minimal.

Left turns from the project driveway will also have long delays. However, the overall intersection level-of-service is expected to be 'A' or better.

Conclusions and Summary

Traffic related impacts at the study intersections are minimal and no mitigation measure are required. All intersections should operate at better than acceptable levels-of-service upon completion of the project.

APPENDIX A

PHOTOGRAPHS OF STUDY INTERSECTIONS

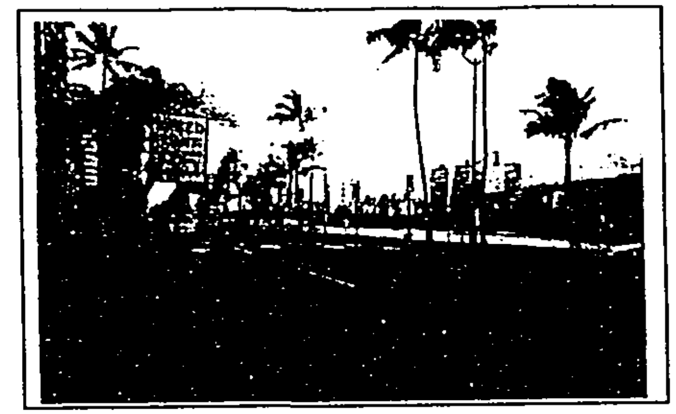

Figure A-1.
Looking west along Ala Wai Blvd. From east of Kanekapolei St.

Figure A-2.
Looking east along Ala Wai Blvd. from west of Kanekapolei St.

Figure A-3.
Looking north along Kanekapolei St. toward Ala Wai Blvd.

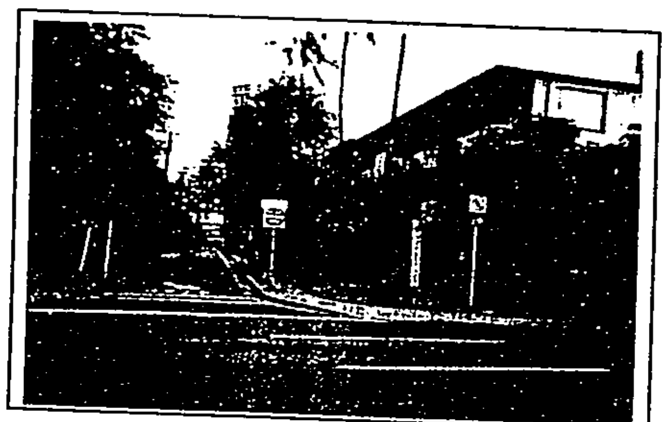

Figure A-4.
Looking south along Kaiulani Ave. from Ala Wai Blvd.

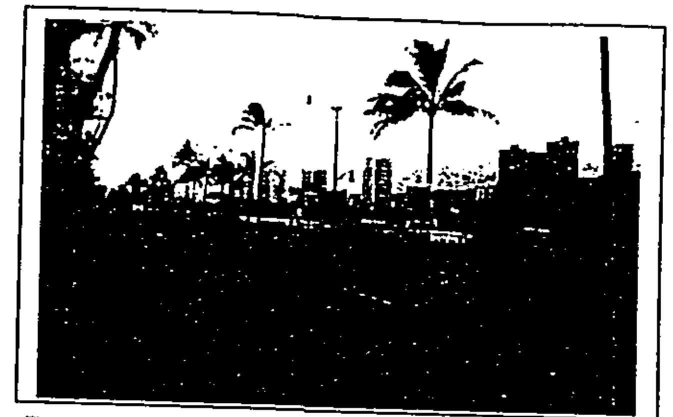

Figure A-7.
Looking west along Ala Wai Blvd. from east of Liliuokalani Ave.

APPENDIX B

TRAFFIC PROJECTION WORKSHEETS

Part 4
TRIP ASSIGNMENT WORKSHEET
Genesis Senior Housing Development TIAR
April 1998

Intersection No. 1
Intersection of. Ala Wai Boulevard at Kanekapolei Street

No	Approach & Mvt	Existing AM	Existing PM	2003 Background AM	2003 Background PM	Related Trips AM	Related Trips PM	2003 Cumulative AM	2003 Cumulative PM	Project Trips AM Peak Hour In	Project Trips AM Peak Hour Out	Project Trips AM Peak Hour Total	Project Trips PM Peak Hour In	Project Trips PM Peak Hour Out	Project Trips PM Peak Hour Total	2003 Cumulative Plus AM	2003 Cumulative Plus PM
1	N- RT	0	0	0	0	0	0	0	0			0			0	0	0
2	TH	0	0	0	0	0	0	0	0			0			0	0	0
3	LT	0	0	0	0	0	0	0	0			0			0	0	0
4	E- RT	0	0	0	0	0	0	0	0			0			0	0	0
5	TH	2155	1579	2276	1768	70	39	2346	1807		7	7		12	12	2353	1819
6	LT	172	176	182	197	17	10	199	207		2	2		3	3	201	210
7	S- RT	0	0	0	0	0	0	0	0			0			0	0	0
8	TH	0	0	0	0	0	0	0	0			0			0	0	0
9	LT	140	152	148	170	0	0	148	170			0			0	148	170
10	W- RT	0	0	0	0	0	0	0	0			0			0	0	0
11	TH	0	0	0	0	0	0	0	0			0			0	0	0
12	LT	0	0	0	0	0	0	0	0			0			0	0	0
TOTAL		2487	1907	2606	2135	87	49	2693	2184	0	9	9	0	15	15	2702	2199
Approach Totals																	
From North		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
From East		2327	1755	2458	1965	87	49	2545	2014	0	9	9	0	15	15	2554	2029
From South		140	152	148	170	0	0	148	170	0	0	0	0	0	0	148	170
From West		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total		2487	1907	2606	2135	87	49	2693	2184	0	9	9	0	15	15	2702	2199
To North		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
To East		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
To South		172	176	182	197	17	10	199	207	0	2	2	0	3	3	201	210
To West		2295	1731	2424	1938	70	39	2494	1977	0	7	7	0	12	12	2501	1989
Total		2487	1907	2606	2135	87	49	2693	2184	0	9	9	0	15	15	2702	2199
Leg Totals																	
North		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
East		2327	1755	2458	1965	87	49	2545	2014	0	9	9	0	15	15	2554	2029
South		312	328	330	367	17	10	347	377	0	2	2	0	3	3	349	380
West		2295	1731	2424	1938	70	39	2494	1977	0	7	7	0	12	12	2501	1989
Total		4834	3814	5212	4270	174	98	5386	4368	0	18	18	0	30	30	5404	4398

TRIP ASSIGNMENT WORKSHEET
Genesis Senior Housing Development TIAR
April 1998

INTERSECTION NO 2
INTERSECTION OF Ala Wai Boulevard at Kalakaua Avenue

No	Approach & Mvt	Existing AM	Existing PM	2003 Background AM	2003 Background PM	Related Trips AM	Related Trips PM	2003 Cumulative AM	2003 Cumulative PM	Project Trips AM Peak Hour In	Project Trips AM Peak Hour Out	Project Trips AM Peak Hour Total	Project Trips PM Peak Hour In	Project Trips PM Peak Hour Out	Project Trips PM Peak Hour Total	2003 Cumulative Plus AM	2003 Cumulative Plus PM
1	N- RT	0	0	0	0	0	0	0	0			0			0	0	0
2	TH	0	0	0	0	0	0	0	0			0			0	0	0
3	LT	0	0	0	0	0	0	0	0			0			0	0	0
4	E- RT	0	0	0	0	0	0	0	0			0			0	0	0
5	TH	2219	1655	2343	1854	87	49	2430	1903		9	9		15	15	2439	1918
6	LT	0	0	0	0	0	0	0	0			0			0	0	0
7	S- RT	0	0	0	0	0	0	0	0			0			0	0	0
8	TH	0	0	0	0	0	0	0	0			0			0	0	0
9	LT	108	100	114	112	0	0	114	112			0			0	114	112
10	W- RT	0	0	0	0	0	0	0	0			0			0	0	0
11	TH	0	0	0	0	0	0	0	0			0			0	0	0
12	LT	0	0	0	0	0	0	0	0			0			0	0	0
TOTAL		2327	1755	2457	1966	87	49	2544	2015	0	9	9	0	15	15	2553	2030

	Existing AM	Existing PM	2003 Background AM	2003 Background PM	Related Trips AM	Related Trips PM	2003 Cumulative AM	2003 Cumulative PM	AM In	AM Out	AM Total	PM In	PM Out	PM Total	2003 Cumulative Plus AM	2003 Cumulative Plus PM
Approach Totals																
From North	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
From East	2219	1655	2343	1854	87	49	2430	1903	0	9	9	0	15	15	2439	1918
From South	108	100	114	112	0	0	114	112	0	0	0	0	0	0	114	112
From West	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	2327	1755	2457	1966	87	49	2544	2015	0	9	9	0	15	15	2553	2030
Departure Totals																
To North	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
To East	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
To South	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
To West	2327	1755	2457	1966	87	49	2544	2015	0	9	9	0	15	15	2553	2030
Total	2327	1755	2457	1966	87	49	2544	2015	0	9	9	0	15	15	2553	2030
Leg Totals																
North	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
East	2219	1655	2343	1854	87	49	2430	1903	0	9	9	0	15	15	2439	1918
South	108	100	114	112	0	0	114	112	0	0	0	0	0	0	114	112
West	2327	1755	2457	1966	87	49	2544	2015	0	9	9	0	15	15	2553	2030
Total	4654	3510	4914	3932	174	98	5088	4030	0	18	18	0	30	30	5106	4060

TRIP ASSIGNMENT WORKSHEET
Genesis Senior Housing Development TIAR
April 1998

INTERSECTION NO 3
INTERSECTION OF Ala Wai Boulevard at Liliuokalani Avenue

No	Approach & Mvt	Existing AM	Existing PM	2003 Background AM	2003 Background PM	Related Trips AM	Related Trips PM	2003 Cumulative AM	2003 Cumulative PM	Project Trips AM Peak Hour In	Project Trips AM Peak Hour Out	Project Trips AM Peak Hour Total	Project Trips PM Peak Hour In	Project Trips PM Peak Hour Out	Project Trips PM Peak Hour Total	2003 Cumulative Plus AM	2003 Cumulative Plus PM
1	N- RT	0	0	0	0	0	0	0	0			0			0	0	0
2	TH	0	0	0	0	0	0	0	0			0			0	0	0
3	LT	0	0	0	0	0	0	0	0			0			0	0	0
4	E- RT	0	0	0	0	0	0	0	0			0			0	0	0
5	TH	1970	1352	2080	1514	87	49	2167	1563	7		7	13		13	2174	1576
6	LT	0	0	0	0	0	0	0	0			0			0	0	0
7	S- RT	0	0	0	0	0	0	0	0			0			0	0	0
8	TH	249	303	263	339	0	0	263	339	2		2	3		3	265	342
9	LT	0	0	0	0	0	0	0	0			0			0	0	0
10	W- RT	0	0	0	0	0	0	0	0			0			0	0	0
11	TH	0	0	0	0	0	0	0	0			0			0	0	0
12	LT	0	0	0	0	0	0	0	0			0			0	0	0
TOTAL		2219	1655	2343	1853	87	49	2430	1902	9	0	9	16	0	16	2439	1918

	Existing AM	Existing PM	2003 Background AM	2003 Background PM	Related Trips AM	Related Trips PM	2003 Cumulative AM	2003 Cumulative PM	AM In	AM Out	AM Total	PM In	PM Out	PM Total	2003 Cumulative Plus AM	2003 Cumulative Plus PM
Approach Totals																
From North	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
From East	1970	1352	2080	1514	87	49	2167	1563	7	0	7	13	0	13	2174	1576
From South	249	303	263	339	0	0	263	339	2	0	2	3	0	3	265	342
From West	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	2219	1655	2343	1853	87	49	2430	1902	9	0	9	16	0	16	2439	1918
Departure Totals																
To North	249	303	263	339	0	0	263	339	2	0	2	3	0	3	265	342
To East	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
To South	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
To West	1970	1352	2080	1514	87	49	2167	1563	7	0	7	13	0	13	2174	1576
Total	2219	1655	2343	1853	87	49	2430	1902	9	0	9	16	0	16	2439	1918
Leg Totals																
North	249	303	263	339	0	0	263	339	2	0	2	3	0	3	265	342
East	1970	1352	2080	1514	87	49	2167	1563	7	0	7	13	0	13	2174	1576
South	249	303	263	339	0	0	263	339	2	0	2	3	0	3	265	342
West	1970	1352	2080	1514	87	49	2167	1563	7	0	7	13	0	13	2174	1576
Total	4438	3310	4686	3706	174	98	4860	3804	18	0	18	32	0	32	4878	3836

TRIP ASSIGNMENT WORKSHEET
Genesis Senior Housing Development TIAR
April 1998

INTERSECTION NO 4
INTERSECTION OF Ala Wai Boulevard at Project Driveway

No	Approach & Mvt	Existing AM	Existing PM	2003 Background AM	2003 Background PM	Related Trips AM	Related Trips PM	2003 Cumulative AM	2003 Cumulative PM	Project Trips AM Peak Hour In	Project Trips AM Peak Hour Out	Project Trips AM Peak Hour Total	Project Trips PM Peak Hour In	Project Trips PM Peak Hour Out	Project Trips PM Peak Hour Total	2003 Cumulative Plus AM	2003 Cumulative Plus PM
1	N- RT	0	0	0	0	0	0	0	0			0			0	0	0
2	TH	0	0	0	0	0	0	0	0			0			0	0	0
3	LT	0	0	0	0	0	0	0	0			0			0	0	0
4	E- RT	0	0	0	0	0	0	0	0			0			0	0	0
5	TH	2219	1855	2343	1854	87	49	2430	1903			0			0	2430	1903
6	LT	0	0	0	0	0	0	0	0	9		9	16		16	9	16
7	S- RT	0	0	0	0	0	0	0	0			0			0	0	0
8	TH	0	0	0	0	0	0	0	0			0			0	0	0
9	LT	0	0	0	0	0	0	0	0		9	9		15	15	9	15
10	W- RT	0	0	0	0	0	0	0	0			0			0	0	0
11	TH	0	0	0	0	0	0	0	0			0			0	0	0
12	LT	0	0	0	0	0	0	0	0			0			0	0	0
TOTAL		2219	1855	2343	1854	87	49	2430	1903	9	9	18	16	15	31	2448	1934
Approach Totals																	
From North		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
From East		2219	1855	2343	1854	87	49	2430	1903	9	0	9	16	0	16	2439	1919
From South		0	0	0	0	0	0	0	0	0	9	9	0	15	15	9	15
From West		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total		2219	1855	2343	1854	87	49	2430	1903	9	9	18	16	15	31	2448	1934
Departure Totals																	
To North		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
To East		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
To South		0	0	0	0	0	0	0	0	9	0	9	16	0	16	9	16
To West		2219	1855	2343	1854	87	49	2430	1903	0	9	9	0	15	15	2439	1918
Total		2219	1855	2343	1854	87	49	2430	1903	9	9	18	16	15	31	2448	1934
Leg Totals																	
North		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
East		2219	1855	2343	1854	87	49	2430	1903	9	0	9	16	0	16	2439	1919
South		0	0	0	0	0	0	0	0	9	9	18	16	15	31	18	31
West		2219	1855	2343	1854	87	49	2430	1903	0	9	9	0	15	15	2439	1918
Total		4438	3310	4686	3708	174	98	4860	3806	18	18	36	32	30	62	4896	3868

APPENDIX C

LEVEL-OF-SERVICE CALCULATIONS

HIGHWAY CAPACITY MANUAL SIGNALIZED INTERSECTION PLANNING METHOD
LANE VOLUME WORKSHEET

File name: Date: 04-29-1998 Time Period: AM Peak
Hour

(E/W): Ala Wai Boulevard (N/S): Kanekapolei Street Analyst : PJR

Peak hour factor: .9

Comment: Existing Conditions

	EAST BOUND	WEST BOUND	NORTH BOUND	SOUTH BOUND
LEFT TURN MOVEMENT				
1. LT volume	0	172	140	0
2. Opposing mainline volume	N/A	0	0	N/A
3. Number of exclusive LT lanes	0	0	2	0
Cross Product [2] * [1]	N/A	0	0	N/A
Left Lane Configuration (E=Excl, S=Shrd):		S	E	
Left Turn Treatment Type:	P+P	NOpp	NOpp	NOpp
4. LT adjustment factor	N/A	.95	.92	N/A
5. LT lane vol	N/A	0	0	N/A
RIGHT TURN MOVEMENT				
Right Lane Configuration (E=Excl, S=Shrd)	S	S	S	S
6. RT volume	0	0	0	0
7. Exclusive lanes	N/A	N/A	N/A	N/A
8. RT adjustment factor	.85	.85	.85	.85
9. Exclusive RT lane volume	0	0	0	0
10. Shared lane vol	0	0	0	0
THROUGH MOVEMENT				
11. Thru volume	0	2155	0	0
12. Parking adjustment factor	1	1	1	1
13. No. of thru lanes including shared	0	4	0	0
14. Total approach volume	0	2327	76	0
15. Prop. of left turns in lane group	N/A	N/A	N/A	N/A
16. Left turn equivalence				
17. LT adj. factor:	N/A	N/A	N/A	N/A
18. Through lane volume	0	582	76	0
19. Critical lane volume	0	582	76	0

Left Turn Check (if [16] > 8)
20. Permitted left turn sneaker capacity:
7200/Cmax

HIGHWAY CAPACITY MANUAL SIGNALIZED INTERSECTION PLANNING METHOD
SIGNAL OPERATIONS WORKSHEET

File name: Date: 04-29-1998 Time Period: AM Peak
Hour

(E/W): Ala Wai Boulevard (N/S): Kanekapolei Street Analyst : PJR

		EAST BOUND	WEST BOUND	NORTH BOUND	SOUTH BOUND
Phase Plan Selection from Lane Volume Worksheet					
Critical through-RT vol: [19]		0	582	76	0
LT lane vol: [5]		N/A	0	0	N/A
Left turn protection: (P/U/N)		P	N	N	N
Dominant left turn: (Indicate by '*')				*	
Selection Criteria based on the specified left turn protection	Plan 1:	U	U	U	U
	Plan 2a:	U	P	U	P
	Plan 2b:	P	U	P	U
* Indicates the dominant left turn for each opposing pair	Plan 3a:	*P	P	*P	P
	Plan 3b:	P	*P	P	*P
	Plan 4:	N	N	N	N
Phase plan selected (1 to 4)		4		4	

Min. cycle (Cmin) 60 Max. cycle (Cmax) 120

Timing Plan	Value	EAST-WEST Ph 1	EAST-WEST Ph 2	EAST-WEST Ph 3	NORTH-SOUTH Ph 1	NORTH-SOUTH Ph 2	NORTH-SOUTH Ph 3
Movement codes		ETL	WTL		NTL	STL	
Critical phase vol [CV]		0	582	0	76	0	0
Critical sum [CS]	658						
CBD adjustment [CBD]	1						
Reference sum [RS]	1539						
Lost time/phase [PL]		3	3	0	3	3	0
Lost time/cycle [TL]	12						
Cycle length [CYC]	60						
Green time		3	45.5	0	8.5	3	0
Critical v/c ratio [Xcm]	0.43						
Status	Under capacity.						

HIGHWAY CAPACITY MANUAL SIGNALIZED INTERSECTION PLANNING METHOD
LANE VOLUME WORKSHEET

File name: IPMEX.HC9   Date: 04-29-1998   Time Period: PM Peak Hour

(E/W): Ala Wai Boulevard   (N/S): Kanekapolei Street   Analyst : PJR

Peak hour factor: .9

Comment: Existing Conditions

	EAST BOUND	WEST BOUND	NORTH BOUND	SOUTH BOUND
LEFT TURN MOVEMENT				
1. LT volume	0	176	152	0
2. Opposing mainline volume	N/A	0	0	N/A
3. Number of exclusive LT lanes	0	0	2	0
Cross Product [2] * [1]	N/A	0	0	N/A
Left Lane Configuration (E=Excl, S=Shrd):		S	E	
Left Turn Treatment Type:	P+P	NOpp	NOpp	NOpp
4. LT adjustment factor	N/A	.95	.92	N/A
5. LT lane vol	N/A	0	0	N/A
RIGHT TURN MOVEMENT				
Right Lane Configuration (E=Excl, S=Shrd)	S	S	S	S
6. RT volume	0	0	0	0
7. Exclusive lanes	N/A	N/A	N/A	N/A
8. RT adjustment factor	.85	.85	.85	.85
9. Exclusive RT lane volume	0	0	0	0
10. Shared lane vol	0	0	0	0
THROUGH MOVEMENT				
11. Thru volume	0	1579	0	0
12. Parking adjustment factor	1	1	1	1
13. No. of thru lanes including shared	0	4	0	0
14. Total approach volume	0	1755	83	0
15. Prop. of left turns in lane group	N/A	N/A	N/A	N/A
16. Left turn equivalence				
17. LT adj. factor:	N/A	N/A	N/A	N/A
18. Through lane volume	0	439	83	0
19. Critical lane volume	0	439	83	0

Left Turn Check (if [16] > 8)
20. Permitted left turn sneaker capacity:
7200/Cmax

HIGHWAY CAPACITY MANUAL SIGNALIZED INTERSECTION PLANNING METHOD
SIGNAL OPERATIONS WORKSHEET

File name: IPMEX.HC9   Date: 04-29-1998   Time Period: PM Peak Hour

(E/W): Ala Wai Boulevard   (N/S): Kanekapolei Street   Analyst : PJR

Phase Plan Selection from Lane Volume Worksheet		EAST BOUND	WEST BOUND	NORTH BOUND	SOUTH BOUND
Critical through-RT vol: [19]		0	439	83	0
LT lane vol: [5]		N/A	0	0	N/A
Left turn protection: (P/U/N)		P	N	N	N
Dominant left turn: (Indicate by '*')				*	
Selection Criteria based on the specified left turn protection	Plan 1:	U	U	U	U
	Plan 2a:	U	P	U	P
	Plan 2b:	P	U	P	U
* Indicates the dominant left turn for each opposing pair	Plan 3a:	*P	P	*P	P
	Plan 3b:	P	*P	P	*P
	Plan 4:	N	N	N	N
Phase plan selected (1 to 4)		4		4	

Min. cycle (Cmin) 60   Max. cycle (Cmax) 120

Timing Plan	Value	EAST-WEST Ph 1	EAST-WEST Ph 2	EAST-WEST Ph 3	NORTH-SOUTH Ph 1	NORTH-SOUTH Ph 2	NORTH-SOUTH Ph 3
Movement codes		ETL	WTL		NTL	STL	
Critical phase vol [CV]		0	439	0	83	0	0
Critical sum [CS]	522						
CBD adjustment [CBD]	1						
Reference sum [RS]	1539						
Lost time/phase [PL]		3	3	0	3	3	0
Lost time/cycle [TL]	12						
Cycle length [CYC]	60						
Green time		3	43.4	0	10.6	3	0
Critical v/c ratio [Xcm]	0.34						
Status	Under capacity.						

HCS: Unsignalized Intersections   Release 2.1d   2AMEX.HC0   Page 1

Phillip Rowell And Associates
47-273 'D' Hui Iwa Street
Kaneohe, HI 96744-
Ph: (808) 239-8206

Streets: (N-S) Kaiulani Avenue   (E-W) Ala Wai Boulevard
Major Street Direction.... EW
Length of Time Analyzed... 15 (min)
Analyst................... PJR
Date of Analysis.......... 4/29/98
Other Information.........Existing AM Peak Hour
Two-way Stop-controlled Intersection

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	0	0	0	4	0	1	0	0	0	0	0
Stop/Yield			N			N						
Volumes					2219		108					
PHF					.9		.9					
Grade					0			0				
MC's (%)												
SU/RV's (%)												
CV's (%)												
PCE's							1.10					

Adjustment Factors

Vehicle Maneuver	Critical Gap (tg)	Follow-up Time (tf)
Left Turn Major Road	5.50	2.10
Right Turn Minor Road	5.50	2.60
Through Traffic Minor Road	6.50	3.30
Left Turn Minor Road	*5.00	*2.10

HCS: Unsignalized Intersections   Release 2.1d   2AMEX.HC0   Page 2

Worksheet for TWSC Intersection

Step 4: LT from Minor Street	NB	SB
Conflicting Flows: (vph)	2466	
Potential Capacity: (pcph)	115	
Major LT, Minor TH Impedance Factor:	1.00	
Adjusted Impedance Factor:	1.00	
Capacity Adjustment Factor due to Impeding Movements	1.00	
Movement Capacity: (pcph)	115	

Intersection Performance Summary

Movement	Flow Rate (pcph)	Move Cap (pcph)	Shared Cap (pcph)	Avg. Total Delay (sec/veh)	95% Queue Length (veh)	LOS	Approach Delay (sec/veh)
NB L	132	115		196.0	6.7	F	
							196.0

Intersection Delay = 9.1 sec/veh

```
HCS: Unsignalized Intersections   Release 2.1d    2PMEX.HCO      Page 1
========================================================================
Phillip Rowell And Associates
47-273 'D' Hui Iwa Street
Kaneohe, HI   96744-
Ph: (808) 239-8206
========================================================================
Streets: (N-S) Kaiulani Avenue          (E-W) Ala Wai Boulevard
Major Street Direction.... EW
Length of Time Analyzed... 15 (min)
Analyst................... PJR
Date of Analysis.......... 4/29/98
Other Information.........Existing PM Peak Hour
Two-way Stop-controlled Intersection
========================================================================
```

	Eastbound L	Eastbound T	Eastbound R	Westbound L	Westbound T	Westbound R	Northbound L	Northbound T	Northbound R	Southbound L	Southbound T	Southbound R
No. Lanes	0	0	0	0	4	0	1	0	0	0	0	0
Stop/Yield			N			N						
Volumes					1655		100					
PHF					.9		.9					
Grade					0			0				
MC's (%)												
SU/RV's (%)												
CV's (%)												
PCE's							1.10					

Adjustment Factors

Vehicle Maneuver	Critical Gap (tg)	Follow-up Time (tf)
Left Turn Major Road	5.50	2.10
Right Turn Minor Road	5.50	2.60
Through Traffic Minor Road	6.50	3.30
Left Turn Minor Road	7.00	3.40


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HCS: Unsignalized Intersections   Release 2.1d    2PMEX.HCO      Page 2
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Worksheet for TWSC Intersection

Step 4: LT from Minor Street	NB	SB
Conflicting Flows: (vph)	1839	
Potential Capacity: (pcph)	71	
Major LT, Minor TH Impedance Factor:	1.00	
Adjusted Impedance Factor:	1.00	
Capacity Adjustment Factor due to Impeding Movements	1.00	
Movement Capacity: (pcph)	71	

Intersection Performance Summary

Movement	Flow Rate (pcph)	Move Cap (pcph)	Shared Cap (pcph)	Avg. Total Delay (sec/veh)	95% Queue Length (veh)	LOS	Approach Delay (sec/veh)
NB L	122	71		467.9	8.7	F	467.9

Intersection Delay = 26.7 sec/veh

HIGHWAY CAPACITY MANUAL SIGNALIZED INTERSECTION PLANNING METHOD
LANE VOLUME WORKSHEET

File name: 3AMEX.HC9 Date: 04-29-1998 Time Period: AM Peak
Hour

(E/W): Ala Wai Boulevard (N/S): LILIUOKALANI street Analyst : PJR

Peak hour factor: .9

Comment: Existing Conditions

	EAST BOUND	WEST BOUND	NORTH BOUND	SOUTH BOUND
LEFT TURN MOVEMENT				
1. LT volume	0	0	249	0
2. Opposing mainline volume	N/A	N/A	0	N/A
3. Number of exclusive LT lanes	0	0	2	0
Cross Product [2] * [1]	N/A	N/A	0	N/A
Left Lane Configuration (E=Excl, S=Shrd):		S	E	
Left Turn Treatment Type:	P+P	NOpp	NOpp	NOpp
4. LT adjustment factor	N/A	N/A	.92	N/A
5. LT lane vol	N/A	N/A	0	N/A
RIGHT TURN MOVEMENT				
Right Lane Configuration (E=Excl, S=Shrd)	S	S	S	S
6. RT volume	0	0	0	0
7. Exclusive lanes	N/A	N/A	N/A	N/A
8. RT adjustment factor	.85	.85	.85	.85
9. Exclusive RT lane volume	0	0	0	0
10. Shared lane vol	0	0	0	0
THROUGH MOVEMENT				
11. Thru volume	0	1970	0	0
12. Parking adjustment factor	1	1	1	1
13. No. of thru lanes including shared	0	4	0	0
14. Total approach volume	0	1970	135	0
15. Prop. of left turns in lane group	N/A	N/A	N/A	N/A
16. Left turn equivalence				
17. LT adj. factor:	N/A	N/A	N/A	N/A
18. Through lane volume	0	492	135	0
19. Critical lane volume	0	492	135	0

Left Turn Check (if [16] > 8)
20. Permitted left turn sneaker capacity:
7200/Cmax

HIGHWAY CAPACITY MANUAL SIGNALIZED INTERSECTION PLANNING METHOD
SIGNAL OPERATIONS WORKSHEET

File name: 3AMEX.HC9 Date: 04-29-1998 Time Period: AM Peak
Hour

(E/W): Ala Wai Boulevard (N/S): LILIUOKALANI street Analyst : PJR

	EAST BOUND	WEST BOUND	NORTH BOUND	SOUTH BOUND
Phase Plan Selection from Lane Volume Worksheet				
Critical through-RT vol: [19]	0	492	135	0
LT lane vol: [5]	N/A	N/A	0	N/A
Left turn protection: (P/U/N)	P	N	N	N
Dominant left turn: (Indicate by '*')			*	

Selection Criteria based on the specified left turn protection		EAST BOUND	WEST BOUND	NORTH BOUND	SOUTH BOUND
	Plan 1:	U	U	U	U
	Plan 2a:	U	P	U	P
* Indicates the dominant left turn for each opposing pair	Plan 2b:	P	U	P	U
	Plan 3a:	*P	P	*P	P
	Plan 3b:	P	*P	P	*P
	Plan 4:	N	N	N	N

Phase plan selected (1 to 4) 4 4

Min. cycle (Cmin) 60 Max. cycle (Cmax) 120

Timing Plan

	Value	EAST-WEST Ph 1	EAST-WEST Ph 2	EAST-WEST Ph 3	NORTH-SOUTH Ph 1	NORTH-SOUTH Ph 2	NORTH-SOUTH Ph 3
Movement codes		ETL	WTL		NTL	STL	
Critical phase vol [CV]		0	492	0	135	0	0
Critical sum [CS]	627						
CBD adjustment [CBD]	1						
Reference sum [RS]	1539						
Lost time/phase [PL]		3	3	0	3	3	0
Lost time/cycle [TL]	12						
Cycle length [CYC]	60						
Green time		3	40.7	0	13.3	3	0
Critical v/c ratio [Xcm]	0.41						
Status	Under capacity.						

HIGHWAY CAPACITY MANUAL SIGNALIZED INTERSECTION PLANNING METHOD
LANE VOLUME WORKSHEET

File name: 3PMEX.HC9 Date: 04-29-1998 Time Period: PM Peak Hour

(E/W): Ala Wai Boulevard (N/S): LILIUOKALANI street Analyst : PJR

Peak hour factor: .9

Comment: Existing Conditions

	EAST BOUND	WEST BOUND	NORTH BOUND	SOUTH BOUND
LEFT TURN MOVEMENT				
1. LT volume	0	0	303	0
2. Opposing mainline volume	N/A	N/A	0	N/A
3. Number of exclusive LT lanes	0	0	2	0
Cross Product [2] * [1]	N/A	N/A	0	N/A
Left Lane Configuration (E=Excl, S=Shrd):		S	E	
Left Turn Treatment Type:	P+P	NOpp	NOpp	NOpp
4. LT adjustment factor	N/A	N/A	.92	N/A
5. LT lane vol	N/A	N/A	0	N/A
RIGHT TURN MOVEMENT				
Right Lane Configuration (E=Excl, S=Shrd)	S	S	S	S
6. RT volume	0	0	0	0
7. Exclusive lanes	N/A	N/A	N/A	N/A
8. RT adjustment factor	.85	.85	.85	.85
9. Exclusive RT lane volume	0	0	0	0
10. Shared lane vol	0	0	0	0
THROUGH MOVEMENT				
11. Thru volume	0	1352	0	0
12. Parking adjustment factor	1	1	1	1
13. No. of thru lanes including shared	0	4	0	0
14. Total approach volume	0	1352	165	0
15. Prop. of left turns in lane group	N/A	N/A	N/A	N/A
16. Left turn equivalence				
17. LT adj. factor:	N/A	N/A	N/A	N/A
18. Through lane volume	0	338	165	0
19. Critical lane volume	0	338	165	0

Left Turn Check (if [16] > 8)

20. Permitted left turn sneaker capacity: 7200/Cmax

HIGHWAY CAPACITY MANUAL SIGNALIZED INTERSECTION PLANNING METHOD
SIGNAL OPERATIONS WORKSHEET

File name: 3PMEX.HC9 Date: 04-29-1998 Time Period: PM Peak Hour

(E/W): Ala Wai Boulevard (N/S): LILIUOKALANI street Analyst : PJR

Phase Plan Selection from Lane Volume Worksheet

	EAST BOUND	WEST BOUND	NORTH BOUND	SOUTH BOUND
Critical through-RT vol: [19]	0	338	165	0
LT lane vol: [5]	N/A	N/A	0	N/A
Left turn protection: (P/U/N)	P	N	N	N
Dominant left turn: (Indicate by '*')			*	
Selection Criteria based on the specified left turn protection — Plan 1:	U	U	U	U
Plan 2a:	U	P	U	P
Plan 2b:	P	U	P	U
* Indicates the dominant left turn for each opposing pair — Plan 3a:	*P	P	*P	P
Plan 3b:	P	*P	P	*P
Plan 4:	N	N	N	N

Phase plan selected (1 to 4) 4 4

Min. cycle (Cmin) 60 Max. cycle (Cmax) 120

Timing Plan	Value	EAST-WEST Ph 1	EAST-WEST Ph 2	EAST-WEST Ph 3	NORTH-SOUTH Ph 1	NORTH-SOUTH Ph 2	NORTH-SOUTH Ph 3
Movement codes		ETL	WTL		NTL	STL	
Critical phase vol [CV]		0	338	0	165	0	0
Critical sum [CS]	503						
CBD adjustment [CBD]	1						
Reference sum [RS]	1539						
Lost time/phase [PL]		3	3	0	3	3	0
Lost time/cycle [TL]	12						
Cycle length [CYC]	60						
Green time		3	35.3	0	18.7	3	0
Critical v/c ratio [Xcm]	0.33						
Status	Under capacity.						

HIGHWAY CAPACITY MANUAL SIGNALIZED INTERSECTION PLANNING METHOD
LANE VOLUME WORKSHEET

File name: 1AMCUM.HC9 Date: 04-29-1998 Time Period: AM Peak Hour

(E/W): Ala Wai Boulevard (N/S): Kanekapolei Street Analyst : PJR

Peak hour factor: .9

Comment: Cumulative Conditions

	EAST BOUND	WEST BOUND	NORTH BOUND	SOUTH BOUND
LEFT TURN MOVEMENT				
1. LT volume	0	199	148	0
2. Opposing mainline volume	N/A	0	0	N/A
3. Number of exclusive LT lanes	0	0	2	0
Cross Product [2] * [1]	N/A	0	0	N/A
Left Lane Configuration (E=Excl, S=Shrd):		S	E	
Left Turn Treatment Type:	P+P	NOpp	NOpp	NOpp
4. LT adjustment factor	N/A	.95	.92	N/A
5. LT lane vol	N/A	0	0	N/A
RIGHT TURN MOVEMENT				
Right Lane Configuration (E=Excl, S=Shrd)	S	S	S	S
6. RT volume	0	0	0	0
7. Exclusive lanes	N/A	N/A	N/A	N/A
8. RT adjustment factor	.85	.85	.85	.85
9. Exclusive RT lane volume	0	0	0	0
10. Shared lane vol	0	0	0	0
THROUGH MOVEMENT				
11. Thru volume	0	2346	0	0
12. Parking adjustment factor	1	1	1	1
13. No. of thru lanes including shared	0	4	0	0
14. Total approach volume	0	2545	80	0
15. Prop. of left turns in lane group	N/A	N/A	N/A	N/A
16. Left turn equivalence				
17. LT adj. factor:	N/A	N/A	N/A	N/A
18. Through lane volume	0	636	80	0
19. Critical lane volume	0	636	80	0

Left Turn Check (if [16] > 8)
20. Permitted left turn sneaker capacity:
7200/Cmax

HIGHWAY CAPACITY MANUAL SIGNALIZED INTERSECTION PLANNING METHOD
SIGNAL OPERATIONS WORKSHEET

File name: 1AMCUM.HC9 Date: 04-29-1998 Time Period: AM Peak Hour

(E/W): Ala Wai Boulevard (N/S): Kanekapolei Street Analyst : PJR

Phase Plan Selection from Lane Volume Worksheet	EAST BOUND	WEST BOUND	NORTH BOUND	SOUTH BOUND
Critical through-RT vol: [19]	0	636	80	0
LT lane vol: [5]	N/A	0	0	N/A
Left turn protection: (P/U/N)	P	N	N	N
Dominant left turn: (Indicate by '*')			*	

Selection Criteria based on the specified left turn protection

* Indicates the dominant left turn for each opposing pair

	EAST BOUND	WEST BOUND	NORTH BOUND	SOUTH BOUND
Plan 1:	U	U	U	U
Plan 2a:	U	P	U	P
Plan 2b:	P	U	P	U
Plan 3a:	*P	P	*P	P
Plan 3b:	P	*P	P	*P
Plan 4:	N	N	N	N

Phase plan selected (1 to 4) 4 4

Min. cycle (Cmin) 60 Max. cycle (Cmax) 120

Timing Plan

	Value	EAST-WEST Ph 1	Ph 2	Ph 3	NORTH-SOUTH Ph 1	Ph 2	Ph 3
Movement codes		ETL	WTL		NTL	STL	
Critical phase vol [CV]		0	636	0	80	0	0
Critical sum [CS]	716						
CBD adjustment [CBD]	1						
Reference sum [RS]	1539						
Lost time/phase [PL]		3	3	0	3	3	0
Lost time/cycle [TL]	12						
Cycle length [CYC]	60						
Green time		3	45.6	0	8.4	3	0
Critical v/c ratio [Xcm]	0.47						
Status	Under capacity.						

HIGHWAY CAPACITY MANUAL SIGNALIZED INTERSECTION PLANNING METHOD
LANE VOLUME WORKSHEET

File name: 1PMCUM.HC9 Date: 04-29-1998 Time Period: PM Peak Hour

(E/W): Ala Wai Boulevard (N/S): Kanekapolei Street Analyst : PJR

Peak hour factor: .9

Comment: Cumulative Conditions

	EAST BOUND	WEST BOUND	NORTH BOUND	SOUTH BOUND
LEFT TURN MOVEMENT				
1. LT volume	0	207	170	0
2. Opposing mainline volume	N/A	0	0	N/A
3. Number of exclusive LT lanes	0	0	2	0
Cross Product [2] * [1]	N/A	0	0	N/A
Left Lane Configuration (E=Excl, S=Shrd):		S	E	
Left Turn Treatment Type:	P+P	NOpp	NOpp	NOpp
4. LT adjustment factor	N/A	.95	.92	N/A
5. LT lane vol	N/A	0	0	N/A
RIGHT TURN MOVEMENT				
Right Lane Configuration (E=Excl, S=Shrd)	S	S	S	S
6. RT volume	0	0	0	0
7. Exclusive lanes	N/A	N/A	N/A	N/A
8. RT adjustment factor	.85	.85	.85	.85
9. Exclusive RT lane volume	0	0	0	0
10. Shared lane vol	0	0	0	0
THROUGH MOVEMENT				
11. Thru volume	0	1807	0	0
12. Parking adjustment factor	1	1	1	1
13. No. of thru lanes including shared	0	4	0	0
14. Total approach volume	0	2014	92	0
15. Prop. of left turns in lane group	N/A	N/A	N/A	N/A
16. Left turn equivalence				
17. LT adj. factor:	N/A	N/A	N/A	N/A
18. Through lane volume	0	504	92	0
19. Critical lane volume	0	504	92	0

Left Turn Check (if [16] > 8)
20. Permitted left turn sneaker capacity:
7200/Cmax

HIGHWAY CAPACITY MANUAL SIGNALIZED INTERSECTION PLANNING METHOD
SIGNAL OPERATIONS WORKSHEET

File name: 1PMCUM.HC9 Date: 04-29-1998 Time Period: PM Peak Hour

(E/W): Ala Wai Boulevard (N/S): Kanekapolei Street Analyst : PJR

		EAST BOUND	WEST BOUND	NORTH BOUND	SOUTH BOUND
Phase Plan Selection from Lane Volume Worksheet					
Critical through-RT vol: [19]		0	504	92	0
LT lane vol: [5]		N/A	0	0	N/A
Left turn protection: (P/U/N)		P	N	N	N
Dominant left turn: (Indicate by '*')				*	
Selection Criteria based on the specified left turn protection	Plan 1:	U	U	U	U
	Plan 2a:	U	P	U	P
	Plan 2b:	P	U	P	U
* Indicates the dominant left turn for each opposing pair	Plan 3a:	*P	P	*P	P
	Plan 3b:	P	*P	P	*P
	Plan 4:	N	N	N	N
Phase plan selected (1 to 4)			4		4

Min. cycle (Cmin) 60 Max. cycle (Cmax) 120

Timing Plan	Value	EAST-WEST Ph 1	EAST-WEST Ph 2	EAST-WEST Ph 3	NORTH-SOUTH Ph 1	NORTH-SOUTH Ph 2	NORTH-SOUTH Ph 3
Movement codes		ETL	WTL		NTL	STL	
Critical phase vol [CV]		0	504	0	92	0	0
Critical sum [CS]	596						
CBD adjustment [CBD]	1						
Reference sum [RS]	1539						
Lost time/phase [PL]		3	3	0	3	3	0
Lost time/cycle [TL]	12						
Cycle length [CYC]	60						
Green time		3	43.6	0	10.4	3	0
Critical v/c ratio [Xcm]	0.39						
Status	Under capacity.						

Phillip Rowell And Associates
47-273 'D' Hui Iwa Street
Kaneohe, HI 96744-
Ph: (808) 239-8206

Streets: (N-S) Kaiulani Avenue (E-W) Ala Wai Boulevard
Major Street Direction.... EW
Length of Time Analyzed... 15 (min)
Analyst................... PJR
Date of Analysis.......... 4/29/98
Other Information.........Cumulative AM Peak Hour
Two-way Stop-controlled Intersection

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	0	0	0	4	0	1	0	0	0	0	0
Stop/Yield			N			N						
Volumes					2430		114					
PHF					.9		.9					
Grade					0			0				
MC's (%)												
SU/RV's (%)												
CV's (%)												
PCE's							1.10					

Adjustment Factors

Vehicle Maneuver	Critical Gap (tg)	Follow-up Time (tf)
Left Turn Major Road	5.50	2.10
Right Turn Minor Road	5.50	2.60
Through Traffic Minor Road	6.50	3.30
Left Turn Minor Road	*5.00	*2.10

Worksheet for TWSC Intersection

Step 4: LT from Minor Street	NB	SB
Conflicting Flows: (vph)	2700	
Potential Capacity: (pcph)	89	
Major LT, Minor TH		
Impedance Factor:	1.00	
Adjusted Impedance Factor:	1.00	
Capacity Adjustment Factor		
due to Impeding Movements	1.00	
Movement Capacity: (pcph)	89	

Intersection Performance Summary

Movement	Flow Rate (pcph)	Move Cap (pcph)	Shared Cap (pcph)	Avg. Total Delay (sec/veh)	95% Queue Length (veh)	LOS	Approach Delay (sec/veh)
NB L	140	89		382.1	9.2	F	
							382.1

Intersection Delay = 17.1 sec/veh

HCS: Unsignalized Intersections Release 2.1d 2PHCUM.HC0 Page 1

Phillip Rowell And Associates
47-273 'D' Hui Iwa Street
Kaneohe, HI 96744-
Ph: (808) 239-8206

Streets: (N-S) Kaiulani Avenue (E-W) Ala Wai Boulevard
Major Street Direction.... EW
Length of Time Analyzed... 15 (min)
Analyst................... PJR
Date of Analysis.......... 4/29/98
Other Information.........Cumulative PM Peak Hour
Two-way Stop-controlled Intersection

	Eastbound L	Eastbound T	Eastbound R	Westbound L	Westbound T	Westbound R	Northbound L	Northbound T	Northbound R	Southbound L	Southbound T	Southbound R
No. Lanes	0	0	0	0	4	0	1	0	0	0	0	0
Stop/Yield			N			N						
Volumes					1903		112					
PHF					.9		.9					
Grade					0			0				
MC's (%)												
SU/RV's (%)												
CV's (%)												
PCE's							1.10					

Adjustment Factors

Vehicle Maneuver	Critical Gap (tg)	Follow-up Time (tf)
Left Turn Major Road	5.50	2.10
Right Turn Minor Road	5.50	2.60
Through Traffic Minor Road	6.50	3.30
Left Turn Minor Road	*5.00	*2.10

Appendix C
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Worksheet for TWSC Intersection

Step 4: LT from Minor Street	NB	SB
Conflicting Flows: (vph)	2114	
Potential Capacity: (pcph)	169	
Major LT, Minor TH Impedance Factor:	1.00	
Adjusted Impedance Factor:	1.00	
Capacity Adjustment Factor due to Impeding Movements	1.00	
Movement Capacity: (pcph)	169	

Intersection Performance Summary

Movement	Flow Rate (pcph)	Move Cap (pcph)	Shared Cap (pcph)	Avg. Total Delay (sec/veh)	95% Queue Length (veh)	LOS	Approach Delay (sec/veh)
NB L	136	169		75.6	4.6	F	75.6

Intersection Delay = 4.2 sec/veh

Appendix C
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HIGHWAY CAPACITY MANUAL SIGNALIZED INTERSECTION PLANNING METHOD
LANE VOLUME WORKSHEET

File name: 3AMCUM.HC9   Date: 04-29-1998   Time Period: AM Peak Hour

(E/W): Ala Wai Boulevard   (N/S): Liliuokalani Avenue   Analyst : PJR

Peak hour factor: .9

Comment: Cumulative Conditions

	EAST BOUND	WEST BOUND	NORTH BOUND	SOUTH BOUND
LEFT TURN MOVEMENT				
1. LT volume	0	0	263	0
2. Opposing mainline volume	N/A	N/A	0	N/A
3. Number of exclusive LT lanes	0	0	2	0
Cross Product [2] * [1]	N/A	N/A	0	N/A
Left Lane Configuration (E=Excl, S=Shrd):		S	E	
Left Turn Treatment Type:	P+P	NOpp	NOpp	NOpp
4. LT adjustment factor	N/A	N/A	.92	N/A
5. LT lane vol	N/A	N/A	0	N/A
RIGHT TURN MOVEMENT				
Right Lane Configuration (E=Excl, S=Shrd)	S	S	S	S
6. RT volume	0	0	0	0
7. Exclusive lanes	N/A	N/A	N/A	N/A
8. RT adjustment factor	.85	.85	.85	.85
9. Exclusive RT lane volume	0	0	0	0
10. Shared lane vol	0	0	0	0
THROUGH MOVEMENT				
11. Thru volume	0	2167	0	0
12. Parking adjustment factor	1	1	1	1
13. No. of thru lanes including shared	0	4	0	0
14. Total approach volume	0	2167	143	0
15. Prop. of left turns in lane group	N/A	N/A	N/A	N/A
16. Left turn equivalence				
17. LT adj. factor:	N/A	N/A	N/A	N/A
18. Through lane volume	0	542	143	0
19. Critical lane volume	0	542	143	0

Left Turn Check (if [16] > 8)
20. Permitted left turn sneaker capacity:
7200/Cmax .

HIGHWAY CAPACITY MANUAL SIGNALIZED INTERSECTION PLANNING METHOD
SIGNAL OPERATIONS WORKSHEET

File name: 3AMCUM.HC9   Date: 04-29-1998   Time Period: AM Peak Hour

(E/W): Ala Wai Boulevard   (N/S): Liliuokalani Avenue   Analyst : PJR

	EAST BOUND	WEST BOUND	NORTH BOUND	SOUTH BOUND
Phase Plan Selection from Lane Volume Worksheet				
Critical through-RT vol: [19]	0	542	143	0
LT lane vol: [5]	N/A	N/A	0	N/A
Left turn protection: (P/U/N)	P	N	N	N
Dominant left turn: (Indicate by '*')			*	

Selection Criteria based on the specified left turn protection		EAST BOUND	WEST BOUND	NORTH BOUND	SOUTH BOUND
	Plan 1:	U	U	U	U
	Plan 2a:	U	P	U	P
	Plan 2b:	P	U	P	U
* Indicates the dominant left turn for each opposing pair	Plan 3a:	*P	P	*P	P
	Plan 3b:	P	*P	P	*P
	Plan 4:	N	N	N	N

Phase plan selected (1 to 4)   4   4

Min. cycle (Cmin) 60   Max. cycle (Cmax) 120

Timing Plan	Value	EAST-WEST Ph 1	EAST-WEST Ph 2	EAST-WEST Ph 3	NORTH-SOUTH Ph 1	NORTH-SOUTH Ph 2	NORTH-SOUTH Ph 3
Movement codes		ETL	WTL		NTL	STL	
Critical phase vol [CV]		0	542	0	143	0	0
Critical sum [CS]	685						
CBD adjustment [CBD]	1						
Reference sum [RS]	1539						
Lost time/phase [PL]		3	3	0	3	3	0
Lost time/cycle [TL]	12						
Cycle length [CYC]	60						
Green time		3	41	0	13	3	0
Critical v/c ratio [Xcm]	0.45						
Status	Under capacity.						

HIGHWAY CAPACITY MANUAL SIGNALIZED INTERSECTION PLANNING METHOD
LANE VOLUME WORKSHEET

File name: 3PMCUM.HC9   Date: 04-29-1998   Time Period: PM Peak Hour

(E/W): Ala Wai Boulevard   (N/S): Liliuokalani Avenue   Analyst : PJR

Peak hour factor: .9

Comment: Cumulative Conditions

	EAST BOUND	WEST BOUND	NORTH BOUND	SOUTH BOUND
LEFT TURN MOVEMENT				
1. LT volume	0	0	339	0
2. Opposing mainline volume	N/A	N/A	0	N/A
3. Number of exclusive LT lanes	0	0	2	0
Cross Product [2] * [1]	N/A	N/A	0	N/A
Left Lane Configuration (E=Excl, S=Shrd):		S	E	
Left Turn Treatment Type:	P+P	NOpp	NOpp	NOpp
4. LT adjustment factor	N/A	N/A	.92	N/A
5. LT lane vol	N/A	N/A	0	N/A
RIGHT TURN MOVEMENT				
Right Lane Configuration (E=Excl, S=Shrd)	S	S	S	S
6. RT volume	0	0	0	0
7. Exclusive lanes	N/A	N/A	N/A	N/A
8. RT adjustment factor	.85	.85	.85	.85
9. Exclusive RT lane volume	0	0	0	0
10. Shared lane vol	0	0	0	0
THROUGH MOVEMENT				
11. Thru volume	0	1563	0	0
12. Parking adjustment factor	1	1	1	1
13. No. of thru lanes including shared	0	4	0	0
14. Total approach volume	0	1563	184	0
15. Prop. of left turns in lane group	N/A	N/A	N/A	N/A
16. Left turn equivalence				
17. LT adj. factor:	N/A	N/A	N/A	N/A
18. Through lane volume	0	391	184	0
19. Critical lane volume	0	391	184	0

Left Turn Check (if [16] > 8)
20. Permitted left turn sneaker capacity:
7200/Cmax

HIGHWAY CAPACITY MANUAL SIGNALIZED INTERSECTION PLANNING METHOD
SIGNAL OPERATIONS WORKSHEET

File name: 3PMCUM.HC9   Date: 04-29-1998   Time Period: PM Peak Hour

(E/W): Ala Wai Boulevard   (N/S): Liliuokalani Avenue   Analyst : PJR

		EAST BOUND	WEST BOUND	NORTH BOUND	SOUTH BOUND
Phase Plan Selection from Lane Volume Worksheet					
Critical through-RT vol: [19]		0	391	184	0
LT lane vol: [5]		N/A	N/A	0	N/A
Left turn protection: (P/U/N)		P	N	N	N
Dominant left turn: (Indicate by '*')				*	
Selection Criteria based on the specified left turn protection	Plan 1:	U	U	U	U
	Plan 2a:	U	P	U	P
	Plan 2b:	P	U	P	U
* Indicates the dominant left turn for each opposing pair	Plan 3a:	*P	P	*P	P
	Plan 3b:	P	*P	P	*P
	Plan 4:	N	N	N	N
Phase plan selected (1 to 4)		4		4	

Min. cycle (Cmin) 60   Max. cycle (Cmax) 120

Timing Plan	Value	EAST-WEST Ph 1	EAST-WEST Ph 2	EAST-WEST Ph 3	NORTH-SOUTH Ph 1	NORTH-SOUTH Ph 2	NORTH-SOUTH Ph 3
Movement codes		ETL	WTL		NTL	STL	
Critical phase vol [CV]		0	391	0	184	0	0
Critical sum [CS]	575						
CBD adjustment [CBD]	1						
Reference sum [RS]	1539						
Lost time/phase [PL]		3	3	0	3	3	0
Lost time/cycle [TL]	12						
Cycle length [CYC]	60						
Green time		3	35.6	0	18.4	3	0
Critical v/c ratio [Xcm]	0.37						
Status	Under capacity.						

HIGHWAY CAPACITY MANUAL SIGNALIZED INTERSECTION PLANNING METHOD
LANE VOLUME WORKSHEET

File name: 1AMPROJ.HC9 Date: 04-29-1998 Time Period: AM Peak Hour

(E/W): Ala Wai Boulevard (N/S): Kanekapolei Street Analyst : PJR

Peak hour factor: .9

Comment: Cumulative Plus Project Conditions

	EAST BOUND	WEST BOUND	NORTH BOUND	SOUTH BOUND
LEFT TURN MOVEMENT				
1. LT volume	0	201	148	0
2. Opposing mainline volume	N/A	0	0	N/A
3. Number of exclusive LT lanes	0	0	2	0
Cross Product [2] * [1]	N/A	0	0	N/A
Left Lane Configuration (E=Excl, S=Shrd):		S	E	
Left Turn Treatment Type:	P+P	NOpp	NOpp	NOpp
4. LT adjustment factor	N/A	.95	.92	N/A
5. LT lane vol	N/A	0	0	N/A
RIGHT TURN MOVEMENT				
Right Lane Configuration (E=Excl, S=Shrd)	S	S	S	S
6. RT volume	0	0	0	0
7. Exclusive lanes	N/A	N/A	N/A	N/A
8. RT adjustment factor	.85	.85	.85	.85
9. Exclusive RT lane volume	0	0	0	0
10. Shared lane vol	0	0	0	0
THROUGH MOVEMENT				
11. Thru volume	0	2353	0	0
12. Parking adjustment factor	1	1	1	1
13. No. of thru lanes including shared	0	4	0	0
14. Total approach volume	0	2554	80	0
15. Prop. of left turns in lane group	N/A	N/A	N/A	N/A
16. Left turn equivalence				
17. LT adj. factor:	N/A	N/A	N/A	N/A
18. Through lane volume	0	638	80	0
19. Critical lane volume	0	638	80	0

Left Turn Check (if [16] > 8)
20. Permitted left turn sneaker capacity:
7200/Cmax

HIGHWAY CAPACITY MANUAL SIGNALIZED INTERSECTION PLANNING METHOD
SIGNAL OPERATIONS WORKSHEET

File name: 1AMPROJ.HC9 Date: 04-29-1998 Time Period: AM Peak Hour

(E/W): Ala Wai Boulevard (N/S): Kanekapolei Street Analyst : PJR

	EAST BOUND	WEST BOUND	NORTH BOUND	SOUTH BOUND
Phase Plan Selection from Lane Volume Worksheet				
Critical through-RT vol: [19]	0	638	80	0
LT lane vol: [5]	N/A	0	0	N/A
Left turn protection: (P/U/N)	P	N	N	N
Dominant left turn: (Indicate by '*')			*	
Selection Criteria based on the specified left turn protection — Plan 1:	U	U	U	U
Plan 2a:	U	P	U	P
Plan 2b:	P	U	P	U
Plan 3a:	*P	P	*P	P
Plan 3b:	P	*P	P	*P
Plan 4:	N	N	N	N

* Indicates the dominant left turn for each opposing pair

Phase plan selected (1 to 4)		4 (East-West)	4 (North-South)
Min. cycle (Cmin)	60	Max. cycle (Cmax)	120

Timing Plan	Value	EAST-WEST Ph 1	EAST-WEST Ph 2	EAST-WEST Ph 3	NORTH-SOUTH Ph 1	NORTH-SOUTH Ph 2	NORTH-SOUTH Ph 3
Movement codes		ETL	WTL		NTL	STL	
Critical phase vol [CV]		0	638	0	80	0	0
Critical sum [CS]	718						
CBD adjustment [CBD]	1						
Reference sum [RS]	1539						
Lost time/phase [PL]		3	3	0	3	3	0
Lost time/cycle [TL]	12						
Cycle length [CYC]	60						
Green time		3	45.7	0	8.3	3	0
Critical v/c ratio [Xcm]	0.47						
Status	Under capacity.						

HIGHWAY CAPACITY MANUAL SIGNALIZED INTERSECTION PLANNING METHOD
LANE VOLUME WORKSHEET

File name: 1PMPROJ.HC9   Date: 04-29-1998   Time Period: PM Peak Hour

(E/W): Ala Wai Boulevard   (N/S): Kanekapolei Street   Analyst : PJR

Peak hour factor: .9

Comment: Cumulative Plus Project Conditions

	EAST BOUND	WEST BOUND	NORTH BOUND	SOUTH BOUND
LEFT TURN MOVEMENT				
1. LT volume	0	210	170	0
2. Opposing mainline volume	N/A	0	0	N/A
3. Number of exclusive LT lanes	0	0	2	0
Cross Product [2] * [1]	N/A	0	0	N/A
Left Lane Configuration (E=Excl, S=Shrd):		S	E	
Left Turn Treatment Type:	P+P	NOpp	NOpp	NOpp
4. LT adjustment factor	N/A	.95	.92	N/A
5. LT lane vol	N/A	0	0	N/A
RIGHT TURN MOVEMENT				
Right Lane Configuration (E=Excl, S=Shrd)	S	S	S	S
6. RT volume	0	0	0	0
7. Exclusive lanes	N/A	N/A	N/A	N/A
8. RT adjustment factor	.85	.85	.85	.85
9. Exclusive RT lane volume	0	0	0	0
10. Shared lane vol	0	0	0	0
THROUGH MOVEMENT				
11. Thru volume	0	1819	0	0
12. Parking adjustment factor	1	1	1	1
13. No. of thru lanes including shared	0	4	0	0
14. Total approach volume	0	2029	92	0
15. Prop. of left turns in lane group	N/A	N/A	N/A	N/A
16. Left turn equivalence				
17. LT adj. factor:	N/A	N/A	N/A	N/A
18. Through lane volume	0	507	92	0
19. Critical lane volume	0	507	92	0

Left Turn Check (if [16] > 8)
20. Permitted left turn sneaker capacity:
7200/Cmax

HIGHWAY CAPACITY MANUAL SIGNALIZED INTERSECTION PLANNING METHOD
SIGNAL OPERATIONS WORKSHEET

File name: 1PMPROJ.HC9   Date: 04-29-1998   Time Period: PM Peak Hour

(E/W): Ala Wai Boulevard   (N/S): Kanekapolei Street   Analyst : PJR

Phase Plan Selection from Lane Volume Worksheet

		EAST BOUND	WEST BOUND	NORTH BOUND	SOUTH BOUND
Critical through-RT vol: [19]		0	507	92	0
LT lane vol: [5]		N/A	0	0	N/A
Left turn protection: (P/U/N)		P	N	N	N
Dominant left turn: (Indicate by '*')				*	
Selection Criteria based on the	Plan 1:	U	U	U	U
specified left turn protection	Plan 2a:	U	P	U	P
	Plan 2b:	P	U	P	U
* Indicates the dominant left turn	Plan 3a:	*P	P	*P	P
for each opposing pair	Plan 3b:	P	*P	P	*P
	Plan 4:	N	N	N	N

Phase plan selected (1 to 4)   4   4

Min. cycle (Cmin) 60   Max. cycle (Cmax) 120

Timing Plan	Value	--- EAST-WEST ---- Ph 1	Ph 2	Ph 3	-- NORTH-SOUTH --- Ph 1	Ph 2	Ph 3
Movement codes		ETL	WTL		NTL	STL	
Critical phase vol [CV]		0	507	0	92	0	0
Critical sum [CS]	599						
CBD adjustment [CBD]	1						
Reference sum [RS]	1539						
Lost time/phase [PL]		3	3	0	3	3	0
Lost time/cycle [TL]	12						
Cycle length [CYC]	60						
Green time		3	43.6	0	10.4	3	0
Critical v/c ratio [Xcm]	0.39						
Status	Under capacity.						

HCS: Unsignalized Intersections Release 2.1d 2AMPROJ.HC0 Page 1

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Streets: (N-S) Kaiulani Avenue (E-W) Ala Wai Boulevard
Major Street Direction.... EW
Length of Time Analyzed... 15 (min)
Analyst................... PJR
Date of Analysis.......... 4/29/98
Other Information.........Cumulative Plus Project AM Peak Hour
Two-way Stop-controlled Intersection

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	0	0	0	4	0	1	0	0	0	0	0
Stop/Yield			N			N						
Volumes					2439		114					
PHF					.9		.9					
Grade					0			0				
MC's (%)												
SU/RV's (%)												
CV's (%)												
PCE's							1.10					

Adjustment Factors

Vehicle Maneuver	Critical Gap (tg)	Follow-up Time (tf)
Left Turn Major Road	5.50	2.10
Right Turn Minor Road	5.50	2.60
Through Traffic Minor Road	6.50	3.30
Left Turn Minor Road	*5.00	*2.10

HCS: Unsignalized Intersections Release 2.1d 2AMPROJ.HC0 Page 2

Worksheet for TWSC Intersection

Step 4: LT from Minor Street	NB	SB
Conflicting Flows: (vph)	2710	
Potential Capacity: (pcph)	88	
Major LT, Minor TH Impedance Factor:	1.00	
Adjusted Impedance Factor:	1.00	
Capacity Adjustment Factor due to Impeding Movements	1.00	
Movement Capacity: (pcph)	88	

Intersection Performance Summary

Movement	Flow Rate (pcph)	Move Cap (pcph)	Shared Cap (pcph)	Avg. Total Delay (sec/veh)	95% Queue Length (veh)	LOS	Approach Delay (sec/veh)
NB L	140	88		390.6	9.3	F	
							390.6

Intersection Delay = 17.4 sec/veh

HCS: Unsignalized Intersections Release 2.1d 2PMPROJ.HC0 Page 1

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Streets: (N-S) Kaiulani Avenue (E-W) Ala Wai Boulevard
Major Street Direction.... EW
Length of Time Analyzed... 15 (min)
Analyst................... PJR
Date of Analysis.......... 4/29/98
Other Information.........Cumulative Plus Project PM Peak Hour
Two-way Stop-controlled Intersection

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	0	0	0	4	0	1	0	0	0	0	0
Stop/Yield			N			N						
Volumes					1918		112					
PHF					.9		.9					
Grade					0			0				
MC's (%)												
SU/RV's (%)												
CV's (%)												
PCE's							1.10					

Adjustment Factors

Vehicle Maneuver	Critical Gap (tg)	Follow-up Time (tf)
Left Turn Major Road	5.50	2.10
Right Turn Minor Road	5.50	2.60
Through Traffic Minor Road	6.50	3.30
Left Turn Minor Road	*5.00	*2.10

HCS: Unsignalized Intersections Release 2.1d 2PMPROJ.HC0 Page 2

Worksheet for TWSC Intersection

Step 4: LT from Minor Street	NB	SB
Conflicting Flows: (vph)	2131	
Potential Capacity: (pcph)	165	
Major LT, Minor TH		
Impedance Factor:	1.00	
Adjusted Impedance Factor:	1.00	
Capacity Adjustment Factor		
due to Impeding Movements	1.00	
Movement Capacity: (pcph)	165	

Intersection Performance Summary

Movement	Flow Rate (pcph)	Move Cap (pcph)	Shared Cap (pcph)	Avg. Total Delay (sec/veh)	95% Queue Length (veh)	LOS	Approach Delay (sec/veh)
NB L	136	165		80.5	4.8	F	
							80.5

Intersection Delay = 4.4 sec/veh

HIGHWAY CAPACITY MANUAL SIGNALIZED INTERSECTION PLANNING METHOD
LANE VOLUME WORKSHEET

File name: 3AMPROJ.HC9   Date: 04-29-1998   Time Period: AM Peak Hour

(E/W): Ala Wai Boulevard   (N/S): Liliuokalani Avenue   Analyst : PJR

Peak hour factor: .9

Comment: Cumulative Plus Project Conditions

	EAST BOUND	WEST BOUND	NORTH BOUND	SOUTH BOUND
LEFT TURN MOVEMENT				
1. LT volume	0	0	265	0
2. Opposing mainline volume	N/A	N/A	0	N/A
3. Number of exclusive LT lanes	0	0	2	0
Cross Product [2] * [1]	N/A	N/A	0	N/A
Left Lane Configuration (E=Excl, S=Shrd):		S	E	
Left Turn Treatment Type:	P+P	NOpp	NOpp	NOpp
4. LT adjustment factor	N/A	N/A	.92	N/A
5. LT lane vol	N/A	N/A	0	N/A
RIGHT TURN MOVEMENT				
Right Lane Configuration (E=Excl, S=Shrd)	S	S	S	S
6. RT volume	0	0	0	0
7. Exclusive lanes	N/A	N/A	N/A	N/A
8. RT adjustment factor	.85	.85	.85	.85
9. Exclusive RT lane volume	0	0	0	0
10. Shared lane vol	0	0	0	0
THROUGH MOVEMENT				
11. Thru volume	0	2174	0	0
12. Parking adjustment factor	1	1	1	1
13. No. of thru lanes including shared	0	4	0	0
14. Total approach volume	0	2174	144	0
15. Prop. of left turns in lane group	N/A	N/A	N/A	N/A
16. Left turn equivalence				
17. LT adj. factor:	N/A	N/A	N/A	N/A
18. Through lane volume	0	544	144	0
19. Critical lane volume	0	544	144	0

Left Turn Check (if [16] > 8)
20. Permitted left turn sneaker capacity:
7200/Cmax

HIGHWAY CAPACITY MANUAL SIGNALIZED INTERSECTION PLANNING METHOD
SIGNAL OPERATIONS WORKSHEET

File name: 3AMPROJ.HC9   Date: 04-29-1998   Time Period: AM Peak Hour

(E/W): Ala Wai Boulevard   (N/S): Liliuokalani Avenue   Analyst : PJR

		EAST BOUND	WEST BOUND	NORTH BOUND	SOUTH BOUND
Phase Plan Selection from Lane Volume Worksheet					
Critical through-RT vol: [19]		0	544	144	0
LT lane vol: [5]		N/A	N/A	0	N/A
Left turn protection: (P/U/N)		P	N	N	N
Dominant left turn: (Indicate by '*')				*	
Selection Criteria based on the	Plan 1:	U	U	U	U
specified left turn protection	Plan 2a:	U	P	U	P
	Plan 2b:	P	U	P	U
* Indicates the dominant left turn	Plan 3a:	*P	P	*P	P
for each opposing pair	Plan 3b:	P	*P	P	*P
	Plan 4:	N	N	N	N
Phase plan selected (1 to 4)		4		4	

Min. cycle (Cmin)   60   Max. cycle (Cmax)   120

Timing Plan	Value	EAST-WEST Ph 1	EAST-WEST Ph 2	EAST-WEST Ph 3	NORTH-SOUTH Ph 1	NORTH-SOUTH Ph 2	NORTH-SOUTH Ph 3
Movement codes		ETL	WTL		NTL	STL	
Critical phase vol [CV]		0	544	0	144	0	0
Critical sum [CS]	688						
CBD adjustment [CBD]	1						
Reference sum [RS]	1539						
Lost time/phase [PL]		3	3	0	3	3	0
Lost time/cycle [TL]	12						
Cycle length [CYC]	60						
Green time		3	41	0	13	3	0
Critical v/c ratio [Xcm]	0.45						
Status	Under capacity.						

HIGHWAY CAPACITY MANUAL SIGNALIZED INTERSECTION PLANNING METHOD
LANE VOLUME WORKSHEET

File name: 3PMPROJ.HC9 Date: 04-29-1998 Time Period: PM Peak Hour

(E/W): Ala Wai Boulevard (N/S): Liliuokalani Avenue Analyst : PJR

Peak hour factor: .9

Comment: Cumulative Plus Project Conditions

	EAST BOUND	WEST BOUND	NORTH BOUND	SOUTH BOUND
LEFT TURN MOVEMENT				
1. LT volume	0	0	342	0
2. Opposing mainline volume	N/A	N/A	0	N/A
3. Number of exclusive LT lanes	0	0	2	0
Cross Product [2] * [1]	N/A	N/A	0	N/A
Left Lane Configuration (E=Excl, S=Shrd):		S	E	
Left Turn Treatment Type:	P+P	NOpp	NOpp	NOpp
4. LT adjustment factor	N/A	N/A	.92	N/A
5. LT lane vol	N/A	N/A	0	N/A
RIGHT TURN MOVEMENT				
Right Lane Configuration (E=Excl, S=Shrd)	S	S	S	S
6. RT volume	0	0	0	0
7. Exclusive lanes	N/A	N/A	N/A	N/A
8. RT adjustment factor	.85	.85	.85	.85
9. Exclusive RT lane volume	0	0	0	0
10. Shared lane vol	0	0	0	0
THROUGH MOVEMENT				
11. Thru volume	0	1576	0	0
12. Parking adjustment factor	1	1	1	1
13. No. of thru lanes including shared	0	4	0	0
14. Total approach volume	0	1576	186	0
15. Prop. of left turns in lane group	N/A	N/A	N/A	N/A
16. Left turn equivalence				
17. LT adj. factor:	N/A	N/A	N/A	N/A
18. Through lane volume	0	394	186	0
19. Critical lane volume	0	394	186	0

Left Turn Check (if [16] > 8)
20. Permitted left turn sneaker capacity:
7200/Cmax

HIGHWAY CAPACITY MANUAL SIGNALIZED INTERSECTION PLANNING METHOD
SIGNAL OPERATIONS WORKSHEET

File name: 3PMPROJ.HC9 Date: 04-29-1998 Time Period: PM Peak Hour

(E/W): Ala Wai Boulevard (N/S): Liliuokalani Avenue Analyst : PJR

		EAST BOUND	WEST BOUND	NORTH BOUND	SOUTH BOUND
Phase Plan Selection from Lane Volume Worksheet					
Critical through-RT vol: [19]		0	394	186	0
LT lane vol: [5]		N/A	N/A	0	N/A
Left turn protection: (P/U/N)		P	N	N	N
Dominant left turn: (Indicate by '*')				*	
Selection Criteria based on the specified left turn protection	Plan 1:	U	U	U	U
	Plan 2a:	U	P	U	P
	Plan 2b:	P	U	P	U
* Indicates the dominant left turn for each opposing pair	Plan 3a:	*P	P	*P	P
	Plan 3b:	P	*P	P	*P
	Plan 4:	N	N	N	N

Phase plan selected (1 to 4) 4 4

Min. cycle (Cmin) 60 Max. cycle (Cmax) 120

Timing Plan	Value	EAST-WEST Ph 1	EAST-WEST Ph 2	EAST-WEST Ph 3	NORTH-SOUTH Ph 1	NORTH-SOUTH Ph 2	NORTH-SOUTH Ph 3
Movement codes		ETL	WTL		NTL	STL	
Critical phase vol [CV]		0	394	0	186	0	0
Critical sum [CS]	580						
CBD adjustment [CBD]	1						
Reference sum [RS]	1539						
Lost time/phase [PL]		3	3	0	3	3	0
Lost time/cycle [TL]	12						
Cycle length [CYC]	60						
Green time		3	35.6	0	18.4	3	0
Critical v/c ratio [Xcm]	0.38						
Status	Under capacity.						

HCS: Unsignalized Intersections Release 2.1d 4AMPROJ.HC0 Page 1

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Streets: (N-S) Project Driveway (E-W) Ala Wai Boulevard
Major Street Direction.... EW
Length of Time Analyzed... 15 (min)
Analyst................... PJR
Date of Analysis.......... 4/29/98
Other Information.........Cumulative Plus Project AM Peak Hour
Two-way Stop-controlled Intersection

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	0	0	0	> 4	0	1	0	0	0	0	0
Stop/Yield			N			N						
Volumes				9	2430		9					
PHF				.9	.9		.9					
Grade					0			0				
MC's (%)												
SU/RV's (%)												
CV's (%)												
PCE's				1.10			1.10					

Adjustment Factors

Vehicle Maneuver	Critical Gap (tg)	Follow-up Time (tf)
Left Turn Major Road	5.50	2.10
Right Turn Minor Road	5.50	2.60
Through Traffic Minor Road	6.50	3.30
Left Turn Minor Road	*5.00	*2.10

HCS: Unsignalized Intersections Release 2.1d 4AMPROJ.HC0 Page 2

Worksheet for TWSC Intersection

Step 2: LT from Major Street	WB	EB
Conflicting Flows: (vph)	0	
Potential Capacity: (pcph)	1714	
Movement Capacity: (pcph)	1714	
Prob. of Queue-Free State:	0.99	
TH Saturation Flow Rate: (pcphpl)	6800	
Major LT Shared Lane Prob. of Queue-Free State:	0.99	

Step 4: LT from Minor Street	NB	SB
Conflicting Flows: (vph)	2710	
Potential Capacity: (pcph)	88	
Major LT, Minor TH Impedance Factor:	0.99	
Adjusted Impedance Factor:	0.99	
Capacity Adjustment Factor due to Impeding Movements	0.99	
Movement Capacity: (pcph)	87	

Intersection Performance Summary

Movement	Flow Rate (pcph)	Move Cap (pcph)	Shared Cap (pcph)	Avg. Total Delay (sec/veh)	95% Queue Length (veh)	LOS	Approach Delay (sec/veh)
NB L	11	87		47.3	0.3	F	47.3
WB L	11	1714		2.1	0.0	A	0.0

Intersection Delay = 0.2 sec/veh

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Streets: (N-S) Project Driveway (E-W) Ala Wai Boulevard
Major Street Direction.... EW
Length of Time Analyzed... 15 (min)
Analyst................... PJR
Date of Analysis.......... 4/29/98
Other Information.........Cumulative Plus Project PM Peak Hour
Two-way Stop-controlled Intersection

	Eastbound L	Eastbound T	Eastbound R	Westbound L	Westbound T	Westbound R	Northbound L	Northbound T	Northbound R	Southbound L	Southbound T	Southbound R
No. Lanes	0	0	0	0	> 4	0	1	0	0	0	0	0
Stop/Yield			N			N						
Volumes				16	1903		15					
PHF				.9	.9		.9					
Grade					0			0				
MC's (%)												
SU/RV's (%)												
CV's (%)												
PCE's				1.10			1.10					

Adjustment Factors

Vehicle Maneuver	Critical Gap (tg)	Follow-up Time (tf)
Left Turn Major Road	5.50	2.10
Right Turn Minor Road	5.50	2.60
Through Traffic Minor Road	6.50	3.30
Left Turn Minor Road	*5.00	*2.10

Worksheet for TWSC Intersection

Step 2: LT from Major Street	WB	EB
Conflicting Flows: (vph)	0	
Potential Capacity: (pcph)	1714	
Movement Capacity: (pcph)	1714	
Prob. of Queue-Free State:	0.99	
TH Saturation Flow Rate: (pcphpl)	6800	
Major LT Shared Lane Prob. of Queue-Free State:	0.98	

Step 4: LT from Minor Street	NB	SB
Conflicting Flows: (vph)	2132	
Potential Capacity: (pcph)	165	
Major LT, Minor TH Impedance Factor:	0.98	
Adjusted Impedance Factor:	0.98	
Capacity Adjustment Factor due to Impeding Movements	0.98	
Movement Capacity: (pcph)	162	

Intersection Performance Summary

Movement	Flow Rate (pcph)	Move Cap (pcph)	Shared Cap (pcph)	Avg. Total Delay (sec/veh)	95% Queue Length (veh)	LOS	Approach Delay (sec/veh)
NB L	19	162		25.2	0.3	D	25.2
WB L	20	1714		2.1	0.0	A	0.0

Intersection Delay = 0.2 sec/veh

Appendix E

Needs Assessment

SMS

Research
Consulting
Financial Consulting
Training
Database Marketing
Socio-Economic Studies

March 9, 1998

Mr. Nicholas Christoff
Genesis Foundation
P. O. Box 88269
Honolulu, HI 96830

Dear Mr. Christoff:

I have reviewed the report that we produced for Genesis Foundation in 1995. I have no information that would cause me to believe that conclusions reported there have changed substantially in the interim. There is still a market for economical rental properties among Hawaii's senior citizens.

As you know, an update of the Hawaii Housing Policy Study 1992 was conducted in 1997. It contains the most up-to-date information on housing for Hawaii's people. A recent article in *The Honolulu Advertiser* (February 18, 1998) presented the conclusions of the consortium for whom we conducted the study. We certainly agree with their conclusion that "...there continues to be a strong need for both rental and owner-occupied housing for lower-income people."

I wish you good fortune in pursuing your project to serve the housing needs of our seniors.

Sincerely,

James E. Dannemiller
President

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PRELIMINARY ASSESSMENT OF NEED FOR AFFORDABLE RENTAL HOUSING IN WAIKIKI

November 1995

Prepared for:

The Genesis Foundation

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SUMMARY

Demand for rental housing in Honolulu is strong. Waikiki has historically been an area with a large rental housing stock, some of which was available for modest rents. However, the supply of inexpensive housing has shrunk, and it is likely to diminish further.

TheSimmons/SMS Hawaii Media Market Study indicates that some 36,300 adults age 55 and over are in rented units on Oahu (as of 1994). Of these, nearly 20,000 have household incomes of $30,000 or less. About 16,000 have less than $25,000 in assets. Given the high cost of housing in Hawaii, this suggests that a sizeable population is vulnerable to reductions in the rental housing supply, and could be unable to find homes if further contractions in supply occur.

The Hawaii Housing Policy Study, conducted in 1992, indicated that up to 2,500 Oahu households with adults age 55 or older would be looking for rental housing in the next three years. (In this report, the 1992 study is taken as a conservative indicator of current conditions. The supply of rental housing has changed little, while demand has grown due to population growth and the economic slowdown. Hence current demand is likely greater than in 1992.) Households with adults aged 55 to 61 tended to prefer Honolulu neighborhoods, while households with adults aged 62 or more tended to prefer suburban locations.

The 1992 study indicated that some 1,420 households would prefer to have rental housing in Waikiki. Demand came from residents of Waikiki and the nearby McCully/Mo'ili'ili area.

These data suggest that a rental project with unit prices appropriate for low-to-moderate income households would serve a large group. That group is varied, and old and young may have very different preferences. Elderly renters may hope for peace and quiet – while younger renters may see Waikiki as Honolulu's entertainment capital, accepting noise as the price of living "where the action is." The two groups can be served by allocating different floors or sides of a building to different age groups.

The elderly market for this project largely consists of one- to three-person households. By targeting elderly households with limited means, with rents set as a proportion of income, the project could be certain to serve this population. The younger market mostly consists of single persons with incomes in the $25,000 to $35,000 range. By offering this group rents at a reasonable rent-to-income ratio (about 30%) – in the range from $600 to $850 per month – the project could attract a large pool of potential renters.

Further research is appropriate to specify the needs of potential elderly renters.

SCOPE OF THIS REPORT

The Genesis Foundation is considering development of affordable rental housing in Waikiki. Such housing would be provided for the elderly, but might also be made available to families with low-to-moderate incomes.

The Genesis Foundation has asked SMS Research to conduct a preliminary assessment of need for and feasibility of affordable rental housing in Waikiki. This report addresses the following questions:

1. How much demand is there for rental housing in Waikiki?
2. Is demand strong from the elderly with low-to-moderate incomes?
3. What sort of units would best serve the elderly affordable rental market, and at what prices?
4. If housing were made available to low-to-moderate income renters of all ages, what level of demand can be expected?
5. What sort of units, and at what price, would best serve the affordable rental market in general?

RENTAL HOUSING SUPPLY AND DEMAND: OAHU

The City and County of Honolulu has experienced a housing shortage marked by high sales prices and low rental availability. The shortage was most noted in the late 1980s and early 1990s, a time when the cost of rental and sale housing was increasing sharply. More recently, housing prices have stabilized and the for-sale market has slumped during a recessionary period. However, new housing supply has tended to address the needs of buyers, not renters, leaving low- and moderate-income households with a very limited supply and range of choices.

In 1990, renters occupied 127,394 housing units on Oahu (US Census, 1991). They averaged 2.80 persons per household, in an average of 3.6 rooms. The median rent was $615 per month.

Changes in Supply.

Oahu had some 281,683 housing units in 1990, of which about 14,000 were vacant and 13,000 were allocated for non-resident use (Locations Inc. and SMS, 1993). The Hawaii Housing Policy Study incorporated a model that suggested that the shortfall between housing demand and available units was over 23,000 units in 1990, but would shrink to 5,400 in 2010. To accomplish that reduction in the shortfall, production of some 3,500 or more new units annually is needed. This level of production is currently being met by the private sector.

EXHIBIT A: CHANGE IN OAHU HOUSING INVENTORY, PRIVATE CONSTRUCTION

	NET CHANGE	Construction Single-Family	Duplex	Apartment	Demolition
1990	1,985	1,580	136	1,210	944
1991	3,944	1,202	48	3,473	779
1992	3,657	1,803	86	2,356	596
1993	3,574	1,913	62	2,146	547
1994	4,172	2,438	80	2,208	563

SOURCE: Unpublished table, to appear in 1995 State data book, Hawaii State Department of Business, Economic Development and Tourism.

However, new housing has largely been built for sale, with the multifamily units build above all to meet the affordability requirements imposed by government bodies as a condition of permits. New rental housing has not been built except by government agencies. Meanwhile, conversion of rentals to condominium units has proceeded, with 759 units converted in fiscal year 1992-93, and 594 units converted in 1993-94 (unpublished tables, State Department of Business, Economic Development and Tourism).

No private sector developer is currently addressing rental housing needs. Non-profit developers are few. One potential contributor, PATH Housing Corporation, recently ended operations when unable to secure financing for a project in Honolulu. The State's efforts on Oahu have focused on for-sale housing at Kapolei. Over the last two decades, the City has been a major developer of rental housing, largely in central Honolulu. More recently, The City has sponsored single-family housing development in Ewa and has built elderly housing throughout the island (in, for example, Manoa, Wahiawa, and Kailua).

Demand: Renters

Recent estimates (in Exhibit B, below) suggest that some 126,000 renting households exist on Oahu, including 16,000 elderly households. Some 11,900 elderly households (74.5% of all elderly renters) have low-to-moderate incomes, i.e., make 80% of the median income or less. (For federal recording purposes, an elderly household is a one- or two-person household in which the head or head's spouse is 62 or older.) For all renters, some 53.4% of renting households are estimated as in the low-to-moderate income group.

Low-to-moderate income renters tend to pay a large share of their income on housing costs. This is true for the elderly as for others. Half the elderly renters are estimated to have housing problems (including limited income and problems of access).

EXHIBIT B: HOUSEHOLDS BY INCOME AND BURDEN OF HOUSING PAYMENTS, 1994

	RENTERS Elderly, 1-2 members	Total Renters	OWNERS Elderly	Total Owners	ALL HOUSEHOLDS
VERY LOW INCOME (up to 30% of median income)	8,537	21,783	3,080	5,697	27,480
Paying > 30% for housing	58.8%	71.7%	48.1%	53.4%	64.2%
Paying > 50%	41.6%	63.5%	31.1%	41.3%	49.9%
LOW INCOME (31% to 50% of median income)	3,245	22,993	3,764	7,730	30,723
Paying > 30% for housing	61.5%	55.8%	22.9%	38.6%	51.4%
Paying > 50%	24.2%	24.8%	11.1%	23.6%	24.3%
MODERATE INCOME (51% to 80% of median income)	2,084	22,567	4,237	11,175	33,762
Paying > 30% for housing	43.4%	42.1%	18.4%	36.6%	44.1%
Paying > 50%	10.6%	7.9%	6.7%	14.9%	10.2%
MIDDLE INCOME (81% to 100% of median income)	983	13,544	2,630	10,560	24,104
Paying > 30% for housing	21.8%	30.1%	12.2%	35.0%	32.0%
Paying > 50%	4.0%	3.3%	3.2%	9.2%	5.9%
TOTAL HOUSEHOLD	15,936	126,104	28,972	139,521	265,625
% with Any Housing Problem	50.0%	50.0%	17.0%	33.0%	41.0%

NOTES: Housing costs include utilities. Housing cost burdens are estimated as very high when greater than 30% of gross income.

SOURCE: City and County of Honolulu, 1994.

The Hawaii Housing Policy Study estimated growth in demand for low income households as more than 800 units annually. In addition, nearly 800 units would be needed annually to meet demand from moderate-income households (including homeowners). In contrast, in FY94, government agencies planned to build some 560 units in projects largely or wholly serving low-to-moderate income renters, to build 140 units for University of Hawaii faculty, and to begin construction of the 529-unit Hale Kewalo, a project that has since been cancelled (Housing Finance and Development Corporation, 1994). These efforts, while important, do not match growth in demand.

The City is planning to build some 120 units of elderly housing at the Willows site in Mo'ili'ili later in the 1990s (Honolulu Planning Department, 1995).

RENTAL HOUSING SUPPLY AND DEMAND: WAIKIKI

For decades, Waikiki included a mix of housing types and housed a wide range of income groups. The resident population grew along with development of taller buildings through the 1970s. In the last decade or so, population growth has slowed. The visitor population, in contrast, has continued to climb:

EXHIBIT C:
WAIKIKI RESIDENT AND VISITOR POPULATION, 1960 - 1990

	1960	1970	1980	1990
Resident Population	11,075	13,124	17,334	19,768
Visitor Population	7,714	21,926	46,500	78,536

SOURCES: US Census and Hawaii Visitors Bureau Data, compiled by Hawaii State Department of Business, Economic Development and Tourism (1994).

The growth in the visitor population since 1980 is especially striking, given the fact that only one hotel has been built since the mid-1980s. Policies opposed to construction of new visitor units have been in place. More visitor and short-term rentals is likely in the future, with redevelopment of part of the western end of Waikiki. Again, development of a convention center at the edge of Waikiki is likely to intensify demand for vacation rentals.

The 1990 Census showed an extremely high vacancy rate of 34% (in Exhibit A-3). This is mostly attributed to rentals, suggesting that the supply of rental housing is more than adequate to meet demand. However, a different explanation is more likely -- many vacation units were counted in 1990 as if they were rentals available to the general public. The City and County Planning Department tested this by plotting Census counts of housing units against their own records of housing on Oahu (personal communication, Steve Young, Research Statistician, City and County Planning Department, October 1995). In most cases, the two sources nearly matched. In Waikiki, however, they differed by at least 2,000 units, with the Census counting units not known to the City as long-term rentals or owner-occupied. If those units were in fact empty visitor units, two conclusions can be drawn:

- The total 1990 vacancy rate for residential units in Waikiki was actually about 24%, and at least half the vacant units were "seasonal" ones owned by people who occupy them part-time; and
- Unofficial vacation units have proliferated. Since City policy has strongly opposed construction or conversion of visitor units, it appears that matters are out of the control of policy-makers. Hence the housing stock actually available for renters in Waikiki may be very small compared to demand.

The correction suggested here still allows for the possibility of a high 1990 vacancy rate (of as much as 12%, when vacation and seasonal units are excluded). If additional information about rental terms could be obtained systematically -- a research problem that has thus far been too difficult for interested agencies to pursue -- it seems likely that Waikiki rentals actually affordable to and available for long-term renters are in short supply.

Ongoing trends may further limit supply. In the 1970s and 1980s, much of Waikiki's low-rise apartment housing was replaced by larger buildings. Early in this decade, at least one building was razed but not replaced -- the developer's plans for expensive units were no longer viable in the cooling real estate market. Renewed upscale and visitor-oriented development seems likely in Waikiki:

- The Myers Corporation project for renovation of the Hobron Lane area, including resort uses, has been approved by the City Council; and
- Development of a convention center just inland of Waikiki will likely increase demand for housing and other intensive urban uses of land on the mauka (uphill) side of Waikiki, with new uses aimed largely at convention visitors, not permanent residents.

PROFILE OF POTENTIAL WAIKIKI RENTERS

US Census data from 1990 provide insight into Waikiki's population and housing situation. Appendix A summarizes the Census data. Major demographic findings include:

- Waikiki has few children and many senior citizens. (Exhibit 1 of Appendix A shows that 20% of Waikiki's population was 65 or older in 1990).
- The population is largely Caucasian, and people of Filipino, Hawaiian and Japanese ancestry are underrepresented as compared to the island population. Still, a substantial number of residents come from Hawaii's smaller ethnic groups.
- Two-thirds of the population has moved in the last five years (as shown in Appendix A, Exhibit 2).
- More than two-thirds of Waikiki's households are renters. (See Appendix A, Exhibit 3.)
- Households are small, with only 1.72 persons on average per household.

- Housing costs are high for a large share of Waikiki residents (as shown in Appendix A, Exhibit 4.)

- A quarter of the population about twice the share found islandwide, had household incomes in 198! of $15,000 or less (about 37% of the county median).

- Labor force participation in Waikiki is below the level found islandwide. (See Exhibit A-5.) This makes sense, given the relatively large number of older residents, including many retirees.

Independent evidence of relatively high turnover of Waikiki apartments comes from the 1992 Housing Policy study.

EXHIBIT D: LENGTH OF STAY IN CURRENT HOUSING UNIT, RENTERS

Years In Current Housing Unit	Oahu Renters	Waikiki Renters
Less than one year	13.6%	25.0%
1 to 3 years	30.4%	36.0%
4 to 5 years	8.4%	21.3%
6 to 10 years	12.3%	14.6%
More than 10 years	34.3%	0.0%
Cases	247,349	6,330

SOURCE: Locations and SMS, 1993.

Respondents to the 1992 Housing Policy study who expressed interest in living in Waikiki were young, and in small households. Most lived alone (as shown in Exhibit E). Their reported incomes were moderate.

Older respondents to the 1992 survey likely to move to new rental housing in three years or less tended to live in larger households than the young people who were interested in moving to Waikiki. Elderly respondents (over 62) had limited household incomes.

EXHIBIT E: CHARACTERISTICS OF SUBGROUPS, HOUSEHOLDS ON OAHU LIKELY TO MOVE TO RENTAL HOUSING WITHIN THREE YEARS

	Interested in Renting In Waikiki (1)	Interested in Renting, with Members 55-61	Interested in Renting, with Members 62+
Household Size			
1	65.3%	19.4%	0.0%
2	19.8%	0.0%	0.0%
3	0.0%	26.9%	35.1%
4	0.0%	26.9%	0.0%
5	15.0%	26.9%	0.0%
More than 5	0.0%	0.0%	64.9%
Income			
Less than $15,000	0.0%	19.4%	0.0%
$15,000 to $24,999	65.3%	0.0%	0.0%
$25,000 to $34,999	0.0%	0.0%	35.1%
$35,000 to $49,999	0.0%	0.0%	64.9%
$50,000 to $99,999	0.0%	0.0%	0.0%
$100,000 +	0.0%	26.9%	0.0%
Refused	34.7%	53.8%	0.0%
Preferred Place to Rent (2)			
Waikiki	100.0%	0.0%	0.0%
Manoa, Punahou	0.0%	53.8%	0.0%
Kaimuki, St. Louis	0.0%	26.9%	35.1%
Kakaako, Downtown	0.0%	26.9%	0.0%
Aiea, Pearl City	0.0%	0.0%	35.1%
Wahiawa, Mililani, Makakilo	0.0%	0.0%	64.9%
Other Oahu	0.0%	19.4%	35.1%
Not in Hawaii	0.0%	26.9%	0.0%

NOTES:
(1) All respondents expressing a preference for Waikiki were in the 18 to 34 year old group, and their households contained no persons from other age groups.
(2) Multiple answers possible. However, for this tabulation, the alternative answers of the households interested in moving to Waikiki were not noted.
SOURCE: Locations, Inc. and SMS, 1993.

The sample on which the estimates in Exhibit E are based is clearly small. Additional information about the characteristics of older residents of Oahu comes from the Simmons/SMS Hawaii Media Market Study of consumers (in 1994). Among respondents age 55 and above who rent their homes:

- About half have households with one to three persons, and half have larger households;

- Two-thirds have no children in the household;

- Just over half -- about 20,000 persons -- have household incomes of $30,000 or less; and

- Nearly half have total assets worth less than $25,000.

The total population in question is about 36,300 persons, about 5% of the total island adult population. This survey suggests that a significant group of older renters has limited assets. The data on household size suggests that Oahu's elderly renters are less likely to be isolated in one- and two-person households than conventional wisdom suggests.

OVERVIEW OF FINDINGS

The findings of the research can be summarized in terms of the questions listed at the beginning of this report:

1. How much demand is there for rental housing in Waikiki?

   Some 1,420 households expect to move, and want to rent, in Waikiki. This number is about 18% of the 1990 supply of rental units in Waikiki. About two-thirds were living in Waikiki at the time of the survey.

2. Is demand strong from the elderly with low-to-moderate incomes?

   Demand for affordable rental housing is clearly evident, but surveys did not encounter people who expect to find elderly housing for moderate rents in Waikiki.

3. What sort of units would best serve the elderly affordable rental market, and at what prices?

   Many households headed by older people contain three or more persons, so a mix of one- and two-bedroom units would likely be appropriate to house the elderly market. Information about income suggests that older renting households are found with incomes ranging from $15,000 to $50,000. In order to meet the needs of those who are most vulnerable to contraction in the rental housing supply, an income-based schedule of prices would give priority to lower-income households.

4. If housing were made available to low-to-moderate income renters of all ages, what level of demand can be expected?

   SMS expects two very different groups -- elderly households and young adults -- to be interested in Waikiki rentals. Demand for a project with moderate rents would likely be strong.

5. What sort of units, and at what price, would best serve the affordable rental market in general?

   For the elderly market, studios and one- and two-bedroom units seem adviseable. For the younger market, studios and one-bedroom units would respond to demand.

   Available data on the young adult market indicates that persons interested in renting in Waikiki have moderate incomes and no dependents. They could afford rents in the range of $600 to $850 per month.

The research for this report indicates that demand for rental housing is likely to increase in Waikiki. Research did not conclusively identify demand for elderly rental housing in Waikiki -- with affordable elderly rental housing in Waikiki nearly non-existent, there is little voiced demand for units that do not now exist. Yet, there are ample signs that need for new affordable rentals exists, and is greater than the new supply now being created by the City and County and nonprofit developers.

OPPORTUNITIES FOR GENESIS FOUNDATION

The analysis has focused on the question of whether a market exists. Questions remain as to how to serve that market well. Two broad strategies for Waikiki development are visible:

Alternative 1: Genesis Foundation seeks to develop housing in Waikiki with the aim of providing shelter within the means of low-to-moderate income residents. To make sure that new units are occupied, both elderly and young adult markets are targeted.

Research questions that are pressing if Genesis Foundation seeks to maximize the amount of housing offered include:

(1) Precisely what competing supply is available for the elderly in Waikiki?

(2) How many elderly residents would be interested in Waikiki rentals if a building or part of one were reserved for them?

(3) What design constraints and problems (e.g., noise) must be addressed for elderly renters to find a project welcoming?

(4) Conversely, what design features can attract a young adult clientele that is, for Waikiki, relatively stable and likely to co-exist well with the elderly?

(5) Would a mixed-age project produce an adequate rate of return?

Alternative 2: Genesis Foundation seeks to serve elderly renters by providing housing and ancillary services or facilities that would make the Foundation's building a center for the elderly community. While it is not certain that demand for elderly rental housing in Waikiki would quickly fill a building's space, it seems quite possible to provide a mix of services and facilities that would assure continuing occupancies and enhance the quality of life for tenants and others.

Major research questions to be addressed if this alternative is pursued include:

(1) How many elderly residents would be interested in Waikiki rentals if a building or part of one were reserved for them?

(2) What design elements, services and facilities are needed to make a new project by the Genesis Foundation stand out as exceptionally well suited to elderly renters in Honolulu?

(3) What design elements, services and facilities would allow a new project to serve the surrounding community as an elderly center?

(4) Would an elderly-only project provide an adequate rate of return?

APPENDIX: 1990 CENSUS DATA, WAIKIKI

EXHIBIT 1: DEMOGRAPHIC CHARACTERISTICS, 1990

	Honolulu County	Waikiki
POPULATION	836,231	19,768
ETHNICITY		
Caucasian	32%	60%
Japanese	23%	13%
Filipino	14%	4%
Hawaiian	11%	4%
Other	20%	20%
AGE		
Under 5 years	7%	3%
5 to 17 years	17%	5%
18 to 34 years	31%	31%
35 to 64 years	34%	41%
65 or more years	11%	20%
Median age (years)	32.2	N/A
EDUCATION OF PERSONS AGED 25 & OVER (1)		
High School Diploma (2)	81%	84%
College Degree (3)	33%	37%
PERSONS AGED 5 & OVER WHO SPEAK A LANGUAGE OTHER THAN ENGLISH AT HOME (1)	28%	29%
PERSONS WITH MOBILITY OR SELF-CARE LIMITATIONS (1)		
% of persons aged 16 to 64	4%	4%
% of persons aged 65 or more	18%	14%

NOTES: (1) Based on 15% sample; hence, figures represent estimates only.
(2) All persons with a high school diploma, including those with college education.
(3) Includes Associate, Bachelor's, and graduate degrees.

SOURCES: U.S. Bureau of the Census, 1992, 1991.

EXHIBIT 2: GEOGRAPHIC MOBILITY, 1990 (1)

	Honolulu County	Waikiki
PERSONS (2)		
PLACE OF BIRTH		
Born in Hawaii	54%	21%
Other U.S.-born (3)	30%	52%
Foreign-born	16%	27%
RESIDENCE 5 YEARS PREVIOUS FOR PERSONS AGED 5 & OVER		
Same house	50%	34%
Same county, different house	26%	27%
Same state, different county	1%	1%
Different state	17%	27%
Lived abroad	5%	10%
HOUSEHOLDERS (2)		
WHEN HOUSEHOLDER MOVED INTO UNIT		
In the last 5 years	53%	64%
6 to 20 years ago	29%	28%
21 to 30 years ago	10%	3%
31 years ago or more	6%	1%

NOTES: (1) Based on 15% sample; hence, figures represent estimates only.
(2) Base figures used in calculating these data may be different than in 100% count.
(3) Includes persons born in U.S. territories, and persons born abroad or at sea to American parents.

SOURCE: U.S. Bureau of the Census, 1992.

EXHIBIT 3: HOUSING CHARACTERISTICS, 1990

	Honolulu County	Waikiki
HOUSING UNITS	281,683	17,196
TOTAL VACANT UNITS	6%	34%
Seasonal/recreational	2%	11%
AGE OF STRUCTURE (1)		
1 year	2%	0%
2 to 10 years	14%	8%
11 to 20 years	30%	46%
21 years or more	54%	49%
UNITS IN STRUCTURE		
1 unit	55%	1%
2 to 4 units	7%	2%
5 or more units	36%	93%
Trailer, other	1%	4%
NOT COMPLETE PLUMBING (1)	1%	2%
HOUSEHOLDS	265,304	11,408
HOUSEHOLD TYPE		
1 or more non-relatives	12%	17%
No non-relatives	88%	83%
TENURE		
Owner-occupied	52%	32%
Renter-occupied	48%	68%
PERSONS PER HOUSEHOLD	3.02	1.72
CROWDED HOUSEHOLDS		
Mildly crowded (2)	8%	4%
Very crowded (3)	8%	10%
MEAN VALUE (4)	$312,824	$278,214

NOTES: (1) Based on 15% sample; hence, figures represent estimates only.
(2) Indicated by households with 1.00 to 1.50 persons per room.
(3) Indicated by households with 1.51 or more persons per room.
(4) For owner-occupied, non-condominium housing units.

SOURCES: U.S. Bureau of the Census, 1992, 1991.

EXHIBIT 4: INCOME CHARACTERISTICS, 1990

	Honolulu County	Waikiki
HOUSEHOLDS (2)		
INCOME LEVEL		
Lowest (3)	13%	25%
Highest (4)	17%	8%
Mean Income (5)	$49,958	$36,021
Interquartile Range (5,6)	$43,154	$31,250
WITH SELECTED INCOME SOURCES		
Social Security Income	24%	28%
Retirement Income	20%	20%
Public Assistance Income	8%	4%
OWNER HOUSING COSTS (7)		
35% or more of Household Income	15%	43%
Mean Monthly Costs (5)	$964	$658
RENTER HOUSING COSTS (8)		
35% or more of Household Income	34%	48%
Mean Gross Rent (5)	$711	$797
Mean Contract Rent (5,9)	$655	$760
POPULATION (2)		
PERSONS BELOW POVERTY LEVEL	7%	13%
% of persons aged 18 to 64	6%	14%
% of persons aged 65 or more	8%	9%
% of related children aged under 18	10%	15%
% of unrelated individuals	18%	18%

NOTES: (1) Based on 15% sample (except "Mean Contract Rent"); hence, figures represent estimates only.
(2) Base figures used in calculating this data may be different than in 100% count.
(3) Incomes of less than $15,000 (based on lowest 14.8% of incomes statewide).
(4) Incomes of $75,000 or more (based on highest 15.8% of incomes statewide).
(5) In 1989 dollars.
(6) A smaller range means less difference between rich and poor, while a larger range means a greater difference between rich and poor.
(7) Owner costs include (but are not limited to) mortgage, real property tax, property insurance, utilities, and fuels.
(8) Renter costs include (but are not limited to) rent, utilities, and fuels.
(9) Monthly cash rent only. Does not include other costs.

SOURCES: U.S. Bureau of the Census, 1992, 1991.

EXHIBIT 5: LABOR FORCE CHARACTERISTICS, 1990

	Honolulu County	Waikiki
POPULATION AGED 16 & OVER	631,920	18,492
In Armed Forces	8%	1%
POTENTIAL CLF (2)	598,371	18,247
% Actually in Civilian Labor Force	68%	63%
ACTUAL CLF	410,023	11,474
MALE		
Labor force participation (3)	75%	68%
Unemployed	4%	6%
FEMALE		
Labor force participation (3)	63%	56%
Unemployed	3%	5%
EMPLOYED CLF	395,811	10,820
BY SELECTED INDUSTRY		
Agriculture, forestry, fisheries, mining	2%	1%
Construction	7%	4%
Manufacturing	6%	4%
Transportation	7%	9%
Retail trade	18%	28%
Finance, insurance, real estate	8%	10%
Personal, entertainment, recreation	6%	14%
Health, education, professional	22%	16%
Public administration	8%	5%
BY OCCUPATION		
Managerial, professional	28%	29%
Technical, sales, support	35%	37%
Service	17%	20%
Farming, forestry, fishing	2%	1%
Precision, craft, repair	10%	7%
Operators, cleaners, laborers	9%	6%
COMMUTE TO WORK		
More than 45 minutes	18%	7%
Mean travel time (minutes)	24.8	19.0

NOTES: (1) Based on 15% sample; hence, figures represent estimates only.
(2) CLF = Civilian Labor Force. Potential CLF calculated by subtracting persons in armed forces from Population Aged 16 & Over.
(3) Calculated by dividing Actual CLF by Potential CLF.

SOURCE: U.S. Bureau of the Census, 1992.

REFERENCES

Bank of Hawaii. Construction in Hawaii, 1995. Honolulu, HI, 1995.

City and County of Honolulu. Final First Year Consolidated Plan: Program Year 1995-1996. Honolulu, HI, 1995.

City and County of Honolulu Planning Department. Development Plan Annual Report. Honolulu, HI, 1995.

Hawaii State Department of Business, Economic Development and Tourism. The State of Hawaii Data Book, 1993-94. Honolulu, HI, 1994.

Housing Finance and Development Corporation. State Comprehensive Housing Affordability Strategy: Annual Plan, October 1, 1993 through September 30, 1994. Honolulu, HI, 1994.

Locations, Inc. and SMS Research and Marketing Services, Inc. Hawaii Housing Policy Study. Honolulu, HI, 1993.

United States Department of Commerce, Bureau of the Census. 1990 Census of Population and Housing: Summary Tape File 3-A: Alaska, Hawaii, Oregon. CD90-3A-02. Washington D.C., 1992

United States Department of Commerce, Bureau of the Census. 1990 Census of Population and Housing: Summary Tape File 1-A: Pacific Division, Vol 1, CD90-1A-9-1. Washington D.C., 1991.

Appendix F

Comments, Responses and Memoranda

THE GENESIS FOUNDATION (808) 926-0121
A non-profit tax exempt corporation for affordable housing serving the elderly and low/moderate income people of Hawaii
311 Ohua #1304 D
Honolulu, Hawaii 96815

October 12, 1999

Jan Naoe Sullivan, Director of Planning and Permitting
Department of Planning and Permitting
650 South King Street
Honolulu, Hawaii 96813

Dear Ms. Sullivan:

Thank you for your letter dated September 7, 1999 transmitting review comments pertaining to the *Supplemental EA for Kahiola, an Affordable Seniors Rental Housing Project in Waikiki, Honolulu, Oahu, Hawaii* (July 1999). Specific responses to your comments are listed below.

Section 1.1 Overview
The Final Supplemental EA will include a discussion of the previous project proposal that was the subject of the earlier EA that was published by OEQC in the *Environmental Notice* on May 8, 1999. The discussion will explain how and why the earlier proposal was revised.

Section 4.10 Land Use
This section of the document will include the statement that the proposed project does not pose any adverse impacts on the General Plan or the City's Primary Urban Center Development Plan nor exceed the existing unit count for this area which is designated for medium-density apartment use. Additionally, this section will include the statement that a Conditional Use Permit (Cm) minor for Joint Development will be required for the development of two separate legal lots of record.

Section 4.13 Public Services and Facilities
The Final Supplemental EA will include the statement that the sewer system is inadequate to accommodate the proposed 109 rental apartments and one building manager's unit. Our representative will continue to coordinate with the DPP, Wastewater Branch to discuss a relief project. Please refer to the attached letter summarizing the two options that have been discussed and continue to be coordinated with officials at the DPP, Wastewater Branch.

fax (808) 926-0335 *email* nicholas@pixi.com

Your review of the Supplemental EA dated July 1999 is greatly appreciated. Please contact the project representative, Mr. Evan D. Cruthers of Media 5, Ltd. at 524-2040 or Ms. Claire Tom of Wil Chee - Planning, Inc. at 955-6088 regarding additional questions.

Sincerely,

Dr. Nicholas B. Christoff, Director
The Genesis Foundation

Enclosure

cc: Media 5, Ltd.
Wil Chee - Planning, Inc.

RECEIVED
SEP 27 1999
MEDIA FIVE LIMITED

MEMORANDUM

URS Greiner Woodward Clyde

To: Evan Cruthers/Files
From: David R. Yogi, Jr. Dave
File: DRY/C:\JOBS\KAHIOLA\09279MEM.DOC
Project: Kahiola Rental Housing Project
Subject: Sewer Service Alternatives

Date: September 27, 1999
Job No.:

Two alternatives will be considered and evaluated for providing sewer service for the Kahiola project. Based on information provided by the City and County of Honolulu, existing adjacent sewers do not have adequate capacity to accommodate sewage flows from the Kahiola project until a major trunk sewer located at the intersection of Lewers Street and Kuhio Avenue. The City plans to resolve sewer capacity problems within the next ten years by constructing new relief sewers or relocating the Beachwalk Wastewater Pump Station.

Alternative 1: Sewage Force Main along Ala Wai Boulevard and Microtunnel Sewer along Lewers Street. A small (3-inch to 6-inch diameter) sewage force main would be installed under Ala Wai Boulevard extending from the Kahiola project site to Lewers Street. Along Lewers, a 36-inch microtunnel sewer would be constructed to accommodate sewage flows from the Kahiola project as well as other adjacent buildings.

Alternative 2: Sewage Force Main along Ala Wai Boulevard and Lewers Street. This alternative is similar to Alternative 1 except that a new sewage force main would be constructed along the entire route from the Kahiola project along Ala Wai Boulevard, and Lewers Street to Kuhio Avenue.

DEPARTMENT OF PLANNING AND PERMITTING
CITY AND COUNTY OF HONOLULU
650 SOUTH KING STREET • HONOLULU, HAWAII 96813
TELEPHONE (808) 523-4414 • FAX (808) 527-6743

JEREMY HARRIS
MAYOR

JAN NAOE SULLIVAN
DIRECTOR

LORETTA K.C. CHEE
DEPUTY DIRECTOR

RECEIVED
SEP 8 1999
MEDIA FIVE LIMITED

1999/ED-6(ST)

September 7, 1999

Mr. Evan D. Cruthers
Media Five Ltd.
345 Queen Street, Suite 900
Honolulu, Hawaii 96813

Dear Mr. Cruthers:

Draft Environmental Assessment (EA)
Revised Kahiola Seniors Rental Housing At
2423 Ala Wai Boulevard, Waikiki Oahu
Tax Map Key: 2-6-24: 70 and 71

We have reviewed the Draft EA for the revised project filed on July 8, 1999, and our comments are as follows:

Section 1.1 Overview

This section fails to disclose the previous project proposal that was the subject of the earlier EA which was published in the Environmental Notice on May 8, 1999. The final EA should be revised to explain how and why the earlier proposal has been revised.

Section 4.10 Land Use

The proposed project does not pose any adverse impacts on the General Plan or the City's Primary Urban Center Development Plan nor exceeds the existing unit count for this area which is designated for medium-density apartment use.

This section should be revised to disclose that a Condition Use Permit (Cm) minor for Joint Development will be required for the development of two separate legal lots of record.

Section 4.13 Public Services and Facilities

The municipal sewer system is inadequate to accommodate the proposed 109 rental apartments and one building manager's unit. The three inadequacies previously cited remain applicable (see enclosed). The applicants should contact our Wastewater Branch directly to discuss a relief project for these inadequacies.

Should you have any questions, please contact Steve Tagawa of our staff at 523-4817.

Very truly yours,

For JAN NAOE SULLIVAN
Director of Planning
and Permitting

JNS:am
Enclosure

cc: Office of Environmental Quality Control

Posse:7164

DEPARTMENT OF PLANNING AND PERMITTING
CITY AND COUNTY OF HONOLULU
650 SOUTH KING STREET • HONOLULU, HAWAII 96813
TELEPHONE: (808) 523-4414 • FAX: (808) 527-6743

JEREMY HARRIS
MAYOR

JAN NAOE SULLIVAN
DIRECTOR

LORETTA K.C. CHEE
DEPUTY DIRECTOR

FILE COPY
Mailed 6/7/99

June 7, 1999

1999/CLOG-2611(ST)
'99 EA Comments Zone 2

Mr. Evan D. Cruthers
Media Five Ltd.
345 Queen Street, Suite 900
Honolulu, Hawaii 96813

Dear Mr. Cruthers:

Draft Environmental Assessment (EA)
Kahiola Senior Rental Housing at 2423 Ala Wai Boulevard
Waikiki, Oahu
Tax Map Keys: 2-6-24: 70 and 71

We have reviewed the Draft EA for the above-referenced project received on April 29, 1999, and offer the following comments:

Section 3.10 Land Use

This section does not address the project's conformance with both the City and County of Honolulu's General and Development Plans. The final EA should be revised to include a full discussion of how this project will conform to these plans.

Section 3.13.2 Wastewater System

The municipal sewer system is inadequate to accommodate the proposed 89 rental apartments and one building manager's unit. The three inadequacies are listed below and require relief projects:

1. A new sewer line in Ala Wai Boulevard is required from the subject property to sewer manhole (SMH) 0007 at the intersection of Ala Wai Boulevard and Kanekapolei Street.

2. The 27-inch sewer line in Ala Wai Boulevard between SMH 0007 and SMH 0637 requires a relief line.

3. The 48-inch sewer line in Lewers Street between SMH 0637 and the SMH 0633 requires a relief line.

Relief of the 48-inch sewer line in Lewers Street may not be required if the City and County of Honolulu complete their plans to move the Beachwalk Wastewater Pump Station (WWPS). Construction of the Beachwalk (new) WWPS project is tentatively scheduled to be completed in 2005.

Should the Beachwalk WWPS remain at its present site, a project is scheduled to relieve the 48-inch sewer line on Lewers Street. However, the construction of this project, the Ala Wai Trunk Sewer Relief, is not scheduled to be completed until 2004. Should this rental project be initiated before that time, the above-mentioned inadequacies would have to be addressed by the applicant.

Section 4.12 Circulation and Traffic

Although we generally concur with the findings contained in the traffic study, we note the following should be provided or incorporated into the design of this development prior to the submittal of construction plans for this project:

1. A preliminary plan showing the site layout, the proposed access location and loading and parking areas should be provided. Adequate vehicular sight to pedestrians and vehicle should be provided and maintained at the driveway to this project. All loading and unloading activities should be conducted on-site and these areas should be designed such that no reversing of vehicles occurs on any public street.

2. There is a 2-foot road widening setback along the Tusitala Street frontage. The developer should contact our Traffic Review Branch prior to applying for building permits to determine whether frontage improvements will be required.

3. Construction plans for all work within the City's road right-of-way should be submitted for review and approval. Traffic control plans during construction will also be required.

Should you have any questions, please contact Steve Tagawa of our Coastal Lands Branch at 523-4817.

Very truly yours,

JAN NAOE SULLIVAN
Director of Planning
and Permitting

JNS:am

cc: Office of Environmental Quality Control

posse doc no. 4988

THE GENESIS FOUNDATION (808) 926-0121
A non-profit tax exempt corporation for affordable housing serving the elderly and low/moderate income people of Hawaii
311 Ohua Suite 1304 D
Honolulu, Hawaii 96815

June 18, 1999

Gary Gill, Deputy Director for Environmental Health
State of Hawaii Department of Health
P.O. Box 3378
Honolulu, Hawaii 96801

Dear Mr. Gill:

Thank you for your letter dated June 7, 1999 addressed to Ms. Sullivan, Director, Department of Planning and Permitting. In general, your recommendations pertaining to the *Draft EA for Kahiola, an Affordable Seniors Rental Housing Project in Waikiki, Honolulu, Oahu, Hawaii* (April 1999) will be incorporated in the Final EA. The following paragraphs are specific responses to your comments.

Noise Concerns
The Final EA will incorporate items 1.a., 1.b., 1.c., 2., and 3. as recommended mitigation measures in Section 4.6 Noise Quality.

Control of Fugitive Dust
The Final EA will incorporate items a., b., c., d., e., and f. as recommended mitigation measures in Section 4.5 Air Quality.

Polluted Runoff Control
The Final EA will reference the *Hawaii's Coastal Nonpoint Source Control Plan* in the mitigation discussion in Section 4.2 Geology and Soils.

Solid Waste
The Final EA will incorporate the recommendation for a waste minimization plan in the discussion in Section 4.13 Public Services and Facilities.

Your review of the Draft EA is greatly appreciated. Please contact the project representative, Evan D. Cruthers of Media 5, Ltd. at 524-2040 or Claire Tom of Wil Chee - Planning, Inc. at 955-6088 regarding additional questions. Thank you very much for your time and participation.

Sincerely,

Dr. Nicholas B. Christoff, Director
The Genesis Foundation

fax (808) 926-0335 *email* nicholas@pixi.com

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

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

BRUCE S. ANDERSON, Ph.D., M.P.H.
DIRECTOR OF HEALTH

In reply, please refer to:
File:

99 JUN 16 AM 8:22
DEPT OF PLANNING and PERMITTING
CITY & COUNTY OF HONOLULU

June 7, 1999

99-091/epo

Ms. Jan Naoe Sullivan, Director
Department of Planning and Permitting
City & County of Honolulu
650 South King Street
Honolulu, Hawaii 96813

Dear Ms. Sullivan:

Subject: Draft Environmental Assessment (DEA)
Kahiola Seniors Rental Housing Project
2429 & 2423 Ala Wai Boulevard
Waikiki, Oahu
TMK: 2-6-24: 70 & 71

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

Noise Concerns

1. Activities associated with the construction phase of the project must comply with the Department of Health's Administrative Rules, Chapter 11-46, "Community Noise Control."

   a. The contractor must obtain a noise permit if the noise levels from the construction activities are expected to exceed the allowable levels of the rules as stated in Section 11-46-6(a).

   b. Construction equipment and on-site vehicles requiring an exhaust of gas or air must be equipped with mufflers as stated in Section 11-46-6(b)(1)(A).

   c. The contractor must comply with the requirements pertaining to construction activities as specified in the rules and the conditions issued with the permit as stated in Section 11-46-7(d)(4).

2. Heavy vehicles travelling to and from the project site must comply with the provisions of the Hawaii Administrative Rules, Chapter 11-42, "Vehicular Noise Control for Oahu."

3. Through facility design, sound levels emanating from stationary equipment such as air conditioning systems, be attenuated to comply with the provisions of the Department of Health's Administrative Rules, Chapter 11-46, "Community Noise Control."

Should there be any questions on this matter, please call Mr. Jerry Haruno, Environmental Health Program Manager of the Noise, Radiation and Indoor Air Quality Branch at 586-4701.

Control of Fugitive Dust

Construction activities must comply with provisions of Hawaii Administrative Rules, Chapter 11-60.1, "Air Pollution Control," Section 11-60.1-33, Fugitive Dust.

The contractor should provide adequate measures to control dust from the road areas and during the various phases of construction. These measures include, but are not limited to:

a. Planning the different phases of construction, focusing on minimizing the amount of dust generating materials and activities, centralizing on-site vehicular traffic routes, and locating potentially dusty equipment in areas of the least impact;

b. Providing an adequate water source at the site prior to start up of construction activities;

c. Landscaping and rapid covering of bare areas, including slopes, starting from the initial grading phase;

d. Controlling of dust from shoulders and access roads;

e. Providing adequate dust control measures during weekends, after hours, and prior to daily start-up of construction activities; and

f. Controlling of dust from debris being hauled away from project site.

If you have any questions regarding these issues on fugitive dust, please contact the Clean Air Branch at 586-4200.

99-091/epo

Polluted Runoff Control

Proper planning, design and use of erosion control measures and management practices during construction will substantially reduce the total volume of runoff and limit the potential impact to the coastal waters from polluted runoff. Please refer to the Hawaii's Coastal Nonpoint Source Control Plan, pages III-117 to III-119 for guidance on these management measures and practices for specific project activities. To inquire about receiving a copy of this plan, please call the Coastal Zone Management Program in the Planning Office of the Department of Business and Economic Development & Tourism at 587-2877.

Solid Waste

Act 324-91, the Integrated Solid Waste Management Act, established the State's commitment to waste diversion and set a goal of 50% diversion by the year 2000. This goal will require waste minimization efforts from businesses, government and residents. The Department of Health recommends that a waste minimization plan be developed and implemented prior to beginning construction, which will mitigate the volumes of solid waste needing disposal. Enclosed are several suggested approaches to waste minimization during construction and occupancy.

If you have any questions regarding these solid waste comments, please contact Mr. Lane Otsu of the Solid & Hazardous Waste Branch at 586-4240.

The Department of Health recommends that the developer and/or contractor be required to hold a public informational meeting in the surrounding community to describe the project and potential environmental impacts and to respond to concerns relating to the project.

Sincerely,

Gary Gill
Deputy Director for
Environmental Health

Enclosure

c: NR & IAQB
CAB
CWB
SHWB

ENCLOSURE

THE FOLLOWING ARE A FEW WASTE MINIMIZATION MEASURES FOR IMPLEMENTATION IN DESIGN AND CONSTRUCTION OF NEW DEVELOPMENTS:

I. WASTE REDUCTION DURING CONSTRUCTION/DEMOLITION

GREENWASTE - SOD AND TOP SOIL COMPOSTING
CONCRETE OR ASPHALT RECYCLING - ROCK & BOULDER SEPARATION
SALVAGE OF DIMENSIONAL LUMBER
METALS RECOVERY

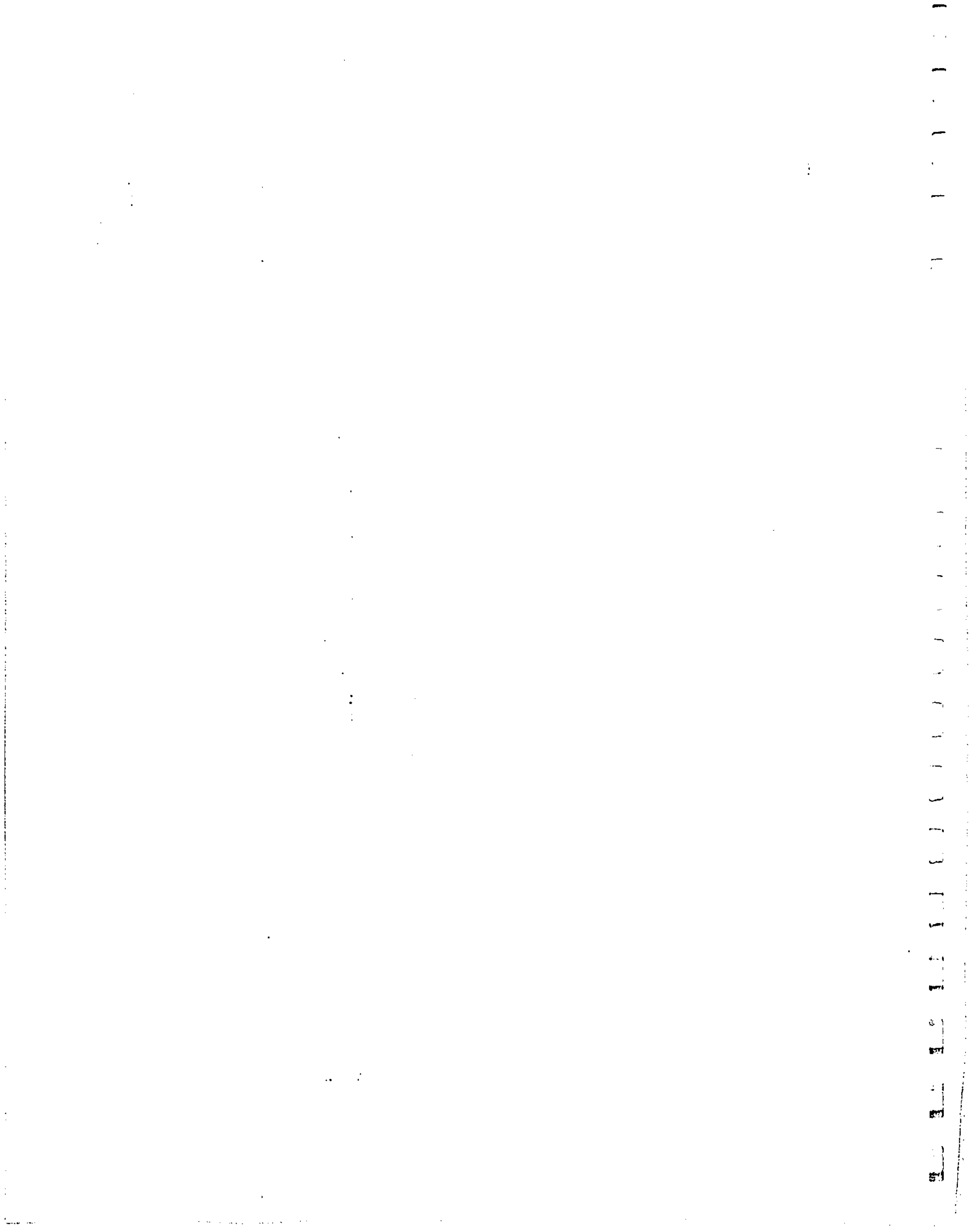
WASTE MINIMIZATION PLAN - USUAL PRACTICE BUT EMPHASIZE
SALVAGE BY LOCAL NON-PROFIT
HAZWASTE MINIMIZATION - ESPECIALLY SUB-CONTRACTORS

II. USE OF RECYCLED MATERIALS

LOCAL COMPOST - SOIL AMENDMENTS
CRUSHED GLASS IN PAVING - BASE - BACKFILL
CONSTRUCTION BOARD WITH RECYCLED CONTENT
RECYCLED CONCRETE OR ASPHALT IN BASE
RECYCLED PLASTIC "LUMBER" IN OUTDOOR FURNITURE, FENCING, ETC.

III. DESIGN AND OPERATIONAL REQUIREMENTS

CONSIDER SPACIAL REQUIREMENTS AT INTERNAL. COLLECTION AND EXTERNAL STORAGE AREAS
REVIEW OPERATIONAL REQUIREMENTS WITH MAINTENANCE AND CUSTODIAL STAFF
PROVIDE COLLECTION CAPABILITIES FOR SEPARATED GREENWASTE
DISCUSS EQUIPMENT AND CONTAINER REQUIREMENTS WITH HAULERS AND VENDORS
MULTI-MATERIAL CHUTES IN HIGH RISES
CONVENIENT DROP-OFF SITES IN TOWN HOUSES
INTERNAL TENANT RECYCLING ~~IN SHOPPING CENTERS~~



THE GENESIS FOUNDATION (808) 926-0121

A non-profit tax exempt corporation for affordable housing serving the elderly and low/moderate income people of Hawaii

311 Ohua Suite 1304 D
Honolulu, Hawaii 96815

June 16, 1999

Jan Naoe Sullivan, Director of Planning and Permitting
Department of Planning and Permitting
650 South King Street
Honolulu, Hawaii 96813

Dear Ms. Sullivan:

Thank you for your letter dated June 7, 1999 transmitting review comments pertaining to the *Draft EA for Kahiola, an Affordable Seniors Rental Housing Project in Waikiki, Honolulu, Oahu, Hawaii* (April 1999). In general, the Final EA will incorporate the additional information mentioned in your letter. The following paragraphs are specific responses to your comments.

Section 3.10 Land Use
The Final EA will include a discussion of how the project will conform to the C&C of Honolulu's General and Development Plans in Section 4.10 Land Use.

Section 3.13.2 Wastewater System
This section of the Final EA will include information pertaining to the three inadequacies mentioned in your letter. Media 5, Ltd., as our representative will continue to coordinate with the DPP on wastewater system improvements.

Section 4.12 Circulation and Traffic
The Final EA will incorporate your recommendations. Our representative will continue to coordinate with the DPP on traffic and circulation issues.

Your review of the Draft EA is greatly appreciated. Please contact the project representative, Evan D. Cruthers of Media 5, Ltd. at 524-2040 or Claire Tom of Wil Chee - Planning, Inc. at 955-6088 regarding additional questions. Thank you very much for your time and participation.

Sincerely,

Dr. Nicholas B. Christoff, Director
The Genesis Foundation

fax (808) 926-0335 *email* nicholas@pixi.com

DEPARTMENT OF PLANNING AND PERMITTING
CITY AND COUNTY OF HONOLULU
650 SOUTH KING STREET • HONOLULU, HAWAII 96813
TELEPHONE (808) 523-4414 • FAX (808) 527-6743

RECEIVED
JUN 8 1999
MEDIA FIVE LIMITED

JEREMY HARRIS
MAYOR

JAN NAOE SULLIVAN
DIRECTOR

LORETTA K.C. CHEE
DEPUTY DIRECTOR

June 7, 1999

1999/CLOG-2611(ST)
'99 EA Comments Zone 2

Mr. Evan D. Cruthers
Media/Five Ltd.
345 Queen Street, Suite 900
Honolulu, Hawaii 96813

Dear Mr. Cruthers:

Draft Environmental Assessment (EA)
Kahiola Senior Rental Housing at 2423 Ala Wai Boulevard
Waikiki, Oahu
Tax Map Keys: 2-6-24: 70 and 71

We have reviewed the Draft EA for the above-referenced project received on April 29, 1999, and offer the following comments:

Section 3.10 Land Use

This section does not address the project's conformance with both the City and County of Honolulu's General and Development Plans. The final EA should be revised to include a full discussion of how this project will conform to these plans.

Section 3.13.2 Wastewater System

The municipal sewer system is inadequate to accommodate the proposed 89 rental apartments and one building manager's unit. The three inadequacies are listed below and require relief projects:

1. A new sewer line in Ala Wai Boulevard is required from the subject property to sewer manhole (SMH) 0007 at the intersection of Ala Wai Boulevard and Kanekapolei Street.

2. The 27-inch sewer line in Ala Wai Boulevard between SMH 0007 and SMH 0637 requires a relief line.

3. The 48-inch sewer line in Lewers Street between SMH 0637 and the SMH 0633 requires a relief line.

Relief of the 48-inch sewer line in Lewers Street may not be required if the City and County of Honolulu complete their plans to move the Beachwalk Wastewater Pump Station (WWPS). Construction of the Beachwalk (new) WWPS project is tentatively scheduled to be completed in 2005.

Should the Beachwalk WWPS remain at its present site, a project is scheduled to relieve the 48-inch sewer line on Lewers Street. However, the construction of this project, the Ala Wai Trunk Sewer Relief, is not scheduled to be completed until 2004. Should this rental project be initiated before that time, the above-mentioned inadequacies would have to be addressed by the applicant.

Section 4.12 Circulation and Traffic

Although we generally concur with the findings contained in the traffic study, we note the following should be provided or incorporated into the design of this development prior to the submittal of construction plans for this project:

1. A preliminary plan showing the site layout, the proposed access location and loading and parking areas should be provided. Adequate vehicular sight to pedestrians and vehicle should be provided and maintained at the driveway to this project. All loading and unloading activities should be conducted on-site and these areas should be designed such that no reversing of vehicles occurs on any public street.

2. There is a 2-foot road widening setback along the Tusitala Street frontage. The developer should contact our Traffic Review Branch prior to applying for building permits to determine whether frontage improvements will be required.

3. Construction plans for all work within the City's road right-of-way should be submitted for review and approval. Traffic control plans during construction will also be required.

Should you have any questions, please contact Steve Tagawa of our Coastal Lands Branch at 523-4817.

Very truly yours,

JAN NAOE SULLIVAN
Director of Planning
and Permitting

JNS:am

cc: Office of Environmental Quality Control

poseo doc no. 4980

THE GENESIS FOUNDATION (808) 926-0121
A non-profit tax exempt corporation for affordable housing serving the elderly and low/moderate income people of Hawaii
311 Ohua Suite 1304 D
Honolulu, Hawaii 96815

June 16, 1999

Genevieve Salmonson, Director
Office of Environmental Quality Control
235 South Beretania Street, Suite 702
Honolulu, Hawaii 96813

Dear Ms. Salmonson:

Thank you for your letter dated June 7, 1999 transmitting review comments pertaining to the *Draft EA for Kahiola, an Affordable Seniors Rental Housing Project in Waikiki, Honolulu, Oahu, Hawaii* (April 1999). In response to your general comment, the Final EA will be printed on both sides of the paper to reduce bulk. The following paragraphs are specific responses to your comments.

1. Visual impacts: Drawings and diagrams will be included to show the proposed landscaping.
2. Funding: Project costs will be included in Section 2.3.2 Economic Characteristics.
3. Contacts: Appendix F will include consultation letters, comments and responses.
4. Significance Criteria: A discussion of the findings and reasons according to the significance criteria listed in HAR 11-200-12 will be provided in Chapter 6.0 Findings and Determinations.
5. Sustainable Building Design: Sustainable building techniques, if any are implemented, will be mentioned in the Final EA.

Your review of the Draft EA is greatly appreciated. Please contact the project representative, Evan D. Cruthers of Media 5, Ltd. at 524-2040 or Claire Tom of Wil Chee - Planning, Inc. at 955-6088 regarding additional questions. Thank you very much for your time and participation.

Sincerely,

Dr. Nicholas B. Christoff, Director
The Genesis Foundation

fax (808) 926-0335 *email* nicholas@pixi.com

BENJAMIN J. CAYETANO
GOVERNOR

STATE OF HAWAII
OFFICE OF ENVIRONMENTAL QUALITY CONTROL
236 SOUTH BERETANIA STREET
SUITE 702
HONOLULU, HAWAII 96813
TELEPHONE (808) 586-4185
FACSIMILE (808) 586-4186

GENEVIEVE SALMONSON
DIRECTOR

RECEIVED
JUN 8 1999
MEDIA FIVE
LIMITED

June 7, 1999

Jan Sullivan, Director
Department of Planning and Permitting
650 South King Street, 7th Floor
Honolulu, Hawaii 96813

Attn: Steve Tagawa

Dear Ms. Sullivan:

Subject: Draft Environmental Assessment (EA) for Kahiola Rental Housing Project, Waikiki

In order to reduce bulk and conserve paper, we recommend printing on both sides of the pages in the final document. In addition please include the following in the final EA:

1. Visual impacts: Include drawings or diagrams of the site, the proposed buildings and any proposed landscaping that show the final appearance of the project. We recommend using native Hawaiian trees and plants for the landscaping.

2. Funding: The total project cost is not given. Disclose all state or county funds involved, including any federal funds flowing through the state or county.

3. Contacts: Please document all contacts in the final EA, including those made during the pre-consultation phase, and include copies of any correspondence. Notify the nearest neighbors or neighboring landowners of the proposed project, as well as any interested community groups.

4. Significance criteria: Include a discussion of findings and reasons, according to the significance criteria listed in HAR 11-200-12, that supports your

forthcoming determination, either Finding of No Significant Impact (FONSI) or EIS preparation notice. You may use the enclosed sample as a guideline.

5. Sustainable Building Design: Please consider applying sustainable building techniques presented in the enclosed "Guidelines for Sustainable Building Design in Hawaii." In the final EA include a description of any of the techniques you will implement.

If you have any questions please call Nancy Heinrich at 586-4185.

Sincerely,

GENEVIEVE SALMONSON
Director

Enc.

c: Evan Cruthers, Media 5
Nicholas Christoff, Genesis Foundation (w/o enc.)

8.0 DETERMINATION, FINDINGS AND REASONS FOR SUPPORTING DETERMINATION

8.1 SIGNIFICANCE CRITERIA

According to the Department of Health Rules (11-200-12), an applicant or agency must determine whether an action may have a significant impact on the environment, including all phases of the project, its expected consequences both primary and secondary, its cumulative impact with other projects, and its short and long-term effects. In making the determination, the Rules establish "Significance Criteria" to be used as a basis for identifying whether significant environmental impact will occur. According to the Rules, an action shall be determined to have a significant impact on the environment if it meets any one of the following criteria:

(1) Involves an irrevocable commitment to loss or destruction of any natural or cultural resources;

The proposed project will not impact scenic views of the ocean or any ridge lines in the area. The visual character of the area will change from the current agricultural land to an improved 4-lane highway which is compatible with the surrounding land use plans and programs being implemented for the region. The highway corridor is comprised of "Prime" agricultural land which is an important resource. Development of drainage systems will follow established design standards to ensure the safe conveyance and discharge of storm runoff. In addition, the subject property is located outside of the Count's Special Management Area (SMA).

As previously noted, no significant archaeological or historical sites are known to exist within the corridor. Should any archaeologically significant artifacts, bones, or other indicators of previous on-site activity be uncovered during the construction phases of development, their treatment will be conducted in strict compliance with the requirements of the Department of Land and Natural Resources.

(2) Curtails the range of beneficial uses of the environment;

Although the subject property is suitable for agricultural uses, the land area adjoining the Mokulele Highway is naturally suited for transportation purposes due to its location proximate to an existing highway system. To return the site to a natural environmental condition is not practical from both an environmental and economic perspective.

(3) Conflicts with the State's long-term environmental policies or goals and guidelines as expressed in Chapter 344, HRS; and any revisions thereof and amendments thereto, court decisions, or executive orders;

The proposed development is consistent with the Environmental Policies established in Chapter 344, HRS, and the National Environmental Policy Act.

(4) Substantially affects the economic or social welfare of the community or state;

The proposed project will provide a significant contribution to Maui's future population by providing residents with the opportunity to "live and work in harmony" in a high quality living environment. The proposed project is designed to support surrounding land use patterns, will not negatively or significantly alter existing residential areas, nor will unplanned population growth or its distribution be stimulated. The project's development is responding to projected population growth rather than contributing to new population growth by stimulating in-migration.

(5) Substantially affects public health

Impacts to public health may be affected by air, noise, and water quality impacts, however, these will be insignificant or not detectable, especially when weighed against the positive economic, social, and quality of life implications associated with the project. Overall, air, noise, and traffic impacts will be significantly positive in terms of public health as compared to the "no action" alternative.

(6) Involves substantial secondary impacts, such as population changes or effects on public facilities

Existing and planned large-scale housing development projects within Wailuku-Kahului and Kihei will contribute to a future population growth rate that will require expansion of public and private facilities and services. These improvements will become necessary as the overall population of Maui grows and settlement patterns shift. However, the proposed project will not in itself generate new population growth, but provide needed infrastructure the area's present and future population.

In addition, new employment opportunities will generate new sources of direct and indirect revenue for individuals and the County of Maui by providing both temporary and long-term employment opportunities during the construction period. Indirect employment in a wide range of service related industries will also be created from construction during project development.

(7) Involves a substantial degradation of environmental quality;

The proposed development will utilize existing vacant agricultural land. With development of the proposed project, the addition of urban landscaping will significantly mitigate the visual impact of the development as viewed from outside the site while the overall design will complement background vistas.

Makai views from the subject property are available, however, they are not significant nor generally available to the public in the property's present restricted condition.

(8) Is individually limited but cumulatively has considerable effect on the environment, or involves a commitment for larger actions;

By planning now to address the future needs of the community and the State, improvement of the transportation system is consistent with the long term plans for Maui. No views will be obstructed or be visually incompatible with the surrounding area.

(9) Substantially affects a rare, threatened or endangered species or its habitat;

No endangered plant or animal species are located within the highway corridor.

(10) Detrimentally affects air or water quality or ambient noise levels;

Any possible impact to near-shore ecosystems resulting from surface runoff, will be mitigated by the establishment of on-site retention basins during the construction phases of development. After development, retention areas within the highway right-of-way will serve the same function to encourage recharge of the groundwater.

(11) Affects or is likely to suffer damage by being located in an environmentally sensitive area, such as a flood plain, tsunami zone, beach, erosion-prone area, geologically hazardous land, estuary, freshwater, or coastal waters.

Development of the property is compatible with the above criteria since there are not environmentally sensitive areas associated with the project and the physical character of the corridor has been previously disturbed by agricultural uses. As such, the property no longer reflects a "natural environment". Shoreline, valleys, or ridges will not be impacted by the development.

(12) Substantially affects scenic vistas and view planes identified in county or state plans or studies;

Due to topographical characteristics of the property, views of the area to be developed are generally not significant although they are visible. The majority of the proposed project will not be visible, except from higher elevations by the general public or from persons traveling along the highway.

(13) Requires substantial energy consumption.

The location of the proposed project is between Maui's major growth areas. This relationship will reduce travel times and energy consumption after project build out through efficiencies gained by the increased capacity of the highway. Construction of the proposed project will not require substantial energy consumption relative to other similar projects.

DRAFT

Guidelines for Sustainable Building Design in Hawaii

A planner's checklist OEQC May, 1999

<u>Introduction:</u>
What is a "sustainable" building?
A sustainable building is built to minimize energy use, expense, waste, and impact on the environment. It seeks to improve the region's sustainability by meeting the needs of Hawaii's residents and visitors today without compromising the needs of future generations. Compared to conventional projects, a resource-efficient building project will:

I. Use less energy for operation and maintenance
II. Contain less *embodied* energy (e.g. locally produced building products contain less *embodied* energy than imported products because they require less energy-consuming transportation.)
III. Protect the environment by preserving/conserving water and other natural resources and by minimizing impact on the site and ecosystems
IV. Minimize health risks to those who construct, maintain, and occupy the building
V. Minimize construction waste
VI. Recycle and reuse generated construction wastes
VII. Use resource-efficient building materials (e.g. materials with recycled content and low embodied energy, and materials that are recyclable, renewable, environmentally benign, non-toxic, low emitting, durable, and that give high life cycle value for the cost.)
VIII. Provide the highest quality product practical at competitive (affordable) first and life cycle costs.

Hawaii law calls for efforts to conserve natural resources, promote efficient use of water and energy and encourage recycling of waste products. To meet these goals, special care must be taken to plan a project from the very beginning to include sustainable design concepts.

The purpose of the state's environmental review law (HRS Ch. 343) is to encourage a full, accurate and complete analysis of proposed actions, promote public participation and support enlightened decision making by public officials. The Office of Environmental Quality Control offers the following guidelines for preparers of environmental reviews under the authority of HRS 343 to assist agencies and applicants in meeting these goals.

These guidelines do not constitute rules or law. They have been refined by staff and peer review to provide a helpful checklist of items that will help the design team to create projects that will have a minimal effect on Hawaii's environment and make wise use of our natural resources. In a word, projects that are *sustainable*.

In order to avoid excessive overlapping of items, the checklist is designed to be read in totality, not just as individual sections. This checklist tries to address a range of project types, large scale as well as small scale. Please use items that are appropriate to the type and scale of the project.

Although this list will help promote careful and sensitive planning, mere compliance with this checklist does not confirm sustainability. Compliance and knowledge of current building codes by users of this checklist is also required.

TABLE OF CONTENTS

I. Pre Design

___1. Hold programming team meeting with client representative, Project Manager, planning consultant, architectural consultant, civil engineer, mechanical, electrical, plumbing (MEP) engineer, structural engineer, landscape architect, interior designer, sustainability consultant and other consultants as required by the project. Identify project and sustainability goals. Client representatives and consultants need to work together to ensure that project and environmental goals are met.

___2. Develop sustainable guideline goals to insert into outline specifications as part of the Schematic Design documents. Select goals from the following sections that are appropriate for the project.

___3. Use Cost-Benefit Method for economic analysis of the sustainability measures chosen. (Cost-Benefit Method is a method of evaluating project choices and investments by comparing the present and life cycle value of expected benefits to the present value and life cycle value of expected cost.)

___4. Include "Commissioning" in the project budget and schedule. (Building "Commissioning" is the process of ensuring that systems are designed, installed, functionally tested, and capable of being operated and maintained according to the owner's operational needs. It improves the performance of the building systems, resulting in energy efficiency and conservation, improved air quality and lower operation costs. *Refer to Section IX.*)

II. Site Selection & Site Design

A. Site Selection

___1. Analyze and assess site characteristics such as vegetation, topography, geology, climate, natural access, solar orientation patterns, water and drainage, and existing utility and transportation infrastructure to determine the appropriate use of the site.

___2. Whenever possible, select a site in a neighborhood, where the project can have a positive social, economic and/or environmental impact.

___3. Select a site with short connections to existing municipal infrastructure (sewer lines, water, waste water treatment plant, roads, gas, electricity, telephone, data communication lines and services). Select a site close to mass transportation, bicycle routes and pedestrian access.

B. Site Preparation and Design

___1. Preserve existing resources and natural features to enhance the design and add aesthetic, economic and practical value. Design to minimize the environmental impact of the development on vegetation and topography.

___2. Site building(s) to take advantage of natural features and maximize their beneficial effects. Provide for solar access, daylighting and natural cooling. Design ways to integrate the building(s) with the site that maximizes and preserves positive site characteristics, enhances human comfort, safety and health, and achieves operational efficiencies.
___3. Locate building(s) to encourage bicycle and pedestrian access and pedestrian oriented uses. Provide bicycle and pedestrian paths, bicycle racks, etc.
___4. Retain existing topsoil and maintain soil health by clearing only the areas reserved for the construction of streets, driveways, parking areas, and building foundations. Replant exposed soil areas when practical. Reuse excavated soils and cut vegetation for fill or mulch.
___5. Grade slopes to a ratio of less than 2 : 1 (run to rise). Balance cut and fill to eliminate hauling. Check grading frequently to prevent accidental over excavation.
___6. Minimize the disruption of site drainage patterns. Provide erosion and dust controls, positive site drainage, and siltation basins as required to protect the site during and after construction, especially, in the event of a major storm.
___7. Minimize the area required for the building footprint. Consolidate utility and infrastructure in common corridors to minimize site degradation, and cost, improve efficiency, and reduce impermeable surfaces.
___8. For ground treatment, use non toxic alternatives to pesticides and herbicides.

III. Building Design

___1. Consider renovating an existing building instead of demolishing and/or constructing a new building.
___2. Plan for high flexibility while designing building shell and interior spaces to accommodate changing needs of the occupants, and thereby extend the life span of the building.
___3. Design for re-use and/or disassembly. (For recyclable and reusable building products, see Section VII).
___4. Design space for recycling and waste diversion opportunities during occupancy.
___5. Provide facilities for bicycle and pedestrian commuters (showers, lockers, bike racks, etc.).
___6. Plan for a comfortable and healthy work environment. Include inviting outdoor spaces, wherever possible. *(Refer to Section VIII.)*
___7. Provide an Integrated Pest Management approach. The use of products such as Termi-mesh, Basaltic Termite Barrier and the Sentricon "bait" system can provide long term protection from termite damage and reduce environmental pollution.
___8. Design a building that is energy efficient and resource efficient. *(See Sections IV, V, VII.)* Determine building operation by-products such as heat gain and build up, waste/gray-water and energy consumption, and plan to minimize them or find alternate uses for them.
___9. For natural cooling, use
a. Reflective or light colored roofing, radiant barrier and/or insulation, roof vents
b. Light colored paving (concrete) and building surfaces
c. Tree Planting to shade buildings and paved areas
d. Building orientation and design that captures trade winds and/or provides for convective cooling of interior spaces when there is no wind.

IV. Energy Use

___1. Obtain a copy of the State of Hawaii Model Energy Code (available through the Hawaii State Energy Division, at Tel. 587-3811). Exceed its requirements. (Contact local utility companies for information on tax credits and utility-sponsored programs offering rebates and incentives to businesses for installing qualifying energy efficient technologies.)
___2. Use site sensitive orientation to :
a. Minimize cooling loads through site shading and carefully planned east-west orientation.
b. Incorporate natural ventilation by channeling trade winds.
c. Maximize daylighting.
___3. Design south, east and west shading devices to minimize solar heat gain.
___4. Use spectrally selective tints or spectrally selective low-e glazing with a Solar Heat Gain Coefficient (SHGC) of 0.4 or less.
___5. Minimize effects of thermal bridging in walls, roofs and window systems.
___6. Maximize efficiencies for lighting, Heating, Ventilation, Air Conditioning (HVAC) systems and other equipment. Use insulation and/or radiant barriers, natural ventilation, ceiling fans and shading to avoid the use of air conditioning whenever possible.
___7. Eliminate hot water in restrooms when possible.
___8. Provide tenant sub-metering to encourage utility use accountability.
___9. Use renewable energy. Consider the use of solar water heaters, photovoltaics and Building Integrated Photovoltaics (BIPV).
___10. Use available energy resources such as waste heat recovery, when feasible.

A. Lighting

___1. Design for at least 15% lower interior lighting power allowance than the Energy Code.
___2. Select lamps and ballasts with the highest efficiency, compatible with the desired level of illumination and color rendering specifications. Examples that combine improved color rendering with efficient energy use include compact flourescents and T8 flourescents that use tri-phosphor gases.

___3. Select lighting fixtures which maximize system efficacy and which have heat removal capabilities

___4. Reduce light absorption on surfaces by selecting colors and finishes that provide high reflectance values without glare.

___5. Use task lighting with low ambient light levels.

___6. Maximize daylighting through the use of vertical fenestration, light shelves, skylights, clerestories, building form and orientation as well as through translucent or transparent interior partitions. Coordinate daylighting with electrical lighting for maximum electrical efficiency.

___7. Incorporate daylighting controls and/or motion activated light controls in low or intermittent use areas.

___8. Avoid light spillage in exterior lighting by using directional fixtures.

___9. Minimize light overlap in exterior lighting schemes.

___10. Use lumen maintenance procedures and controls.

B. Mechanical Systems

___1. Design to comply with the Energy Code and to exceed its efficiency requirements.

___2. Use "Smart Building" monitor/control systems when appropriate.

___3. Utilize thermal storage for reduction of peak energy usage.

___4. Use Variable air volume systems to save fan power.

___5. Use variable speed drives on pumping systems and fans for cooling towers and air handlers.

___6. Use air-cooled refrigeration equipment or use cooling towers designed to reduce drift.

___7. Specify premium efficiency motors.

___8. Reduce the need for mechanical ventilation by reducing sources of indoor air pollution. Use high efficiency air filters and ultraviolet lamps in air handling units. Provide for regular maintenance of filtration systems. Use ASHRAE standards as minimum.

___9. Locate fresh air intakes away from polluted or overheated areas. Locate on roof where possible. Separate air intake from air exhausts by at least 40 ft.

___10. Use separate HVAC systems to serve areas that operate on widely differing schedules and/or design conditions.

___11. Use shut off or set back controls on HVAC system when areas are not occupied.

___12. Use condenser heat, waste heat or solar energy. (Contact local utility companies for information on the utility-sponsored Commercial and Industrial Energy Efficiency Programs which offer incentives to businesses for installing qualifying energy efficient technologies.)

___13. Evaluate plug-in loads for energy efficiency and power saving features.

___14. Improve comfort and save energy by reducing the relative humidity by waste reheat, heat pipes or solar heat.

___15. Minimize heat gain from equipment and appliances by using:

a. Environmental Protection Agency (EPA) Energy Star rated appliances.
b. Hoods and exhaust fans to remove heat from concentrated sources.
c. High performance water heating that exceeds the Energy Code requirements.

___16. Specify HVAC system "commissioning" period to reduce occupant exposure to Indoor Air Quality (IAQ) contaminants and to maximize system efficiency.

V. Water Use

A. Building Water

___1. Install water conserving, low flow fixtures as required by the Uniform Plumbing Code.

___2. If practical, eliminate hot water in restrooms.

___3. Use infrared sensors for flushing of toilets and urinals.

___4. Use self closing faucets (infrared sensors or spring loaded faucets) for lavatories and sinks.

B. Landscaping and Irrigation

(See Section VI.)

VI. Landscape and Irrigation

___1. Incorporate water efficient landscaping (xeriscaping) using the following principles:

a. Planning, Efficient irrigation: Create watering zones for different conditions. Separate vegetation types by watering requirements. Install moisture sensors to prevent operation of the irrigation system in the rain or if the soil has adequate moisture. Use appropriate sprinkler heads.
b. Soil analysis/improvement: Use (locally made) soil amendments and compost for plant nourishment, improved water absorption and holding capacity.
c. Appropriate plant selection: Use drought tolerant and/or slow growing hardy grasses, native and indigenous plants, shrubs, ground covers, trees, appropriate for local conditions, to minimize the need for irrigation.
d. Practical turf areas: Turf only in areas where it provides functional benefits.
e. Mulches: Use mulches to minimizes evaporation, reduce weed growth and retard erosion.

Contact the Honolulu Board of Water Supply at 527-6126 for additional information on xeriscaping such as efficient irrigation, soil improvements, mulching, lists of low water-demand plants, tours of xeriscaped facilities, and xeriscape classes.

___2. Protect existing beneficial site features and save trees to prevent erosion. Establish and carefully mark tree protection areas well before construction.
___3. Limit staging areas and prevent unnecessary grading of the site to protect existing, especially native, vegetation.
___4. Use top soil from the graded areas, stockpiled on the site and protected with a silt fence to reduce the need for imported top soil.
___5. Irrigate with non-potable water or reclaimed water when feasible. Collect rainwater from the roof for irrigation.
___6. Sub-meter the irrigation system to reduce water consumption and consequently water and sewer fees. Contact the Honolulu Department of Environmental Services at 527-6240 to obtain irrigation sub-metering requirements and procedures. Locate irrigation controls within sight of the irrigated areas to verify that the system is operating properly.
___7. Use pervious paving instead of concrete or asphalt paving. Use natural and man-made berms, hills and swales to control water runoff.
___8. Avoid the use of solvents that contain or leach out pollutants that can contaminate the water resources and runoff. Contact the State of Hawaii Clean Water Branch at 586-4309 to determine whether a NPDES (National Pollutant Discharge Elimination System) permit is required.
___9. Use Integrated Pest Management (IPM) techniques. IPM involves a carefully managed use of biological, cultural and chemical pest control tactics. It emphasizes minimizing the use of pesticides and maximizing the use of natural process
__10. Use trees and bushes that are felled at the building site (i.e. mulch, fence posts). Leave grass trimmings on the lawn to reduce green waste and enhance the natural health of lawns.
__11. Use recycled landscape materials such as plastic lumber for planters and benches.

VII. Building Materials & Solid Waste Management

A. Material Selection and Design
___1. Use durable products.
___2. Specify and use natural products or products with low embodied energy and/or high recycled content. Products with recycled content include steel, concrete with fly ash or glass, drywall, carpet, etc. Use ground recycled concrete, graded glass cullet or asphalt as base or fill material.
___3. Specify low toxic or non-toxic materials whenever possible, such as low VOC (Volatile Organic Compounds) paints, sealers and adhesives and low or formaldehyde-free materials. Avoid products with CFCs (Chloro-fluoro-carbons).
___4. Use locally produced products such as plastic lumber, insulation, hydro-mulch, glass tiles, compost.

___5. Use advanced framing systems that reduce waste, two stud corners, engineered structural products and prefabricated panel systems.
___6. Use materials which require limited or no application of finishing or surface preparation. (i.e. finished concrete floor surface, glass block and glazing materials, concrete block masonry, etc.).
___7. Use re-milled salvaged lumber where appropriate and as available. Minimize the use of old growth timber.
___8. Use sustainably harvested timber.
___9. Commit to a material selection program that emphasizes efficient and environmentally sensitive use of building materials, and that uses locally available building materials. (A list of Earth friendly products and materials is available through the Green House Hawaii Project. Call Clean Hawaii Center, Tel. 587-3802 for the list.)

B. Solid Waste Management, Recycling and Diversion Plan
___1. Prepare a job-site recycling plan and post it at the job-site office.
___2. Conduct pre-construction waste minimization and recycling training for employees and sub-contractors.
___3. Use a central area for all cutting.
___4. Establish a dedicated waste separation/diversion area. Include Waste/Compost/Recycling collection areas and systems for use during construction process and during the operational life cycle of the building.
___5. Separate and divert all unused or waste cardboard, ferrous scrap, construction materials and fixtures for recycling and/or forwarding to a salvage exchange facility. Information on "Minimizing C&D (construction and demolition) waste in Hawaii" is available through Department of Health, Office of Solid Waste Management, Tel. 586-4240.
___6. Use all green waste, untreated wood and clean drywall on site as soil amendments or divert to offsite recycling facilities.
___7. Use concrete and asphalt rubble on-site or forward the material for offsite recycling.
___8. Carefully manage and control waste solvents, paints, sealants, and their used containers. Separate these materials from C&D (construction and demolition) waste and store and dispose them of them carefully.
___9. Donate unused paint, solvents, sealants to non-profit organizations or list on HIMEX (Hawaii Materials Exchange). HIMEX is a free service operated by Maui Recycling Group, that offers an alternative to landfill disposal of usable materials, and facilitates no-cost trades. See web site, www.himex.org.
__10. Use suppliers that re-use or recycle packaging material whenever possible.

VIII. Indoor Air Quality

___1. Design an HVAC system with adequate supply of outdoor air, good ventilation rates, even air distribution, sufficient exhaust ventilation and appropriate air cleaners.
___2. Develop and specify Indoor Air Quality (IAQ) requirements during design and contract document phases of the project. Monitor compliance in order to minimize or contain IAQ contaminant sources during construction, renovation and remodeling.
___3. Notify occupants of any type of construction, renovation and remodeling and the effects on IAQ.
___4. Inspect existing buildings to determine if asbestos and lead paint are present and arrange for removal or abatement as needed.
___5. Supply workers with, and ensure the use of VOC (Volatile Organic Compounds)-safe masks.
___6. Ensure that the HVAC system is installed, operated and maintained in a manner consistent with its design. Use UV lamps in Air Handling Units to eliminate mold and mildew growth. An improperly functioning HVAC system can harbor biological contaminants such as viruses, bacteria, molds, fungi and pollen, and can cause Sick Building Syndrome (SBS).
___7. Install separate exhaust fans in rooms where air polluting office equipment is used, and exhaust directly to the exterior of the building, at sufficient distance from the air intake vents.
___8. Place bird guards over air intakes to prevent pollution of shafts and HVAC ducts.
___9. Control indoor air pollution by selecting products and finishes that are low or non-toxic and low VOC emitting. Common sources of indoor chemical contaminants are adhesives, carpeting, upholstery, manufactured wood products, copy machines, pesticides and cleaning agents.
___10. Schedule finish application work to minimize absorption of VOCs into surrounding materials e.g. allow sufficient time for paint and clear finishes to dry before installing carpet and upholstered furniture. Increase ventilation rates during periods of increased pollution.
___11. Allow a flush-out period after construction, renovation, remodeling or pesticide application to minimize exposure to any chemicals and debris.

IX. Commissioning & Construction Project Closeout

___1. Appoint a Commissioning Authority to develop and implement a commissioning plan and a preventative maintenance plan. Project Manager's responsibilities must include coordination of commissioning activities during project closeout.

___2. Commissioning team should successfully demonstrate all systems and perform operator training before final acceptance.
___3. Provide flush-out period to remove air borne contaminants from the building and systems.
___4. Provide as-built drawings and documentation for all systems. Provide data on equipment maintenance and their control strategies as well as maintenance and cleaning instructions for finish materials.

X. Occupancy and Operation

A. General Objectives
___1. Develop a User's Manual for building occupants that emphasizes the Owner's/Management's commitment to efficient sustainable operations.
___2. Management's responsibilities must include ensuring that sustainability policies are carried out.

B. Energy
___1. Purchase EPA rated, Energy Star, energy-efficient office equipment, appliances, computers, and copiers. (Energy Star is a program sponsored by U.S. Dep. Of Energy. Use of these products will contribute to reduced energy costs for buildings and reduce air pollution.)
___2. Institute an employee education program about the efficient use of building systems and appliances, occupants impact on and responsibility for water use, energy use, waste generation, waste recycling programs, etc.
___3. Re-commission systems and update performance documentation periodically per recommendations of the Commissioning Authority, or whenever modifications are made to the systems.

C. Water
___1. Start the watering cycle in the early morning in order to minimize evaporation.
___2. To reduce cooling tower water consumption, increase concentration of chemical treatment.

D. Air
___1. Provide incentives which encourage building occupants to use alternatives to and to reduce the use of single occupancy vehicles.
___2. Provide a location map of services within walking distance of the place of employment (child care, restaurants, gyms, shopping).
___3. Periodically monitor or check for indoor pollutants in building.

___4. Provide an IAQ plan for tenants, staff and management that establishes policies and documentation procedures for controlling and reporting indoor air pollution. This helps tenants and staff understand their responsibility to protect the air quality of the facility.

E. Materials and Products

___1. Purchase business products with recycled content such as paper, toners, etc.
___2. Purchase Furniture made with sustainably harvested wood, or with recycled and recycled content materials, which will not off gas VOC's.
___3. Remodeling and painting should comply with or improve on original sustainable design intent.
___4. Use low VOC, non-toxic, phosphate and chlorine free, biodegradable cleaning products.

F. Solid Waste

___1. Collect recyclable business waste such as paper, cardboard boxes, and soda cans.
___2. Avoid single use items such as paper or Styrofoam cups and plates, and plastic utensils.

XI. Resources

Financing: Energy Efficiency in Buildings. U.S. Department of Energy, DOE/EE-0152, May, 1998 (Call Tel.1-800-DOE-EREC or visit local office)

Building Commissioning: The Key to Quality Assurance. U.S. Department of Energy, DOE/EE-0153, May, 1998 (Call Tel.1-800-DOE-EREC or visit local office)

Guide to Resource-Efficient Building in Hawaii. University of Hawaii at Manoa, School of Architecture and Energy, Resources and Technology Division, Department of Business, Economic Development and Tourism, October 1998. (Call Tel. 587-3804 for publication)

Hawaii Model Energy Code. Energy, Resources and Technology Division, Department of Business, Economic Development and Tourism, November 1997 (Call Tel. 587-3810 for publication)

Photovoltaics in the Built Environment: A Design Guide for Architects and Engineers. NREL Publications, DOE/GO #10097-436, September 1997 (Call Tel.1-800-DOE-EREC or visit local office)

Building Integrated Photovoltaics: A Case Study. NREL Publications #TP-472-7574, March 1995 (Call Tel.1-800-DOE-EREC or visit local office)

Solar Electric Applications: An overview of Today's Applications. NREL Publications, DOE/GO #10097-357, Revised February, 1997 (Call Tel.1-800-DOE-EREC or visit local office)

Green Lights: An Enlightened Approach to Energy Efficiency and Pollution Prevention. U.S. Environmental Protection Agency, Pacific Island Contact Office (Call Tel. 541-2710 for publication.)

Healthy Lawn, Healthy Environment. U.S. Environmental Protection Agency, Pacific Island Contact Office. (Call Tel. 541-2710 for this and related publications)

How to Plant a Native Hawaiian Garden. Office of Environmental Quality Control (OEQC), Department of Health, State of Hawaii (Call Tel. 586-4185 for publication)

Buy Recycled in Hawaii. Clean Hawaii Center, Energy, Resources and Technology Division, Department of Business, Economic Development and Tourism, November 1997. (Call Tel. 587-3802 for publication)

Minimizing Construction and Demolition Waste. Office of Solid Waste Management, Department of Health and Clean Hawaii Center, Energy, Resources and Technology Division, Department of Business, Economic Development and Tourism, February 1998. (Call Tel. 586-4240 for publication)

Waste Management and Action: Construction Industry. Department of Health, Solid and Hazardous Waste Branch (Call Tel. 586-7496 for publication)

Business Guide For reducing Solid Waste. U.S. Environmental Protection Agency, Pacific Island Contact Office, Tel. 541-2710 (Call for publication.)

The Inside Story: A Guide to Indoor Air Quality. U.S Environmental Protection Agency, Pacific Island Contact Office, Tel. 541-2710 (Call for this and related publications.) Additional information is available from the American Lung Association, Hawaii, Tel. 537-5966

Office Paper Recycling: An Implementation Manual. U.S. Environmental Protection Agency, Pacific Island Contact Office, Tel. 541-2710 (Call for publication.)

THE GENESIS FOUNDATION (808) 926-0121
A non-profit tax exempt corporation for affordable housing serving the elderly and low/moderate income people of Hawaii
311 Ohua Suite 1304 D
Honolulu, Hawaii 96815

8 June 1999

Don Hibbard, Administrator
Department of Land and Natural Resources
Historic Preservation Division
601 Kamokila Blvd., Rm. 555
Kapolei, Hawaii 96707

PROJECT: Kahiola - An Affordable Seniors Rental Housing Project
TMK: 2-6-24:70 & 71

SUBJECT: Environmental Assessment

Dear Mr. Hibbard:

Thank you for your letter dated May 11, 1999 transmitting comments pertaining to the proposed Kahiola project in Waikiki. In response to your comments, we acknowledge your recommendation that an archaeological inventory survey of the proposed project area be performed to determine if historic sites are present.

As iterated in telephone conversations between our Environmental Assessment Preparer and Elaine Jourdane of your staff, we intend to perform the archaeological inventory survey as recommended. This work is expected to be accomplished during the site preparation phase of the construction period. The Final EA will incorporate your recommendations and state our commitment to accomplish and report the findings of the archaeological inventory survey.

Your participation in the preparation of the EA is greatly appreciated. If you have any questions or need additional information, please contact the project representative, Evan D. Cruthers of Media 5, Ltd. at 524-2040 or Claire Tom of Wil Chee - Planning, Inc. at 955-6088. Thank you very much for your time and cooperation.

Sincerely,

Dr. Nicholas B. Christoff, Director
The Genesis Foundation

fax (808) 926-0335 *email* nicholas@pixi.com

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

STATE OF HAWAII

DEPARTMENT OF LAND AND NATURAL RESOURCES
HISTORIC PRESERVATION DIVISION
Kakuhihewa Building, Room 555
601 Kamokila Boulevard
Kapolei, Hawaii 96707

TIMOTHY E. JOHNS, CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES

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HISTORIC PRESERVATION
LAND
STATE PARKS
WATER RESOURCE MANAGEMENT

99 MAY 20 AM 8:38

May 11, 1999

Jan Naoe Sullivan, Director
Department of Planning and Permitting
City and County of Honolulu
650 South King Street, 7th Floor
Honolulu, Hawaii 96813

LOG NO: 23381 ✓
DOC NO: 9905EJ06

Dear Ms. Sullivan:

SUBJECT: Chapter 6E-42 Historic Preservation Review --Draft Environmental Assessment for Kahiola, An Affordable Seniors Rental Housing Project in Waikiki
Waikiki, Kona, O'ahu
TMK: 2-6-24:70, 71

Thank you for the opportunity to review the DEA for the Kahiola Seniors Rental Housing Project. Our review is based on historic reports, maps, and aerial photographs maintained at the State Historic Preservation Division; no field inspection was made of the subject parcel. A review of our records shows that this area of Waikiki has the potential for intact subsurface deposits that may contain information important to the history of Hawaii.

As noted in the Phase I Environmental Site Investigation report provided by you, the Ainahau Estate, once used by Territorial Governor Archibald S. Cleghorn, may be located within the project area. An archaeological inventory survey conducted for a nearby development (TMK: 2-6-24:34-40; 42-45; 65-68, 80-83) uncovered the remains of an *'auwai*, various taro *lo'i* and a portion of the historic Ainahau estate. In addition, a human burial was also uncovered during the archaeological investigations.

The project site was developed with single, duplex and fourplex-style bungalows in the 1920s and low rise apartment structure in the 1950s. Given the above and the fact that the project area does not seem to have undergone extensive, modern land alteration, it is possible that subsurface archaeological deposits could be present in the project area. If such deposits are present, they could be extremely important for understanding the history and the settlement history of the Waikiki.

Therefore, we recommend that an archaeological inventory survey of the proposed project area be performed to determine if historic sites are present, and, if so, to gather sufficient information to evaluate their significance. A report of the finds should be submitted to the State Historic Preservation Division for adequacy review.

If significant historic sites are found during the survey, a mitigation plan may need to be developed and executed.

If you have any questions please call Sara Collins at 692-8026 or Elaine Jourdane at 692-8027.

Aloha,

Don Hibbard, Administrator
State Historic Preservation Division

EJ:jk

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Pacific Islands Ecoregion
300 Ala Moana Blvd, Rm 3-122
Box 50088
Honolulu, HI 96850

AUG 19 1998

In Reply Refer To: EAS

Caire Tom
Wil Chee - Planning, Inc.
1400 Rycroft Street
Suite #028
Honolulu, HI 96814

RE: Environmental Assessment for Kahiola: An Affordable Seniors Rental Housing Project in Waikiki, Oahu, Hawaii

Dear Ms. Tom:

This responds to your July 8, 1998, request for a listing of threatened, endangered, and candidate species that may occur in the Kahiolo project area, where the Genesis Foundation proposes to build an affordable senior rental housing project. The applicant for this project is the Genesis Foundation and the accepting authority is the City and County of Honolulu, Department of Land Utilization. This currently vacant project site is located within an existing urbanized area.

We have reviewed the information provided in your July 8 facsimile as well as other information in our files. To the best of our knowledge, there are no Federally endangered, threatened, or candidate species in the project site.

We appreciate your concern for threatened and endangered species. If you have any questions, please contact Fish and Wildlife Biologist Elizabeth Sharpe at (808) 541-3441.

Sincerely,

for Robert P. Smith
Pacific Islands Manager

WAIKIKI NEIGHBORHOOD BOARD NO. 9

c/o NEIGHBORHOOD COMMISSION • CITY HALL, ROOM 400 • HONOLULU, HAWAII 96813

REGULAR MEETING MINUTES
TUESDAY, APRIL 21, 1998
WAIKIKI COMMUNITY CENTER
7:00 P.M. TO 9:45 P.M.

CALL TO ORDER: Chair Bren called the meeting to order at 7:00 p.m with a quorum present.

MEMBERS PRESENT: Joe Bowen, Leslie Among (left early), Rodger Snow, Anita Benfatti, Robert Finley, Brett White, James Korus, Georgia Miller (late), Scott Hamilton, Carol Sword (late), Sam Bren, Kevin Flannelly (late), Betty Johnson, Steven Thomas, and Christ Zivalich.

MEMBERS ABSENT: Mel Cotton, David McCulloch.

GUESTS: Peggy Farris, George Melanka, Robert Bo Last, Doug Aton (Mayor' Office, and the Office of Waikiki Development), Tom Brower, Elaine Lee (Senator Les Ihara, Jr.'s office staff), Linda Iwasaki (Councilmember Duke Bainum's office staff), Mary Simpson, Norman Nagamine (Nagamine Engineers), Larry Hurst (Ala Moana Kakaako Neighborhood Board No. 11), Ed Yoshida (Department of Transportation, DOT), Captain Clyde Kobatake (Waikiki Fire Station), Steve Lent & Peter Wolf (Waikiki News), Sgt. George Smith and Officer D. Sato (HPD, Waikiki Substation), Representative Galen Fox, Suzanne Varady (Convention Center Authority), Ursula Post (Waikiki Residents Association), Councilmember Duke Bainum, Elaine Killam, Leilani Stewart, Frank Naibach, Amy Hayashi, Bill Mau, Steve Hirano, Reggie DeSilva (TransHawaiian), Jon Edwards, Linda W., Ronald Jove, Marian & Marvin Waters (Prince of Peace Church), Leila Ishiki, D. Wilson, Barb Selchow, Ron C. Hudson (Mortenson), Harold Rapoza, Elliot K. Mills, Gregory Pai (Governor's Office), Christen Mitchell (SPAN), Toni Robinson (Department of Parks & Recreation), Greg Wongham, Randy Nishimoto & Joseph Napoleon (Anuenue Canoe Club), Violet Rehak, Charlian Wright (Royal Hawaiian Shopping Center), Christen (Genesis Foundation), Henry Curtis (Life of the Land), Keith Shida, Tracy Okubo (Representative Brian Yamane's Office staff), Mathilda Nasuso (Waikiki Residents Association), Peg Kirkpatrick, Peter Cartwheel (Anuenue Canoe Club), Elijah Monroe, David Nagamine (Department of Wastewater Management), Dr. Nicholas Christoff, and Leni Williams (Neighborhood Commission office staff).

Chair Bren congratulated Carol Sword on her new job and noted that she would be leaving the Island for a job in the Marshall Islands. He wished her well and thanked her for her contribution to the Waikiki Neighborhood Board.

He also asked members of the community to consider filling the vacancy position that will be created by Sword's departure. He noted that the vacancy would be on next month's agenda.

APPROVAL OF MEETING MINUTES OF MARCH 17 1998: The Board approved the minutes of the March 17, 1998 meeting with the following corrections:

> Page 3, third paragraph from the bottom, insert at the end of the paragraph, Snow voted in the affirmative with reservations.
>
> Page 4, eighth paragraph, add ed to addressed.

TREASURER'S REPORT: Chair Bren reported the following Board expenditures for the period ending March 31, 1998: operating account balance - $328.19; previous expenditures total - $991.81; total current expenses - $164.19; operating account balance to-date - $174.00; The publicity account balance remains at $556.75. Chair Bren commented that he hoped that the publicity account balance could carry over to next year's budget.

FIRE DEPARTMENT: Captain Clyde Kobatake reported that the Waikiki Fire Station ladder company responded to five structure fires and 67 emergency calls and the engine company responded to seven emergency calls and 22 fire calls for the month of March. He also reported that Station No. 2, the Pawaa Station, which covers the West end of Waikiki, responded to 29 emergency calls, seven fire calls and two rescue calls.

Safety Tip: When cooking, roll back long sleeves. Long sleeves are hazard, if they get caught on a pot handle or brush against a heated flame.

Kobatake also provided the following: 1) the Firefoxes Easter Seals Benefit luncheon will be held Wednesday, April 22; 2) the Fire Department has a new Chief, Attilio Leonardi and Assistant Chief John Clark, and 3) the cause of the Century Center fire is still under investigation.

POLICE DEPARTMENT: Officer Dwight Sato reported that the Waikiki Station statistics shows that there were 47 burglaries, 15 pickpockets, 12 purse snatchings, 30 major motor vehicle collisions, 63 minor motor vehicle collisions, 23 prostitutes arrested, 13-robberies and 32 domestic abuse type arrests for the month of March.

Hamilton expressed his concern to Officer Sato about the numerous daily violations that occur in Waikiki, such as riding bicycles, skateboards, and rollerblades on the sidewalks, loud motorcycles, bus engines running. Officer Sato acknowledged that there are numerous incidents occurring in Waikiki every day and that the police have been enforcing the laws regarding, bicycle, rollerblades, skateboards, loud motorcycle noise etc.

Bill Mau of the Seashore Condominium, expressed his and the Condominium Board's concern regarding the illegal activities occurring in their condominium by some residents (prostitution). He asked for help from the police and the Board. The police stated that they must catch the person in the act of the illegal activity before they can arrest them. Chair Bren stated that the Board could not get involved between the tenants and the Condominium Board and noted that the Condominium Board would have to work out the problem themselves.

Citizens' Concerns: The following concerns and information was reported at the meeting:

> Resident Robert Bo Last informed that Board that he has gotten involved in helping the homeless and has found that it is more complex than he realized. He will continue to keep the Board apprised of issues with the homeless. Chair Bren noted that Last, who also works for the Hilton Hawaiian Village, collects unused food from the Waikiki Hotels and delivers it to the homeless shelters for distribution.
>
> Charlian Wright from the Royal Hawaiian Shopping Center, informed the Board of the Parade of Nations to be held on Tuesday, April 28, from 5:30 -6:30 p.m. The parade will feature Brook Lee, Miss Universe and 80 worldwide delegates. It will begin at Fort DeRussy and end at Kapiolani Park.
>
> Greg Wongham requested to be put on the Board's May agenda. He reported that the Save the Ala Wai Coalition is seeking support for a resolution to request that the City and County of Honolulu provide a fifty-five year lease for the purpose of ensuring the continued use of the designated areas now being utilized by the Canoe Clubs for storage along the Ala Wai Canal, Magic Island and Waikiki Beach. Those areas include the Ala Wai Boat House and Recreation Center, the canoe storage facility at the makai end of University Avenue, the area adjacent to the Kapahulu Library and the area at Magic Island and Kahanamoku Beach.

Zivalich moved and Snow seconded that the Board put this issue on their May agenda. The motion carried unanimously.

Snow announced the various committee meetings that will be occurring at the Legislature tomorrow.

CHAIR REPORT/MOTIONS/ACTION: Chair Bren noted that it has been a busy month. He has been testifying at the legislature and the City Council on matters that concern Waikiki. He also noted that the area legislators have also been working hard for the residents. He commented that the fate of the prostitution bill is still uncertain.

PRESENTATIONS/MOTIONS/ACTION/PUBLIC TESTIMONY/DISCUSSION

At this time without objection, Chair Bren took the agenda out of order.

Mamala Bay, Sand Island Wastewater Plant - David Nagamine: Nagamine reported that the Department of Wastewater Management is informing all the communities about the Sand Island Wastewater Treatment Plant (WWTP) issue and future improvements to the plant. He noted that the possible improvements could lead to an increase in sewer charge fees for the island of Oahu.

The City is currently operating the Sand Island WWTP under the terms of a 301 (h) ocean discharge permit issued by the Federal Environmental Protection Agency and the State Department of Health. Section 301 (h) of the Federal Clean Water Act permits deep ocean dischargers, like the City, to dispose of less-than secondary treated wastewater, provided very strict environmental criteria are met. The most important criteria are that the State Water Quality Standards are not exceeded and the public health is protected. The City has been monitoring the plant since 1979 when the plant and outfall began full operations and have met the criteria.

The City's 301(h) waiver permit was issued in February 1990 and became effective in January 1992. The City reapplied for the permit in August 1994 and the permit has been administratively extended since its expiration in February 1995. The EPA has completed their technical review of the application and intends to issue a tentative decision and a draft permit in June 1998.

As the Sand Island WWTP approaches its treatment capacity, the City is planning the expansion and modification of the plant. They are also studying disinfection alternatives as recommended by the Mamala Bay Commission Study. The Mamala Bay study was ordered by a 1991 Consent Decree between the City and several environmental groups. The purpose of the study was to study the point and non point sources of pollution into Mamala Bay and make recommendations to reduce pollution and improve water quality.

There were recommendations to evaluate the performance of Chemically Enhanced Primary Treatment and provide appropriate disinfection of the discharge of the Sand Island WWTP, which the City is following up with in two projects. The total cost of the two projects will determine if the sewer rate fees will be increased.

Kalakaua Avenue Pedestrian Bridge - Norman Nagamine: Using drawings, Nagamine described the bridge. He noted that a 12 foot wide sidewalk will abut the existing Kalakaua Avenue bridge. The construction will include the installation of 10 concrete foundations drilled into the water. The bridge will be used only for pedestrian traffic, however, if needed the old bridge may be modified to accommodate an additional vehicle lane.

White inquired if there were plans to build another bridge near Lipeepee Street. Nagamine noted that there is another appropriation to build a bridge near Lipeepee Street if needed.

Some residents noted that there isn't a pedestrian problem and recommended that an additional lane be added on the makai side of the bridge leading into Waikiki.

In response to questions and concerns, Nagamine also noted the following: 1) they will try to minimize the impact to traffic during the construction period; 2) instead of driving piles into the ground, a quieter drilling technique will be used; 3) they are in the process of getting all required permits and clearances; 4) the Draft Environmental Impact Statement (DEIS) will be out soon and the public will have 45 days to comment on the DEIS; and 5) the project has funding.

Brett White, Chair of the Zoning Committee noted that the committee did not wish to take a position on the project.

Bill 46, Commercial Property Leasehold Reform: Brett White explained that this bill would give lessees the same rights as residential and condominium homeowners. He also noted that Councilmember Jon Yoshimura has decided not to hear this bill in committee because of some concerns that he has about the bill.

White moved and Sword seconded that the Waikiki Neighborhood Board No. 9 request that Councilmember Jon Yoshimura schedule Bill 46 for a public hearing as soon as possible. The motion carried unanimously.

Genesis Foundation Housing Project - Dr. Nicholas Christoff: Finley moved and White seconded that the Waikiki Neighborhood No. 9 support the concept of the Genesis Foundation Housing Project planned for 2423 Ala Wai Boulevard.

Dr. Christoff provided the following information on the project:

> The development will be named Kahiola and will consist of one tower of apartments with a base of parking and a penthouse level multi-purpose room for meetings, community functions and activities. The ground floor level will be a lobby and building services such as loading, electrical and mechanical equipment rooms; a coin operated laundry room and a mail room. Laundry services will be provided. An enclosed garden area with shade will serve as the outdoor recreation space and the management office will also be on the ground floor.
>
> The building will be Uniform Building Code Type 1 construction. The structure will be post tensioned reinforced concrete slabs with vertical concrete columns and walls. The exterior of the building will be finished with an Exterior Insulation Finish System (EIFS). The interior partitions will be metal framed and drywalled.
>
> There will be 283 one bedroom non-profit affordable rental units for Waikiki seniors under the established guidelines to rent to those seniors with incomes of no more than 60 percent of the Honolulu mean income level. Twenty-two units will be fully equipped for special needs and five units will be equipped for the hearing and sight impaired. All units will be convertible for special needs. The estimated rent will start at $720 which includes utilities and air conditioning. Each unit will have its own specially designed air conditioning unit. Occupancy should be around June 2000.
>
> The ingress and egress for the building will be on both Tusitala Street and Ala Wai Boulevard. 201E exemptions applications have been submitted for height, density and parking exemptions.

Snow inquired if they contractor would be doing any pile driving and what measures are being taken to mitigate the noise. It was noted that the contractor would be pre-drilling the holes before doing the pile driving and that the actual pile driving time should be for about 3-5 weeks. They also noted that they would look into other means to minimize the noise impact.

In response to a question regarding fire drills and/or actual fires, it was noted that special pressurized stairwells on each floor on two sides of the building will be built. These stairwells will enable the physically handicapped individual to wait safely for assistance.

The motion to support the project carried, 12-3-0. Ayes: Among, Benfatti, Bowen, Finely, Flannelly, Homilton, Miller, Thomas, Sword, White, Zivalich, Bren. Nays: Johnson, Korus, Snow.

Construction Permit Process for Waikiki-Doug Aton: Aton distributed handouts describing the permit process for the City and noted that if the Board wanted more detailed information, Loree Chee from the Department of Land Use would be available to speak to the Board at a future meeting.

Chair Bren and Brett White noted that the Board would like to know what the City is doing to shorten the permit processing time. They wanted to know the timetable from the conception of a project to the actual finishing time. They encouraged Mayor Harris to shorten the process time and to inform the Board on how this will be done.

Safe Power Action Network (SPAN): Henry Curtis from Life of the Land, requested the Board's support for a resolution to request agencies to extend the Draft Environmental Impact Statement (DEIS) comment period from 45 days to six months. He noted that SPAN received information that the DEIS for the Kamoku-Pukele 138kV Transmission Line consist of seven volumes and that SPAN felt that 45 days would not be sufficient time to review the documents.

A lawyer for HECO noted that they are not sure how many volumes the DEIS will contain and that their position is not to extend the comment period. She noted that State law does not allow extension of comment periods.

Henry Curtis noted that the State Attorney General recommended changing the law, however, the bill in the legislature failed because HECO lobbied against it.

The Board, by consensus, agreed not to take any action.

Namahana Traffic Pattern: Sgt. George Smith of the Honolulu Police Department, Community Policing Bureau spoke to the Board about a study to improve Namahana Street. The study was done by the residents of Namahana Street to ascertain the feasibility of redesignating Namahana Street as a one-way street, north-bound.

As a result of complaints from the residents within the Namahana Street area regarding parking, Sgt. Smith, along with the beat officer observed the potential safety hazard located at the south/east corner of Namahana Street and Kuhio Avenue.

The corner, 2058 Kuhio Avenue is occupied by the Outrigger Maile Skycourt Hotel. There are two driveways that facilitate the drop-off and pick-up of hotel guests. The Kuhio driveway is to short too accommodate oversized vehicles and the north lane, west bound for Kuhio Avenue would be blocked if any vehicle parked to service the hotel.

The second driveway, on Namahana Street, is an extended driveway that services the parking entrance/exit to the garage, the service driveway for deliveries, and the unloading and loading of guests. This driveway is a major traffic problem and a potential danger to vehicular and pedestrian traffic. The tour companies, taxis and other vehicles that service the hotel park on Namahana Street, fronting the hotel. When the limited space is occupied, the vehicles that arrive later, park with the rear end of their vehicles close to or protruding into the west bound traffic of Kuhio Avenue. This forces another vehicle turning onto Namahana Street to enter the south-bound lane of Namahana Street, crossing the double-solid line and exposing itself to the hazard of an oncoming vehicle and putting pedestrian crossing the street at risk.

Sgt. Smith noted that the sporadic enforcement efforts by the police does not deter the abuse of the area by the tour transportation industry.

Some of the recommendations from the residents are: 1) allow traffic to flow north bound in both lanes; 2) prohibit the loading/unloading of passengers from oversized tour buses on Namahana Street, fronting the Outrigger Maile Skycourt; 3) prohibit oversized tour buses from using Namahana Street; 4) establish a tour bus loading zone on Kuhio Avenue, north lane, west bound, fronting the Ambassador Hotel; 5) hotel freight for the Ambassador Hotel and the Outrigger Maile Skycourt may utilize the freight loading areas on Namahana Street fronting the Ambassador and Maile Skycourt Hotel; 6) prohibit left turns from Kuhio Avenue, east bound traffic onto Namahana Street; 7) install raised curbs at Kuhio/Namahana and Kuhio/Kuamoo to prohibit straight-through traffic and to clearly indicate the passenger loading areas; 8) remove the OTS bus stop fronting the

Ambassador Hotel on Kuhio Avenue, west bound and relocate it to Kalakaua/Kaonlana or Kuhio/Olohana; and 10) allow all high capacity tour buses to utilize the bus lane beginning at Kuamoo Street, west bound. Right turns may be made at Pau Street to access Ala Wai Boulevard, or continue west to the Hawaii Convention Center, or to exit Waikiki via Kapiolani Boulevard.

White moved and Thomas seconded that the Waikiki Neighborhood Board No. 9 encourage the residents of Namahana Street to continue their efforts to meet the traffic and parking challenges and problems on that street, including petition efforts to determine the level of support for making that street one-way. The motion carried unanimously.

(Among left the meeting)

UNFINISHED BUSINESS/UPDATES/MOTIONS/ACTION

Update on Kuhio Beach Expansion: Chair Bren noted that there was no update on the project and that the next meeting will be on Thursday, April 30.

Update on Transient Accommodation Tax: Chair Bren commented that the bill to tax time share units has fallen by the wayside in the legislature and that the issue of the Transient Accommodation Tax on hotels is still being discussed in the legislature.

Prostitution in Waikiki: Chair Bren commented that prostitution continues to flourish in Waikiki while the legislature continues to battle the legal issues.

Governor's Economic Revitalization Task Force: No report.

Second Floor Signage: Chair Bren noted there have been two meetings on this issue and that Councilmember Balnum is looking into the fine points and will schedule another meeting when more information is available.

Bicycling, Skateboard, Rollerblade, Signage in Waikiki: No new information.

Artist Display Area: Chair Bren noted that there is a similar situation in Portland, Oregon. The way that they do business there is to take customers interested in purchasing an item to a designated area away from the prohibited area and have them pay for the item and then return to the vendor to pick up their item.

Voting Locations for Precincts 3 and 5: Snow reported that the First Baptist Church will be made available for the voters of the third precinct and that the Kalani Building will be for used by the voters in precinct 5. He noted that absentee balloting is also being considered and that notices will be sent to the residents.

NEW BUSINESS/MOTIONS/ACTION1

SUBMISSION OF WRITTEN REPORTS: A report from the Environmental Committee Chair Snow was submitted.

ANNOUNCEMENTS: None.

ELECTED OFFICIALS

Senators Carol Fukunaga and Les Ihara, Jr.: Elaine Lee distributed copies of Convention Center related legislation still alive in the State Legislature.

Representative Brian Yamane: No report.

Representative Galen Fox: Representative Fox's distributed his written report and he spoke briefly on the following issues: 1) Japan's tax restructuring; 2) the hotel room tax proposals 3) penalties for prostitution, and 4) the balancing of the State Budget by both the House and the Senate.

Mayor's Representative: Doug Aton distributed copies of the Mayor's Neighbor to Neighbor Newsletter and inquired if the Board would like to hear a presentation on the Mayor's re-organization plans for the City at next month's meeting.

In response to concerns Aton noted the following: 1) the Department of Transportation Services installed the bike racks on the sidewalks of Waikiki. However, bikes are improperly parking and DTS will be issuing notices on the correct way to park the bikes; 2) the cost of the publication kiosks is a concern for Councilmember Hannemann; and 3) the information kobans designs have been finalized and the Royal Hawaiian Shopping Center is still working on their koban. The City will be forming a committee to help choose the locations for the information kobans.

ADJOURNMENT: Chair Bren adjourned the meeting at 9:55 p.m.

Submitted by
Lani Williams
Neighborhood Assistant