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December 29, 2004

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Office of Environmental Quality Control
235 S. Beretania Street, Suite 702
Honolulu, Hawai`i 96813

Subject: **Final Environmental Assessment (EA)/ Finding of No Significant Impact (FONSI) 2020 Kino`ole Senior Residences Wai`ākea, South Hilo, Island of Hawai`i TMK: (3)2-2-41:10**

The Office of Housing and Community Development (OHCD), has reviewed the comments received during the 30-day comment period which began on May 23, 2004, and determined that the subject project will not have a significant environmental effect. As such, the OHCD has issued a Finding of No Significant Impact (FONSI). Please publish a notice of this finding in your next edition of The Environmental Notice.

We have enclosed a completed OEQC Publication Form, and four copies of the Final Environmental Assessment. Please utilize the project summary that was previously e-mailed to your office for the Draft EA.

If you have any questions or need additional information, please call Noel Fujimoto at 808/961-8379. Thank you.

Edwin S. Taira
Housing Administrator

enclosure

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2005-02-08 FONSI
KINOOLE SENIOR RESIDENCES

FINAL ENVIRONMENTAL ASSESSMENT AND FINDING OF NO SIGNIFICANT IMPACT

2020 KINOOLE SENIOR RESIDENCES

Waiakea, South Hilo, Hawaii

October, 2004

Prepared For:

Hawaii Island Community Development Corporation

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1. Introduction

1.1 Purpose

The County of Hawaii is the owner of approximately 1 acre of land in Waiakea, South Hilo, Hawaii, Tax Map Key: (3) 2-2-41: 10. The subject property is currently vacant and the County intends to lease the property to the Hawaii Island Community Development Corporation (HICDC), a non-profit Hawaii corporation, for the purpose of developing and constructing a 30-unit elderly rental housing project for very low income seniors in the city of Hilo. The HICDC intends to utilize a combination of subsidies to ensure the financial feasibility of the proposed project including nominal land cost from the County, Department of Housing and Urban Development (HUD) grants and rental subsidies and Low Income Housing Tax Credit equity funds. The use of County land and federal funds triggers the environmental review requirements of Chapter 343, Hawaii Revised Statutes (HRS) and the Code of Federal Regulations 24 CFR, part 58. The purpose of this Environmental Assessment is to comply with both of these requirements.

1.2 Identification of Proposing Agency

Mr. Keith Kato is the Executive Director of the Hawaii Island Community Development Corporation doing business at 100 Pauahi Street, Suite 204, Hilo, Hawaii 96720.

1.3 Identification of Approving Agency

In accordance with Chapter 343, HRS, the Mayor of the County of Hawaii, or an authorized representative, is the appropriate accepting authority of the Environmental Assessment. In addition, the County of Hawaii is the "Responsible Entity" that will carry out the federal environmental review requirements of CFR 24 Part 58.

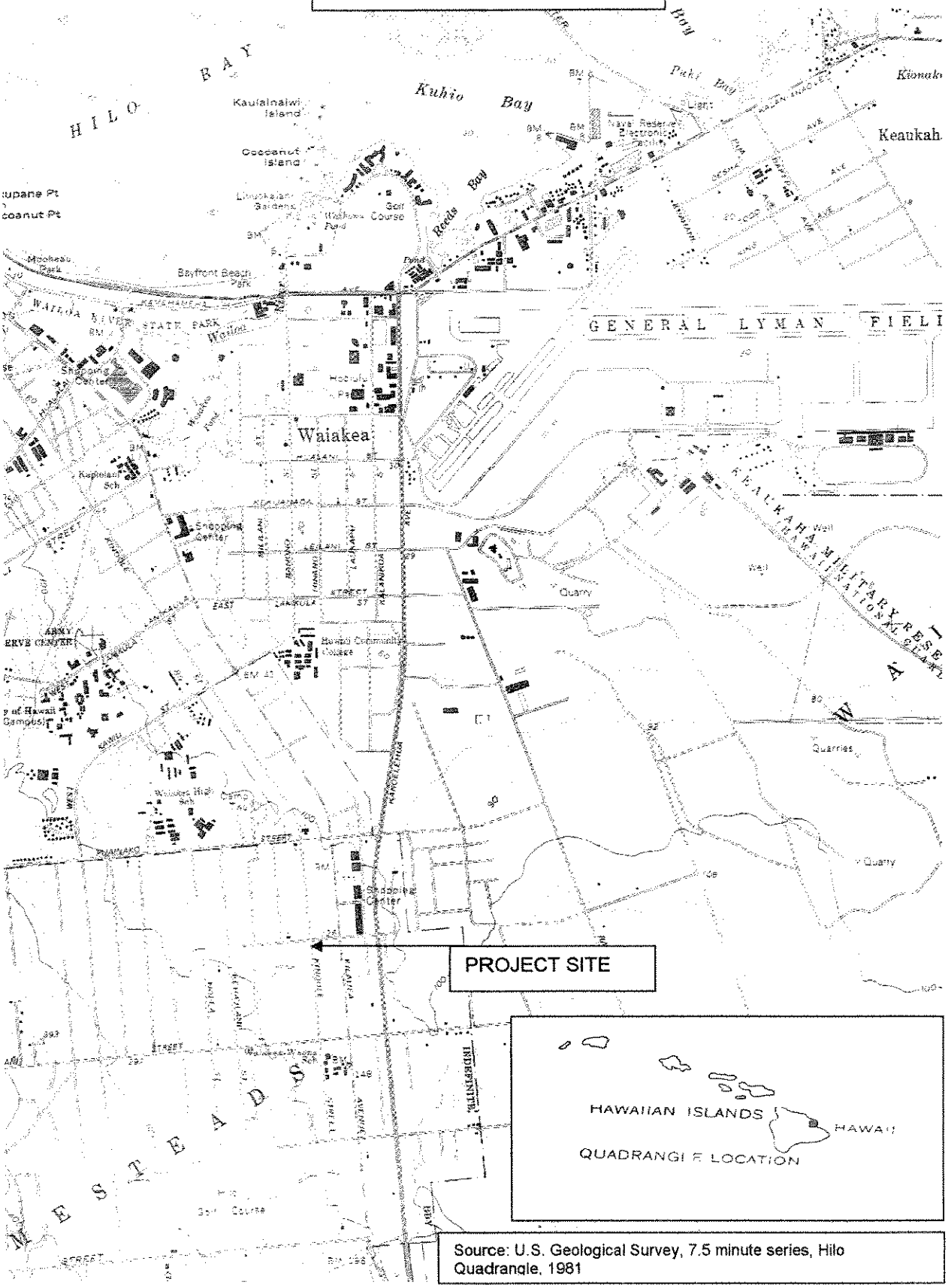
1.4 Technical Description

The Hawaii Island Community Development Corporation (HICDC) is proposing to develop a 30 unit elderly housing project on a 1.0 acre parcel identified as TMK No. (3) 2-2-41: 10. The property is located on the southwest corner of Kinoole and Kahaopea Streets in Waiakea, South Hilo, Island of Hawaii. (See Figure 1 Location Map)

The proposed project will provide 30 one-bedroom, one-bath apartment units for Very-Low Income (50% of the median income) seniors in the City of Hilo. The units will be housed in a single, three story structure which will include all living units, laundry, mailboxes, one or more activity rooms, one or more elevators and a project office. All of the units as well as the project site will be designed to meet ADA and Fair Housing accessibility requirements. The project will also include 20 parking stalls and extensive landscaping throughout the property. (See Figure 2 Site Plan)

The units will be designed to provide privacy in an apartment building setting as well as natural daylight and ventilation for the living area. This will be accomplished by providing the primary window openings facing toward the exterior of the structure and away from the walkways that will connect all of the units. A typical unit floor plan is provided as Figure 3 and will include approximately 540 square feet of interior floor space.

FIGURE 1 – LOCATION MAP



Source: U.S. Geological Survey, 7.5 minute series, Hilo Quadrangle, 1981

FIGURE 2 - SITE PLAN

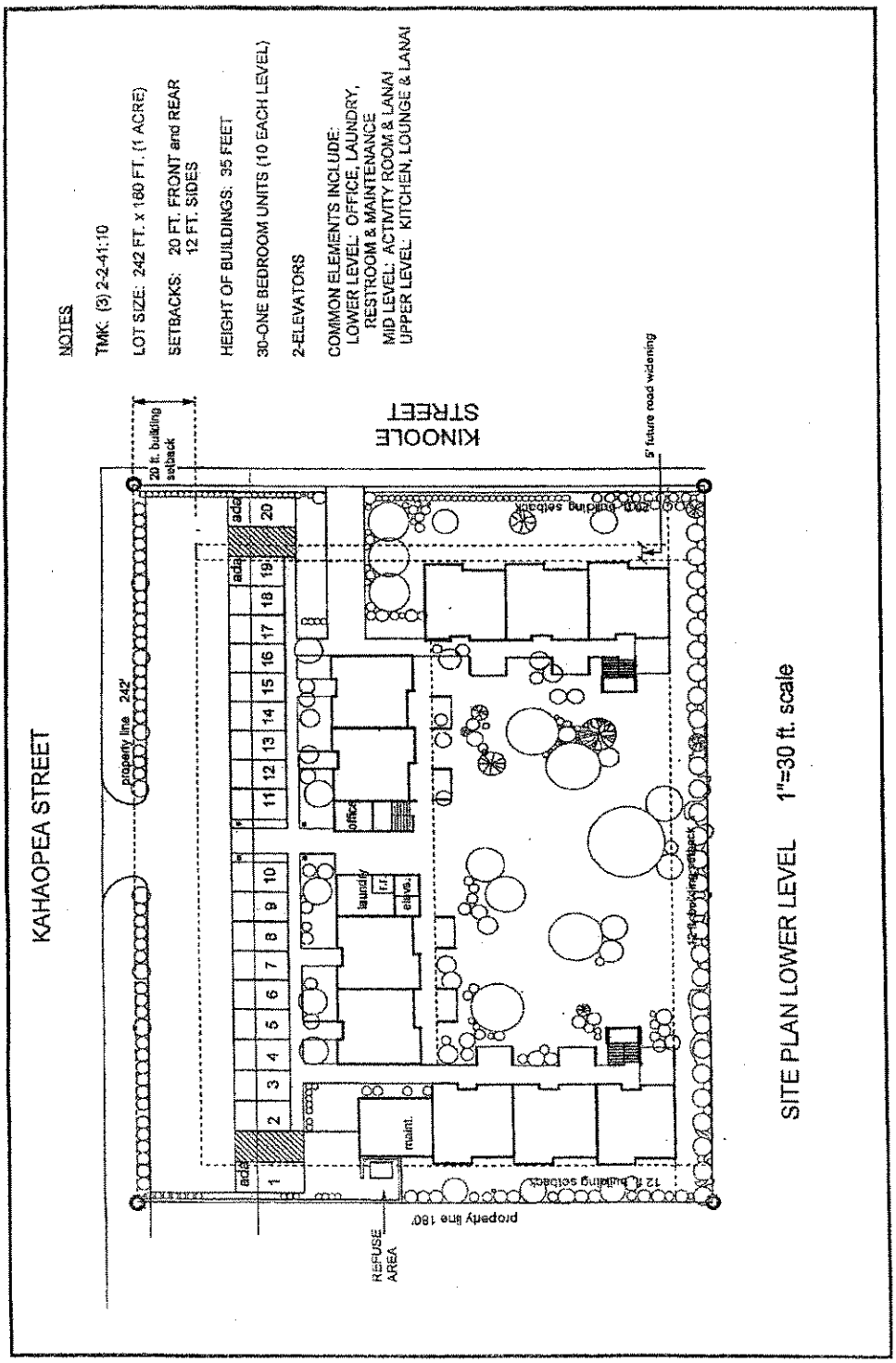


FIGURE 3 - TYPICAL FLOOR PLAN

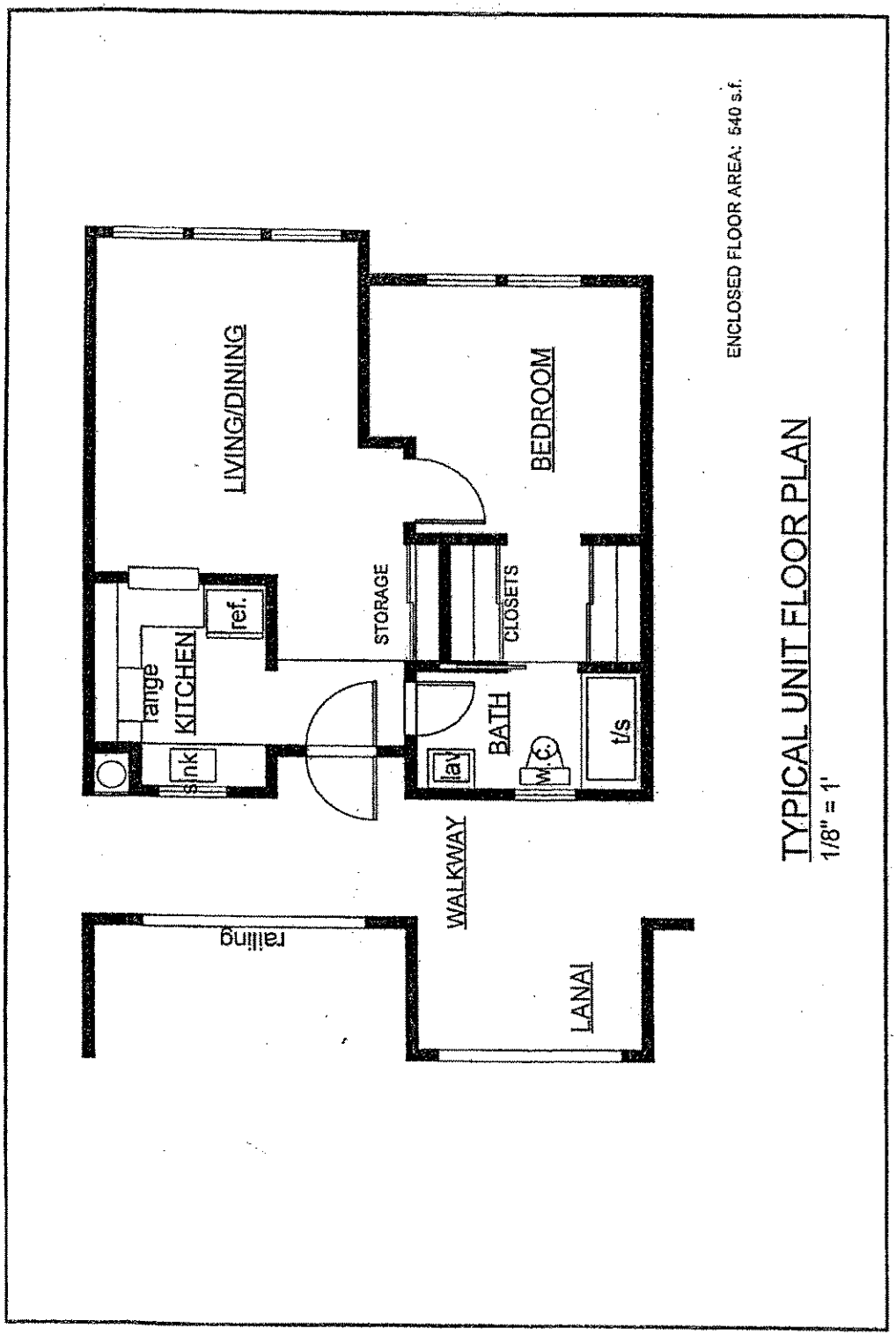
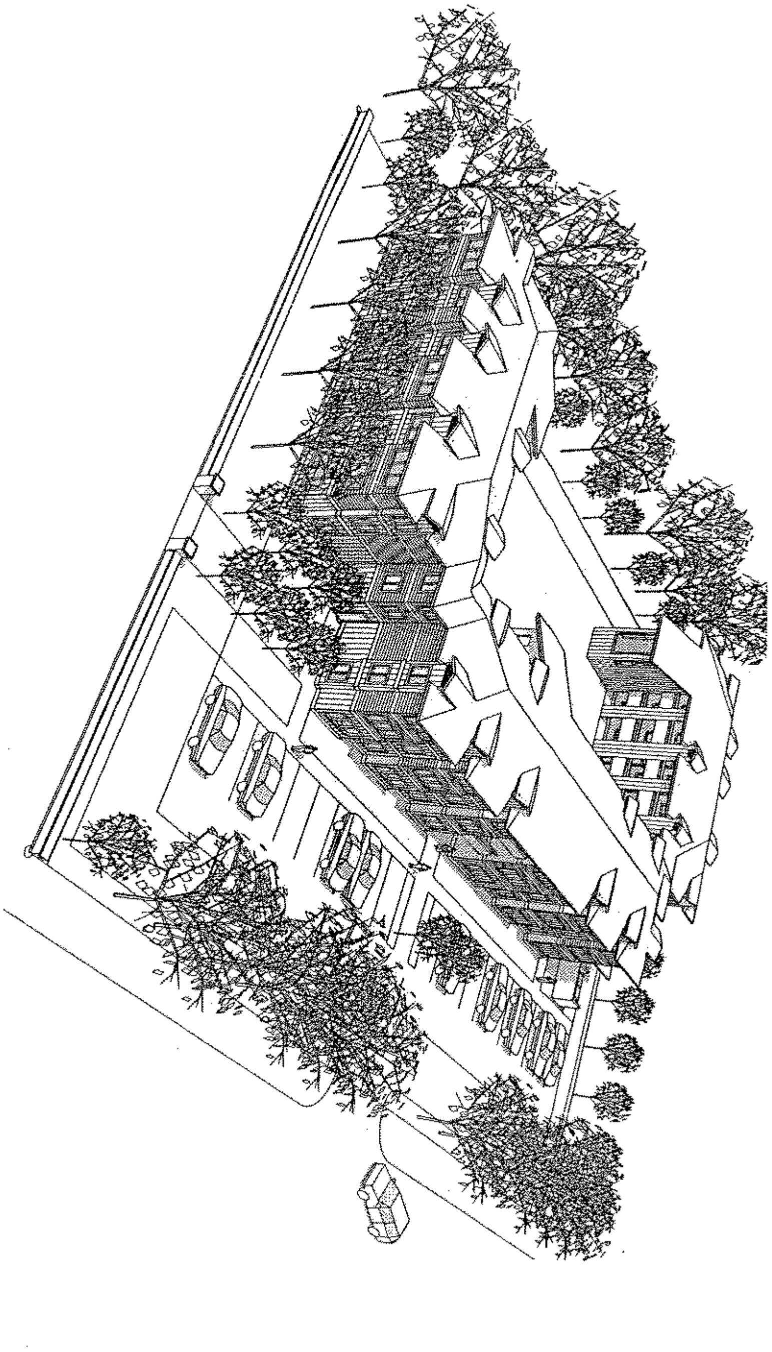


FIGURE 4 – PROJECT RENDERING



2020 KINOOLE SENIOR RESIDENCES
HILO, HAWAII
ODA/McCARTY ARCHITECTS LIMITED

Access to the project will be from Kahaopea Street which is a County road with a right-of-way width of 30 feet and 20 feet of pavement fronting the property. The area is served by all necessary utilities and improvements including electricity, roads and water system. Sewage disposal will be handled by an on-site septic system meeting with the approval of the Department of Health.

Construction for the proposed project is expected to begin in January, 2005 and be completed in November, 2005. The total project cost is estimated at approximately $4.6 million.

1.5 Project Background

1.5.1 Need for the Project

A market study prepared for the proposed project determined that there is strong and sufficient demand within the South Hilo district for additional rental units targeting low and very low income seniors. This conclusion was supported by the following findings:

- "There are a total of 218 elderly housing units among 5 projects within the South Hilo District with existing vacancy rates under 3%.

- "The last elderly housing project built in the South Hilo district was the Haili Elderly project with 36 units completed in 1983. The Haili Elderly project has no current vacancies and has a wait list of 86.

- "The Section 8 wait list maintained by the County of Hawaii, Office of Housing and Community Development, will be utilized for obtaining the tenants for the proposed project. The list currently includes 89 elderly heads of household.

- "The monthly rent structure for the proposed project is based solely on the tenants' ability to pay and not contingent on market conditions. Tenants will pay 30% of their adjusted gross income. The affordable rent guidelines for those with incomes up to 30% of the median income will pay no more than $309/month including utilities while those with incomes up to 50% of the median income will pay no more than $516/month including utilities.

- "The average market rent for a one bedroom apartment in East Hawaii (including South Hilo) during 2002 was $558. The average market rent for a one bedroom apartment advertised in the Hawaii Tribune Herald during the month of January, 2004 was $563. The available market rents are significantly higher (particularly when factoring in additional utility payments) than the projected rents for the proposed project (based on 30% of the tenant's adjusted gross income).

- "The County of Hawaii experienced a substantial growth in their population for those 45 to 60 years of age. As this age group moves into their senior years, there will be a large mass of people in need of senior housing opportunities. This is especially true for the South Hilo District which already has 39.1% of all of the elderly residents in the County of Hawaii.

- There are approximately 3,993 single and two person elderly households living within the South Hilo District with annual household incomes under $25,000/year. The proposed 30-unit elderly housing project will address less than 1% of the potential demand from this low and very low income target group." [1]

1.5.2 Land Use Designations

The subject property is situated within the State Land Use Urban District. The County General Plan Land Use Pattern Allocation Guide Map (LUPAG) designation for the project area is Low Density Urban. The County zoning designation for the property is Single Family Residential 10,000 (RS-10). The project area is not situated within the County's Special Management Area (SMA).

The Hawaii County Planning Department has noted that Section 25-4-11(c) of the Zoning Code states that, "public uses, structures and buildings are permitted uses in any district, provided that the director has issued plan approval for such use."[2] As such, the proposed project is consistent with both the State and County land use designations and regulations.

1.5.3 Listing of Permits and Approvals

Federal	None
State of Hawaii	
Department of Health	Underground Injection Control-Approval of Drywells, Approval of Septic System
County of Hawaii	
Department of Water Supply	Approval of Project Construction Plans
Department of Public Works	Approval of Project Construction Plans
Planning Department	Plan Approval, Approval of Construction Plans

1.6 Agency and Public Consultation

The following public and private organizations and individuals were consulted during the preparation of this environmental assessment:

United States Fish and Wildlife Services, Division of Ecological Services
State of Hawaii, Department of Land and Natural Resources, Historic Preservation Division
State of Hawaii, Dept. of Land and Natural Resources, Division of Forestry and Wildlife
State of Hawaii, Department of Health
State of Hawaii, Department of Transportation
State of Hawaii, Office of Hawaiian Affairs

[1] Nishimura, Brian, T., Planning Consultant, "Market Study 2020 Kinoole Senior Residences", Prepared for the Hawaii Island Community Development Corporation, February, 2004.
[2] County of Hawaii, Zoning Code, Adopted as Ordinance No. 96-160 (as ratified and amended in 1999.)

State of Hawaii, Department of Hawaiian Home Lands
County of Hawaii, Planning Department
County of Hawaii, Department of Public Works
County of Hawaii, Department of Environmental Management
County of Hawaii, Department of Water Supply
County of Hawaii, Police Department
County of Hawaii, Fire Department

2. ENVIRONMENTAL SETTING

2.1 Physical Environment

2.1.1 Geology and Hazards

Environmental Setting

The project area is located on the lower northeastern slopes of Mauna Loa and consists of the Kau volcanic series (Stems and Macdonald, 1946). The Kau volcanic series consists mainly of basaltic lava flows.

The volcanic hazard as assessed by the United States Geological Survey for the project area is "3" on a scale of ascending risk 9 to 1 (Heliker 1990). Zone "3" includes the lower slopes of Mauna Loa which are "gradationally less hazardous than Zone 2 because of greater distance from recently active vents and/or because the topography makes it less likely that flows will cover these areas."

The island of Hawaii is one of the most seismically active areas in the world and has experienced more than twenty large earthquakes (magnitude 6 or larger) over the past 166 years. (Wyss and Koyanagi, 1992) Magnitude 6 earthquakes can be expected to cause structural damage to non-reinforced buildings. The Building Code rating for the entire island of Hawaii is seismic Zone 4 which has the highest risk for seismic activity.

Impacts and Mitigation Measures

The proposed elderly housing project will not expose the residents or the general public to any additional hazard risk that does not already exist for the entire city of Hilo. The volcanic hazard risk is relatively low and the same as any other alternative site that could be utilized for the same purpose in the city of Hilo. The Hawaii County Building Code requires that all new structures be designed to resist forces to seismic Zone 4 standards.

2.1.2 Soils

Environmental Setting

The soils of the project area are classified as Olaa extremely stony silty clay loam with 0 to 20 percent slopes (O1D) by the U.S. Department of Agriculture Soil Conservation Service (SCS) Soil Survey. (U.S. Soil Conservation Service 1973) The Olaa soil series consists of well drained silty clay loams formed in volcanic ash. The Agricultural Capability Subclass rating this soil is VIIs which includes soils having very severe limitations that make them unsuited for cultivation and that restrict their use largely to pasture or range, woodland, or wildlife.

Impacts and Mitigation Measures

The project area has been previously graded and is relatively flat. As such, the potential for soil erosion is negligible. In addition, all construction activities will comply with the applicable requirements of the State Department of Health and the Department of Public Works.

2.1.3 Climate

Environmental Setting

Hawaii's climate is generally characterized as mild with uniform temperatures, moderate humidity, and two identifiable seasons. The "summer" season, between May and October is generally warmer and drier. The "winter" season, between October and April is cooler and wetter. The project area is situated along the "windward" side of the Island of Hawaii which is exposed to northeasterly trade winds that causes relatively high rainfall (over 150 inches annually). The average monthly minimum temperature in Hilo ranges from the mid 60's to 70 degrees Fahrenheit while the average monthly maximum temperature ranges from the high 70's to the high 80's. (University of Hawaii Press, 1983)

Impacts

The climatic conditions of the area will not have a significant impact on the proposed project.

2.1.4 Hydrology and Drainage

Environmental Setting

The project area is situated within Flood Zone "X" (areas determined to be outside the 500 year flood plain) according to the Flood Insurance Rate Map (FIRM) prepared by the Federal Emergency Management Agency dated September 16, 1988, (Panel No. 155166 0880C).

The proposed project is not located within one mile of a listed Wild and Scenic River and will not have an effect on the natural, free flowing or scenic qualities of a river in the National Wild and Scenic Rivers System.

Impacts and Mitigation Measures

Development of the proposed project has the potential to increase surface runoff. The proposed project will adhere to County and State requirements for disposing of runoff and addressing drainage concerns. As such, the use of the subject 1 acre parcel for an elderly housing project is not anticipated to have any significant adverse impact on hydrology and drainage.

2.1.5 Water Quality

Environmental Setting

The Waiakea Pond is the closest water body to the project area and is situated approximately 1.7 miles northeast of the subject property. The nearest coastal waters are situated approximately 2.3 miles northeast of the project site. The project area is not situated within or adjacent to a wetland identified by the U.S. Department of Interior, Fish and Wildlife Service nor in an area designated by the U.S. Environmental Protection Agency as being supported by a sole source aquifer.

Impacts

The proposed project is not expected to have any direct impact on any streams, wetlands, aquifer resource or marine waters.

2.1.6 Flora and Fauna

Environmental Setting

A previous environmental assessment prepared for the subject property in 1998 states the following:

> "The project was inspected for biological resources in June of 1998. The entire parcel is landscaped and somewhat overgrown with weeds. A wide variety of ornamental species, almost entirely alien, are present. There is no habitat that would appear valuable for native terrestrial or aquatic species. The disturbed, urban qualities of the site make it poorly suited for habitat native fauna habitat."[3]

With regard to threatened and endangered species the previous environmental assessment stated the following:

> "Section 7 of the federal Endangered Species Act requires federal agencies undertaking actions that may affect listed or candidate endangered species to consult with the U.S. Fish and Wildlife Service. This agency was consulted via letter regarding the potential presence of listed, candidate or proposed threatened or endangered animal or plant species in the area. In its response (see Appendix 1), the agency did not indicate the presence of such species, and no listed, candidate or proposed endangered animal or plant species were found on the property during inspection. In terms of conservation value, it would appear that no botanical or zoological resources requiring special protection are present."[4]

The former Family Crisis Shelter has since been demolished and the site conditions described in the previous environmental assessment essentially remain the same. Although a written response was not provided by the U.S. Fish and Wildlife Service (USFWS) for this environmental assessment, a telephone conversation with staff member Marigold Saul did confirm that the USFWS did not have any concerns regarding the proposed project and would not require any further notification.

Impacts

Based on the extensive prior disturbance of the project site and the lack of native flora and fauna, it is highly unlikely that any candidate, proposed, or listed threatened or endangered species as set forth in the Endangered Species Act of 1973, as amended are present on the subject property. As such, the proposed project will not have any significant impact on any protected or native plant or animal species.

2.1.7 Air Quality

Environmental Setting

The air quality of the subject area is affected by pollutants derived from the volcanic emissions from the ongoing Kilauea emption. Other sources of air pollutants to a limited

[3] Moore, William L. Planning, Environmental Assessment-Former Family Crisis Shelter Demolition, prepared for Hawaii County Office of Housing and Community Development, November, 1998.
[4] Ibid

degree include vehicle exhaust emissions along the neighboring streets. In general, however, the ambient air quality of the project area meets all federal and state standards as evidenced by its designation as an "attainment" area by the State Department of Health, Clean Air Branch.

Impacts and Mitigation Measures

Short tern impacts will result from the construction activity involved with developing the subject property including dust and exhaust from machinery and vehicles. Given the temporary nature of the construction time period, the potential impacts of these construction activities should be minimal. In addition, the developer of the property will comply with all applicable state and County requirements, including the requirements to utilize best management practices to minimize dust impact and comply with provisions of Hawaii Administrative Rules, Chapter 11-60.1, "Air Pollution Control," and Section 11-60.1-33, Fugitive Dust.

2.1.8 Noise

Environmental Setting

Existing noise levels at the project site are typical of a residential/commercial district with ambient noise derived from traffic on Kinoole Street, the commercial complex across Kahaopea Street, and other roads, residences and businesses in the vicinity. Based on a general inspection of the project area, the site is not subject to current or projected noise levels that exceed 65 DNL (day-night average sound level, in decibels). Although the project site is situated less than 2 miles from the Hilo International Airport, it is not within the existing or projected 55 DNL noise contours for the airport.[5]

Impacts and Mitigation Measures

Temporary noise impacts will occur from construction activities for the development of the elderly housing project and are unavoidable. Mitigation measures can be taken, however, to minimize noise impacts including the use of mufflers and implementing construction curfew periods. All project activities must comply with the Administrative Rules of the Department of Health, Chapter 11-46, on "Community Noise Control".

The Department of Housing and Urban Development (HUD) noise standards applicable to housing and other noise sensitive uses indicates that noise levels below 65 DNL are "acceptable" with no mitigation required.

2.1.9 Scenic Resources

Environmental Setting

The predominant scenic views in the vicinity of the project area are of Mauna Kea and Mauna Loa. These views will not be adversely affected by the development of the project site for an elderly housing project.

[5] Wilson Okamoto & Associates, Inc., Hilo International Airport Draft Environmental Assessment, prepared for the State of Hawaii, Department of Transportation, Airports Division, October, 2002.

Impacts

The open space and scenic resources in the vicinity of the project area will not be adversely affected by the development of the elderly housing project.

2.2 Social, Cultural and Economic Setting

2.2.1 Socio-Economic Characteristics

Setting

Hawaii County's population increased by more than 56,000 persons between 1980 and 2000. Between 1980 and 1990, Hawaii Island's population increased by 30.7 percent, and increased by 23.6 percent between 1990 and 2000. The April 1, 2000 population figure for Hawaii County was 148,677 according to census figures compiled by the County of Hawaii, Department of Research and Development.[6]

Statistics compiled by the Hawaii County Office of Aging indicate that the elderly population (60 years and over) has grown tremendously during the 30 year period between 1970 and the year 2000. (See Appendix 2) There were 26,122 persons over the age of 60 in the year 2000 which was a 195% increase over the 1970 figure of 8,858. The elderly population accounted for 17.6 percent of the total population in 2000 compared to only 13.9 percent of the population in 1970. There were 10,213 elderly individuals (39.1% of the County's elderly population) residing in South Hilo in 2000 which was the highest total of any other district on the island.

The South Hilo district had a population of 47,386 in 2000 which represented approximately 32 percent of the total population for Hawaii Island. The City of Hilo is the largest population center on the island with the main offices of the county government, branch offices of federal and state agencies located there. The island's major deep draft harbor and international airport are also located in Hilo. In addition to industrial, commercial and social service activities, the University of Hawaii at Hilo and Hawaii Community College and affiliated research programs play an important role in Hilo's economy.

Hilo and the rest of the east Hawaii communities are adjusting to the loss of the sugar industry in the mid 1990's. Industrial activities that remain include quarrying, construction material manufacturing and fabrication, storage, wholesaling facilities, garment manufacturing, processing and packaging of agricultural products and supportive services to businesses. Although the district enjoys some economic benefit from tourism, much of it is indirect through the spin-offs from the primary tourism activity in West Hawaii.

Impacts

The proposed project will help address a small portion of the demand for low income elderly rental units on the island of Hawaii and in particular, this section of the South Hilo district. There are approximately 3,993 single and two person elderly households living within the South Hilo District with annual household incomes under $25,000/year. The proposed 30-

[6] County of Hawaii, Department of Research and Development, Data Book, Table 1.5-Resident Population, By Districts, Hawaii County: 1980, 1990, AND 2000, April, 2001.

unit elderly housing project will address less than 1% of the potential demand from this low and very low income target group.[7] The proposed action will not generate growth but rather addresses an existing need in the community.

The proposed project is not located in a neighborhood that suffers from adverse human healthor environmental conditions, nor will it be situated in a neighborhood that is predominantly low income or of a minority population. No adverse impacts on low income or minority persons are anticipated from the proposed project.

2.2.2 Adjacent Land Uses

Existing Setting

The project area is predominantly residential in character although there is a commercial complex situated directly across Kahaopea Street. Adjacent properties to the south, east and west have single family residential units which were constructed over fifty years ago. Other land uses in the within a ½ mile radius of the subject property include several multi-family housing projects, churches, schools, gas stations, restaurants, fast food outlets, shopping centers, convenience stores and personal service providers.

The proposed project is not situated within an FAA-designated civilian airport Runway Clear Zone (RCZ), within a military airfield Clear Zone (CZ) or Accident potential Zone (APZ). The closest airport is the Hilo International Airport situated approximately 1.6 miles northeast of the project site.

The proposed project is not situated within one mile of a NPL ("Superfund") site, nor within 2,000 feet of a CERCLIS site, nor adjacent to any other known or suspected sites contaminated with toxic chemicals or radioactive materials.

Impacts and Mitigation Measures

The proposed elderly housing project will be consistent with other uses already established within the general area and is consistent with the County's Zoning Code. The proposed project will not expose either people or buildings to hazards from aircraft, explosive or flammable operations, toxic chemicals or radioactive materials. Any impacts on the surrounding properties due to noise and other disturbances caused by the construction activity will be mitigated through careful construction management practices and compliance with state and county regulations.

2.3 Public Facilities and Services

2.3.1 Roads

Existing Setting

Kinoole Street, fronting along the eastern border of the project site, has a 24-foot wide pavement within a 50-foot wide right-of-way. The Planning Department has established a 5-foot future road widening setback along the eastern boundary of the subject property. West

[7] Nishimura, Brian T., Planning Consultant, "Market Study – 2020 Kinoole Senior Residences" prepared for Hawaii Island Community Development Corporation, February, 2004.

Kahaopea Street, fronting along the northern boundary of the project site has a 20-foot wide pavement within a 30-foot wide right-of-way.

A traffic impact analysis report prepared for the proposed project by M&E Pacific, Inc. included an analysis of the critical turning movements of the unsignalized Kinoole Street/West Kahaopea Street intersection. These included the outbound movements from both approaches of West Kahaopea Street, and the two left turn movements from Kinoole Street into West Kahaopea Street. The traffic impact analysis report stated the following:

> "The results show that all critical turning movements are currently operating at levels of service C or better in both analyses periods. The outbound movement from the eastbound approach of West Kahaopea Street, which would be utilized by traffic from the proposed project, is currently at level of service B and C during the morning and afternoon peak periods, respectively. Levels of service in both analysis periods would remain unchanged for the ambient and total with project forecasts. The two left turn movements from Kinoole Street would continue to operate unchanged at level of service A with the ambient and total with project forecast conditions for both analysis periods. This analysis indicates that the increase in ambient and total with project forecast volumes would not have an adverse traffic impact at this intersection."[8] (The complete traffic impact analysis report is included as Appendix 3.)

The State Department of Transportation stated that, "The proposed 30-unit elderly housing project is unlikely to adversely impact State highways." (Letter dated March 3, 2004 included in Appendix 1)

Impacts and Mitigation Measures

The proposed 30-unit elderly housing project is not anticipated to have any significant adverse impact on the roads and traffic circulation in the area.

2.3.2 Water System

Existing Setting

Water is available from an existing 6-inch waterline along Kinoole Street. The Department of Water Supply has indicated that, "The maximum fire flow available is estimated to be approximately 1,000 gallons per minute and will require a fire flow test to verify this flow rate." (Letter dated February 23, 2004 included in Appendix 1)

Impacts

The proposed project will not have a significant adverse impact on the existing Department of Water Supply system serving the subject location.

2.3.3 Protective Services

Existing Setting

[8] M&E Pacific, Inc., "Traffic Impact Analysis Report, Kinoole Street Elderly Housing Complex, March, 2004.

The closest County fire station is situated approximately one mile southwest of the project site on Kawailani Street. The police station is situated approximately two miles away and the hospital is situated approximately three miles away.

Impacts

The proposed project will not create an additional burden on the existing service providers.

2.3.4 Power and Communication Systems

Setting

The project area is served by Hawaii Electric Light Company's (HELCO) power lines from existing roadways fronting the property. Telephone and cable T.V. service is also available to the project site.

Impacts

The proposed action will not have any significant adverse impact on the power and communication systems serving the region.

2.3.5 Wastewater

Setting

The project area is not situated within the service limits of the County wastewater disposal system. The County is currently considering the possibility of an improvement district to extend the sewer line. It should be noted, however, that the boundaries for the improvement district have not been determined and no timetable has been established for implementation.

Impacts

The proposed project will not have any significant adverse impact on the County sewer system. Sewage disposal will be handled by an onsite septic system meeting with the approval of the Department of Health.

2.3.6 Solid Waste

Setting

There is no municipal collection system for solid waste in the County of Hawaii. Businesses rely on private firms to collect and dispose of waste at the County's Hilo landfill which is situated approximately two miles northeast of the project site.

Impacts

A private commercial rubbish hauler will be utilized for the proposed elderly housing project. All waste generated by the proposed project will be disposed at appropriate sites designated by the Department of Environmental Management.

2.4 Archaeology, Historic and Cultural Resources

Setting

The entire property has been previously cleared and graded for the construction of a single family dwelling and related landscaping and improvements which was established since 1934. Based on the prior residential use of the subject property, the State Historic Preservation Division stated, in part, the following, "we believe that no historic properties will be affected by this undertaking." (letter dated March 10, 2004 included in Appendix 1)

A Cultural Impact Assessment was prepared for the Draft Environmental Assessment, Hilo International Airport Project No. AH1011-03 by Wilson, Okamoto & Associates in February, 2002. The Cultural Impact Assessment provides a historical perspective of the natural landscape and traditional land use patterns of the ahupua'a of Waiakea which includes the project site. The ahupua'a is over 95,000 acres in size and extends along the coast from the west side of Hilo Bay to the Puna district boundary and inland to approximately the 6,000 foot elevation. In describing the ahupua'a of Waiakea, the Cultural Impact Assessment states the following:

> "The lands of Waiakea were productive, and the resources of the different environmental and ecological zones were utilized to support the native population. Along the coast, fishponds were constructed to raise and harvest fish, an important source of protein. Inland the decomposed lava and consistent rainfall created fertile lands for growing kalo and other food crops. Hala groves provided an abundance of lau hala for weaving and house thatching. The forest, which extended within a few miles of the coast, provided timber, an array of occupational and medicinal trees and plants, as well as a number of bird species."[9]

Impacts

Any valued archaeological, floral or faunal resources that may have existed on the subject property was removed by the complete clearing and grading of the property for the single family residence and related uses over seventy years ago. As such, the proposed action is anticipated to have "no effect" on significant historic sites or cultural activities.

[9] Wilson Okamoto & Associates, Inc., "Cultural Impact Assessment, Hilo International Airport Proposed Improvements", prepared for State of Hawaii, Department of Transportation, February, 2002.

3. SUMMARY OF POTENTIAL ADVERSE ENVIRONMENTAL IMPACTS AND PROPOSED MITIGATION MEASURES

3.1 Short Term Impacts

Construction Activity

Impacts: Short term impacts will result from the proposed construction of the 30-unit elderly housing project including increased noise levels, dust and exhaust from machinery.

Mitigation: Given the relative short construction time period involved in developing the 30 unit elderly housing project, the potential impacts of the construction activities should be minimal. In addition, the developer will comply with all applicable state and County requirements.

3.2 Long Term Impacts

Drainage:

Impacts: County requirements stipulate that, all development generated runoff be disposed on site and cannot be directed toward any adjacent properties.

Mitigation: The developer will construct drainage improvements meeting with the approval of the Department of Public Works.

4. ALTERNATIVES

4.1 No Action Alternative

The no action alternative would result in the property remaining vacant and unproductive as it has been for a number of years. The County acquired the subject property through the use of Community Development Block Grant (CDBG) funds, and the site is restricted to uses which address the special needs population, one of which includes elderly low income residents. The County could entertain other development proposals to address the special needs population but that would delay development of the property for several years.

4.2 Alternative Sites

The proposed elderly housing project could be constructed on other sites within the South Hilo district. Although other feasible sites may be available, the financing package for the proposed project is time sensitive and will surely lapse prior to securing an alternative site. Furthermore, it is unlikely that the impacts generated for this site will be significantly less at any other site in the district.

5. DETERMINATION, FINDINGS AND REASONS FOR SUPPORTING DETERMINATION

5.1 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 on the environment if it meets anyone of the following thirteen criteria.

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

   The proposed project involves the development of a 30-unit elderly housing project on a 1-acre parcel which was previously utilized as a single family residence which was constructed over seventy years ago. The property has been previously cleared and graded for the residential and related uses. As such, the subject property does not contain any existing natural or cultural resources that will be destroyed or irrevocably lost by the proposed action.

2. **Curtails the range of beneficial uses of the environment.**

   The project site has been previously cleared and graded the existing vegetation is primarily composed of alien species. The development of the subject site for a 30-unit elderly housing project is consistent with the other land uses already established in the area.

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 action 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 action will have a positive impact on the economic and social welfare of the community. The 30-unit elderly housing project for low and very low income seniors will address only a small portion of the demand for such units. There are approximately 3,993 single and two person elderly households living within the South Hilo District with annual household incomes under $25,000/year. The proposed 30-unit elderly housing project will address less than 1% of the potential demand from this low and very low income target group.

5. **Substantially affects public health.**

The proposed action will not have any substantial impact on public health. Potential noise, air, water and drainage impacts will be addressed through careful construction management practices and compliance with federal, state and County requirements.

6. **Involves substantial secondary impacts, such as population changes or effects on public facilities.**

   The proposed project will not have any substantial secondary impacts because it is not a generator of growth. Rather, the proposed action will address an existing need in the community to provide affordable housing for our growing elderly population.

7. **Involves a substantial degradation of environmental quality.**

   The proposed 30-unit elderly housing project is consistent with the other uses already established in the project area. Although the project area is predominantly residential in character, predominantly residential in character, other land uses within a ½ mile radius of the subject property include several multi-family housing projects, churches, schools, gas stations, restaurants, fast food outlets, shopping centers, convenience stores and personal service providers.

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

   As stated previously, the proposed action will not have any substantial secondary impacts. The proposed action does not involve a commitment for larger actions and will not induce other actions having a cumulative effect on the environment.

9. **Substantially affects a rare, threatened or endangered species or its habitat.**

   The project site has been extensively disturbed by earthmoving equipment and does not have any candidate, proposed, or listed threatened or endangered species on the property. As such, the proposed action will not have any substantial adverse effect on any rare~ threatened or endangered species or its habitat.

10. **Detrimentally affects air or water quality or ambient noise levels.**

    Short term impacts will result from the proposed action including increased noise levels, dust and exhaust from machinery involved in the construction of project improvements. Given the relative short construction time period the potential impacts of these construction activities should be minimal. The developer will comply with all applicable state and County requirements.

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.**

    The project site is not situated in an environmentally sensitive area such as a flood plain, tsunami zone, beach, erosion-prone area, geologically hazardous land, estuary, freshwater, or coastal waters.

12. Substantially affects scenic vistas and view planes identified in county or state plans or studies.

The proposed 30-unit elderly housing project will be constructed in an area that has been extensively developed with a variety of urban uses. As such, any impacts to the scenic vistas of the area will be similar to what already exists.

13. Requires substantial energy consumption.

The proposed project will not require substantial energy consumption,

5.2 Findings

Based on the foregoing information presented, it is determined that the proposed 30-unit elderly housing project will not have a significant effect. As such, a determination of a Finding of No Significant Impact for the proposed action is appropriate.

5.3 Reasons Supporting Determination

The nature and scale of the proposed action is such that no significant environmental effects are anticipated. Potential impacts, if any, can be mitigated through careful construction management practices and compliance with all governmental requirements including those of the State Department of Health and the County Department of Public Works.

REFERENCES

County of Hawaii, Department of Research and Development, Data Book, April, 2001.

County of Hawaii, Zoning Code, Adopted as Ordinance No. 96-160 as ratified and amended in 1999.

Heliker, C. 1990. *Volcano and Seismic Hazards on the Island of Hawaii.* Washington: GPO

M&E Pacific, Inc., "Traffic Impact Analysis Report, Kinoole Street Elderly Housing Complex, March, 2004.

Moore, William L. Planning, "Environmental Assessment-Former Family Crisis Shelter Demolition, prepared for Hawaii County Office of Housing and Community Development, November, 1998.

Nishimura, Brian T., Planning Consultant, "Market Study-20220 Kinoole Senior Residences", Prepared for the Hawaii Island Community Development Corporation, February, 2004.

Stearns, H.T. and Macdonald G.A. 1946. *Geology and Ground-Water Resources of the Island of Hawaii.* Bulletin 9, Hawaii Division of Hydrography. Advertiser Publishing Co., Ltd. Honolulu.

University of Hawaii Department of Geography. 1983. *Atlas of Hawaii.* University of Hawaii Press, Honolulu.

U.S. Soil Conservation Service. 1973. *Soil Survey of the Island of Hawaii, State of Hawaii.* Washington: U.S.D. A.

Wilson Okamoto & Associates, Inc. 2002. *Hilo International Airport Draft Environmental Assessment, State of Hawaii, Department of Transportation, Airports Division.* Honolulu.

Wilson Okamoto & Associates, Inc. 2002. *Cultural Impact Assessment, Hilo International Airport Improvements.* Honolulu.

APPENDIX 1 – REPRODUCTION OF COMMENTS MADE DURING THE PRE-ASSESSMENT CONSULTATION PERIOD

1. State of Hawaii, Department of Land and Natural Resources, Division of Forestry and Wildlife, January 28, 2004.
2. State of Hawaii, Department of Land and Natural Resources, Historic Preservation Division, March 10, 2004.
3. State of Hawaii, Department of Health, District Environmental Health Program Chief, January 26, 2004.
4. State of Hawaii, Department of Transportation, Director of Transportation, March 3, 2004.
5. State of Hawaii, Office of Hawaiian Affairs, February 4, 2004.
6. County of Hawaii, Department of Water Supply, February 23, 2004.
7. County of Hawaii, Department of Environmental Management, February 3, 2004. Response: Brian T. Nishimura to Barbara Bell, Director, March 17, 2004
8. County of Hawaii, Fire Department, February 10, 2004.
9. County of Hawaii, Planning Department, January 28 & February 6, 2004.

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
POST OFFICE BOX 621
HONOLULU, HAWAII 96809

January 28, 2004

Mr. Brian T. Nishimura
Planning Consultant
101 Aupuni Street, Suite 217
Hilo, Hawaii 96720-4221

Dear Mr. Nishimura:

Subject: Request for Comments: Pre-Environmental Assessment
Kahaopea Street Elderly Housing Project
TMK: (3) 2-2-41: 10
Waiakea, South Hilo, Island of Hawaii

We have reviewed your cover letter to us dated January 22, 2004 for the subject project description above and have no comments to offer at this time. Thank you for the opportunity to comment and we do not need to be consulted further on your project.

Sincerely yours,

Michael G. Buck
Administrator

C: DOFAW, Hawaii Branch

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES

HISTORIC PRESERVATION DIVISION
KAKUHIHEWA BUILDING, ROOM 555
601 KAMOKILA BOULEVARD
KAPOLEI, HAWAII 96707

March 10, 2004

HAWAI'I HISTORIC PRESERVATION DIVISION REVIEW

LOG NO.: 2004.0704
DOC NO.: 0403JK08

Applicant/Agency: Hawaii Island Community Development Corp.
Address: C/O Brian T. Nishimura, Planning Consultant
101 Aupuni Street, Suite 217
Hilo, HI 96720-4221

Project: Chapter 6E-42 Review
Pre-Environmental Assessment Consultation
Kahaopea Street Elderly Housing Project

Location: Waiakea, North Kona, Hawai'i Island
Tax Map Key: (3) 2-2-41: 010

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1. We believe there are no historic properties present because:
_____a. intensive cultivation has altered the land
___X__b. residential development /urbanization has altered the land
_____c. previous grubbing/grading has altered land
_____d. an acceptable archaeological assessment or inventory survey found no historic properties
_____e. other:

2. This project has already gone through the historic preservation review process.
_ ___ a. mitigation has been completed
_ ___ b. other:

____X_ Thus, we believe that "no historic properties will be affected by this undertaking.

Signed Jeanne M. Knapp Date 3-10-04
Historic Preservation Division-Kona
Jeanne M. Knapp

LINDA LINGLE
GOVERNOR

CHIYOME L. FUKINO, M.D.
DIRECTOR OF HEALTH

STATE OF HAWAII
DEPARTMENT OF HEALTH
P.O. BOX 916
HILO, HAWAII 96721-0916

January 26, 2004

Mr. Brian T. Nishimura
Planning Consultant
101 Aupuni Street, Suite 217
Hilo, Hawaii 96720-4221

Subject: Pre-Environmental Assessment Consultation
Kahaopea Street Elderly Housing Project
Tax Map Key: (3) 2-2-41:10
Waiakea, South Hilo, Island of Hawaii

Thank you for allowing the Department of Health to comment on the proposed project. Preliminary review indicates consultation is needed in regards to wastewater disposal. Please feel free to contact the DOH Wastewater Engineer at 933-0401 on your wastewater disposal plans.

Sincerely,

Aaron A. Ueno
District Environmental Health Program Chief
Hawaii District Health Office

LINDA LINGLE
GOVERNOR

RODNEY K. HARAGA
DIRECTOR

Deputy Directors
BRUCE Y. MAT
LINDEN H. JOES
BRIAN H. SEKIGUCHI

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

IN REPLY REFER TO:

HWY-PS
2.3372

MAR 3 2004

Mr. Brian T. Nishimura
Planning Consultant
101 Aupuni Street. Suite 217
Hilo, Hawaii 96720-4221

Dear Mr. Nishimura:

Subject: Pre-Environmental Assessment (EA) Consultation for Kahaopea Street Elderly Housing Project, Waiakea, South Hilo, TMK: 2-2-41: 10

Thank you for consulting us. The proposed 30-unit elderly housing project is unlikely to adversely impact State highways.

If you have any questions, please contact Ronald F. Tsuzuki, Head Planning Engineer, Highways Division, at 587-1830.

Very truly yours,

for RODNEY K. HARAGA
Director of Transportation

PHONE (808) 594-1888

FAX (808) 594-1865

STATE OF HAWAI'I
OFFICE OF HAWAIIAN AFFAIRS
711 KAPI'OLANI BOULEVARD, SUITE 500
HONOLULU, HAWAI'I 96813

NRCD 04-1268

February 4, 2004

Mr. Brian T. Nishimura
Planning Consultant
101 Aupuni Street, Suite 217
Hilo, Hawaii 96720-4221

Dear Mr. Nishimura:

Subject: **Pre-Environmental Assessment Consultation**
Kahaopea Street Elderly Housing Project
Waiakea, South Hilo, Hawaii
TMK (3) 2-2-041:010

Thank you for the opportunity to review and comment on the above-referenced request. The Office of Hawaiian Affairs has no comment at this time and would like further notification documents on this project. Should you have any questions, please feel free to contact Pomaialoha Cox at 594-1970 or by email at pomaialohac@oha.org.

'O wau iho nō,

Clyde W. Nāmu'o
Administrator

DEPARTMENT OF WATER SUPPLY • COUNTY OF HAWAI'I
345 KEKŪANAŌ'A STREET, SUITE 20 • HILO, HAWAI'I 96720
TELEPHONE (808) 961-8050 • FAX (808) 961-8657

February 23, 2004

Mr. Keith Kato
Hawai'i Island Community Development Corporation
100 Pauahi Street, Suite 204
Hilo, HI 96720

WATER AVAILABILITY FOR THE 30-UNIT SENIOR RESIDENCE
TAX MAP KEY 2-2-041: 010

This is in response to your February 6, 2004 letter.

Please be informed that water for the 30-unit complex can be made available from an existing 6-inch waterline within Kino'ole Street fronting the property.

For your information, the maximum fire flow available is estimated to be approximately 1,000 gallons per minute and will require a fire flow test to verify this flow rate.

Should there be any questions, please contact Mr. William Atkins of our Water Resources and Planning Branch at 961-8070.

Sincerely yours,

Milton D. Pavao, P.E.
Manager

WA:dfg

... Water brings progress...

Harry Kim
Mayor

Barbara Bell
Director

County of Hawaii

DEPARTMENT OF ENVIRONMENTAL MANAGEMENT

25 Aupuni Street, Room 210 • Hilo, Hawaii 96720-4252
(808) 961-8083 • Fax (808) 961-8086

February 3, 2004

Mr. Brian T. Nishimura
Planning Consultant
101 Aupuni Street, Suite 217
Hilo, HI 96720-4221

Re: Pre-Environmental Assessment Consultation
Kahaopea Street Elderly Housing Project
TMK: (3)2-2-41:10
Waiakea, South Hilo, Island of Hawaii

We have reviewed your letter of January 22, 2004 and offer the following comments:

DEPARTMENT COMMENTS: No additional comments.

WASTEWATER DIVISION:
( ) No comments
( ) Require connection of existing and/or proposed structures to the public sewer in accordance with Section 21-5 of the Hawaii County Code.
( ) Require extension of the sewer system to service the proposed subdivision in accordance with Section 23-85 of the Hawaii County Code.
(X) Other: MAY WANT TO PARTICIPATE IN PROPOSED PUAINAKO ID.

SOLID WASTE DIVISION:
( ) No comments
( ) Commercial operations may not use transfer stations for disposal.
( ) Aggregates and any other construction/demolition waste should be reused to its fullest extent.
( ) Ample room should be provided for recycling.
( ) Greenwaste may be disposed of only at the drop sites located at the Kailua and Hilo transfer stations.
(X) Other: SUBMIT A SOLID WASTE MANAGEMENT PLAN (GUIDELINES ARE ATTACHED.)

Barbara Bell
DIRECTOR

Harry Kim
Mayor

Barbara Bell
Director

Lono Tyson
Solid Waste Division Chief

County of Hawai'i

DEPARTMENT OF ENVIRONMENTAL MANAGEMENT

25 Aupuni Street, Room 210 • Hilo, Hawai'i 96720-4252
(808) 961-8083 • Fax (808) 961-8086

October 13, 2003

SOLID WASTE MANAGEMENT PLAN
Guidelines

INTENT AND PURPOSE

This is to establish guidelines for reviewing solid waste management plans, for which special conditions are placed on developments. The solid waste management plan will be used for (1) encouraging recycling and recycling programs, (2) predict the waste generated by the proposed development to anticipate the loading on County transfer stations, landfills and recycling facilities, and (3) predict the additional traffic being generated because of waste and recycling transfers.

REPORT

The consultant's report will contain the following:

1. Description of the project and the potential waste it may be generating: i.e. analysis of anticipated waste volume and composition. This includes waste generated during the construction and operational phases. Greenwastes will be included in this report for both construction grubbing and future operational landscape maintenance.

2. Description and location of the possible sites for waste disposal or recycling. We will not allow the use of the County transfer stations for any commercial development; commercial development as defined under the policies of the Department of Environmental Management, Solid Waste Division.

3. Since the Department of Environmental Management promotes recycling, indicate onsite source separation facilities by waste stream; i.e. source separation bins of glass, metal, plastic, cardboard, aluminum, etc.

4. Identification of the proposed disposal site and transportation methods for the various components of the waste disposal and recycling system, including the number of truck traffic and the route that truck will be using to transport the waste and recycled materials.

BRIAN T. NISHIMURA, PLANNING CONSULTANT
101 Aupuni Street, Suite 217
Hilo, Hawaii 96720-4221
Phone: (808) 935-7692 Fax: (808) 935-6126 E-mail: btnishi@interpac.net

March 17, 2004

Barbara Bell, Director
County of Hawaii
Department of Environmental Management
25 Aupuni Street, Room 210
Hilo, Hawaii 96720-4252

Subject: Pre-Environmental Assessment Consultation
Kahaopea Street Elderly Housing Project
TMK: (3) 2-2-41: 10

Dear Ms. Bell:

This is to acknowledge receipt of your letter dated February 3, 2004 regarding the above-described matter. With regard to the Wastewater Division, your letter indicated that the project may want to participate in the proposed Puainako ID. My understanding is that the boundaries for the improvement district have not been determined and no timetable has been established for implementing the project. The proposed elderly housing project is scheduled for completion in November, 2005 and will construct an onsite septic system to address their sewage disposal needs. The developer will monitor the progress of the Puainako ID project to determine whether participation is feasible in the future.

With regard to the Solid Waste Division, your comment was to submit a Solid Waste Management Plan. After discussing this matter with Mr. Lono Tyson, Solid Waste Division Chief, we believe that we can address your concerns without preparing a Solid Waste Management Plan. Please be advised that the proposed elderly housing project will utilize a private commercial rubbish hauler and all waste generated by the project will be disposed of at appropriate sites designated by the Department of Environmental Management. In addition, the project site will have ample room for recycling.

Thank you for taking the time to provide your comments during the pre-assessment consultation process. Should you have any questions regarding this matter, please do not hesitate to contact me.

Sincerely,

Brian T. Nishimura, Planning Consultant

Harry Kim
Mayor

Darryl J. Oliveira
Fire Chief

Desmond K. Wery
Deputy Fire Chief

County of Hawai'i
FIRE DEPARTMENT
25 Aupuni Street • Suite 103 • Hilo, Hawai'i 96720
(808) 961-8297 • Fax (808) 961-8296

February 10, 2004

Mr. Brian T. Nishimura
Planning Consultant
101 Aupuni Street, Suite 217
Hilo, HI 96720-4221

Dear Mr. Nishimura:

RE: PRE-ENVIRONMENTAL ASSESSMENT CONSULTATION
KAHAOPEA STREET ELDERLY HOUSING PROJECT
TAX MAP KEY: (3) 2-2-41: 10
WAIAKEA, SOUTH HILO, ISLAND OF HAWAII

Fire apparatus access roads shall be in accordance with UFC Section 10.207:

"Fire Apparatus Access Roads

"Sec. 10.207. (a) **General.** Fire apparatus access roads shall be provided and maintained in accordance with the provisions of this section.

"(b) **Where Required.** Fire apparatus access roads shall be required for every building hereafter constructed when any portion of an exterior wall of the first story is located more than 150 feet from fire department vehicle access as measured by an unobstructed route around the exterior of the building.

"**EXCEPTIONS:** 1. When buildings are completely protected with an approved automatic fire sprinkler system, the provisions of this section may be modified.

"2. When access roadways cannot be installed due to topography, waterways, nonnegotiable grades or other similar conditions, the chief may require additional fire protection as specified in Section 10.301 (b).

"3. When there are not more than two Group R, Division 3 or Group M occupancies, the requirements of this section may be modified, provided, in the opinion of the chief, fire-fighting or rescue operations would not be impaired.

"More than one fire apparatus road may be required when it is determined by the chief that access by a single road may be impaired by vehicle congestion, condition of terrain, climatic conditions or other factors that could limit access.

"For high-piled combustible storage, see Section 81.109.

"(c) **Width.** The unobstructed width of a fire apparatus access road shall meet the requirements of the appropriate county jurisdiction.

"(d) **Vertical Clearance.** Fire apparatus access roads shall have an unobstructed vertical clearance of not less than 13 feet 6 inches.

> **"EXCEPTION:** Upon approval vertical clearance may be reduced, provided such reduction does not impair access by fire apparatus and approved signs are installed and maintained indicating the established vertical clearance.

"(e) **Permissible Modifications.** Vertical clearances or widths required by this section may be increased when, in the opinion of the chief, vertical clearances or widths are not adequate to provide fire apparatus access.

"(f) **Surface.** Fire apparatus access roads shall be designed and maintained to support the imposed loads of fire apparatus and shall be provided with a surface so as to provide all-weather driving capabilities." (20 tons)

"(g) **Turning Radius.** The turning radius of a fire apparatus access road shall be as approved by the chief." (45 feet)

"(h) **Turnarounds.** All dead-end fire apparatus access roads in excess of 150 feet in length shall be provided with approved provisions for the turning around of fire apparatus.

"(i) **Bridges.** When a bridge is required to be used as access under this section, it shall be constructed and maintained in accordance with the applicable sections of the Building Code and using designed live loading sufficient to carry the imposed loads of fire apparatus.

"(j) **Grade.** The gradient for a fire apparatus access road shall not exceed the maximum approved by the chief." (15%)

"(k) **Obstruction.** The required width of any fire apparatus access road shall not be obstructed in any manner, including parking of vehicles. Minimum required widths and clearances established under this section shall be maintained at all times.

"(l) **Signs.** When required by the fire chief, approved signs or other approved notices shall be provided and maintained for fire apparatus access roads to identify such roads and prohibit the obstruction thereof or both."

Water supply shall be in accordance with UFC Section 10.301:

> "(c) **Water Supply.** An approved water supply capable of supplying required fire flow for fire protection shall be provided to all premises upon which buildings or portions of buildings are hereafter constructed, in accordance with the respective county water requirements. There shall be provided, when required by the chief, on-site fire hydrants and mains capable of supplying the required fire flow.
>
> "Water supply may consist of reservoirs, pressure tanks, elevated tanks, water mains or other fixed systems capable of providing the required fire flow.
>
> "The location, number and type of fire hydrants connected to a water supply capable of delivering the required fire flow shall be protected as set forth by the respective county water requirements. All hydrants shall be accessible to the fire department apparatus by roadways meeting the requirements of Section 10.207."

Sincerely,

DESMOND K. WERY
Deputy Fire Chief

JP:lk

Harry Kim
Mayor

Christopher J. Yuen
Director

Roy R. Takemoto
Deputy Director

County of Hawaii
PLANNING DEPARTMENT
101 Pauahi Street, Suite 3 • Hilo, Hawaii 96720-3043
(808) 961-8288 • Fax (808) 961-8742

January 28, 2004

Mr. Brian T. Nishimura
Planning Consultant
101 Aupuni Street, Suite 217
Hilo HI 96720-4221

Dear Mr. Nishimura:

Pre-Environmental Assessment Consultation
Kahaopea Street Elderly Housing Project
Tax Map Key: 2-2-41:10

In response to your letter dated January 22, 2004, we have the following to offer:

1. The subject parcel consists of 43,560 square feet.
2. According to the General Plan Land Use Pattern Allocation Guide Map, this parcel is designated Low Density Urban.
3. The State Land Use designation is Urban.
4. County zoning is Single Family Residential (RS-10).
5. According to Chapter 25, Zoning Code, Section 25-5-3(b)(7), a Use Permit is required to establish hospitals, sanitariums, old age, convalescent, nursing and rest homes. Plan Approval may be required as a condition of approval of the Use Permit.
6. Front yard setbacks are 20 feet. Side yard setbacks are 10 feet.
7. There is a five-foot wide future road-widening setback along Kinoole Street.
8. This parcel is not located within the County's Special Management Area.

Please submit a copy of the draft Environmental Assessment for our review. Further, should you have questions, Esther Imamura or Larry Brown may be contacted at 961-8288.

Sincerely,

CHRISTOPHER J. YUEN
Planning Director

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Harry Kim
Mayor

Christopher J. Yuen
Director

Roy R. Takemoto
Deputy Director

County of Hawaii
PLANNING DEPARTMENT
101 Pauahi Street, Suite 3 • Hilo, Hawaii 96720-3043
(808) 961-8288 • Fax (808) 961-8742

February 6, 2004

Mr. Brian T. Nishimura
Planning Consultant
101 Aupuni Street, Suite 217
Hilo HI 96720-4221

Dear Mr. Nishimura:

Pre-Environmental Assessment Consultation
Kahaopea Street Elderly Housing Project
Tax Map Key: 2-2-41:10

This is to augment our letter dated January 28, 2004.

As stated in that letter, a Use Permit is required to establish hospitals, sanitariums, old age, convalescent, nursing and rest homes in an area zoned Single Family Residential (RS-10) by the County. However, we inadvertently overlooked Section 25-5-3(a)(12) of the Zoning Code, which allows for *Public uses and structures, as permitted under section 25-4-11.* Section 25-4-11(c) states that *public uses, structures and buildings are permitted uses in any district, provided that the director has issued plan approval for such use.*

In view of the foregoing, the Kahaopea Street Elderly Housing Project can be permitted on the proposed building site upon issuance of Final Plan Approval by the Planning Director.

Should you have questions, Esther Imamura or Larry Brown may be contacted at 961-8288.

Sincerely,

CHRISTOPHER J. YUEN
Planning Director

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xc: Ministerial Division

APPENDIX 2 – REPRODUCTION OF ADDITIONAL COMMENTS RECEIVED AND RESPONSES MADE

1. State of Hawaii, Office of Environmental Quality Control dated June 10, 2004.
   Response: Brian T. Nishimura to Ms. Genevieve Salmonson, dated October 25, 2004.

2. County of Hawaii, Office of Aging dated June 29, 2004.

3. Mr. Richard Taber dated October 14, 2004.
   Response: Keith H. Kato to Mr. Richard Taber dated October 18, 2004

4. Ms. Hannah Nardini dated October 18, 2004.
   Response: Mr. Keith H. Kato to Ms. Hannah Nardini dated October 21, 2004.

LINDA LINGLE
GOVERNOR OF HAWAII

GENEVIEVE SALMONSON
DIRECTOR

STATE OF HAWAII
OFFICE OF ENVIRONMENTAL QUALITY CONTROL
235 SOUTH BERETANIA STREET
SUITE 702
HONOLULU, HAWAII 96813
TELEPHONE (808) 586-4185
FACSIMILE (808) 586-4186
E-mail: oeqc@health.state.hi.us

June 10, 2004

Edwin Taira
Office of Housing & Community Development Corp.
50 Wailuku Drive
Hilo, Hawaii 96720

Attn: Noel Fujimoto

Dear Mr. Taira:

Subject: Draft Environmental Assessment (EA) for **Kinoole Senior Residences**

We have the following comments to offer:

Sustainable building techniques: Please consider applying sustainable building techniques presented in the "Guidelines for Sustainable Building Design in Hawaii." In the final EA include a description of any of the techniques you will implement. Contact our office for a paper copy of the guidelines or go to our website at *http://www.state.hi.us/health/oeqc/guidance/sustainable.htm.*

Visual impacts: Include drawings or diagrams of the site, the proposed buildings and any proposed landscaping that show the final appearance of the project. Identify public viewpoints of the project site from which visual impacts may occur, especially of mauka and makai viewplanes. Show these impacts by superimposing a rendering of the proposed facility onto photographs taken from public vantage points.

Contacts: Community consultation is an important aspect of the environmental review process. Notify any community groups that might have an interest in or be affected by this project and the nearest neighbors or neighboring landowners, allowing them sufficient time to review the draft EA and submit comments. Document all contacts in the final EA and include copies of any correspondence.

Consultation with advocacy groups: Consult with groups or organizations that advocate for the elderly, at a minimum the state's Area Office on Aging.

Cultural impacts assessment: The cultural impacts assessment included in the draft EA is for Hilo International Airport, 1.6 miles away. What analysis have you done for this particular parcel

regarding cultural resources and cultural practices? In the final EA list the steps you have taken for the analysis and the conclusion you have drawn from it.

If you have any questions call Nancy Heinrich at 586-4185.

Sincerely,

GENEVIEVE SALMONSON
Director

c: Keith Kato, HICDC; Brian Nishimura

BRIAN T. NISHIMURA, PLANNING CONSULTANT
101 Aupuni Street, Suite 217
Hilo, Hawaii 96720-4221
Phone: (808) 935-7692 Fax: (808) 935-6126 E-mail: btnishi@interpac.net

October 25, 2004

Ms. Genevieve Salmonson, Director
State of Hawaii
Office of Environmental Quality Control
235 S. Beretania St., Suite 702
Honolulu, Hawaii 96813

Subject: Draft Environmental Assessment
Kinoole Senior Residences

Dear Ms. Salmonson:

This is in response to your letter dated June 10, 2004, providing comments on the subject Draft Environmental Assessment. The responses to your comments are provided as follows:

1. SUSTAINABLE BUILDING TECHNIQUES. The *Guidelines for Sustainable Building Design in Hawaii* will be reviewed by the project architect and will be utilized where appropriate for the proposed project.

2. VISUAL IMPACTS. A rendering of the proposed project including the building, landscaping and parking area has been included in the Final Environmental Assessment. Please be advised that the mauka and makai view planes of the project area will not be adversely affected by the proposed project. Existing vegetation on the property effectively block views along both the Kahaopea Street and Kinoole Street frontages of the property. The proposed structure will be lower than the height of the existing vegetation which exceeds the 35 foot height limit for the property.

3. CONTACTS. Surrounding property owners within 300 feet of the subject property were sent letters describing the proposed project. Two comment letters were received and these will be included in the Final Environmental Assessment along with the responses from the Hawaii Island Community Development Corporation.

4. CONSULTATION WITH ADVOCACY GROUPS. The County of Hawaii Office of Aging has been consulted regarding the proposed project and their letter of support is included in the Final Environmental Assessment.

5. CULTURAL IMPACTS ASSESSMENT. The cultural impacts assessment included in the draft EA provides a historical perspective of the natural landscape and traditional land use patterns of the entire ahupua'a of Waiakea which includes the Hilo Airport site

as well as the subject property. This general description applies to both properties. In addition, the urbanized use of the subject property since 1934, initially as a single family residence and later as a family crisis shelter, has precluded the use of the property for traditional cultural practices for over seventy years.

Thank you for taking the time to comment on the proposed project.

Sincerely,

Brian T. Nishimura, Planning Consultant

c. Mr. Edwin Taira, Housing Administrator, Office of Housing and Community Development
Keith Kato, Hawaii Island Community Development Corporation

Harry Kim
Mayor

Alan R. Parker
Executive on Agin

County of Hawaii

OFFICE OF AGING

Hilo Lagoon Centre, 101 Aupuni Street, Suite 342, Hilo, Hawai'i 96720-4262
Phone (808) 961-8600 • Fax (808) 961-8603
Hanama Place, 75-5706 Kuakini Highway, Suite 106, Kailua-Kona, Hawai'i 96740-1751
Phone (808) 327-3597 • Fax (808) 327-3599

June 29, 2004

Brian T. Nishimura, Planning Consultant
101 Aupuni Street, Suite 217
Hilo, Hawaii 96720

Brian
Dear ~~Mr. Nishimura~~:

Thank you for your correspondence informing me of your involvement with the proposed senior housing development in Hilo.

The Hawaii County Office of Aging supports the proposed project as there is a need for additional senior housing in South Hilo. The housing shortage on the Big Island is a major concern of the current county administration.

The general island wide shortage affects our senior population as rising rents and availability of affordable units places a major burden on seniors living on fixed incomes.

Mr. Keith Kato had contacted our office about the project about a year ago, and we are glad to see the project moving ahead.

Sincerely yours,

Alan

Alan Parker
Executive on Aging

ap

RICHARD TABER
82 MAIKAI STREET
HILO, HAWAII 96720
(808) 959-3887 VOICE
(808) 959-9036 FAX
RTABER@RTABER.COM (EMAIL)

October 14, 2004

Keith Kato
Hawaii Island Community Development Corporation
100 Pauahi Street
Suite 204
Hilo, HI 96720

Dear Mr Kato:

I am writing to you regarding your letter to me, a neighbor, on the proposed apartment building to be located on tmk (3) 2-2-41:10

I have several concerns about this project.

1. The land now is zoned RS-10 (10,000 sqft per unit). This would allow only 4 units to be built on this land. Any environmental impact study must reject this project as it does not conform to existing zoning regulations.
2. I understand that the entrance to this project is to be accessed from Kahaopea Street. As you realize, the roadway narrows down significantly as it connects to Maikai Street. Compounding this problem is a church located on the corner of Maikai Street and Kahaopea. I am asking that the county widen the road prior to any approval of this project.
3. With 30 units to be added, there will not be enough parking on this property.
4. The narrow sub-standard Kahaopea Street is not wide enough to handle the increased traffic on Kahaopea.
5. There is an existing flooding problem on Kahaopea Street, however, it is not located in a designated flood zone. My property, located at tmk (3) 2-4-9-2 was flooded during the 2002 floods. My laundry room was destroyed. I received aid from the SBA from this flood. I don't believe that there is a storm sewer in this area. I request that also, the environmental impact study require a storm sewer along Kahaopea Street and Kinoole Street, and that it be installed before this proposed project is approved. As our Mayor has proclaimed, the infrastructure be installed first for any such project.
6. Please advise me when and where I will need to testify at any hearings to be held in this matter.

Richard Taber

HAWAII ISLAND COMMUNITY DEVELOPMENT CORPORATION
100 Pauahi Street Suite 204 Hilo, Hawaii 96720 Phone 808-969-1158 Fax 808-935-6916
Equal Housing Opportunity Provider

October 18, 2004

Richard Taber
82 Maikai Street
Hilo, Hawaii 96720

Subject: Kinoole Senior Residences
TMK: 2-2-41: 10

Dear Mr. Taber:

This is in response to your letter dated October 14, 2004 expressing your concerns about this project. Our response to your concerns is as follows:

1) The proposed use is a permitted use under the current zoning designation. The zoning code provides for conditionally permitted uses which includes projects such as this elderly housing project. The Planning Department has approved this use for the property. For your information, all of the elderly projects in Hilo have been developed under similar zoning.

2) The Department of Public Works will be reviewing the project's access prior to the issuance of any building permits. We also believe that Kahaopea Street should be improved although the extent of improvements that the Department of Public Works will require has not been determined. Any such requirements will have to be part of the development plan prior to the issuance of a building permit.

3) Adequate parking will be provided. It is our experience with similar projects in Kona and in Hilo that the senior projects require less off-street extent than a family orient project would require. Many of the seniors do not own vehicles and visitors come on irregular basis. We are planning to provide 20 off street parking stalls which should be more than adequate for a senior project of this size. This matter has been reviewed by the Planning Department and they are in agreement with the parking plan.

4) A drainage study for this property will be conducted as part of the design process and will be submitted to the Department of Public Works for their review prior to the issuance of a building permit. It is very unlikely that this project will affect your property since this property drains toward Kinoole Street and away from your property. Further, the Department of Public Works requires that all development generated runoff must be disposed on site and may not be directed toward other properties.

5) To our knowledge no future public hearings are scheduled.

Thank you for your response to our letter. Your letter will be included in the environmental assessment for this project.

Sincerely Yours,

Keith H. Kato
Executive Director

October 18, 2004

Hawaii Island Community Development Corporation
100 Pauahi Street
Suite 204
Hilo, HI 96720

Re: 2020 Kinoole Senior Residence Project

Dear Mr. Kato:

I am concerned about the potential impact on my property tax. If this causes a great increase in my taxes I am not in favor of this project.

Sincerely,

Hannah Nardini

Hannah Nardini
1421 Komohana Street
Hilo, HI 96720

HAWAII ISLAND COMMUNITY DEVELOPMENT CORPORATION
100 Pauahi Street Suite 204 Hilo, Hawaii 96720 Phone 808-969-1158 Fax 808-935-6916
Equal Housing Opportunity Provider

October 21, 2004

Hannah Nardini
1421 Komohana Street
Hilo, Hawaii 96720

Subject: Kinoole Senior Residences
TMK: 2-2-41: 10

Dear Ms. Nardini:

This is in response to your letter dated October 18, 2004 expressing your concern the potential real property tax impact of this project.

We will be leasing the site from the county for a nominal fee so we would not expect any impact on the tax bills for neighboring properties. However, we are not experts in this field and cannot predict the actions of the county tax department.

Thank you for your response to our letter. Your letter will be included in the environmental assessment for this project.

Sincerely Yours,

Keith H. Kato
Executive Director

APPENDIX 3 – HAWAII COUNTY OFFICE OF AGING, ELDERLY STATISTICS

Hawaii County's 30-years Elderly (60+) Population Growth by District **APPENDIX 2**

District	1970	*Percent*	1980	*Percent*	decennial %change	1990	*Percent*	decennial %change	2000	*Percent*	decennial %change	30 years % change
So. Hilo	4,296	48.50%	6,526	48.01%	51.91%	9,223	44.44%	41.33%	10,213	39.10%	10.73%	137.73%
Puna Mauka	690	7.79%	1,144	8.42%	65.80%	2,099	10.11%	83.48%	2,957	11.32%	40.88%	328.55%
Puna Makai	291	3.29%	588	4.33%	102.06%	998	4.81%	69.73%	1,319	5.05%	32.16%	353.26%
Ka'u	481	5.43%	637	4.69%	32.43%	881	4.24%	38.30%	1,180	4.52%	33.94%	145.32%
So. Kona	681	7.69%	867	6.38%	27.31%	1,186	5.71%	36.79%	1,509	5.78%	27.23%	121.59%
No. Kona	617	6.97%	1,460	10.74%	136.63%	3,179	15.32%	117.74%	4,575	17.51%	43.91%	641.49%
So. Kohala	244	2.75%	550	4.05%	125.41%	944	4.55%	71.64%	1,635	6.26%	73.20%	570.08%
No. Kohala	467	5.27%	583	4.29%	24.84%	767	3.70%	31.56%	1,068	4.09%	39.24%	128.69%
Hamakua	753	8.50%	919	6.76%	22.05%	1,122	5.41%	22.09%	1,285	4.92%	14.53%	70.65%
No. Hilo	338	3.82%	318	2.34%	-5.92%	356	1.72%	11.95%	381	1.46%	7.02%	12.72%
Total	8,858	100%	13,592	100%	53.44%	20,755	100%	52.70%	26,122	100%	25.86%	194.90%
County Gen. Pop. Total	63,468		92,053		45.04%	120,317		30.70%	148,677		23.57%	134.26%

30-years Elderly (60+) Population Growth by County

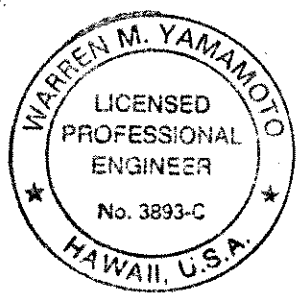
	1970	*Percent*	1980	*Percent*	decennial %change	1990	*Percent*	decennial %change	2000	*Percent*	decennial %change	30 years % change
State Gen. Pop. Total	769,913		964,691		25.30%	1,108,229		14.88%	1,211,537		9.32%	57.36%
State 60+ Total	67,488		113,994		68.91%	173,733		52.41%	207,001		19.15%	206.72%
Kauai County 60+	4,231	6.27%	6,125	5.37%	44.76%	8,877	5.11%	44.93%	10,468	5.06%	17.92%	147.41%
Maui County 60+	6,415	9.51%	10,407	9.13%	62.23%	15,611	8.99%	50.00%	19,436	9.39%	24.50%	202.98%
Honolulu 60+	47,984	71.10%	83,820	73.53%	74.68%	128,490	73.96%	53.29%	150,910	72.90%	17.45%	214.50%
Hawaii County 60+	8,858	13.13%	13,592	11.92%	53.44%	20,755	11.95%	52.70%	26,122	12.62%	25.86%	194.90%

Compiled & tabulated by Lito M. Asuncion, Hawaii County Office of Aging

APPENDIX 4 – TRAFFIC IMPACT ANALYSIS REPORT, KINOOLE STREET ELDERLY HOUSING COMPLEX

TRAFFIC IMPACT ANALYSIS REPORT

KINOOLE STREET ELDERLY HOUSING COMPLEX



THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION

Expiration Date: 4/30/04

By:

M&E Pacific, Inc.
100 Pauahi Street, Suite 212
Hilo, Hawaii 96720
Telephone: (808)961-2776
Fax: (808)935-5934

March 2004

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Table 2	Level of Service Analysis

APPENDIX

Appendix A	Traffic Turning Movement Counts
Appendix B	Signalized and Unsignalized Intersection Level of Service (LOS) Calculations

TRAFFIC IMPACT ANALYSIS REPORT
KINOOLE STREET ELDERLY HOUSING COMPLEX

An elderly housing complex is being proposed in Hilo, Hawaii. This report documents a study that was conducted to identify the traffic impacts of the proposed project and to recommend any mitigating measures.

PROJECT DESCRIPTION

The County of Hawaii plans to develop a 30 unit apartment complex for independent living senior citizens. The project site is located on a one acre site identified as Tax Map Key (3)2-2-41:10 on the southwest corner of Kinoole Street and West Kahaopea Street. Adjacent east-west streets that intersect Kinoole Street include West Kawailani Street and West Puainako Street. The location of the project site in relationship to the local road system is shown on Figure 1.

The proposed project would consist of 30 one bedroom apartments, with ten units per floor. Twenty parking stalls would be provided. Access to the project site would be from West Kahaopea Street. A proposed site plan is shown on Figure 2. The proposed project is scheduled for to be ready for occupancy about November 2005.

Based on the development schedule and location of the proposed project, this study analyzed the traffic impacts for a one year forecast period at three intersections:

- Kinoole Street/West Kawailani Street,
- Kinoole Street/West Kahaopea Street, and
- Kinoole Street/West Puainako Street.

These three intersections are identified on Figure 1.

EXISTING CONDITIONS

A survey of the existing roadway and traffic conditions was made.

Existing Roadways

Kinoole Street is a secondary arterial that provides north-south access between downtown Hilo to the northwest and the terminal in the vicinity of Haihai Street about a mile south of West Kahaopea Street. It is a two lane roadway in the vicinity of the project site and is under the jurisdiction of the County of Hawaii.

West Kawailani Street is an east-west, two lane secondary arterial that provides access to residential areas from Kanoelehua Avenue. It passes an elementary school at the corner with Kinoole Street. The intersection with Kinoole Street is signalized and all four approaches have separate left turn and through/right turn lanes. All approaches have a leading left turn arrow followed by a through phase with permitted left turns.

West Puainako Street is an east-west, two lane facility west of Kanoelehua Avenue. The General Plan classifies Puainako Street as a primary arterial with a minimum right-of-way width of 120 feet. West Puainako Street provides access from Kanoelehua Avenue to several schools and the University of Hawaii at Hilo. The roadway is under the jurisdiction of the State Department of Transportation which is implementing the Puainako Street improvement project. The Kanoelehua Avenue/Puainako Street intersection was recently improved and the mauka extension of Puainako Street is currently under construction. Future improvements include the widening and realignment of the roadway section between Kilauea Street and Komohana Street. The intersection with Kinoole Street has no turning lanes and has a two phase signal.

West Kahaopea Street is a two lane collector street serving residential areas. It becomes a narrow one lane roadway west of the project site. The West Kahaopea Street approaches to Kinoole Street are stop sign controlled. There are no turning lanes at this intersection.

Traffic Volumes

Traffic turning movement counts were taken at the West Kawailani Street and West Kahaopea Street intersections with Kinoole Street on Thursday, January 22, 2004. Traffic counts were taken during the morning (6:30 to 8:30 a.m.) and afternoon (3:30 to 5:30 p.m.) peak periods. Traffic turning movement counts require traffic surveyors to station themselves by each study intersection and record each vehicle movement as through or turning movements by 15 minute intervals. The worksheets for the traffic counts are included in the Appendix. The resultant peak hour movements are summarized on Figure 3. Traffic volumes over five vehicles per hour (vph) are rounded to the nearest five.

The County of Hawaii Department of Public Works provided traffic counts taken at the West Puainako Street intersection by their consultant for the Kilauea/Kinoole Traffic Circulation Study, The Traffic Management Consultant. The counts were taken on November 13, 2001. The counts are included in the Appendix. The hourly counts were factored by 3 percent (assuming a one percent annual growth rate from 2001 to 2004) and are included on Figure 3.

The dominant direction of travel on Kinoole Street is northbound in the morning peak and southbound in the afternoon peak. West Kawailani Street shows an eastbound dominant flow in the morning peak and westbound in the afternoon peak due to commuter traffic from the residential areas. There is a spike in the westbound morning traffic before school starts. West Puainako Street has about equal flows in the morning peak and a westbound dominant flow in the afternoon peak. The traffic volumes coming from the eastbound approach of West Kahaopea Street can be considered minor.

The State Department of Transportation takes traffic counts every two years at selected roadway sections on the island of Hawaii. One of these count stations is at the Kanoelehua Avenue/East Puainako Street intersection (Station 18-G).

Traffic counts were available for five years: 1994, 1996, 1998, 2000 and 2002. The data and graph on Figure 4 shows the trend in two-way daily traffic volumes on each leg of the intersection.

Daily two-way traffic volumes on the south leg of Kanoelehua Avenue was at its highest level in 1994, decreased in 1996, increased to 2000, and then leveled off in 2002 at levels that are still below the 1994 volumes. The leg shows an average annual increase of 2.1% from 1998 to 2002. Traffic volumes on the north leg decreased from 1994 to 1998, increased to its highest value in 2000, and then declined in 2002. The north leg shows a 1.7% increase over the 1998 to 2002 period. Both legs of East Puainako Street show constantly declining traffic volumes from 1996 to 2002. This latter trend is believed to be applicable to the study roadways.

TRAFFIC FORECAST

The proposed project is scheduled for occupancy in 2005. Therefore, traffic forecasts were prepared for a one year period. During this period, ambient traffic can be expected to increase due to regional growth and new projects in the area. The traffic that would be generated from the proposed project was then added to the ambient traffic forecast to obtain the total with project traffic forecast.

Ambient Traffic Forecast

The historical growth rate of traffic was used to forecast regional traffic growth. However, traffic volumes on East Puainako Street have shown a decreasing trend. Therefore, the current traffic volumes on the study roadways were increased by 1 percent to obtain the combined ambient traffic forecast shown on Figure 5. The traffic volumes for the West Puainako Street intersection counted in 2001 were increased by 4 percent. Traffic volumes over five vehicles per hour (vph) are rounded to the nearest five.

Project Generated Traffic

The traditional procedure of trip generation, distribution, and assignment was used to forecast the number of trips that would be generated by the proposed project, the distribution of these trips, and the specific intersection turning movements that would be utilized.

The trip generation step forecasts the volume of vehicle trips that would be generated by the proposed project during the two analysis periods. The Institute of Transportation Engineers Trip Generation Handbook (Seventh Edition, 2003) has trip generation equations or rates to calculate the number of morning and afternoon peak hour trips that would be generated by various land uses. The handbook also provides the percentage of inbound and outbound trips in each peak hour.

The handbook has two land uses appropriate to this study: Senior Citizen Adult Housing-Detached (Land Use 251) and Senior Citizen Adult Housing-Attached (Land Use 252). The Detached housing units are essentially single family housing units within gated communities while the Attached housing units are essentially apartment units. The trip rates per unit and number of trips produced for 30 housing units with each type of housing are summarized below:

	DETACHED		ATTACHED	
	RATE	TRIPS	RATE	TRIPS
AM PEAK HOUR	0.20	6	0.08	2
PM PEAK HOUR	0.26	8	0.11	3

Although the attached housing land use would be more appropriate to this study, the higher rate for the detached housing land use was utilized since the number of trips generated is very small. By comparison, these rates are much lower than for the condominium/townhouse land use, which has rates of 0.44 and 0.52 for morning and afternoon peaks, respectively. The trip generation analysis is summarized on Table 1.

The trip distribution step divides the generated trips by directions of travel to/from the project site. The three primary directions of travel were north and south via Kinoole Street, and east via West Kahaopea Street. The proportion of trips in each direction of travel was based on the average percentages of turning movements from the traffic counts at the Kinoole Street/West Kahaopea Street intersection. The trip distribution percentages and resultant volumes are summarized on Table 1.

The trip assignment step assigns the distributed trips as turning movements to the three study intersections. The results of the trip assignment procedure for the proposed project are graphically shown on Figure 6. The traffic volumes are not rounded.

Total Forecast Volumes

The project generated volumes from Figure 6 were added to the ambient traffic forecasts from Figure 5 to obtain the total with project traffic forecasts shown on Figure 7. Traffic volumes over five vph are rounded to the nearest five for the five study intersections. Due to the small number of forecast to be generated, most of the total forecast volumes are similar to the ambient traffic forecast volumes or differ by just a small amount.

LEVEL OF SERVICE ANALYSIS

The concept of level of service is used to quantify the quality of traffic flow on roadway facilities. The Transportation Research Board has developed procedures to calculate level of service value(s) by measuring traffic volumes against the capacities of different types of roadway facilities. Their Highway Capacity Manual 2000 (HCM2000) describes the various procedures developed for freeways, highways, signalized and unsignalized intersections, etc. A comparison of levels of service for the different forecast scenarios can give an indication of the traffic impacts of ambient traffic growth and the proposed project.

The methodology for analyzing signalized intersections calculates the levels of service for individual approaches and the intersection as a whole based on the average stopped delay per vehicle. The results range from level of service A (best with average delays less than five seconds) to F (worst with average delays longer than 80 seconds), described as follows:

Level of Service	Control Delay per Vehicle (Seconds/Vehicle)
A	<10.0
B	10.1 to 20.0
C	20.1 to 35.0
D	35.1 to 55.0
E	55.1 to 80.0
F	>80.0

Many jurisdictions consider levels of service A to D as acceptable for areas like Hilo, with levels of service E and F indicating the need for mitigating measures. The County of Hawaii recommends a minimum level of service C for proposed projects, while recognizing that many of their signalized intersections are already at level of service D.

The procedure used for analyzing unsignalized intersections calculates vehicle delays and levels of service based on the distribution of gaps in traffic on the major street and driver judgment in selecting gaps through which to execute turns. For two way stop intersections where only the minor street approaches are controlled by a stop sign, levels of service are calculated for the critical turning movements including outbound movements from the stop-controlled approach, and left turns from the main road to the minor road. The procedure does not calculate an overall intersection level of service. For all way stops where each incoming approach is controlled by a stop sign, levels of service are calculated for each approach and the intersection as a whole.

The Highway Capacity Manual defines the relationship between level of service and delay (in seconds/vehicle) for unsignalized intersections as shown below:

Level of Service	Delay (Seconds/Vehicle)
A	<10.0
B	10.1 to 15.0
C	15.1 to 25.0
D	25.1 to 35.0
E	35.1 to 50.0
F	>50.1

Levels of service A to E are considered acceptable for unsignalized intersections. Level of service F (with average delays longer than 50 seconds) is considered undesirable and would indicate the need for mitigation.

The results of the level of service analyses are summarized on Table 2 with the intersections ordered geographically from south to north. The existing, ambient forecast and total with project forecast levels of service and delays are placed side-by-side for each analysis period so that changes in levels of service can be identified.

The Kinoole Street/West Kawailani Street intersection is currently at level of service D in the morning peak and is forecast to remain the same with the ambient and total with project forecast traffic volumes. The additional volumes due to ambient traffic growth and the very few project-generated trips would have little effect on traffic operations. The intersection shows an overall level of service D due to the high northbound through volumes that cause the approach to operate at level of service F. All the other approaches are operating at level of service C. Increasing the maximum green time for the Kinoole Street approaches would improve its level of service.

The intersection is operating at level of service C during the afternoon peak period and is forecast to remain the same under the ambient and total with

project forecasts. The above analysis indicates that the proposed project would not have an adverse traffic impact at this intersection.

Table 2 also shows the levels of service on the critical turning movements of the unsignalized Kinoole Street/West Kahaopea Street intersection. The critical turning movements include the outbound movements from both approaches of West Kahaopea Street, and the two left turn movements from Kinoole Street into West Kahaopea Street.

The results show that all critical turning movements are currently operating at levels of service C or better in both analyses periods. The outbound movement from the eastbound approach of West Kahaopea Street, which would be utilized by traffic from the proposed project, is currently at level of service B and C during the morning and afternoon peak periods, respectively. Levels of service in both analysis periods would remain unchanged for the ambient and total with project forecasts. The two left turn movements from Kinoole Street would continue to operate unchanged at level of service A with the ambient and total with project forecast conditions for both analysis periods. This analysis indicates that the increase in ambient and total with project forecast volumes would not have an adverse traffic impact at this intersection.

The signalized intersection at Kinoole Street and West Puainako Street is currently operating at level of service C in both the morning and afternoon peaks. Levels of service in both analysis periods would remain unchanged with the ambient and total with project forecast volumes. This analysis indicates that the increase in ambient and total with project forecast volumes would not have an adverse traffic impact at this intersection.

CONCLUSIONS

The proposed project would generate a small number of trips and is not expected to adversely affect traffic on the adjacent roadway system. The northbound approach of Kinoole Street at West Kawailani Street was found to be operating at level of service F during the morning peak hour. Increasing the maximum green time for the morning peak would help mitigate this condition.

FIGURES

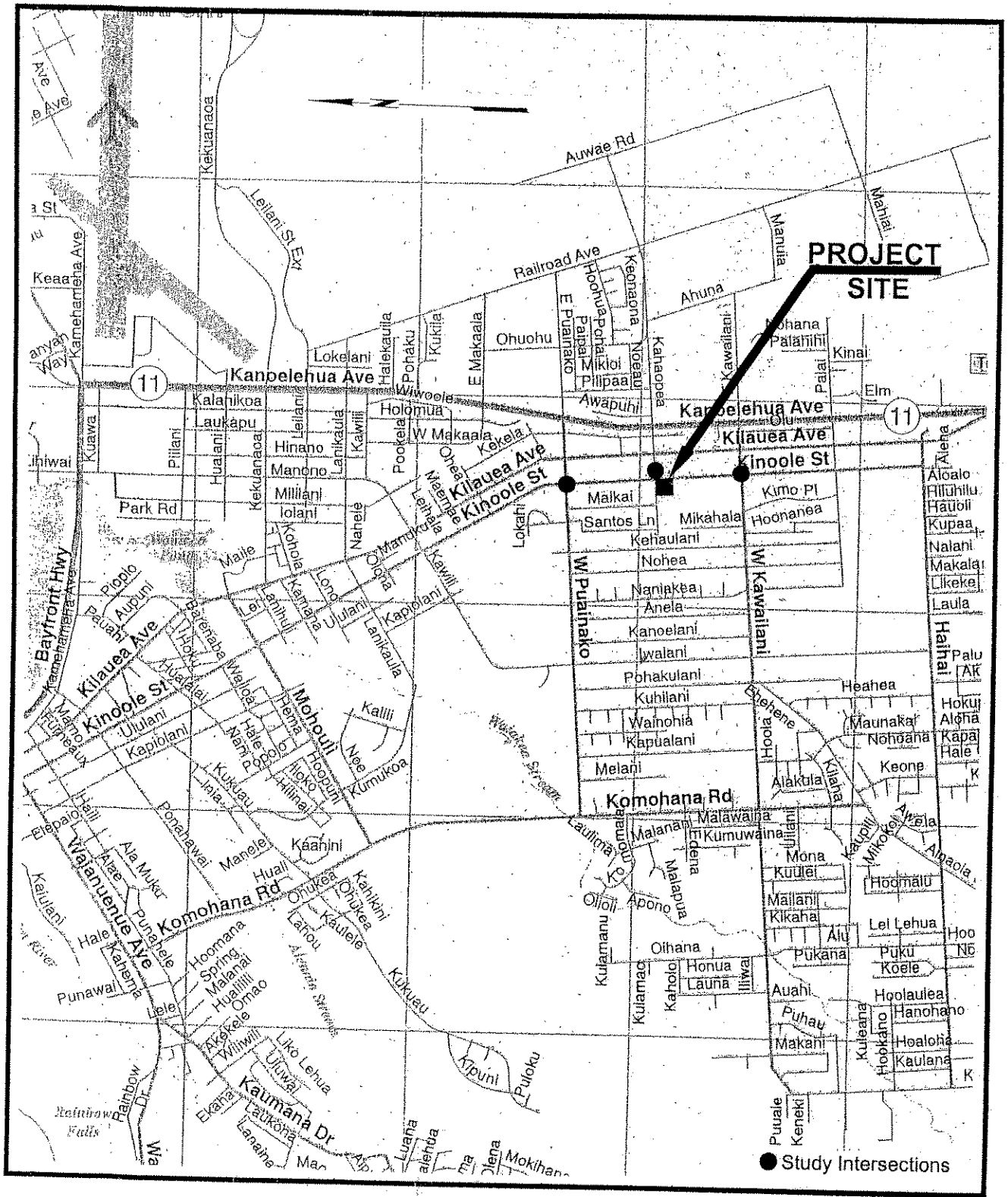
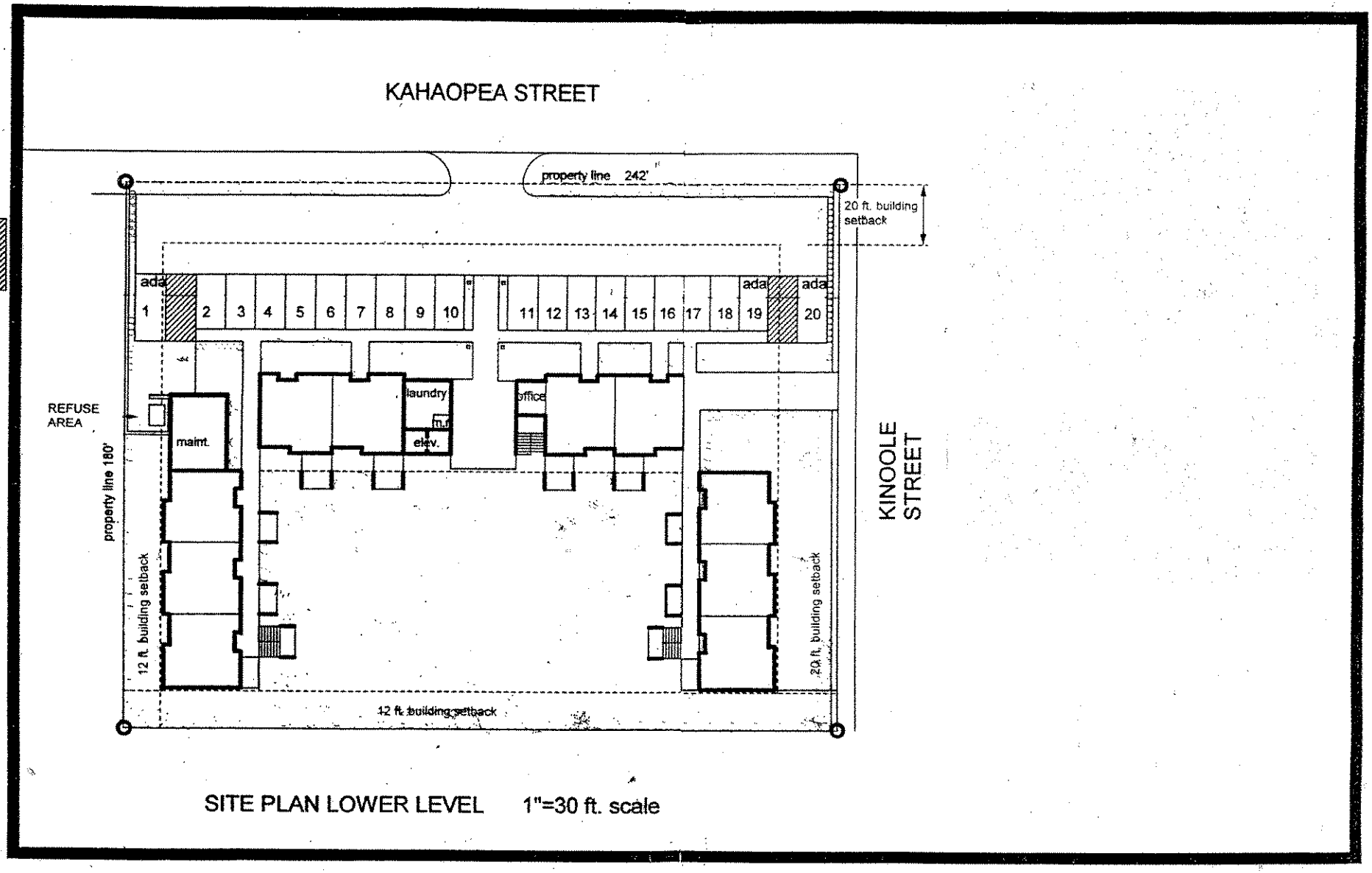
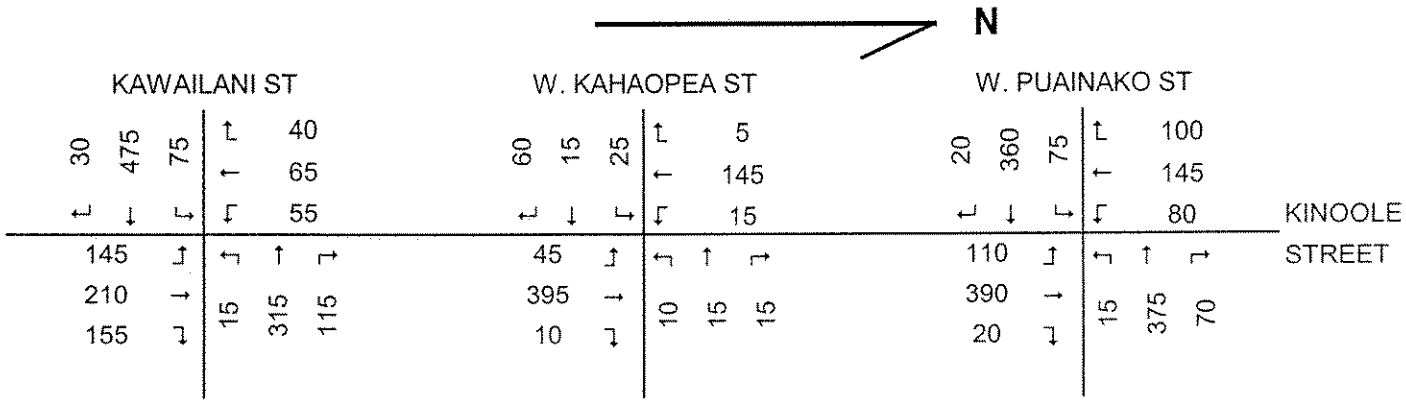


FIGURE 1

LOCATION MAP



SITE PLAN
FIGURE 2



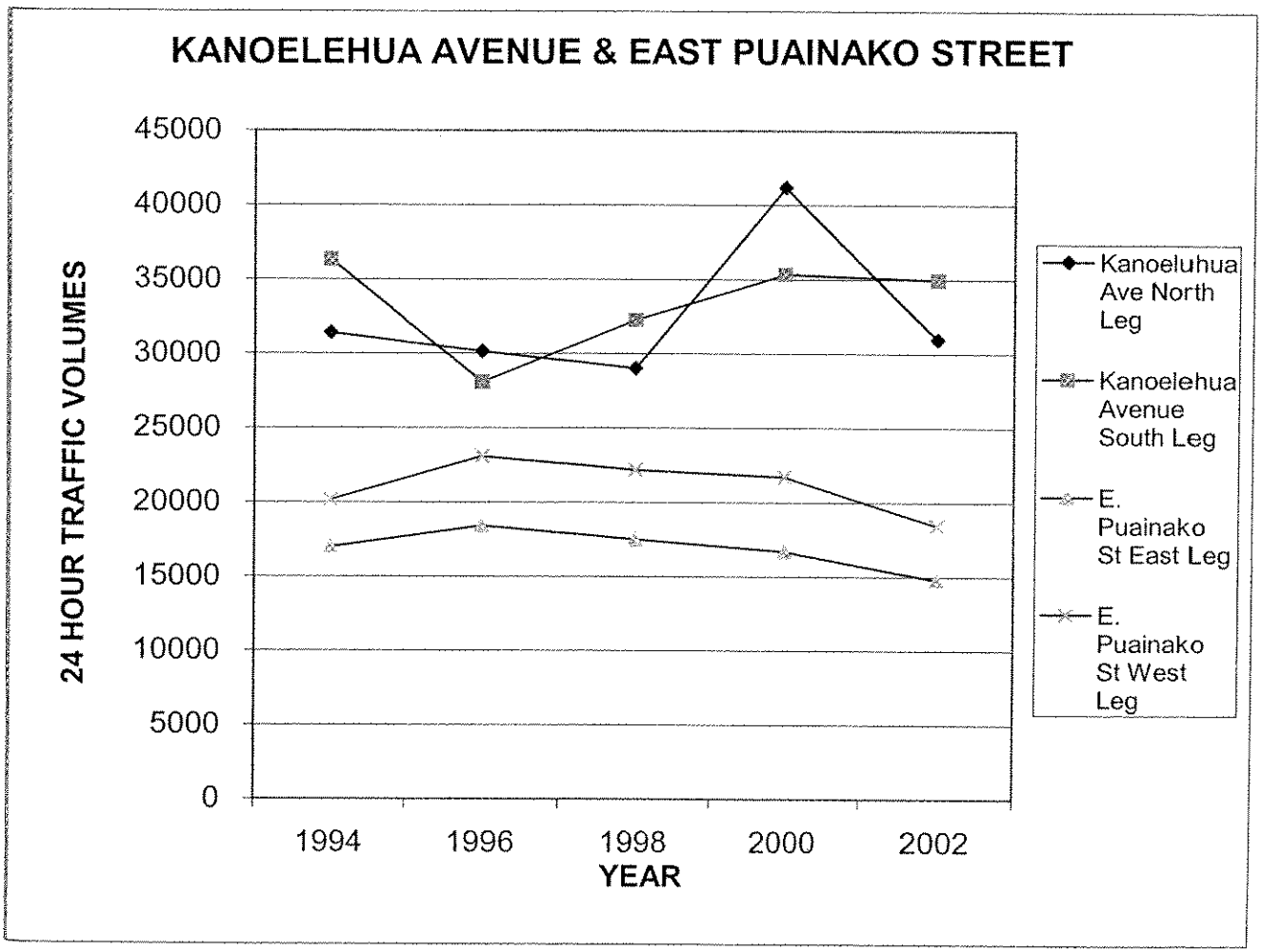
Not to scale

EXISTING TRAFFIC VOLUMES
FIGURE 3

24 HOUR TWO WAY TRAFFIC VOLUMES

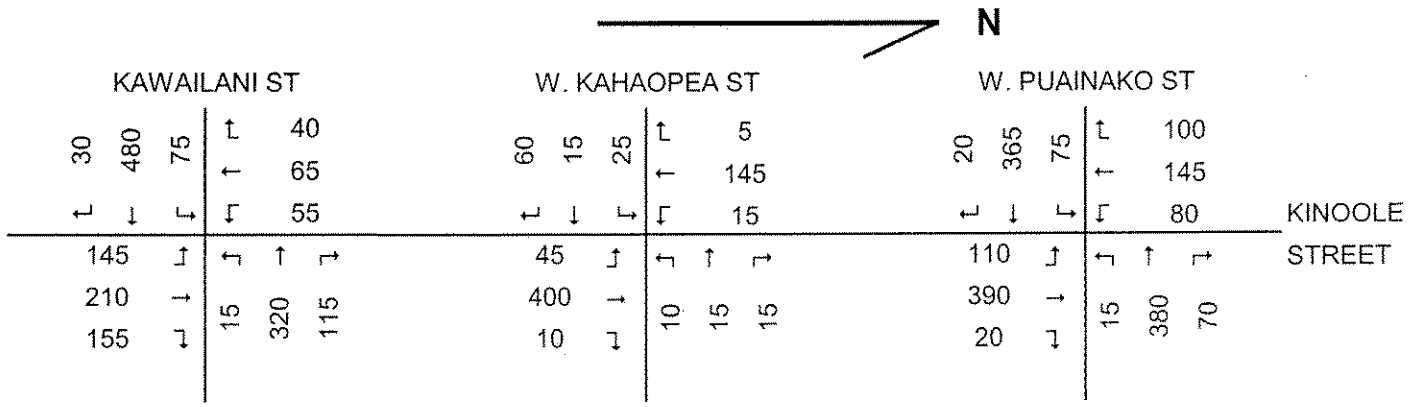
YEAR	KANOELEHUA AVENUE		PUAINAKO STREET	
	NORTH	SOUTH	EAST	WEST
1994	31399	36328	16973	20164
1996	30146	28078	18418	23093
1998	29004	32255	17508	22174
2000	41178	35332	16695	21704
2002	30953	34977	14769	18440

Source: State of Hawaii Department of Transportation

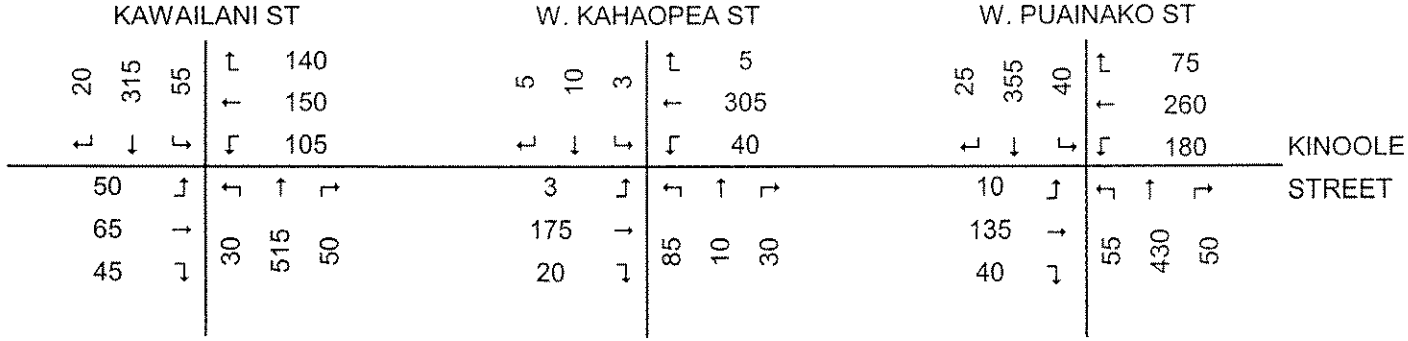


HISTORICAL TREND IN DAILY TRAFFIC VOLUMES
KANOELEHUA AVENUE AT EAST PUAINAKO STREET

FIGURE 4



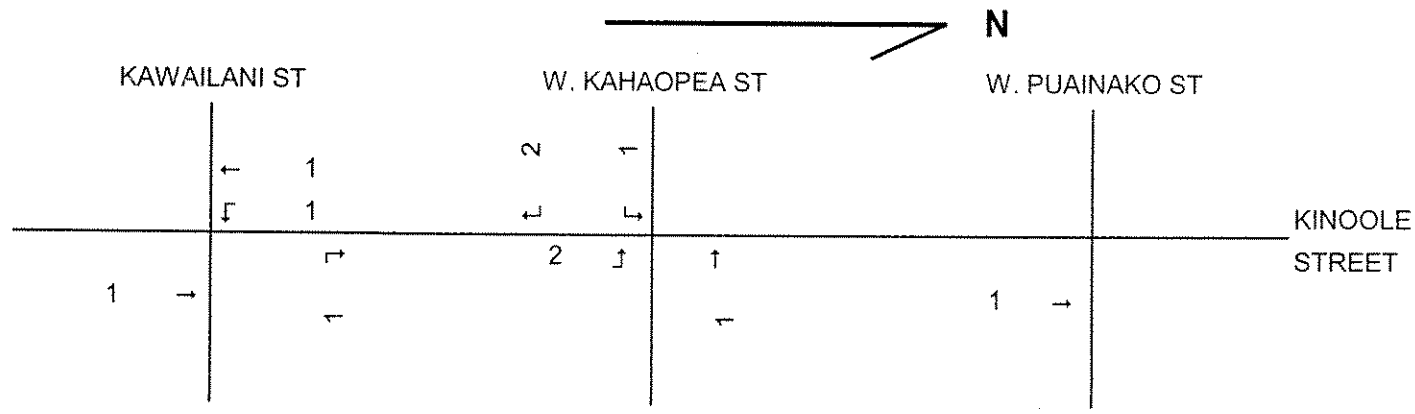
AM PEAK HOUR



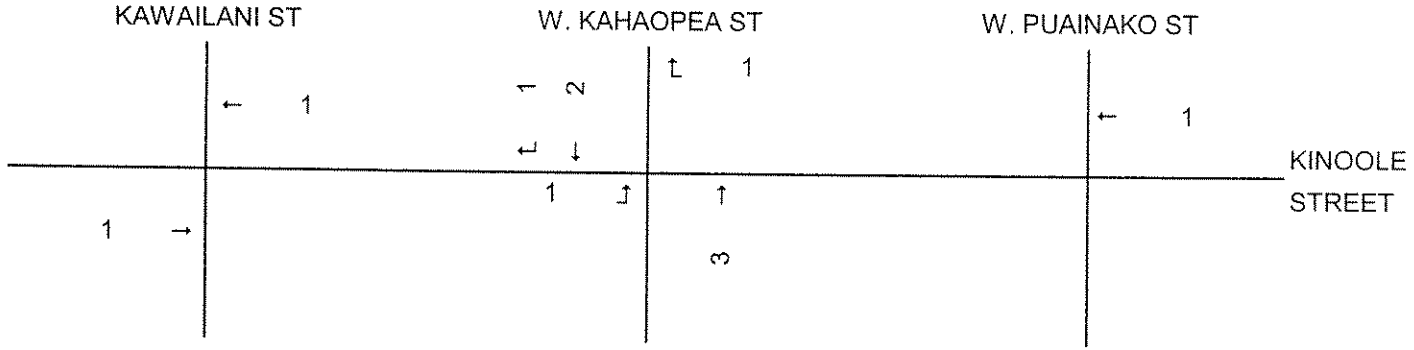
Not to scale

PM PEAK HOUR

AMBIENT TRAFFIC FORECASTS
FIGURE 5



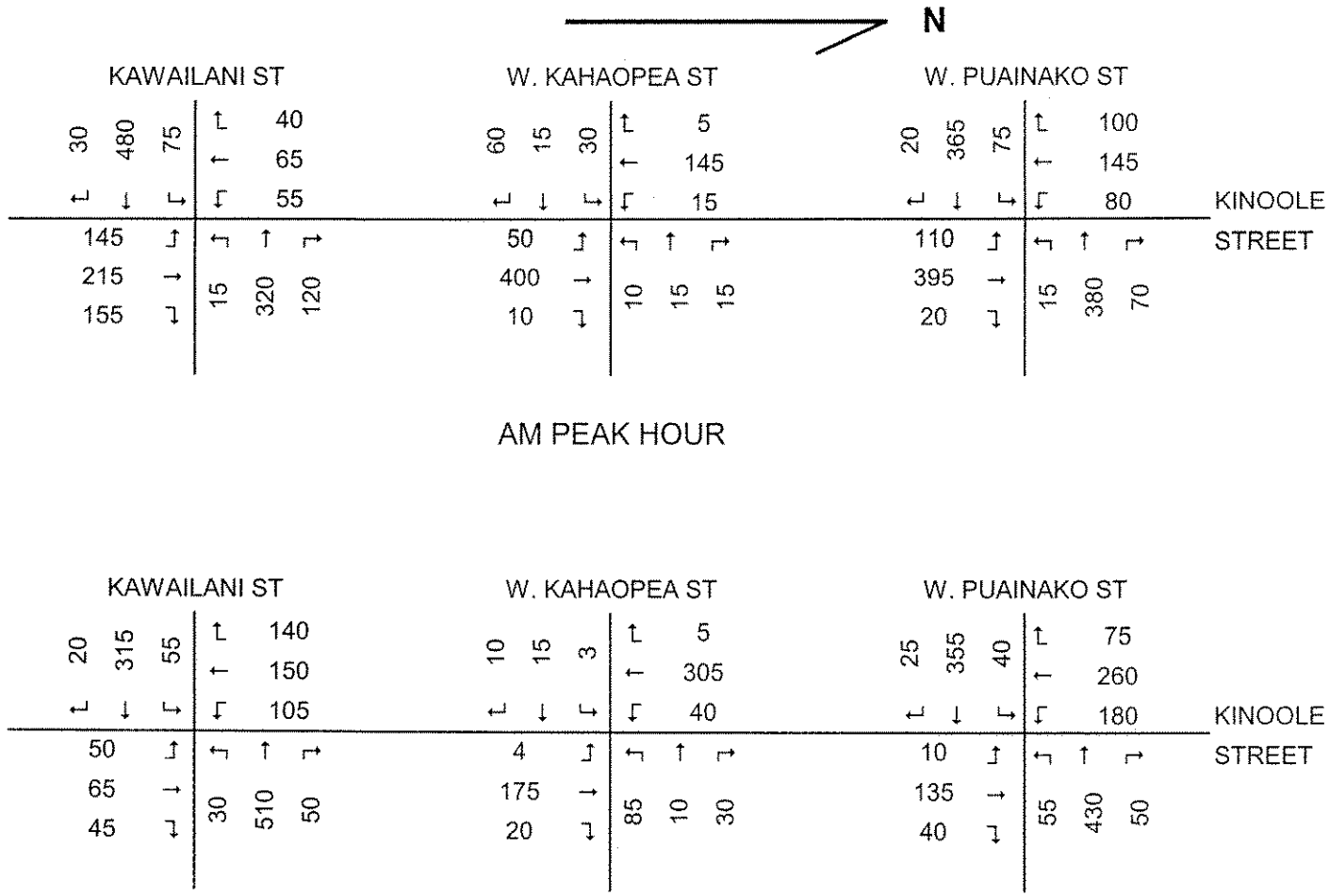
AM PEAK HOUR



Not to scale

PM PEAK HOUR

PROJECT GENERATED TRAFFIC FORECASTS
FIGURE 6



Not to scale

TOTAL WITH PROJECT TRAFFIC FORECAST
FIGURE 7

TABLES

TABLE 1
TRIP GENERATION AND DISTRIBUTION ANALYSIS

KINOOLE STREET ELDERLY HOUSING TIAR

TRIP GENERATION					**TRIP DISTRIBUTION**							
30 One Bedroom Units							DIRECTION OF TRAVEL					
			entering	exiting		TOTAL	SOUTH		EAST		NORTH	
							%	#	%	#	%	#
AM	T=	0.20(X)	42%	58%	entering	3	70%	2	23%	1	7%	0
	T=	6	3	3	exiting	3	60%	2	15%	0	25%	1
PM	T=	0.26(X)	61%	39%	entering	5	17%	1	56%	3	28%	1
	T =	8	5	3	exiting	3	28%	1	56%	2	17%	0

TABLE 2
LEVEL OF SERVICE ANALYSIS

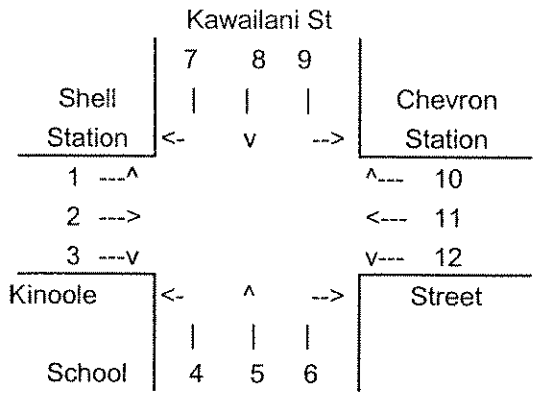
INTERSECTION APPROACH	AM PEAK HOUR						PM PEAK HOUR					
	EXISTING		AMBIENT		TOTAL		EXISTING		AMBIENT		TOTAL	
	LOS	DELAY	LOS	DELAY	LOS	DELAY	LOS	DELAY	LOS	DELAY	LOS	DELAY
KINOOLE STREET/KAWAILANI STREET (SIGNALIZED) INTERSECTION												
OVERALL	D	52.2	D	52.3	D	54.1	C	27.4	C	28.0	C	28
Kawailani St EB	C	21.7	C	22	C	22	B	17.7	B	17.7	B	17.7
Kawailani St WB	C	25.8	C	26.3	C	27	C	27.8	C	28.4	C	28.4
Kinoole St NB	F	113	F	113	F	117	C	22.4	C	22.4	C	22.4
Kinoole St SB	C	22.6	C	22.6	C	22.6	D	38.9	D	40	D	40
KINOOLE STREET/W. KAHAOPEA STREET (UNSIGNALIZED) INTERSECTION												
W. Kahaopea St WB	C	15.6	C	15.7	C	15.9	B	13.2	B	13.2	B	13.3
W. Kahaopea St EB	B	13.9	B	14.0	B	14.6	C	15.6	C	15.6	C	15.3
Kinoole St NB left turn	A	7.6	A	7.6	A	7.6	A	7.9	A	7.9	A	7.9
Kinoole St SB left turn	A	8.2	A	8.3	A	8.3	A	7.8	A	7.8	A	7.8
KINOOLE STREET/W. PUAINAKO STREET (SIGNALIZED) INTERSECTION												
OVERALL	C	22.2	C	22.3	C	22.5	C	29.5	C	30.8	C	30.8
W. Puainako St WB	B	19.9	C	20.2	C	20.2	B	16.6	B	16.7	B	16.7
W. Puainako St EB	B	18.7	B	18.9	B	18.9	C	25.5	C	26.1	C	26.1
Kinoole St NB	C	29.1	C	29.1	C	29.7	B	12.9	B	12.9	B	12.9
Kinoole St SB	B	19.8	B	19.8	B	19.9	D	47.5	D	50.7	D	50.7

APPENDIX A

TRAFFIC TURNING MOVEMENT COUNTS

TRAFFIC TURNING MOVEMENT COUNT
Kinoole Street Elderly Housing

LOCATION: Kinoole Street/Kawailani Street
DATE: January 22, 2004, Thursday
TIME: 6:30 - 8:30 a.m./3:30 - 5:30 p.m.
WEATHER: Clear
RECORDER: C. Darby/R. Mauk



Time Periods	1	2	3	4	5	6	7	8	9	10	11	12	Total
6:30-6:45	10	15	12	5	44	9	2	85	16	6	8	9	221
6:45-7:00	19	19	9	4	51	51	5	109	17	16	21	11	332
7:00-7:15	28	43	22	2	53	21	8	120	15	6	22	14	354
7:15-7:30	33	53	48	4	76	35	8	132	16	10	9	9	433
7:30-7:45	45	62	51	3	102	34	7	116	24	13	13	16	486
7:45-8:00	40	52	32	8	85	26	6	109	21	13	20	15	427
8:00-8:15	21	44	5	4	73	11	1	74	25	15	34	11	318
8:15-8:30	10	18	10	5	49	5	2	56	18	18	17	8	216
6:30-8:30	206	306	189	35	533	192	39	801	152	97	144	93	2787
7:00-8:00	146	210	153	17	316	116	29	477	76	42	64	54	1700

Time Periods	1	2	3	4	5	6	7	8	9	10	11	12	Total
3:30- 3:45	10	24	8	15	108	18	2	72	11	21	27	25	341
3:45- 4:00	8	21	6	7	102	9	3	80	12	24	28	24	324
4:00- 4:15	6	20	6	10	112	8	3	78	13	28	33	19	336
4:15- 4:30	11	15	8	5	102	18	5	75	16	29	37	27	348
4:30- 4:45	12	21	13	6	132	16	2	83	16	29	39	23	392
4:45- 5:00	9	16	10	10	133	11	6	75	9	28	40	26	373
5:00- 5:15	17	10	9	9	128	9	5	87	15	44	37	28	398
5:15- 5:30	12	16	12	7	115	15	5	69	14	37	31	25	358
3:30- 5:30	85	143	72	69	932	104	31	619	106	240	272	197	2870
4:30- 5:30	50	63	44	32	508	51	18	314	54	138	147	102	1521

TRAFFIC COUNT DATA

FILE NAME: **Puainako / Kinoole**

PROJECT: Kilauea Kinoole Traffic Circulation Study
LOCATION: Hilo, Hawaii
E-W STREET: Puainako Street
N-S STREET: Kinoole Street

PERIOD: AM Peak

TECHNICIAN: Tom French / Brandon Walker
DATE: 11/14/01

		Puainako Street						Kinoole Street							
TIME	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	TOTAL	HRLY	
06:30 06:45		5	42	1	1	41	10	6	39	6	5	14	8	178	
06:45 07:00		15	84	1	1	51	11	5	42	1	13	25	6	255	
07:00 07:15		16	96	4	4	76	15	20	81	4	15	29	20	380	
07:15 07:30		17	76	4	1	109	22	29	109	6	21	34	24	452	1265
07:30 07:45		20	87	5	4	108	14	35	96	4	14	46	35	468	1655
07:45 08:00		19	90	6	7	72	15	24	91	7	26	32	18	407	1707
08:00 08:15		7	52	1	4	70	26	11	58	10	25	40	9	313	1640
08:15 08:30		10	59	1	10	54	11	7	42	14	15	25	10	258	1446
AM PEAK HOUR															
07:00 08:00		72	349	19	16	365	66	108	377	21	76	141	97	1707	1707
PHF		0.90	1.00	0.95	1.00	0.84	1.18	0.77	0.96	1.31	1.36	0.77	0.69		
PHF			0.982			0.887			0.937			0.826		0.91 PHF	

TRAFFIC COUNT DATA

FILE NAME: **Puainako / Kinoole** Printed

PROJECT: Kilauea Kinoole Traffic Circulation Study
LOCATION: Hilo, Hawaii
E-W STREET: Puainako Street
N-S STREET: Kinoole Street

PERIOD: PM Peak 02/03/2004

TECHNICIAN: Tom French / Brandon Walker
DATE: 11/13/01

		Puainako Street						Kinoole Street							
TIME	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	TOTAL	HRLY	
14:30 14:45		5	60	10	2	62	13	11	43	6	32	42	12	298	
14:45 15:00		14	90	8	8	81	11	4	35	10	64	46	15	386	
15:00 15:15		4	84	5	9	95	20	11	48	5	43	57	15	396	
15:15 15:30		5	84	4	13	85	30	5	31	4	42	53	15	371	1451
15:30 15:45		9	102	9	15	94	25	2	29	9	44	65	14	417	1570
15:45 16:00		16	103	5	10	109	16	9	35	9	51	54	15	432	1616
16:00 16:15		6	75	4	6	96	18	5	34	5	46	59	14	367	1587
16:15 16:30		3	68	8	6	102	17	2	25	6	47	69	15	368	1584
16:30 16:45		14	83	5	23	107	10	3	30	10	50	70	19	424	1591
16:45 17:00		11	91	6	11	106	16	1	34	14	36	71	16	413	1572
17:00 17:15		5	79	9	9	107	15	2	32	5	46	53	22	384	1589
17:15 17:30		7	88	4	11	94	7	4	36	8	40	56	16	371	1592
17:30 17:45		5	60	3	12	101	17	5	32	4	41	62	4	346	1514
17:45 18:00		13	61	4	14	99	13	1	11	3	43	42	11	315	1416
PM PEAK HOUR															
16:30 17:30		37	341	24	54	414	48	10	132	37	172	250	73	1592	
PHF		0.66	1.03	1.20	0.59	0.97	1.20	0.83	1.10	0.93	0.86	0.89	0.96		
PHF			0.985			0.921			1.041			0.89		0.92 PHF	

APPENDIX B

SIGNALIZED AND UNSIGNALIZED INTERSECTION LEVEL OF SERVICE (LOS) CALCULATIONS

SIGNALIZED INTERSECTION
LEVEL OF SERVICE (LOS) CALCULATIONS

CHAPTER 16 - OPERATIONAL ANALYSIS - SUMMARY WORKSHEET

General Information

Analyst: WY
Agency or Company:
Analysis Period/Year: 2004 EX AM
Comment: EXISTING AM

Site Information

Jurisdiction/Date: 2/12/04
EB/WB Street: KAWAILANI
NB/SB Street: KINOOLE

Intersection Data

Area type: Other | Analysis period: .25 h | Signal type: Actuated-Field | % Back of queue: 70

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Volume (veh/h)	75	475	30	15	315	115	145	210	155	55	65	40
RTOR volume (veh/h)			0			0			0			0
Peak-hour factor	.98	.98	.98	.8	.8	.8	.8	.8	.8	.83	.83	.83
Heavy vehicles (%)	2	2	2	2	2	2	2	2	2	2	2	2
Start-up lost time, l_1 (s)	2	2	2	2	2	2	2	2	2	2	2	2
Extension of effective green, e (s)	2	2	2	2	2	2	2	2	2	2	2	2
Arrival type, AT	3	3	3	3	3	3	3	3	3	3	3	3
Approach pedestrian volume (p/h)	50			50			50			50		
Approach bicycle volume (bic/h)	0			0			0			0		
Left/right parking (Y or N)	N	/	N	N	/	N	N	/	N	N	/	N

Signal Phasing Plan

L: LT T: TH R: RT P: Peds

	Phase 1	Phase 2	Phase 3	Phase 4	Phase 5	Phase 6	Phase 7	Phase 8
EB	L	LTR						
WB	L	LTR						
NB			L	LTR				
SB			L	LTR				
Green (s)	4	30	7	17				
Yellow + All red (s)	3.8	5.7	3.8	5.4				

Cycle (s): 76.7 | Lost time per cycle (s): 18.7 | Critical v/c Ratio: .94

Intersection Performance

	EB			WB			NB			SB		
Lane group configuration	L	TR		L	TR		L	TR		L	TR	
No. of lanes	1	1		1	1		1	1		1	1	
Flow rate (veh/h)	77	515		19	538		181	456		66	127	
Capacity (veh/h)	270	719		287	687		446	374		258	378	
Adjusted saturation flow (veh/h)	1770	1839		1770	1757		1770	1687		1770	1705	
v/c ratio	.284	.716		.065	.782		.406	1.22		.257	.335	
g/C ratio	.518	.391		.518	.391		.383	.222		.383	.222	
Average back of queue (veh)	1	10.5		.2	11.7		3	21.7		1	2.4	
Uniform delay (s)	12.2	19.8		11.4	20.5		16.4	29.9		17.9	25.1	
Incremental delay (s)	0	3.4		0	5.8		.2	120.9		0	0	
Initial queue delay (s)	0	0		0	0		0	0		0	0	
Delay (s)	12.2	23.2		11.4	26.3		16.6	150.8		17.9	25.1	
LOS	B	C		B	C		B	F		B	C	
Approach delay (s)/LOS	21.7	/	C	25.8	/	C	112.6	/	F	22.6	/	C
Intersection delay (s)/ LOS	52.2			/			D					

CHAPTER 16 - OPERATIONAL ANALYSIS - SUMMARY WORKSHEET

General Information

Analyst: WY
Agency or Company:
Analysis Period/Year: 2005 AMB AM
Comment: AMBIENT AM

Site Information

Jurisdiction/Date: 2/13/04
EB/WB Street: KAWAILANI
NB/SB Street: KINOOLE

Intersection Data

Area type: Other | Analysis period: .25 h | Signal type: Actuated-Field | % Back of queue: 70

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Volume (veh/h)	75	480	30	15	320	115	145	210	155	55	65	40
RTOR volume (veh/h)			0			0			0			0
Peak-hour factor	.98	.98	.98	.8	.8	.8	.8	.8	.8	.83	.83	.83
Heavy vehicles (%)	2	2	2	2	2	2	2	2	2	2	2	2
Start-up lost time, l_1 (s)	2	2	2	2	2	2	2	2	2	2	2	2
Extension of effective green, e (s)	2	2	2	2	2	2	2	2	2	2	2	2
Arrival type, AT	3	3	3	3	3	3	3	3	3	3	3	3
Approach pedestrian volume (p/h)	50			50			50			50		
Approach bicycle volume (bic/h)	0			0			0			0		
Left/right parking (Y or N)	N	/	N	N	/	N	N	/	N	N	/	N

Signal Phasing Plan

L: LT T: TH R: RT P: Peds

	Phase 1	Phase 2	Phase 3	Phase 4	Phase 5	Phase 6	Phase 7	Phase 8
EB	L	LTR						
WB	L	LTR						
NB			L	LTR				
SB			L	LTR				
Green (s)	4	30	7	17				
Yellow + All red (s)	3.8	5.7	3.8	5.4				

Cycle (s): 76.7 | Lost time per cycle (s): 18.7 | Critical v/c Ratio: .944

Intersection Performance

	EB			WB			NB			SB		
Lane group configuration	L	TR		L	TR		L	TR		L	TR	
No. of lanes	1	1		1	1		1	1		1	1	
Flow rate (veh/h)	77	520		19	544		181	456		66	127	
Capacity (veh/h)	265	719		283	688		446	374		258	378	
Adjusted saturation flow (veh/h)	1770	1839		1770	1759		1770	1687		1770	1705	
v/c ratio	.289	.723		.066	.79		.406	1.22		.257	.335	
g/C ratio	.518	.391		.518	.391		.383	.222		.383	.222	
Average back of queue (veh)	1	10.7		.2	11.9		3	21.7		1	2.4	
Uniform delay (s)	12.3	19.8		11.4	20.6		16.4	29.9		17.9	25.1	
Incremental delay (s)	0	3.6		0	6.2		.2	120.9		0	0	
Initial queue delay (s)	0	0		0	0		0	0		0	0	
Delay (s)	12.3	23.4		11.4	26.8		16.6	150.8		17.9	25.1	
LOS	B	C		B	C		B	F		B	C	
Approach delay (s)/LOS	22	/	C	26.3	/	C	112.6	/	F	22.6	/	C
Intersection delay (s)/ LOS	52.3			/			D					

CHAPTER 16 - OPERATIONAL ANALYSIS - SUMMARY WORKSHEET

General Information

Analyst: WY
Agency or Company:
Analysis Period/Year: 2005 TOT AM
Comment: TOTAL W/PROJECT AM

Site Information

Jurisdiction/Date: 2/13/04
EB/WB Street: KAWAILANI
NB/SB Street: KINOOLE

Intersection Data

Area type: Other | Analysis period: .25 h | Signal type: Actuated-Field | % Back of queue: 70

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Volume (veh/h)	75	480	30	15	320	120	145	215	155	55	65	40
RTOR volume (veh/h)			0			0			0			0
Peak-hour factor	.98	.98	.98	.8	.8	.8	.8	.8	.8	.83	.83	.83
Heavy vehicles (%)	2	2	2	2	2	2	2	2	2	2	2	2
Start-up lost time, l_1 (s)	2	2	2	2	2	2	2	2	2	2	2	2
Extension of effective green, e (s)	2	2	2	2	2	2	2	2	2	2	2	2
Arrival type, AT	3	3	3	3	3	3	3	3	3	3	3	3
Approach pedestrian volume (p/h)	50			50			50			50		
Approach bicycle volume (bic/h)	0			0			0			0		
Left/right parking (Y or N)	N	/	N	N	/	N	N	/	N	N	/	N

Signal Phasing Plan

L: LT T: TH R: RT P: Peds

	Phase 1	Phase 2	Phase 3	Phase 4	Phase 5	Phase 6	Phase 7	Phase 8
EB	L	LTR						
WB	L	LTR						
NB			L	LTR				
SB			L	LTR				
Green (s)	4	30	7	17				
Yellow + All red (s)	3.8	5.7	3.8	5.4				

Cycle (s): 76.7 | Lost time per cycle (s): 18.7 | Critical v/c Ratio: .954

Intersection Performance

	EB			WB			NB			SB		
Lane group configuration	L	TR		L	TR		L	TR		L	TR	
No. of lanes	1	1		1	1		1	1		1	1	
Flow rate (veh/h)	77	520		19	550		181	463		66	127	
Capacity (veh/h)	261	719		283	687		446	374		258	378	
Adjusted saturation flow (veh/h)	1770	1839		1770	1755		1770	1690		1770	1705	
v/c ratio	.294	.723		.066	.801		.406	1.235		.257	.335	
g/C ratio	.518	.391		.518	.391		.383	.222		.383	.222	
Average back of queue (veh)	1	10.7		.2	12.2		3	22.5		1	2.4	
Uniform delay (s)	12.4	19.8		11.4	20.7		16.4	29.9		18	25.1	
Incremental delay (s)	0	3.6		0	6.8		.2	126.8		0	0	
Initial queue delay (s)	0	0		0	0		0	0		0	0	
Delay (s)	12.4	23.4		11.4	27.5		16.6	156.7		18	25.1	
LOS	B	C		B	C		B	F		B	C	
Approach delay (s)/LOS	22	/	C	27	/	C	117.2	/	F	22.6	/	C
Intersection delay (s)/ LOS	54.1			/			D					

CHAPTER 16 - OPERATIONAL ANALYSIS - SUMMARY WORKSHEET

General Information

Analyst: WY
Agency or Company:
Analysis Period/Year: 2004 EX PM
Comment: EXISTING PM

Site Information

Jurisdiction/Date: 2/12/04
EB/WB Street: KAWAILANI
NB/SB Street: KINOOLE

Intersection Data

Area type: Other Analysis period: .25 h Signal type: Actuated-Field % Back of queue: 70

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Volume (veh/h)	55	315	20	30	510	50	50	65	45	100	145	140
RTOR volume (veh/h)			0			0			0			0
Peak-hour factor	.9	.9	.9	.95	.95	.95	.85	.85	.85	.9	.9	.9
Heavy vehicles (%)	2	2	2	2	2	2	2	2	2	2	2	2
Start-up lost time, l_1 (s)	2	2	2	2	2	2	2	2	2	2	2	2
Extension of effective green, e (s)	2	2	2	2	2	2	2	2	2	2	2	2
Arrival type, AT	3	3	3	3	3	3	3	3	3	3	3	3
Approach pedestrian volume (p/h)	50			50			50			50		
Approach bicycle volume (bic/h)	0			0			0			0		
Left/right parking (Y or N)	N	/	N	N	/	N	N	/	N	N	/	N

Signal Phasing Plan

L: LT T: TH R: RT P: Peds

	Phase 1	Phase 2	Phase 3	Phase 4	Phase 5	Phase 6	Phase 7	Phase 8
EB	L	LTR						
WB	L	LTR						
NB			L	LTR				
SB			L	LTR				
Green (s)	4	30	7	17				
Yellow + All red (s)	3.8	5.7	3.8	5.4				

Cycle (s): 76.7 Lost time per cycle (s): 18.7 Critical v/c Ratio: .807

Intersection Performance

	EB			WB			NB			SB		
Lane group configuration	L	TR		L	TR		L	TR		L	TR	
No. of lanes	1	1		1	1		1	1		1	1	
Flow rate (veh/h)	61	372		32	589		59	129		111	317	
Capacity (veh/h)	231	719		398	715		294	375		444	368	
Adjusted saturation flow (veh/h)	1770	1839		1770	1827		1770	1694		1770	1660	
v/c ratio	.264	.517		.079	.825		.2	.345		.25	.86	
g/C ratio	.518	.391		.518	.391		.383	.222		.383	.222	
Average back of queue (veh)	.8	6.6		.4	13.4		.9	2.5		1.7	8.2	
Uniform delay (s)	12.9	17.8		10.1	21		16.2	25.2		15.7	28.7	
Incremental delay (s)	0	.7		0	7.8		0	0		0	18.3	
Initial queue delay (s)	0	0		0	0		0	0		0	0	
Delay (s)	12.9	18.5		10.1	28.8		16.2	25.2		15.7	47	
LOS	B	B		B	C		B	C		B	D	
Approach delay (s)/LOS	17.7	/	B	27.8	/	C	22.4	/	C	38.9	/	D
Intersection delay (s)/ LOS	27.4			/			C					

CHAPTER 16 - OPERATIONAL ANALYSIS - SUMMARY WORKSHEET

General Information

Analyst: WY
Agency or Company:
Analysis Period/Year: 2005 AMB PM
Comment: AMBIENT PM

Site Information

Jurisdiction/Date: 2/13/04
EB/WB Street: KAWAILANI
NB/SB Street: KINOOLE

Intersection Data

Area type: Other | Analysis period: .25 h | Signal type: Actuated-Field | % Back of queue: 70

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Volume (veh/h)	55	315	20	30	515	50	50	65	45	105	150	140
RTOR volume (veh/h)			0			0			0			0
Peak-hour factor	.9	.9	.9	.95	.95	.95	.85	.85	.85	.9	.9	.9
Heavy vehicles (%)	2	2	2	2	2	2	2	2	2	2	2	2
Start-up lost time, l_1 (s)	2	2	2	2	2	2	2	2	2	2	2	2
Extension of effective green, e (s)	2	2	2	2	2	2	2	2	2	2	2	2
Arrival type, AT	3	3	3	3	3	3	3	3	3	3	3	3
Approach pedestrian volume (p/h)	50			50			50			50		
Approach bicycle volume (bic/h)	0			0			0			0		
Left/right parking (Y or N)	N	/	N	N	/	N	N	/	N	N	/	N

Signal Phasing Plan

L: LT T: TH R: RT P: Peds

	Phase 1	Phase 2	Phase 3	Phase 4	Phase 5	Phase 6	Phase 7	Phase 8
EB	L	LTR						
WB	L	LTR						
NB			L	LTR				
SB			L	LTR				
Green (s)	4	30	7	17				
Yellow + All red (s)	3.8	5.7	3.8	5.4				

Cycle (s): 76.7 | Lost time per cycle (s): 18.7 | Critical v/c Ratio: .819

Intersection Performance

	EB			WB			NB			SB		
Lane group configuration	L	TR		L	TR		L	TR		L	TR	
No. of lanes	1	1		1	1		1	1		1	1	
Flow rate (veh/h)	61	372		32	595		59	129		117	322	
Capacity (veh/h)	227	719		398	715		289	375		444	369	
Adjusted saturation flow (veh/h)	1770	1839		1770	1828		1770	1694		1770	1664	
v/c ratio	.269	.517		.079	.832		.203	.345		.263	.874	
g/C ratio	.518	.391		.518	.391		.383	.222		.383	.222	
Average back of queue (veh)	.8	6.6		.4	13.6		.9	2.5		1.8	8.4	
Uniform delay (s)	13	17.8		10.1	21.1		16.3	25.2		15.8	28.8	
Incremental delay (s)	0	.7		0	8.3		0	0		0	20	
Initial queue delay (s)	0	0		0	0		0	0		0	0	
Delay (s)	13	18.5		10.1	29.4		16.3	25.2		15.8	48.8	
LOS	B	B		B	C		B	C		B	D	
Approach delay (s)/LOS	17.7	/	B	28.4	/	C	22.4	/	C	40	/	D
Intersection delay (s)/ LOS	28			/			C					

CHAPTER 16 - OPERATIONAL ANALYSIS - SUMMARY WORKSHEET

General Information

Analyst: WY
Agency or Company:
Analysis Period/Year: 2005 TOT PM
Comment: TOTAL W/PROJECT PM

Site Information

Jurisdiction/Date: 2/13/04
EB/WB Street: KAWAILANI
NB/SB Street: KINOOLE

Intersection Data

Area type: Other | Analysis period: .25 h | Signal type: Actuated-Field | % Back of queue: 70

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Volume (veh/h)	55	315	20	30	515	50	50	65	45	105	150	140
RTOR volume (veh/h)			0			0			0			0
Peak-hour factor	.9	.9	.9	.95	.95	.95	.85	.85	.85	.9	.9	.9
Heavy vehicles (%)	2	2	2	2	2	2	2	2	2	2	2	2
Start-up lost time, l_1 (s)	2	2	2	2	2	2	2	2	2	2	2	2
Extension of effective green, e (s)	2	2	2	2	2	2	2	2	2	2	2	2
Arrival type, AT	3	3	3	3	3	3	3	3	3	3	3	3
Approach pedestrian volume (p/h)	50			50			50			50		
Approach bicycle volume (bic/h)	0			0			0			0		
Left/right parking (Y or N)	N	/	N	N	/	N	N	/	N	N	/	N

Signal Phasing Plan

L: LT T: TH R: RT P: Peds

	Phase 1	Phase 2	Phase 3	Phase 4	Phase 5	Phase 6	Phase 7	Phase 8
EB	L	LTR						
WB	L	LTR						
NB			L	LTR				
SB			L	LTR				
Green (s)	4	30	7	17				
Yellow + All red (s)	3.8	5.7	3.8	5.4				

Cycle (s): 76.7 | Lost time per cycle (s): 18.7 | Critical v/c Ratio: .819

Intersection Performance

	EB			WB			NB			SB		
Lane group configuration	L	TR		L	TR		L	TR		L	TR	
No. of lanes	1	1		1	1		1	1		1	1	
Flow rate (veh/h)	61	372		32	595		59	129		117	322	
Capacity (veh/h)	227	719		398	715		289	375		444	369	
Adjusted saturation flow (veh/h)	1770	1839		1770	1828		1770	1694		1770	1664	
v/c ratio	.269	.517		.079	.832		.203	.345		.263	.874	
g/C ratio	.518	.391		.518	.391		.383	.222		.383	.222	
Average back of queue (veh)	.8	6.6		.4	13.6		.9	2.5		1.8	8.4	
Uniform delay (s)	13	17.8		10.1	21.1		16.3	25.2		15.8	28.8	
Incremental delay (s)	0	.7		0	8.3		0	0		0	20	
Initial queue delay (s)	0	0		0	0		0	0		0	0	
Delay (s)	13	18.5		10.1	29.4		16.3	25.2		15.8	48.8	
LOS	B	B		B	C		B	C		B	D	
Approach delay (s)/LOS	17.7	/	B	28.4	/	C	22.4	/	C	40	/	D
Intersection delay (s)/ LOS	28			/			C					

CHAPTER 16 - OPERATIONAL ANALYSIS - SUMMARY WORKSHEET

General Information

Analyst: WY
Agency or Company:
Analysis Period/Year: 2004 AM
Comment: EXISTING AM

Site Information

Jurisdiction/Date: 2/13/04
EB/WB Street: E PUAINAKO
NB/SB Street: KINOOLE

Intersection Data

Area type: Other | Analysis period: .25 h | Signal type: Actuated-Field | % Back of queue: 70

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Volume (veh/h)	75	360	20	15	375	70	110	390	20	80	145	100
RTOR volume (veh/h)			0			0			0			0
Peak-hour factor	.98	.98	.98	.89	.89	.89	.94	.94	.94	.83	.83	.83
Heavy vehicles (%)	2	2	2	2	2	2	2	2	2	2	2	2
Start-up lost time, l_1 (s)	2	2	2	2	2	2	2	2	2	2	2	2
Extension of effective green, e (s)	2	2	2	2	2	2	2	2	2	2	2	2
Arrival type, AT	3	3	3	3	3	3	3	3	3	3	3	3
Approach pedestrian volume (p/h)	20			20			20			20		
Approach bicycle volume (bic/h)	0			0			0			0		
Left/right parking (Y or N)	N	/	N	N	/	N	N	/	N	N	/	N

Signal Phasing Plan

L: LT T: TH R: RT P: Peds

	Phase 1	Phase 2	Phase 3	Phase 4	Phase 5	Phase 6	Phase 7	Phase 8
EB		LTR						
WB		LTR						
NB	LTR							
SB	LTR							
Green (s)	30	30						
Yellow + All red (s)	5	5						

Cycle (s): 70 | Lost time per cycle (s): 10 | Critical v/c Ratio: .781

Intersection Performance

	EB			WB			NB			SB		
Lane group configuration		LTR			LTR			LTR			LTR	
No. of lanes		1			1			1			1	
Flow rate (veh/h)		464			517			553			392	
Capacity (veh/h)		658			758			646			567	
Adjusted saturation flow (veh/h)		1535			1768			1507			1322	
v/c ratio		.706			.682			.856			.691	
g/C ratio		.429			.429			.429			.429	
Average back of queue (veh)		8.5			9.2			12			7.1	
Uniform delay (s)		16.4			16.2			18.1			16.2	
Incremental delay (s)		3.5			2.5			11			3.6	
Initial queue delay (s)		0			0			0			0	
Delay (s)		19.9			18.7			29.1			19.8	
LOS		B			B			C			B	
Approach delay (s)/LOS	19.9	/	B	18.7	/	B	29.1	/	C	19.8	/	B
Intersection delay (s)/ LOS	22.2			/			C					

CHAPTER 16 - OPERATIONAL ANALYSIS - SUMMARY WORKSHEET

General Information

Analyst: WY
Agency or Company:
Analysis Period/Year: 2005 AMB AM
Comment: AMBIENT AM

Site Information

Jurisdiction/Date: 2/13/04
EB/WB Street: E PUAINAKO
NB/SB Street: KINOOLE

Intersection Data

Area type: Other | Analysis period: .25 h | Signal type: Actuated-Field | % Back of queue: 70

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Volume (veh/h)	75	365	20	15	380	70	110	390	20	80	145	100
RTOR volume (veh/h)			0			0			0			0
Peak-hour factor	.98	.98	.98	.89	.89	.89	.94	.94	.94	.83	.83	.83
Heavy vehicles (%)	2	2	2	2	2	2	2	2	2	2	2	2
Start-up lost time, l_1 (s)	2	2	2	2	2	2	2	2	2	2	2	2
Extension of effective green, e (s)	2	2	2	2	2	2	2	2	2	2	2	2
Arrival type, AT	3	3	3	3	3	3	3	3	3	3	3	3
Approach pedestrian volume (p/h)	20			20			20			20		
Approach bicycle volume (bic/h)	0			0			0			0		
Left/right parking (Y or N)	N	/	N	N	/	N	N	/	N	N	/	N

Signal Phasing Plan

L: LT T: TH R: RT P: Peds

	Phase 1	Phase 2	Phase 3	Phase 4	Phase 5	Phase 6	Phase 7	Phase 8
EB		LTR						
WB		LTR						
NB	LTR							
SB	LTR							
Green (s)	30	30						
Yellow + All red (s)	5	5						

Cycle (s): 70 | Lost time per cycle (s): 10 | Critical v/c Ratio: .785

Intersection Performance

	EB			WB			NB			SB		
Lane group configuration		LTR			LTR			LTR			LTR	
No. of lanes		1			1			1			1	
Flow rate (veh/h)		469			522			553			392	
Capacity (veh/h)		658			758			646			567	
Adjusted saturation flow (veh/h)		1536			1768			1507			1322	
v/c ratio		.713			.689			.856			.691	
g/C ratio		.429			.429			.429			.429	
Average back of queue (veh)		8.6			9.3			12			7.1	
Uniform delay (s)		16.5			16.2			18.1			16.2	
Incremental delay (s)		3.7			2.7			11			3.6	
Initial queue delay (s)		0			0			0			0	
Delay (s)		20.2			18.9			29.1			19.8	
LOS		C			B			C			B	
Approach delay (s)/LOS	20.2	/	C	18.9	/	B	29.1	/	C	19.8	/	B
Intersection delay (s)/ LOS	22.3			/			C					

CHAPTER 16 - OPERATIONAL ANALYSIS - SUMMARY WORKSHEET

General Information

Analyst: WY
Agency or Company:
Analysis Period/Year: 2005 TOT AM
Comment: TOTAL W/PROJECT AM

Site Information

Jurisdiction/Date: 2/13/04
EB/WB Street: E PUAINAKO
NB/SB Street: KINOOLE

Intersection Data

Area type: Other Analysis period: .25 h Signal type: Actuated-Field % Back of queue: 70

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Volume (veh/h)	75	365	20	15	380	70	110	395	20	80	145	100
RTOR volume (veh/h)			0			0			0			0
Peak-hour factor	.98	.98	.98	.89	.89	.89	.94	.94	.94	.83	.83	.83
Heavy vehicles (%)	2	2	2	2	2	2	2	2	2	2	2	2
Start-up lost time, l_1 (s)	2	2	2	2	2	2	2	2	2	2	2	2
Extension of effective green, e (s)	2	2	2	2	2	2	2	2	2	2	2	2
Arrival type, AT	3	3	3	3	3	3	3	3	3	3	3	3
Approach pedestrian volume (p/h)	20			20			20			20		
Approach bicycle volume (bic/h)	0			0			0			0		
Left/right parking (Y or N)	N	/	N	N	/	N	N	/	N	N	/	N

Signal Phasing Plan

L: LT T: TH R: RT P: Peds

	Phase 1	Phase 2	Phase 3	Phase 4	Phase 5	Phase 6	Phase 7	Phase 8
EB		LTR						
WB		LTR						
NB	LTR							
SB	LTR							
Green (s)	30	30						
Yellow + All red (s)	5	5						

Cycle (s): 70 Lost time per cycle (s): 10 Critical v/c Ratio: .788

Intersection Performance

	EB			WB			NB			SB		
Lane group configuration		LTR			LTR			LTR			LTR	
No. of lanes		1			1			1			1	
Flow rate (veh/h)		469			522			559			392	
Capacity (veh/h)		658			758			647			565	
Adjusted saturation flow (veh/h)		1536			1768			1510			1319	
v/c ratio		.713			.689			.863			.693	
g/C ratio		.429			.429			.429			.429	
Average back of queue (veh)		8.6			9.3			12.2			7.1	
Uniform delay (s)		16.5			16.2			18.1			16.3	
Incremental delay (s)		3.7			2.7			11.6			3.6	
Initial queue delay (s)		0			0			0			0	
Delay (s)		20.2			18.9			29.7			19.9	
LOS		C			B			C			B	
Approach delay (s)/LOS	20.2	/	C	18.9	/	B	29.7	/	C	19.9	/	B
Intersection delay (s)/ LOS	22.5		/	C								

CHAPTER 16 - OPERATIONAL ANALYSIS - SUMMARY WORKSHEET

General Information

Analyst	WY	Jurisdiction/Date	2/13/04
Agency or Company		EB/WB Street	E PUAINAKO
Analysis Period/Year	2004 PM	NB/SB Street	KINOOLE
Comment	EXISTING PM		

Intersection Data

Area type: Other | Analysis period: .25 h | Signal type: Actuated-Field | % Back of queue: 70

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Volume (veh/h)	40	350	25	55	425	50	10	135	40	175	260	75
RTOR volume (veh/h)			0			0			0			0
Peak-hour factor	.98	.98	.98	.89	.89	.89	.94	.94	.94	.83	.83	.83
Heavy vehicles (%)	2	2	2	2	2	2	2	2	2	2	2	2
Start-up lost time, l_1 (s)	2	2	2	2	2	2	2	2	2	2	2	2
Extension of effective green, e (s)	2	2	2	2	2	2	2	2	2	2	2	2
Arrival type, AT	3	3	3	3	3	3	3	3	3	3	3	3
Approach pedestrian volume (p/h)	20			20			20			20		
Approach bicycle volume (bic/h)	0			0			0			0		
Left/right parking (Y or N)	N	/	N	N	/	N	N	/	N	N	/	N

Signal Phasing Plan

L: LT T: TH R: RT P: Peds

	Phase 1	Phase 2	Phase 3	Phase 4	Phase 5	Phase 6	Phase 7	Phase 8
EB		LTR						
WB		LTR						
NB	LTR							
SB	LTR							
Green (s)	30	30						
Yellow + All red (s)	5	5						

Cycle (s): 70 | Lost time per cycle (s): 10 | Critical v/c Ratio: .897

Intersection Performance

	EB			WB			NB			SB		
Lane group configuration		LTR			LTR			LTR			LTR	
No. of lanes		1			1			1			1	
Flow rate (veh/h)		423			596			197			614	
Capacity (veh/h)		719			721			738			634	
Adjusted saturation flow (veh/h)		1677			1682			1723			1480	
v/c ratio		.589			.826			.267			.969	
g/C ratio		.429			.429			.429			.429	
Average back of queue (veh)		7			12.3			2.6			16.5	
Uniform delay (s)		15.3			17.7			12.9			19.5	
Incremental delay (s)		1.3			7.8			0			28	
Initial queue delay (s)		0			0			0			0	
Delay (s)		16.6			25.5			12.9			47.5	
LOS		B			C			B			D	
Approach delay (s)/LOS	16.6	/	B	25.5	/	C	12.9	/	B	47.5	/	D
Intersection delay (s)/ LOS	29.5		/		C							

CHAPTER 16 - OPERATIONAL ANALYSIS - SUMMARY WORKSHEET

General Information

Analyst: WY
Agency or Company:
Analysis Period/Year: 2005 AMB PM
Comment: AMBIENT PM

Site Information

Jurisdiction/Date: 2/13/04
EB/WB Street: E PUAINAKO
NB/SB Street: KINOOLE

Intersection Data

Area type: Other | Analysis period: .25 h | Signal type: Actuated-Field | % Back of queue: 70

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Volume (veh/h)	40	355	25	55	430	50	10	135	40	180	260	75
RTOR volume (veh/h)			0			0			0			0
Peak-hour factor	.98	.98	.98	.89	.89	.89	.94	.94	.94	.83	.83	.83
Heavy vehicles (%)	2	2	2	2	2	2	2	2	2	2	2	2
Start-up lost time, l_1 (s)	2	2	2	2	2	2	2	2	2	2	2	2
Extension of effective green, e (s)	2	2	2	2	2	2	2	2	2	2	2	2
Arrival type, AT	3	3	3	3	3	3	3	3	3	3	3	3
Approach pedestrian volume (p/h)	20			20			20			20		
Approach bicycle volume (bic/h)	0			0			0			0		
Left/right parking (Y or N)	N	/	N	N	/	N	N	/	N	N	/	N

Signal Phasing Plan

L: LT T: TH R: RT P: Peds

	Phase 1	Phase 2	Phase 3	Phase 4	Phase 5	Phase 6	Phase 7	Phase 8
EB		LTR						
WB		LTR						
NB	LTR							
SB	LTR							
Green (s)	30	30						
Yellow + All red (s)	5	5						

Cycle (s): 70 | Lost time per cycle (s): 10 | Critical v/c Ratio: .907

Intersection Performance

	EB			WB			NB			SB		
Lane group configuration		LTR			LTR			LTR			LTR	
No. of lanes		1			1			1			1	
Flow rate (veh/h)		429			601			197			620	
Capacity (veh/h)		719			721			738			632	
Adjusted saturation flow (veh/h)		1678			1683			1722			1475	
v/c ratio		.596			.833			.267			.981	
g/C ratio		.429			.429			.429			.429	
Average back of queue (veh)		7.1			12.5			2.6			17.1	
Uniform delay (s)		15.3			17.8			12.9			19.7	
Incremental delay (s)		1.4			8.3			0			31	
Initial queue delay (s)		0			0			0			0	
Delay (s)		16.7			26.1			12.9			50.7	
LOS		B			C			B			D	
Approach delay (s)/LOS	16.7	/	B	26.1	/	C	12.9	/	B	50.7	/	D
Intersection delay (s)/ LOS	30.8			/			C					

CHAPTER 16 - OPERATIONAL ANALYSIS - SUMMARY WORKSHEET

General Information

Analyst: WY
Agency or Company:
Analysis Period/Year: 2005 TOT PM
Comment: TOTAL W/PROJECT PM

Site Information

Jurisdiction/Date: 2/13/04
EB/WB Street: E PUAINAKO
NB/SB Street: KINOOLE

Intersection Data

Area type: Other Analysis period: .25 h Signal type: Actuated-Field % Back of queue: 70

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Volume (veh/h)	40	355	25	55	430	50	10	135	40	180	260	75
RTOR volume (veh/h)			0			0			0			0
Peak-hour factor	.98	.98	.98	.89	.89	.89	.94	.94	.94	.83	.83	.83
Heavy vehicles (%)	2	2	2	2	2	2	2	2	2	2	2	2
Start-up lost time, l_1 (s)	2	2	2	2	2	2	2	2	2	2	2	2
Extension of effective green, e (s)	2	2	2	2	2	2	2	2	2	2	2	2
Arrival type, AT	3	3	3	3	3	3	3	3	3	3	3	3
Approach pedestrian volume (p/h)	20			20			20			20		
Approach bicycle volume (bic/h)	0			0			0			0		
Left/right parking (Y or N)	N	/	N	N	/	N	N	/	N	N	/	N

Signal Phasing Plan

L: LT T: TH R: RT P: Peds

	Phase 1	Phase 2	Phase 3	Phase 4	Phase 5	Phase 6	Phase 7	Phase 8
EB		LTR						
WB		LTR						
NB	LTR							
SB	LTR							
Green (s)	30	30						
Yellow + All red (s)	5	5						

Cycle (s): 70 Lost time per cycle (s): 10 Critical v/c Ratio: .907

Intersection Performance

	EB			WB			NB			SB		
Lane group configuration		LTR			LTR			LTR			LTR	
No. of lanes		1			1			1			1	
Flow rate (veh/h)		429			601			197			620	
Capacity (veh/h)		719			721			738			632	
Adjusted saturation flow (veh/h)		1678			1683			1722			1475	
v/c ratio		.596			.833			.267			.981	
g/C ratio		.429			.429			.429			.429	
Average back of queue (veh)		7.1			12.5			2.6			17.1	
Uniform delay (s)		15.3			17.8			12.9			19.7	
Incremental delay (s)		1.4			8.3			0			31	
Initial queue delay (s)		0			0			0			0	
Delay (s)		16.7			26.1			12.9			50.7	
LOS		B			C			B			D	
Approach delay (s)/LOS	16.7	/	B	26.1	/	C	12.9	/	B	50.7	/	D
Intersection delay (s)/ LOS	30.8			/			C					

UNSIGNALIZED INTERSECTION
LEVEL OF SERVICE (LOS) CALCULATIONS

CHAPTER 17 - TWSC - UNSIGNALIZED INTERSECTIONS WORKSHEET

Analysis Summary

General Information

Analyst	WY
Agency or Company	
Analysis Period/Year	2004 EX AM
Comment	EXISTING AM

Site Information

Jurisdiction/Date	2/12/04
Major Street	KINOOLE
Minor Street	W KAHAOPEA

Input Data

Lane Configuration	NB			SB			WB			EB		
Lane 1 (curb)	LTR			LTR			LTR			LTR		
Lane 2												
Lane 3												
	NB			SB			WB			EB		
Movement	1 (LT)	2 (TH)	3 (RT)	4 (LT)	5 (TH)	6 (RT)	7 (LT)	8 (TH)	9 (RT)	10 (LT)	11 (TH)	12 (RT)
Volume (veh/h)	45	395	10	15	145	5	10	15	15	25	15	60
PHF	.93	.93	.93	.98	.98	.98	.9	.9	.9	.9	.9	.9
Proportion of heavy vehicles, HV	2	2	2	2	2	2	2	2	2	2	2	2
Flow rate	48	425	11	15	148	5	11	17	17	28	17	67
Flare storage (# of vehs)									0			0
Median storage (# of vehs)							0			0		

Signal upstream of Movement 2 _____ ft Movement 5 _____ ft

Length of study period (h) .25

Output Data

	Lane	Movement	Flow Rate (veh/h)	Capacity (veh/h)	v/c	Queue Length (veh)	Control Delay (s)	LOS	Approach Delay and LOS
WB	1	LTR	45	384	.117	<1	15.6	C	15.6
	2								
	3								C
EB	1	LTR	112	516	.217	1	13.9	B	13.9
	2								
	3								B
		①	48	1428	.034	<1	7.6	A	
		④	15	1124	.014	<1	8.2	A	

CHAPTER 17 - TWSC - UNSIGNALIZED INTERSECTIONS WORKSHEET

Analysis Summary

General Information

Analyst	WY
Agency or Company	
Analysis Period/Year	2005 AMB AM
Comment	AMBIENT AM

Site Information

Jurisdiction/Date	2/13/04
Major Street	KINOOLE
Minor Street	W KAHAOPEA

Input Data

Lane Configuration	NB			SB			WB			EB		
Lane 1 (curb)	LTR			LTR			LTR			LTR		
Lane 2												
Lane 3												
	NB			SB			WB			EB		
Movement	1 (LT)	2 (TH)	3 (RT)	4 (LT)	5 (TH)	6 (RT)	7 (LT)	8 (TH)	9 (RT)	10 (LT)	11 (TH)	12 (RT)
Volume (veh/h)	45	400	10	15	145	5	10	15	15	25	15	60
PHF	.93	.93	.93	.98	.98	.98	.9	.9	.9	.9	.9	.9
Proportion of heavy vehicles, HV	2	2	2	2	2	2	2	2	2	2	2	2
Flow rate	48	430	11	15	148	5	11	17	17	28	17	67
Flare storage (# of vehs)									0			0
Median storage (# of vehs)							0			0		

Signal upstream of Movement 2 _____ ft Movement 5 _____ ft

Length of study period (h) .25

Output Data

	Lane	Movement	Flow Rate (veh/h)	Capacity (veh/h)	v/c	Queue Length (veh)	Control Delay (s)	LOS	Approach Delay and LOS
WB	1	LTR	45	381	.118	<1	15.7	C	15.7
	2								C
	3								
EB	1	LTR	112	513	.218	1	14	B	14
	2								B
	3								
		①	48	1428	.034	<1	7.6	A	
		④	15	1119	.014	<1	8.3	A	

CHAPTER 17 - TWSC - UNSIGNALIZED INTERSECTIONS WORKSHEET

Analysis Summary

General Information

Analyst	WY
Agency or Company	
Analysis Period/Year	2005 TOT AM
Comment	TOTAL W/PROJECT AM

Site Information

Jurisdiction/Date	2/13/04
Major Street	KINOOLE
Minor Street	W KAHAOPEA

Input Data

Lane Configuration	NB			SB			WB			EB		
Lane 1 (curb)	LTR			LTR			LTR			LTR		
Lane 2												
Lane 3												
	NB			SB			WB			EB		
Movement	1 (LT)	2 (TH)	3 (RT)	4 (LT)	5 (TH)	6 (RT)	7 (LT)	8 (TH)	9 (RT)	10 (LT)	11 (TH)	12 (RT)
Volume (veh/h)	50	400	10	15	145	5	10	15	15	30	15	60
PHF	.93	.93	.93	.98	.98	.98	.9	.9	.9	.9	.9	.9
Proportion of heavy vehicles, HV	2	2	2	2	2	2	2	2	2	2	2	2
Flow rate	54	430	11	15	148	5	11	17	17	33	17	67
Flare storage (# of vehs)									0			0
Median storage (# of vehs)							0			0		

Signal upstream of Movement 2 _____ ft Movement 5 _____ ft

Length of study period (h) .25

Output Data

	Lane	Movement	Flow Rate (veh/h)	Capacity (veh/h)	v/c	Queue Length (veh)	Control Delay (s)	LOS	Approach Delay and LOS
WB	1	LTR	45	376	.12	<1	15.9	C	15.9
	2								
	3								C
EB	1	LTR	117	491	.238	1	14.6	B	14.6
	2								
	3								B
		①	54	1428	.038	<1	7.6	A	
		④	15	1119	.014	<1	8.3	A	

CHAPTER 17 - TWSC - UNSIGNALIZED INTERSECTIONS WORKSHEET

Analysis Summary

General Information

Analyst	WY	Jurisdiction/Date	2/12/04
Agency or Company		Major Street	KINOOLE
Analysis Period/Year	2004 EX PM	Minor Street	W KAHAOPEA
Comment	EXISTING PM		

Site Information

Input Data

Lane Configuration	NB			SB			WB			EB		
Lane 1 (curb)	LTR			LTR			LTR			LTR		
Lane 2												
Lane 3												
	NB			SB			WB			EB		
Movement	1 (LT)	2 (TH)	3 (RT)	4 (LT)	5 (TH)	6 (RT)	7 (LT)	8 (TH)	9 (RT)	10 (LT)	11 (TH)	12 (RT)
Volume (veh/h)	3	175	20	40	305	5	85	10	30	3	10	5
PHF	.88	.88	.88	.98	.98	.98	.9	.9	.9	.9	.9	.9
Proportion of heavy vehicles, HV	2	2	2	2	2	2	2	2	2	2	2	2
Flow rate	3	199	23	41	311	5	94	11	33	3	11	6
Flare storage (# of vehs)									0			0
Median storage (# of vehs)							0			0		

Signal upstream of Movement 2 _____ ft Movement 5 _____ ft

Length of study period (h) .25

Output Data

	Lane	Movement	Flow Rate (veh/h)	Capacity (veh/h)	v/c	Queue Length (veh)	Control Delay (s)	LOS	Approach Delay and LOS
WB	1	LTR	45	482	.093	<1	13.2	B	13.2
	2								
	3								B
EB	1	LTR	51	390	.131	<1	15.6	C	15.6
	2								
	3								C
		①	3	1244	.003	<1	7.9	A	
		④	41	1347	.03	<1	7.8	A	

CHAPTER 17 - TWSC - UNSIGNALIZED INTERSECTIONS WORKSHEET

Analysis Summary

General Information

Analyst	WY
Agency or Company	
Analysis Period/Year	2005 AM PM
Comment	AMBIENT PM

Site Information

Jurisdiction/Date	2/13/04
Major Street	KINOOLE
Minor Street	W KAHAOPEA

Input Data

Lane Configuration	NB			SB			WB			EB		
Lane 1 (curb)	LTR			LTR			LTR			LTR		
Lane 2												
Lane 3												
	NB			SB			WB			EB		
Movement	1 (LT)	2 (TH)	3 (RT)	4 (LT)	5 (TH)	6 (RT)	7 (LT)	8 (TH)	9 (RT)	10 (LT)	11 (TH)	12 (RT)
Volume (veh/h)	3	175	20	40	305	5	85	10	30	3	10	5
PHF	.88	.88	.88	.98	.98	.98	.9	.9	.9	.9	.9	.9
Proportion of heavy vehicles, HV	2	2	2	2	2	2	2	2	2	2	2	2
Flow rate	3	199	23	41	311	5	94	11	33	3	11	6
Flare storage (# of vehs)									0			0
Median storage (# of vehs)							0			0		

Signal upstream of Movement 2 _____ ft Movement 5 _____ ft

Length of study period (h) .25

Output Data

	Lane	Movement	Flow Rate (veh/h)	Capacity (veh/h)	v/c	Queue Length (veh)	Control Delay (s)	LOS	Approach Delay and LOS
WB	1	LTR	45	482	.093	<1	13.2	B	13.2
	2								
	3								B
EB	1	LTR	51	390	.131	<1	15.6	C	15.6
	2								
	3								C
		①	3	1244	.003	<1	7.9	A	
		④	41	1347	.03	<1	7.8	A	

CHAPTER 17 - TWSC - UNSIGNALIZED INTERSECTIONS WORKSHEET

Analysis Summary

General Information

Analyst	WY
Agency or Company	
Analysis Period/Year	2005 TOT PM
Comment	TOTAL W/PROJECT PM

Site Information

Jurisdiction/Date	2/13/04
Major Street	KINOOLE
Minor Street	W KAHAOPEA

Input Data

Lane Configuration	NB			SB			WB			EB		
Lane 1 (curb)	LTR			LTR			LTR			LTR		
Lane 2												
Lane 3												
	NB			SB			WB			EB		
Movement	1 (LT)	2 (TH)	3 (RT)	4 (LT)	5 (TH)	6 (RT)	7 (LT)	8 (TH)	9 (RT)	10 (LT)	11 (TH)	12 (RT)
Volume (veh/h)	4	175	20	40	305	5	85	10	30	3	15	10
PHF	.88	.88	.88	.98	.98	.98	.9	.9	.9	.9	.9	.9
Proportion of heavy vehicles, HV	2	2	2	2	2	2	2	2	2	2	2	2
Flow rate	5	199	23	41	311	5	94	11	33	3	17	11
Flare storage (# of vehs)									0			0
Median storage (# of vehs)							0			0		

Signal upstream of Movement 2 _____ ft Movement 5 _____ ft

Length of study period (h) .25

Output Data

	Lane	Movement	Flow Rate (veh/h)	Capacity (veh/h)	v/c	Queue Length (veh)	Control Delay (s)	LOS	Approach Delay and LOS
WB	1	LTR	45	477	.094	<1	13.3	B	13.3
	2								
	3								B
EB	1	LTR	56	405	.138	<1	15.3	C	15.3
	2								
	3								C
		①	5	1244	.004	<1	7.9	A	
		④	41	1347	.03	<1	7.8	A	